Arab American University

Faculty of Graduate Studies

The Strategies of Food Security in Palestine

Wheat Strategic Reserve as a Case

By
Yahya Nashat Abed Alazeez

Supervisor
Dr. Ahmad Sadaqa

This thesis was submitted in partial fulfillment of the requirements for the Master`s degree in Strategic Planning and Fundraising

December / 2019

The Strategies of Food Security in Palestine

Wheat Strategic Reserve as a Case

By
Yahya Nashat Abed Alazeez

This thesis was defended successfully on 14 DEC 2019 and approved by:

Committee members	Signature
1. Dr. Ahmad Sadaqa	.....
2. Dr. Mohammad Abu Sharbeh	.....
3. Dr. Abdelrahman Alamarah	.....

Declaration

I hereby declare that this master thesis has been written only by myself without any assistance of any third party and describes my own work unless otherwise acknowledged in the text of the thesis.

All references, verbatim extracts and information source are quoted and cited properly. Thus, I confirm that no source has been used in this thesis other than those indicated in the thesis itself.

This master thesis has not been accepted in any other previous application, in whole or in part for any degree.

Student's Name: Yahya Nashat Yahya Abed Alazeez

Student ID: 201612929

Signature:

Date: DEC 14, 2019

Dedication

I dedicate this thesis

To those whose love runs in my veins, my loving father and mother.

To the white dove who dwells in my heart and soul, my dear wife.

To those who pushed me, my angelic children: Shad, Hala, Aya and Nasha'at.

To those pearls who have big hearts, my sisters.

To my brothers and friends who supported me.

To my teachers who taught me how to write and lightened up my path for learning.

To my people and country I love and adore.

ACKNOWLEDGEMENT

First and foremost, I praise and thanks to God, for His blessings throughout my research work to complete the research successfully.

I would like to express my deep and sincere gratitude to my research supervisor, Dr. Ahmad Sadaqa, for giving me the opportunity to do research and providing invaluable guidance throughout this research. His dynamism, vision, sincerity, and motivation have deeply inspired me. He has taught me the methodology to carry out the research and to present the research works as clearly as possible. It was a great privilege and honor to work and study under his guidance. I am extremely grateful for what he has offered me. I would also like to thank him for his friendship and empathy.

I am extremely grateful to my parents for their love, prayers, caring and sacrifices for educating and preparing me for my future. I am very much thankful to my wife, my daughters and my son for their love, understanding, prayers and continuing support to complete this research work. Also, I express my thanks to my sisters for their support and valuable prayers. My Special thanks go to my friends for their keen interest shown to complete this thesis successfully.

Finally, my thanks go to all the people who have supported me to complete the research work directly or indirectly

Abstract

The study clarifies the importance of wheat strategic reserve in Palestine food security, wheat, the key resource of food security, was selected as one of the strategic reserve components. As a matter of fact, Palestine – West Bank and Gaza Strip - suffers from a shortage of wheat strategic reserve which must be used to face any potential crises. The study aims at identifying the optimal wheat strategic reserve volume and proper places needed for this to ensure food security. The study adopted descriptive analytical method in explaining research problem through estimating the optimal wheat strategic reserve volume based on the data collected and analyzed from several sources; The method of interviewing with the concerned parties and persons was applied taking into consideration the reality of Palestinian agriculture and the obstacles that may face wheat strategic reserves, and considering the experience of some surrounding countries with this regard.

The study considered four methods for distributing wheat silos and warehouses to the proposed areas applying these scenarios; distribution by production; population density and consumption rate. Three methods were found to estimate strategic wheat reserve volume, 17% of annual consumption; estimated scenarios (17%, 20%, 25%, 30%, and 35%) of annual consumption and (2 to 4) times of annual consumption. The minimum six- month wheat strategic reserve volume is around (53,813) tons. The last scenario "decentralization of the silo, central warehouse, and sub-warehouses" is the best one that can be applied.

The conclusions emphasize that Palestine has no wheat strategic reserve and its wheat local production is insufficient to support the strategic reserve and face crises; Palestine basically relies on imports from abroad due to an absence of effective policies to grow wheat instead; there are political, financial, technical and logistical constraints facing wheat silos construction; and a lack of studies on wheat strategic reserve.

Recommendations concentrate on encouraging the government in cooperation with non-governmental institutions to invest in wheat silo projects, increasing agricultural areas to grow wheat, increasing wheat production to reduce dependence on imports from abroad through following a policy of encouraging farmers to do so; overcoming all obstacles that may face silos construction, and conducting more studies on agricultural development.

Keywords:

Food Gap; Food Security; Strategic Reserves; Wheat Silos; Wheat.

Abbreviations

AOAD	Arab Organization for Agricultural Development
FAO	Food and Agriculture Organization
G. S	Gaza Strip
GDP	Gross Domestic Product
IFC	International finance Corporation
MAS	Palestine Economic Policy Research Institute
MMT	Million Metric Tonnes
MNE	Ministry of National Economy
MOA	Ministry of Agriculture
PCBS	Palestinian Central Bureau of Statistics
PHG	Palestinian Hydrology Group
PNA	Palestinian National Authority
UNRWA	The United Nations Relief and Works Agency for Palestine Refugees
USDA	United States Department of Agriculture
W.B	West Bank
WAFA	Palestinian News and Information Agency
WFP	World Food Programme
WFS	World Food Summit

Table of Contents

Tables

Figures

Chapter One: Introduction

1.1. Background

Cereals are considered the key food groups all over the world in terms of area used for cultivation and nutritional value; food grains production, storage, industry and trade are among main issues of a local and international food security to take into account. world's countries, particularly Arab ones in, always face difficulties in providing food grains, especially after the late of global financial crisis emerged which was characterized by two main features: the persistent rise in the food grains prices and a decline in world stocks volume leading them to face a severe food crisis and a threat of complicated situations because of problems of food shortage caused by successive non-seasonal droughts in major grain-producing areas, and production inputs high prices. Arab countries basically depend on imports meeting food commodities needs, especially wheat whose prices are notably increasing.

According to commodity stock policies, many of Arab countries have tended to provide a strategic reserve of basic food commodities for at least (3 to 6) months, which is used to balance high prices when low supply exists, food commodities stock movement is an indicator reflecting food security situation in terms of commodities supply and countries' ability to provide. (AOAD, 2009)

Realizing the fact that most Arab countries depend on imports to meet their cereal consumption needs, it is necessary to develop strategic reserve policies. Wheat is one of the most important crops in Palestine. Therefore, most Palestinians consider wheat a food main source which is consumed in bread, pasta, noodles, and other forms. Considering the

high demand on wheat, Palestinian voices have called for the need to support cultivating this product in a season facing various challenges, the most important of which is Israeli occupation, these voices come at a time when wheat production is threatened by many factors leading it to decline to less than (10%) comparing to the consumption volume. Palestine produces about (40,000 tons) of wheat and consumes more than (360,000 tons); it produces less than (10%) of what it consumes (Besharat, 2019).

Wheat strategic reserve must be built up to address all potential crises facing the country. The plans should be necessarily formulated in order to determine a proper strategic reserve volume to be distributed to all governorates achieving the highest degree of food security.

1.2. Significant of Study

1.2.1 The Overall Objective of the Study

The overall objective of the research is to develop and increase awareness of food security in general and grain reserves in particular due to the high probability of political and natural disasters in Palestine.

1.2.2 Research Objectives

- Adopting the best-suited technology for preservation of food grain quality, quantity and nutritional level.
- Developing Silos complexes of high reserve capacity.
- Facilitating access to domestic silos to ensure household level food security
- Improving food security standards in quality, quantity, and price.
- Providing spatial distributions of national wheat reserves to ensure accessibility during and after crises.

- Providing the Palestinian governorates with wheat throughout the year.
- Providing the community with a strategic local reserve and sustainable supplies of wheat.
- Reducing losses from traditional storage methods.
- Reducing dependence on Israeli mills.

1.3. Problem Statement

After global crisis emergence (2007-2008) causing food commodities high price and food reserve decline, it is expected that world countries including Arab ones face a new global reality; they are to be prepared for any potential crises considering global food reserve changes affecting the economy and food security (Ismail, 2010). The state of Palestine lack's food strategic reserve, especially wheat, and most of the existing wheat is a small percentage of domestic production and the rest of quantity is imported from aboard, which make the country vulnerable to food insecurity as a result of the difficult political and economic situation imposed by Israel on the Palestinian areas. Therefore, it is necessary to build a food strategic reserve to face difficult conditions affecting countries, particularly, Palestine which has no wheat strategic reserve. The study attempts to answer the following questions:

1) What is wheat necessary quantities ensuring food security in Palestine for any potential crises?
2) What is the most efficient spatial distribution for Palestine wheat strategic reserve?

1.4. Methodology

This study has both quantitative and qualitative methods when attempting to determine wheat strategic reserve impact on Palestinian food security, explain mechanisms of managing wheat strategic reserve, and select geographical areas for building silos considering their total capacity of storing wheat for potential crises. It reviews some of countries experiences which are good examples for Palestine to take advantage. The study uses a set of data sources to help analyze the current situation and the ability to answer research question, including:

- **Primary sources**: The researcher made an unstructured interview with decision makers, experts, and concerned institutions. The interviews included officials from the Ministry of Agriculture, Ministry of Economy, Ministry of Local Government, Ministry of Finance, agricultural federations, chambers of commerce and farmers.
- **Secondary Sources**: books, scientific journals, studies and previous research.

1.5. Study Scope

- **Spatial:** Since the study concerns the Palestinian State, its spatial boundaries will be the West Bank and the Gaza Strip.
- **Time:** years from 1994 to 2030, conducting study in the first semester of the year 2018/2019

1.6 Conceptual Framework

1.6.1 Silo

Building is equipped to store, load and unload grain before being sold or used. It is usually found in farms, mills, railway stations and ports. These are the most important types of grain stores in modern times **(Beedle, P. L, 2001)**. **Also, Yu Xie (2015)** defined it as "a private building on a farm used for grain storage. Based on the above two definitions, silos can be defined as buildings of different geometric shapes being designed and constructed for storing grain; they are usually in places where grain is easily consumed, grown or transported.

1.6.2 Storage

Saadia, in 2014, defined storage as all materials of different types physically exist in warehouses, having future benefits for an economic unit, being used in production processes or for community members direct consumption **(Saadia Mazal, Ibtahal Naji, Iman Mohamed, 2014). Bougara (2007)** also defined it as objects waiting for use (consumption) at specific moment and location.

1.6.3 Strategic Stock

Adam (2016) defines strategic stocks as indefinite food commodities being necessary for citizen's life as a common food pattern, the quantities of which are kept under governments' direct supervision. They are used in certain situations such as: natural disasters, wars, prices sudden rise, change in global supply and demand on these goods if they are not locally produced. This stock periodically demands quantities which are

equivalent to those being taken from. Stock quantity and quality are determined upon countries economic circumstances and technical capabilities. **SAB (2018)** defines strategic stocks as a type of long-term storage (for a year or more) and is to save quantities of goods for environmental, political or natural fluctuations or for a nature of market fluctuations. Therefore, the strategic stocks, from the researcher's point of view, are basic foodstuffs which are supervised, managed, and stored by a state for more than a year to face emergency cases.

1.6.4 Strategic Reserve

This strategic reserve is usually used to meet starvation or other urgent or exceptional relief requirements **(CRS Report for Congress, 2005)**. The strategic grain reserve is the national cereal stocks - including wheat - that are kept, through government programs, to meet future domestic and international needs **(Womach, Jasper, 2005).** It is noted that the two terms (strategic stock and strategic reserve) are identical synonyms when explaining food storage purpose, the time and goals.

1.6.5 Food Security

Barakat (2019) explained that food security focuses on food availability and access physically, socially and economically, whether it is a locally produced, imported or a manufactured, **Mounir (2018)** defined food security as "All society members at all times have access to basic food which enables them to live in health and activity". It is also intended to secure food in cooperation with others **(Porter, 2017)**. **Food and Agriculture Organization of the United Nations-FAO, (2017)** defined food security as a factual situation when all people, at all times, have access to adequate food at a socioeconomic

level to meet their food nutritious and safe needs for an active and healthy life. Based on this definition, four dimensions of food security can be identified: food availability, economic and physical access to food, food use and stability over time**. FAO, IFAD, UNICEF, WFP and WHO, (2017) Palestinian Economic Policy Research Institute (MAS, 2015)** also adopted World Food Summit recommendations in Rome in 1996 as "All people at all times have access to adequate, healthy and useful food to meet their nutritional needs in order to have a healthy and active life" **(MAS, 2015)**. Therefore, the concept of food security is based on four main factors: food availability, access to food at any time and everywhere, food stability and finally food use.

1.6.6 Food Gap

It is the difference between domestic production and the net imports of various food commodities, when demand growth rates are higher than production growth ones, the consumption rate is about double the production rate lead to widen food gap and decrease self-adequacy rates. **Jabare and Ratol, (2016)**, defines the food gap as "the quantitative expression of a food crisis resulting from inadequate local production capacity of providing food necessary quantity for needs". The food gap causes are common and varied and the role of these causes differ according to country social structure, population density and distribution between rural and urban areas, scarcity of natural and financial resources, the inefficiency of administrative country structures, and the lack of concern in agriculture within development plans. These causes affect production, productivity, and available capacities utilization **(Abu helal, 2011).**

1.6.7 Wheat

Wheat is a kind of Nigella plants producing grains, these grains are the main food for many of world people, only corn and rice compete to share human food on earth. **P. R. Shewry (2009)** said that wheat is a significant grain crop with over (731) million tons being annually collected, in 2017, the total world harvest was about (749) million tons compared with (740) million tons of rice and (106) million tons of maize **(FAOSTAT,2018).** However, wheat is unique in agricultural range, from (67^{o} north) in Russia and Scandinavia countries to (45^{o} South) in Argentina, including elevated regions in the tropics and sub-tropics. It is also unique in its range of variety and the extent to which it has become root in many societies' culture and religion **(P. R. Shewry, 2009).**

1.6.8 Logistics

It is an art and science of controlling and managing goods stream, energy, information and other resources, such as service and even human products, from the production area to the consumption one. It is difficult to fulfill any global trade (import/export) or transfer raw materials, products, and manufactures without professional logistic support which includes information gathering, transportation, stock, storage, physical processing, and packaging. **(Lummus, 2001)**

1.6.8 Self-Sufficiency

Means that a country depends for its own potential to obtain consumption and investment goods to reduce the level of political and economic dependence on other countries leading to achieve a higher degree of independence which enhances its position in world system **(Marwan Rajab, 2014).**

According to Mansour (2002), self-sufficiency is a society ability of achieving a state of depending on its own resources and producing all of its food local needs. In fact, it is not enough for a country to achieve self-sufficiency, but it should be linked to society food level. Self-sufficiency is largely based on balance needs of purchasing power rather than the health needs and the available domestic production; if national income rises above its minimum levels or the community purchasing power increases, demand on food will increase; if agriculture does not meet this demand, it will lead to imbalance, and it will need to import from abroad and to be far away from achieving self-sufficiency **(Mansour, Ahmed ,2002).**

1.7 Literature Review

1.7.1 Food Security

According to **FAO (1996)** definition, "food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their needs and food preferences for an active and healthy life".

This definition, as explained by **Schmidhuber, J., & Tubiello (2007)**, included four food supply dimensions: availability, stability, access, and utilization. Food availability (elements related to production, distribution and exchange); food access (elements related to affordability, allocation and preference) and food utilization (elements related to nutritional value, social value and food safety **(Gregory, Ingram & M. Brklacich, 2005)**

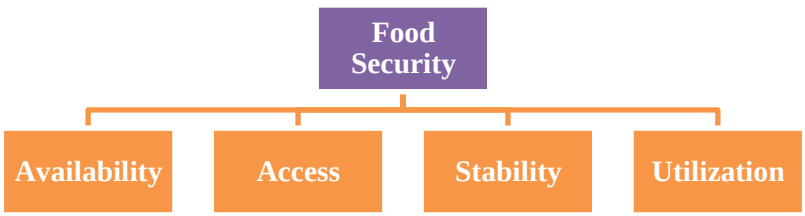


Figure (1-1): The four key dimensions of food supply

Recently, as climate change issues have caught great attention from the world, food stability is also considered to be an important component of food security **(Wenbin, 2012)**. The four dimensions of defining global food security apply to the Palestinian situation; according to the availability of food, there are two available food sources in Palestinian markets: local agricultural production and imports, which have become more important in meeting Palestinian food needs lately. The policy response to challenge of food insecurity and poverty has been extremely complicated in Palestine, despite the growing demand on addressing food insecurity and poverty through a development approach, implementation on the ground is being directed through relief channels manipulating food insecurity rather than eliminating its causes. The food security deterioration, high poverty, and unemployment have necessitated intervention of many local and international parties to make efforts address persistent poverty and food insecurity. Food security, in line with the national agriculture strategy, is one of the priorities that need a number of interventions to deal with; the national strategy for economy development and agricultural production. The national strategy considers food security as part of its priorities for protecting social development and supporting poor families; Palestinian society that is resilient, productive, and creative to ensure its members welfare **(MAS, 2017).**

Wheat is the world's first food crop considering bread is the main food for more than three-quarters of the world's population. The stability and food security depend on wheat availability, cultivation, production, storage and optimum consumption **(Tarq & Faten, 2004)**.

According to **FAO, World Food Situation Report (2018)** world cereal utilization in (2018/2019) is expected to be (2,646) million tonnes; the increase in food, feed, and industrial

uses are behind the growth of total cereals consumption. World wheat production is expected to be (754.1) million tonnes, and wheat utilization is expected to be (743) million tonnes in (2018/2019). Global food use of wheat is expected to grow in line with population growth; world wheat trade in (2018/2019) is expected to be (175) million tonnes. Global wheat stocks for 2019 are (283) million tonnes, almost (6) million tonnes larger than their already high opening level, the new forecast is also (4.4) million tonnes above the May forecast, and this is mostly on account of larger ending stocks expected in Argentina, the EU and India. Nonetheless, excluding China stocks accumulation on an annual basis, world wheat stocks would decrease by almost (6) million tonnes from their opening level.

Table (1-1) : World Wheat Market (Million Metric Tons) 2009 – 2018

Time	Production	Supply	Utilization	Trade	Ending stocks
2009	684.4	864.4	**654.6**	130.8	209.5
2010	650.6	860.2	**656.6**	129.9	205.5
2011	698.1	903.6	**694.0**	149.2	203.9
2012	656.7	860.6	**682.7**	143.2	183.1
2013	713.0	896.1	**690.5**	159.5	197.0
2014	732.2	929.2	**712.6**	156.7	216.8
2015	734.4	951.2	**709.6**	167.0	236.5
2016	759.7	996.3	**735.2**	176.3	258.6
2017	757.2	1,015.7	**738.6**	174.2	277.4
2018	754.1	1,031.6	**743.5**	175.0	283.4

Source: FAO - World Food Situation report 2018 – 2019

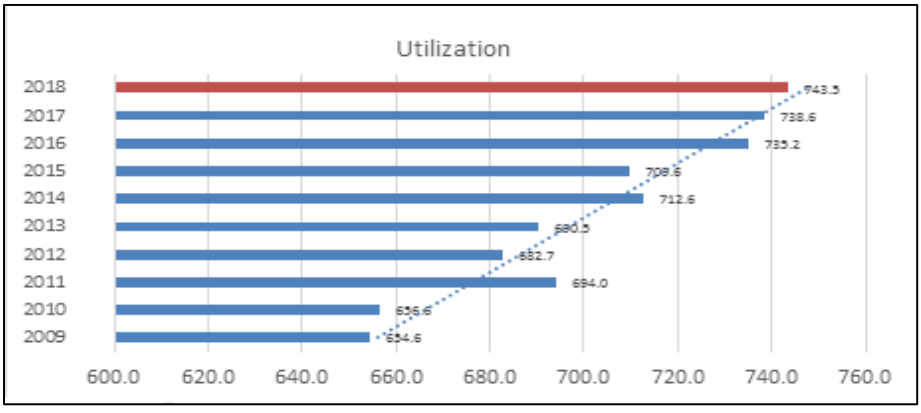


Figure (1-2): World Cereal Utilization, 2009 – 2018.
Source : The Chart is Designed By the Researcher Based on FAO Data

The total area of West Bank and Gaza Strip planted fields is (242,000) dunums, of which (102,124) are wheat planted; its total return is (106,685,300) NIS. Whereas total return for wheat as grains is (54,501,750) NIS, and as straw is (52,183,520) NIS. Wheat average production per dunum is (150-180) kilograms, wheat average consumption per Palestinian is (120) kilograms a year, wheat annual average production is (41) thousand tons, and wheat demand annually reaches up to (400) thousand tons **(PCBS, 2013).**

1.7.2 Growing Population and Food Problem

Looking after crop cultivation is imperative all times and places since the products of these crops are essential for human existence. Historically, many starvations have emerged focusing on this matter. In 879, the world suffered from a severe shortage of food. In 1125, Germany faced starvation that reduced its population by half, and Hungary had starvation in 1505; in the mid of 17th century, famine spread in central Europe, in 1870, Iran lost a quarter of its total population, while China was said to have been ravaged by starvation in 1877 that killed 9.5 million people. The number of people affected by starvation in the Soviet Union in 1891 by about one million people, and in Africa continent there were starvations in the early 1980s that killed millions of people due to drought and lack of rain, which caused a sharp fall in cereal crops **(Ali Al-Khash, Mohammed Shaalan, Abdul Majid Gad, 1986, P. 26-27).**

In order to stabilize life conditions, any country must follow a wise plan of producing grain crops for its people to cope with population rapid increase. More than 2,000 years ago, ancient Egyptians method was to store grain surplus for drought years.

During nineteenth and twentieth centuries, governments rarely intervened in regulating crop production, but World War I (1914-1918) led to new economic theories or economic

policies for regulating and protecting domestic agricultural production, such as wheat that was the first to receive global attention in terms of area, production abundance and distribution to provide bread not only for producing countries population but to the majority of the world's population **(Ali Al-Khash, et al.,1986, P.28).**

1.7.3 The Malthusian Theory

The British economic scientist Malthus (1766-1834) observed that food resources are increasing according to numerical computation, while the number of populations increases according to geometrical progression **(Dolan, Brian ,2000)**. The result is that this rapid increase in population, which is not matched by the same rapid increase in food resources, causes a serious shortage of food, which leads to poverty in the world. At first, no one paid attention to this theory because of prosperity and the provision of food resources during the 19th and early 20th centuries. But after World War I and II, this theory was revived again because of the intense competition on world's natural resources and population density, and food shortage.

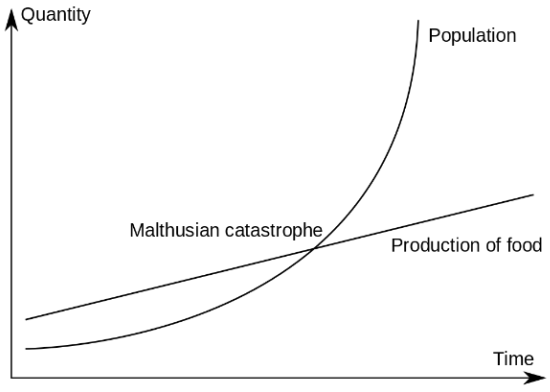


Figure (1-3): The Malthusian Catastrophe

The Malthusian catastrophe simplistically illustrated. For Malthus, as population increases exponentially and food production only linearly, a point where food supply is inadequate

will at some point be reached **(Kovatch, P., Ezell, M., & Braby, R. ,2011)**. For Malthus, as population is exponentially growing, food production (supply) is not appropriate for the coming phases **(Dolan, Brian ,2000).**

Malthus theory focuses on the relationship between population and civilization level since the population is an important factor in labour and growth **(Fawzi, Amal. ,2017)**. Prentice raised fears of Malthus' theory In 1944 saying that it was impossible to sustain prosperity in a world where population was growing in some areas, consequently, food resources were gradually decreasing; the prosperity of the nineteenth century was followed by a period of population explosion causing a starvation in many world parts (**Ali Al Khash, et al., 1986, P.29)**. Governments need to look for strategic plans of securing food for their people being suitable for their population growth rates. Establishing strategic stocks of the main food types of high consumption, especially cereals, should be taken into account. There are reasons for governments to hold food reserves: responding to food shocks and vulnerability, increasing food self-sufficiency, decreasing dependence on international markets and controlling price volatility **(Mark Curtis, 2014).**

Migdad and Abu Thuwaib (2015) considered that Arab world food crisis has gradual effects since 1997; food deficit has increased from (12) to (37) billion dollars by the end of 2012, on the other hand, the problem of cost has been related to a demographic increase; Malthus' theory is also about population engineering sequence; Arab world population was (252) million in 1997, and by the end of 2012 it was around (360) million, which means imbalance between capacity an imbalances in reducing the food deficit gap and population growth. Figure (1-4) shows food security levels in Arab countries.

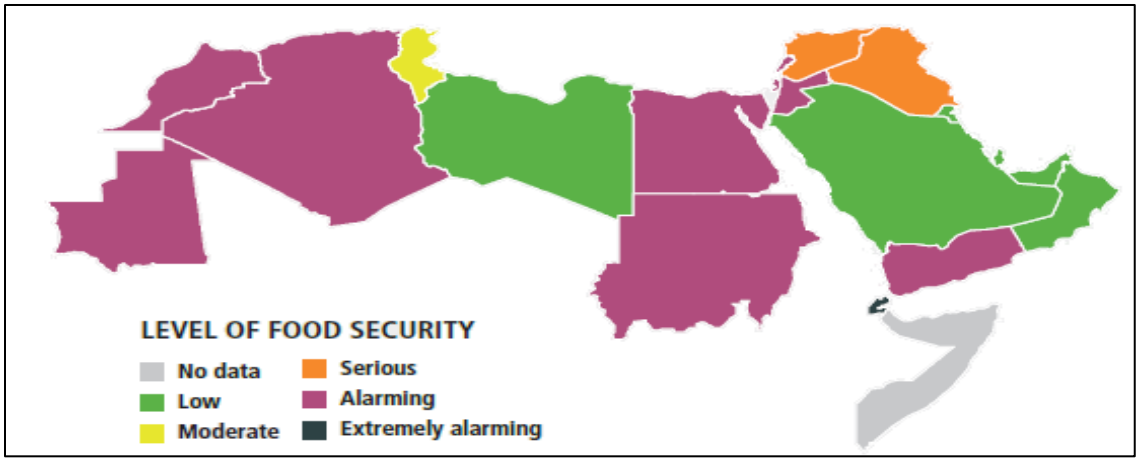


Figure (1-4) : National Level Food Security, Arab Region
Source: http://egyptssp.ifpri.info.

1.7.4 Food Gap

According to **Joint Arab Economic Report (2009)**, despite cereals and major crops production increase, major food commodities gap has continued to increase, the deficit continued in some major crops; Arab countries imported more than (50%) of their grain, (63%) of vegetable oils and (71%) of sugar, these commodities were about 76% of major food commodities gap in 2013 **(AOAD, 2013)**. It is also pointed out that major food commodities gap has increased in value in Arab countries in 2013; wheat came at the top of imported grain representing about (28%) of the total value of Arab food gap followed by rice (6.6%). The contribution of sugar and vegetable oil amounted to (11%) and (8%) respectively, while animal products were about (26%) of the value of the food gap. **(AOAD, 2013)**.

Table (1-2): Quantity and Value of Food Gap from Major Food Commodity Groups in The Arab World for 2006-2008

Item	Quantity of gap/100 tone	Value gap/ Million dollars	Relative importance %
Grain and flour	52455.91	11307.67	53.8
Wheat and flour	25149.21	5392.67	25.66
Maize	13243.12	2317.57	10.03
Rice	2534.4	1500.73	7.14
Barley	10551.52	1860.4	8.85
Pulses	885.04	395.2	1.88
Vegetables	2451.57	1350.03	6.42
Fruit	2570.02	493.4	2.35
Sugar	7058.57	2883.93	13.72
Vegetable oil and grease	3230.54	2104.9	10.02
Red meat	746.63	1618.8	7.7
White meat	916.19	1235.2	5.88
Dairy products	10644.12	3750.27	17.84

Source: AOAD (2009), Agricultural Statistics Yearbook

Table (1-2) shows that the value of commodities groups food gap in Arab countries during 2006-2008 being estimated at ($21.02) billion, the value of grain and flour gap is (53.80%) of the value of total gap, the value of the wheat and flour gap represents about (25.66%) of food gap total value, followed by milk and dairy products gap by (17.84%), sugar by (13.72%), maize by (10.03%) and the rest of goods are in different proportions. It should also be noted that both vegetables and fish in Arab region have achieved self-sufficiency with export surpluses amounting to (6.42%), (6.77%) of total gap value, respectively. Food crisis in Arab world has not been a problem of shortage or scarcity of resources, nor rapid population growth and financial resources deficit; it is mainly agricultural policies failure in exploiting available resources, they are part of Arab development issue: their production, consumption and distribution patterns at national and international levels. Arab world food gap, which reached critical levels, is higher demand growth rate than food production growth rates. **(Besharat, MOG, 2019)**

1.7.5 Strategic Reserves

Al Haidar (2011) defined strategic reserves as "a country's cereal needs that are centrally maintained and managed by the country and are subject to clear rules in terms of their withdrawal and management policies, whether in determining their volume, location or conversion methods. **(Mudhei, 2012)** defined the strategic reserves as "specific food commodities are necessary in human life and a common pattern, in which quantities are kept under government control and used in certain cases; the quantity and quality of such stocks are determined by country conditions and its technical and economic decisions ". **The Food and Agriculture Organization of the United Nations – FAO (2005)** has identified the strategic reserves as (17%) of the country's annual consumption.

Table (1-3): **The Volume of Strategic Reserve Assumed in Some Arab Countries (1000 Tons) Based on The Volume of Consumption**

Country	Product			
	Rice	Barley	Wheat	yellow corn
Iraq	161.5	193.29	765	49.47
Syria	40.07	373	637.5	250.41
Egypt	496.5	34.34	2805	1831.75
Saudi Arabia	168.65	1194.5	257	331.16
Sudan	7.14	-	404.6	10.37

Source: (Mudhei, 2012)

1.7.6 Wheat Silos

Keeping reserve stocks of main grain and food is as old as civilization, the **holy Quran in surah Yusuf, (Joseph) verse 47 and verse 48**, shows the storage importance, [Joseph] said, "You will plant for seven years consecutively; and what you harvest leave in its spikes, except a little from which you will eat (47), then will come after that seven difficult [years] which will consume what you saved for them, except a little from which you will store (48)". Grain and food reserves have always been an instrument used by governments. Strategic

grain reserves were kept in ancient Egypt (since 1750 BC), China has used this since 498 AD. Now, countries such as China, Brazil, India, Indonesia, Canada, and Senegal maintain different types of national grain and food reserves. **(Wijeratna, Alex. ,2011)** According to **Murphy (2009)** wheat reserves are an ancient idea about agriculture characteristics being valid all times and places, referring to constant inelastic demand connected with more changeable short-term supply. Wheat silo aims at protecting grain shortages in an emergency, helping stabilize grain prices; restoring confidence in markets by ensuring adequate grain and food availability (**Ibid, P 4-5**). It is used to save wheat strategic stocks, and to face natural, political or economic disasters, which is important to ensure country food security. **Tariq al-Zadjali (2014)** said that the reasons for establishing strategic food reserve are the global warming and climate change, low rainfall in major agricultural production areas, food prices decrease, and biofuels production from agricultural crops. Palestine lacks strategic wheat silos, which are currently owned by private wheat companies and mills, these silos are in West Bank and Gaza Strip whose stocks are used in daily operations.

1.8 Knowledge Gap

Previous studies have focused on the importance of wheat as a strategic commodity and food essential component. These studies shed light on the role of world wheat strategic reserve in achieving food security and national security through reducing food gap and potential risks whether they are natural, political or economic. However, these studies never addressed the extent of the positive wheat strategic reserve reflection of the Palestinian case; this necessitated conducting this study to address the topic of strategic planning for wheat strategic reserve in Palestine, in terms of estimating the sufficient volume facing any

potential crisis, and distributing this reserve to all Palestinian regions reasonably, because it directly affects both food and national security. Moreover, this study is new and qualitative, concentrating on the Palestinian social, political, and economic situation as follows:

At the social level, providing Palestinians with wheat in crises is an urgent necessity to ensure food security, to enhance the right to food, and thus guarantee them safe life in dignity and freedom.

At the political level, building wheat strategic reserve and distributing it equally to all Palestinian areas is a resistance tool of minimizing Israeli control, and reducing risks of closures practiced on Palestinian areas.

At the economic level, investment in building wheat strategic reserve is considered to be one of the most profitable projects that investing sectors benefit. This encourages farmers to take advantage of large unused lands for wheat cultivation to boost wheat strategic reserve and increase their financial income. As a result of their agricultural activities, the overall result of this is to reduce imports from abroad, minimize dependence on the policies of wheat exporting countries, and reduce the import bill to an absolute minimum.

As a result of a lack of Palestinian studies on wheat strategic reserve, this study was prepared and considered to be a basis of many academic studies related to wheat strategic reserve next to come.

Chapter Two
Countries Experience in Wheat Reserve
(Egypt, Jordan, Syria, Iraq, and European Union)

Overview

In this chapter, the researcher reviewed the reality of wheat cultivation, production, and consumption in some Arab countries whose experience in establishing wheat strategic reserve and management methods is vital for Palestine to follow their footsteps considering that agriculture is a formula of developing wheat strategic reserve and reducing the import bill through minimizing dependence on wheat-exporting countries and promoting self-sufficiency. These countries were chosen for demographic, natural, geopolitical, and technological considerations, including:

1. Climatic and regional similarities. The state of Palestine is part of the Fertile Crescent, which also includes Jordan, Syria, Iraq, and Lebanon, in addition to extending part of this crescent to the northern regions of Egypt, especially in the Nile Basin region, and some eastern regions of Iran, as in the following figure (2-1):

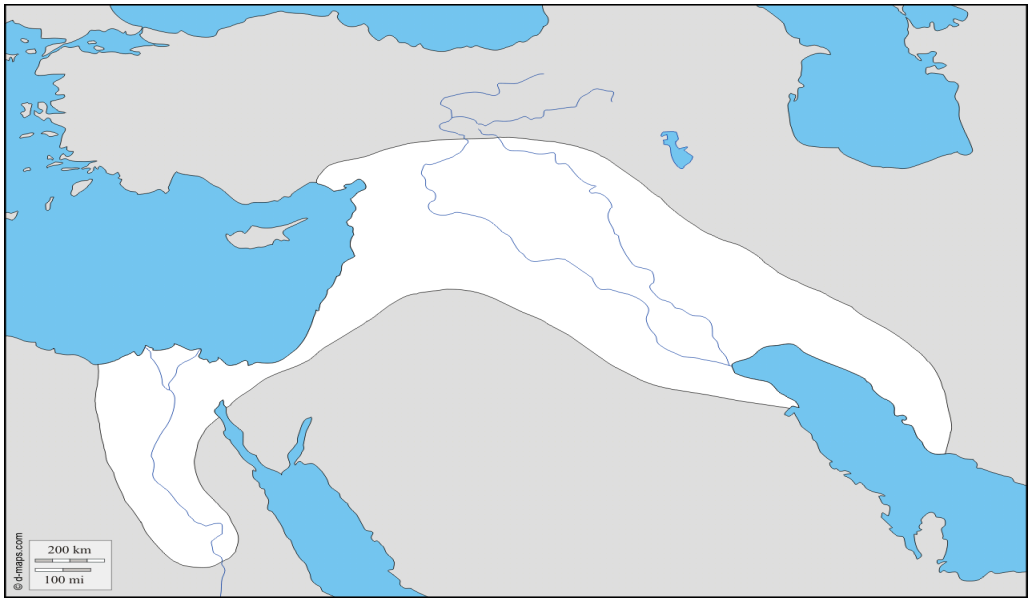


Figure (2-1): Fertile Crescent
Source: D-Maps Website, https://d-maps.com/carte.php?num_car=30686&lang=en

2. Convergence in soil properties and suitability for growing wheat in each of them.
3. The availability of natural sources for growing wheat, especially water, besides the groundwater, we find the Nile in Egypt, the Orontes and Euphrates rivers in Syria, and the Tigris and Euphrates rivers in Iraq. The extension of wheat cultivation along the banks of these rivers, and the spread of wheat silos along these rivers.
4. The moderate climate diversity in Europe is very similar to the climate of the Fertile Crescent countries, especially the northern regions of the Fertile Crescent and the areas near the Mediterranean basin.
5. Similarities in the prevailing political instability of some of the aforementioned Arab countries, and experience in managing wheat strategic reserve, especially in crises.
6. Similarities to a large extent in the patterns of food, as wheat is an essential component of daily food for some of these countries, especially Arab countries.
7. Experience and knowledge in developing farming systems (fertilizers, irrigation methods, building silos, improving wheat seeds, etc.), and exporting these experiences and knowledge abroad such as Germany and France.

2.1 Wheat in Arab World

Table (2-1) shows that wheat production in the Arab world is estimated at (2.64) tons per hectare, which is less than the global productivity estimated at (3.41) tons per hectare. The productivity of Arab countries is about (6.74) tons per hectare in irrigated agriculture, which is about (1.62 and 1.26 tons) per hectare in Algeria, Tunisia and Morocco because most of their production is a rain fed agriculture.

Wheat is ranked the most important grain group, where the cultivated wheat area is about (30.35%) of the total area of grain in the Arab world, and the production of wheat is

(48.02%) of the total grain production and (3,07%) of global wheat one, which amounts to (749.46 million tons) in 2016 (AOAD, 2017).

Table (2-1): Total Area, Production and Productivity of Wheat Crop in Area of The Arab Country, 2009 – 2017

Province		The Arab Orient	The Arabian Peninsula	Arab Maghreb	Middle	The Arab World
Average period 2009 - 2015	Area	2989	239	5786.5	1586.6	10601.1
	Productivity	2158.8	3775.6	1799.5	5989	2572.4
	Production	6452.8	902.2	10413	9502	27270
2016	Area	2187.6	250	4362.9	1646.9	8447.4
	Productivity	2280.2	3956.1	1317.5	6151.4	2587.3
	Production	4988.1	988.9	5748.2	10130.6	21855.8
2017	Area	2082.2	241.1	4665.3	1728.3	8716.9
	Productivity	2447.8	3704.3	1376.7	6140.9	2641.5
	Production	5096.7	893.2	6422.6	10613.1	23025.6

Source: AOAD, Arab Agricultural Statistics Yearbook, vol. 37, 2017.
Area: thousand hectares **Production**: 1000 tons **Productivity**: kg / ha

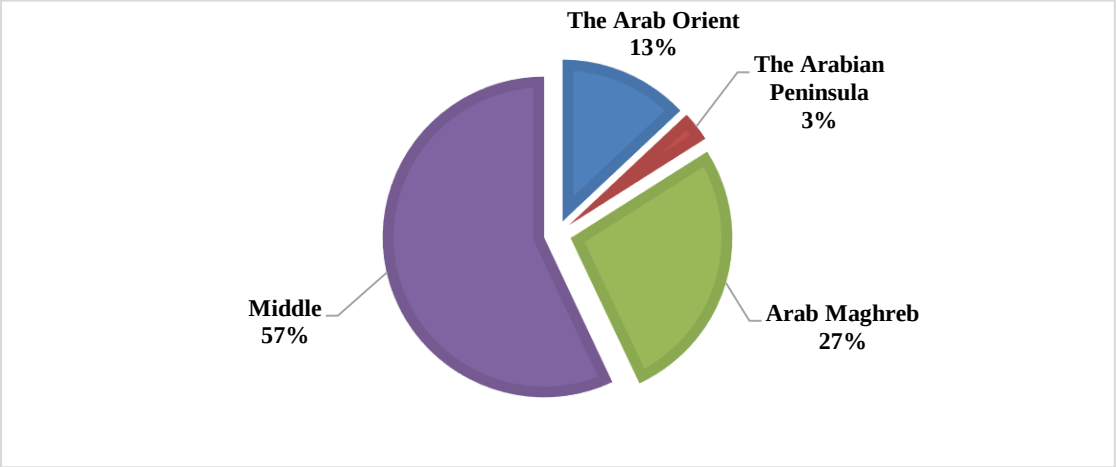


Figure (2-2): Percentage of The Contribution of Arab Regions to Wheat Production in 2017
Source: AOAD, Annual Report of Arab Agricultural Statistics, Vol. 37

According to these countries, wheat production mainly concentrated in Egypt, Iraq, Morocco, Algeria, Tunisia, and Sudan; these countries account for (86.2%) of the total wheat production in the Arab world. Unfortunately, Syria, the main producer and exporter

of wheat was excluded from this statistic because war destroyed almost everything and no accurate information about wheat were found.

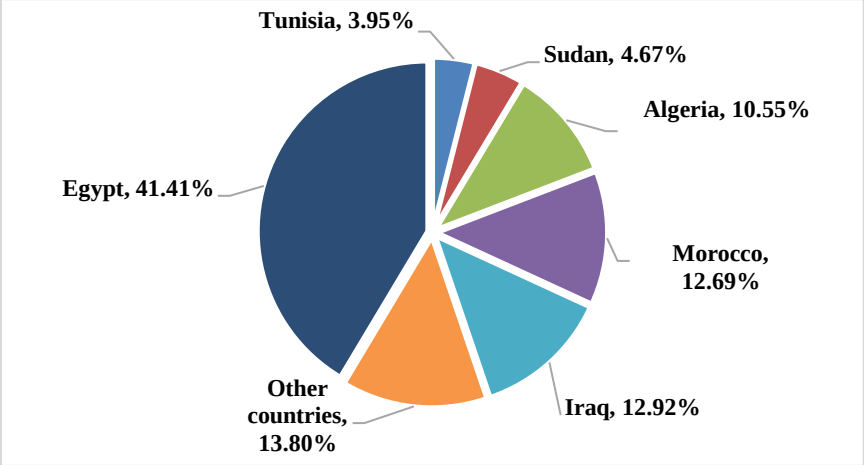


Figure (2-3): Percentage of The Contribution of Arab Countries to Wheat Production in 2017.
Source: AOAD, Annual Report of Arab Agricultural Statistics, vol. 37

At a regional level, productivity was the highest in the middle region at (6.14) tons per hectare and the lowest in Moroccan region at (1.38) tons per hectare.

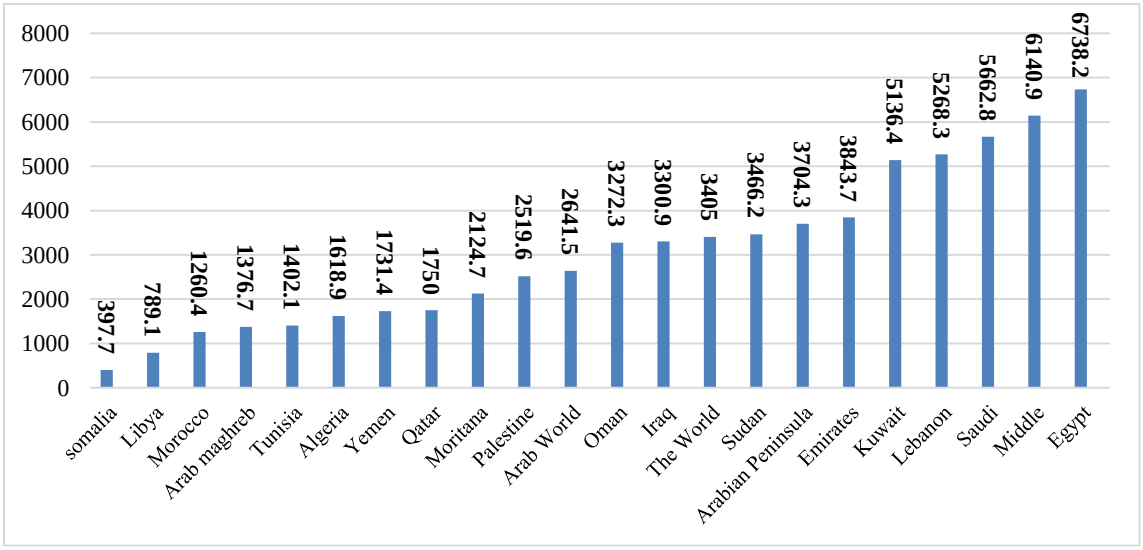


Figure (2-4): Wheat Productivity in The Arab World and The World In 2017 (Kg / Ha)
Source: AOAD, Annual Report of Arab Agricultural Statistics, Vol. 37

2.1.1 Available Wheat For Consumption

The available consumption of wheat is mainly referred to the quantities locally produced in the Arab world, the quantities imported, the quantities exported and a change in stock. Since there were no data of the change in stock volume for all Arab countries, consumption was calculated as (Consumption = production + imports – exports) (Tariq Deeb, Faten, Susi. ,2004), the consumption of wheat in the Arab world is a large percentage of the grain group, in 2017 wheat consumption represented (53%) of grain consumption.

Table (2-2): Evolution of The Quantity Available for Consumption of The Total Cereal and Wheat Crops in The Arab World During The Period 2009-2017

Item	Consumption (1000 tons)		
	Average period 2009 - 2015	2016	2017
Grain	124.4	119.2	128.8
Wheat	63.9	64.4	68.4
Wheat consumption %	%51.36	%53.9	%53

Source: Calculated from The Annual Book of Statistics, The Annual Book of Arab Agricultural Statistics, Volume 37, 2017.

Table (2-2) shows that Arab consumption average per capita of wheat was to (158.6 kg) in 2016, and rose to (164.8 kg) in 2017 with an increase of (3.9%) (AOAD, 2017), the average of the period 2009-2015 was (68.4) kg per capita a year, representing (53%) of the annual average of per capita grain intake during this period. Contrasting the average Arab per capita wheat to the world one- as explained in table (2-3), a difference was found between them, which in 2017 was (98 kg), this is logical because the food pattern tends to consume grain, especially wheat that is used in many daily meals for an Arab individual.

Table (2-3): Average Per Capita Consumption of Wheat Available in The Arab World and The World During 2009-2017

Item	Arab World			World Average
	Average Period 2009 - 2015	2016	2017	2017
Grain	315.2	293.7	310.6	148.7
Wheat	161.8	158.6	**164.8**	**66.8**

Source: The Annual Book of Statistics, The Annual Book of Arab Agricultural Statistics, Vol. 37, 2017.

2.1.2 Commodity Balance of Wheat and Flour in Arab World

Wheat represents a considerable share of the Arab world consumption and one of the most important cereal crops in the Arab consumption pattern in general. Over time, there has been a general tendency to make consumption patterns in the Arab countries depend less on wheat taking advantage of other types of grains such as maize and barley (Tariq and Faten, 2004).

Table (2-4) shows that the quantity of wheat consumption in the Arab world is continuously increasing because of the consumption and dependence on wheat as an essential element in food. Moreover, overpopulation played a key role in rising the quantity of wheat consumed in 2014 to (66354.93) and (66736.40) tons in 2015 with an increase of (0.57%). The quantity dropped to (64421.6) in 2016 by (3.5%), it was noted that the consumption rate ranged between the lowest consumption rate in the Comoros (0.03%) and the highest one in Egypt (30.89%) of the total consumption of the Arab world.

Table (2-4): Commodity Balance Wheat and Flour in The Arab World

Country	Available for consumption (1000 ton)				% of Arab consumption 2016
	Average period 2009-2013	2014	2015	2016	
Comoros	16.2	16.6	15.8	17.4	0.03%
Somalia	196.6	316.3	338.6	376.1	0.58%
Djibouti	230.7	536.2	736.0	416.0	0.65%
Palestine	262.2	382.0	322.0	357.8	0.56%
Oman	275.1	505.5	437.5	438.9	0.68%
Kuwait	319.6	416.9	209.2	389.1	0.60%
Mauritania	360.4	457.4	545.5	447.9	0.70%
Lebanon	652.3	695.2	700.5	715.1	1.11%
Emirates	837.6	1629.2	907.0	826.7	1.28%
Jordan	846.2	1348.1	861.9	2025.5	3.14%
Libya	1931.4	1897.1	1351.4	1282.3	1.99%
Sudan	2386.4	1955.2	2582.0	2935.6	4.56%
Tunisia	2892.6	3173.8	2891.4	2952.0	4.58%
Iraq	2964.8	5178.3	4502.1	5252.9	8.15%
Saudi Arabia	2987.9	3891.1	2179.1	1433.3	2.22%

Country	Available for consumption (1000 ton)				% of Arab consumption 2016
	Average period 2009-2013	2014	2015	2016	
Yemen	3263.0	3567.0	3294.9	2843.1	4.41%
Syria	4332.6	3020.6	3811.4	2372.8	3.68%
Morocco	8856.6	10054.2	11168.5	8989.5	13.95%
Algeria	8907.8	9853.2	11158.5	10159.9	15.77%
Egypt	15882.0	17243.9	18424.8	19901.8	30.89%
ARAB REGION	**58619.83**	**66354.93**	**66736.40**	**64421.6**	

Source: The Annual Book of Statistics, Arab Agricultural Statistics, Vol. 37, 2017.

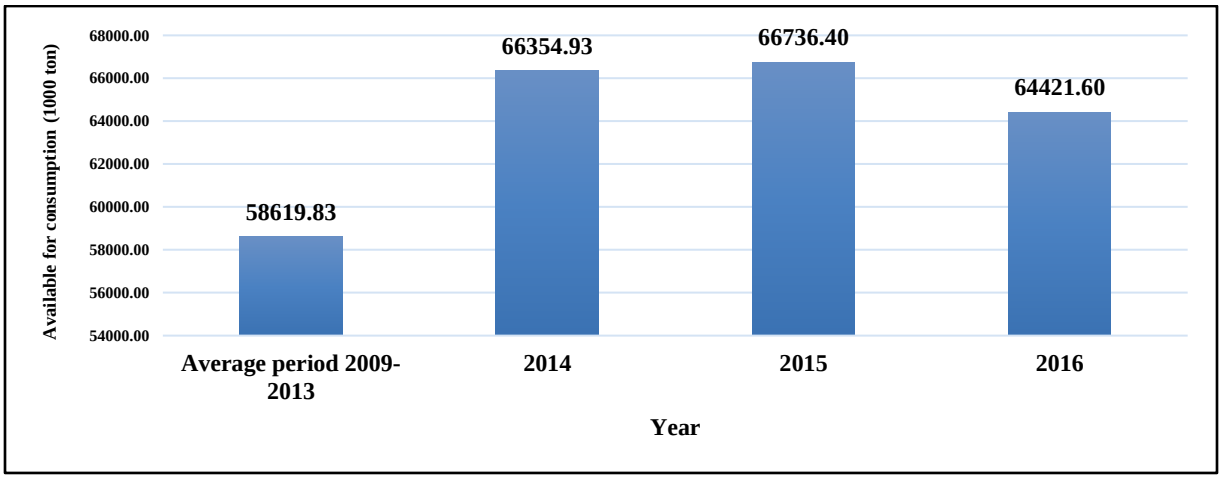


Figure (2-5): Balance of Wheat and Flour in The Arab World 2017
Source: Annual Book of Arab Agricultural Statistics, Vol. 37, 2017.

2.1.3 Wheat Strategic Reserves in Arab World

M. Abdulla, H. Basem and F. Ahmed (2016) explained that the concept of strategic stockpile reflects the country's grain needs, which are centrally maintained and managed by the country, and they shall be subject to clear rules of managing consumption and policies adopted in determining their volume, location and methods of transport.

FAO (1997) has identified the volume of this stock (17%) of the country annual consumption (Committee on World Food Security, 2000), based on this percentage, which is a requirement to ensure food security. Table (2-5) shows an estimation of the strategic reserve in some Arab countries.

Table (2-5): Estimation Wheat Strategic Reserve in Some Arab Countries Depending on Consumption Average 2011 – 2016 (1000 Ton)

Country	consumption							Estimation reserve
	2011	2012	2013	2014	2015	2016	Average	
Egypt	18015	15184	17215	17244	18425	19902	17664	3003
Morocco	9892	7971	9662	10054	11168	8989	9623	1636
Algeria	7621	9771	8121	9853	11158	10160	9447	1606
Yemen	2930	8539	8901	3567	3295	2843	4307	732
Iraq	2810	3064	4180	5178	4502	5253	4165	708
Syria	4354	4105	3564	3021	3811	2373	3538	601
Tunisia	3181	3099	3009	3174	2891	2952	3051	519
Saudi Arabia	3312	3170	2617	3891	2179	1433	2767	470
Sudan	2724	2392	3564	1955	2582	2936	2692	458
Libya	1827	1916	1916	1897	1351	1282	1698	289
Jordan	1092	930	856	1348	862	2026	1186	202
Emirates	850	843	882	1629	907	827	990	168
Djibouti	154	154	2902	536	736	416	816	139
Lebanon	538	756	718	695	700	715	687	117
Mauritania	344	345	344	457	546	448	414	70
Oman	266	441	190	505	438	439	380	65
Kuwait	292	331	292	417	209	389	322	55
Palestine	168	210	262	382	322	358	284	48
Somalia	198	198	198	316	339	376	271	46
Qatar	145	171	55	97	239	198	151	26
Bahrain	113	109	70	120	59	90	93	16

Source: AOAD, Agricultural Agriculture Yearbook, Multiple Publications, http://www.aoad.org

According to the data provided in table (2-5), it is clear that Egypt ranks first in the estimated volume of strategic wheat reserve at 27.4% of the estimated Arab strategic reserves, followed by Morocco and Algeria with 14.9% and 14.6%, respectively, these ratios are logical as a result of the large consumption of wheat in each of the previous countries

2.2 The Egyptian Experience

The wheat crop is considered one of the most important food crops in Egypt, on which Egyptians, especially the low-income ones, depend for their daily food. It constitutes about (65%) of the total daily calories (FAO and EBRD,2015). Table (2-6) below shows Egypt's average per capita wheat.

Table (2-6): Average Per Capita Wheat in Egypt (2005-2017)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Value	178	191	177	183	141	160	152	123	127	134	141	138	164	**154.4**

Source: Ministry of Agriculture and Land Reclamation - Central Agency for Public Mobilization and Statistics – Egypt

The average per capita wheat was between a minimum of (122.5) kg/ year in 2012 and a maximum of (191.1) kg / year in 2006 with an annual average of (154.38) kg / year, with an annual growth rate of (1.34%); as a matter of fact, it is the highest one in the world. Egypt is one of the most consuming countries of wheat and its derivatives, and the average per capita of wheat in it is among the high rates in the world.

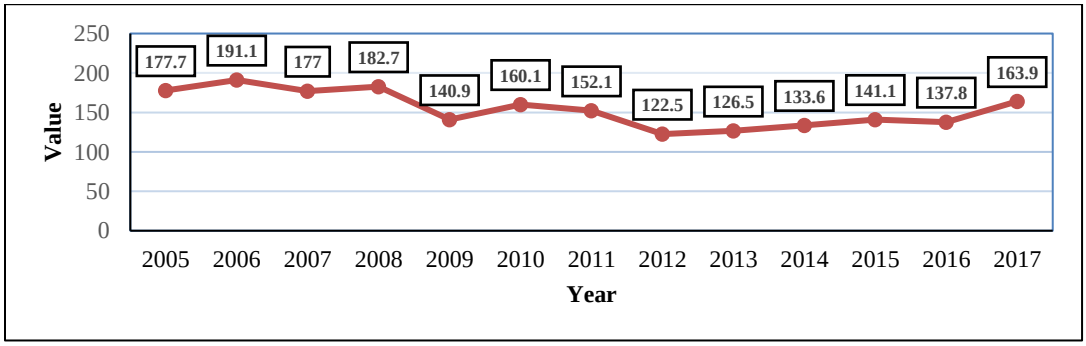


Figure (2-6): Average Per Capita Wheat in Egypt (2005-2017)
Source: Ministry of Agriculture and Land Reclamation - Central Agency for Public Mobilization and Statistics – Egypt.

Table (2-7): Development of Wheat Production Indicators in Egypt (1997-2012)

Year	Area Million feddan	Wheat production/ Ton / feddan	Production/ Million tons
1997	2.49	2.80	6.98
1998	2.42	2.67	6.46
1999	2.38	2.76	6.56
2000	2.46	2.69	6.62
2001	2.34	2.85	6.66
2002	2.45	2.79	6.84
2003	2.51	2.79	7.01
2004	2.61	2.75	7.17
2005	2.99	2.72	8.14
2006	3.06	2.70	8.27
2007	2.72	2.71	7.38

Year	Area Million feddan	Wheat production/ Ton / feddan	Production/ Million tons
2008	2.92	2.46	7.18
2009	3.15	2.46	7.76
2010	3.00	2.39	7.16
2011	3.05	2.74	8.37
2012	3.16	2.54	8.05
Average	**2.73**	**2.68**	**7.29**

Source: Central Agency for Public Mobilization and Statistics (2017), Egypt.

Wheat cultivated area was between (2.34) million donums in 2001 and (3.16) million donums in 2012, with an annual average of (2.73) million donums and an annual growth rate of (2.1%). The productivity of wheat donum was between (2.39) tons in 2010 and (2.80) tons in 1997, with an annual average of (2.68) tons and an annual decline of (0.7%). Production varied between (6.46) million tons in 1998 and (8.37) million tons in 2011, with an annual average of (7.29) million tons and an annual growth rate of (1.4%).

Table (2-8): Development of The Most Important Economic Indicators of Wheat Crop in Egypt (1997-2012)

Years	Consumption / million tons	Average per capita consumption	Self-sufficiency ratio (%)
1997	10.41	173.50	67.1
1998	11.18	182.38	57.8
1999	09.62	153.67	68.2
2000	11.11	173.97	59.6
2001	09.82	150.66	67.8
2002	11.62	174.66	58.9
2003	10.93	160.95	64.1
2004	11.75	169.53	61.0
2005	13.35	188.69	61.0
2006	14.23	197.06	58.1
2007	13.77	186.99	53.6
2008	14.55	193.41	49.3
2009	14.59	189.65	53.2
2010	14.97	190.14	47.8
2011	16.87	209.80	49.6
2012	16.18	196.00	49.8
Average	**12.81**	**180.69**	**57.93**

Source: Central Agency for Public Mobilization and Statistics, Egypt.

Total consumption ranged between (9.62) million tons in 1999 and (16.87) million tons in 2011 with an annual average of (12.81) million tons at an annual growth rate of (3.5%).

The increase in total wheat consumption continued to reach (18.11) million tons in 2017, this resulted when demand on wheat increased. Average per capita consumption ranged from (151) kg in 2001 to (210) kg in 2011, with an annual average of (181 kg) and an annual growth rate of (1.4%). The self-sufficiency rate ranged between (47.8%) in 2010 and (68.2%) in 1999, with an average of (57.93%), and an annual decline of (2.1%). The consumption increase rate is higher than the production one.

Table (2-9): Evolution of Factors Affecting Wheat in Egypt (1996-2011)

Year	Production/ million tons	Imports/ million tons	Stock/ million tons	Consumption/ million tons	Population /million	Support/ billion pounds	Area million feddan
1996	4.44	4.88	1.2	9.32	58.85	2.2	2.42
1997	4.7	5.34	1.52	10.4	60.03	2.3	2.49
1998	4.7	5.63	1.84	10.33	61.3	2.4	2.42
1999	6.22	5.57	2.01	11.79	62.55	2.5	2.38
2000	6.46	4.57	2.17	11.03	63.8	2.6	2.46
2001	6.41	4.84	2.25	11.24	65.12	2.7	2.34
2002	6.44	4.57	2.35	11.01	66.51	2.9	2.45
2003	6.85	4.09	3.69	10.94	67.91	3.5	2.51
2004	7.18	4.57	3.72	11.75	69.33	4.2	2.61
2005	8.14	5.21	2.95	13.35	70.75	4.4	2.99
2006	8.27	5.81	3.18	14.08	72.22	7	3.06
2007	7.38	5.9	2.96	13.68	73.64	6	2.72
2008	7.98	5.76	3.03	13.74	75.14	6.11	2.92
2009	8.52	5.97	3.1	14.49	76.82	6.21	3.15
2010	7.17	5.53	2.22	12.7	81.39	8.4	3.05
2011	8.37	5.66	2.4	14.03	86.2	11.2	3.18
Average	**6.83**	**5.24**	**2.54**	**12.09**	**74.2**	**4.664**	**2.697**

Source: Central Agency for Public Mobilization and Statistics

Table (2-9) shows that there is an increase in wheat stocks; the average quantity of stocks per year is (2.54) million tons which varies between (1.2) and (3.72) million tons in 1996 and 2004, respectively.

2.2.1 Wheat Silos in Egypt

In Egypt, two public holding companies are engaged in wheat storage and all operations related to wheat product:

2.2.1.1 The Egyptian Holding Company for Silos and Storage

The company was established under the decree of the Prime Minister's decision no. (1682) in 2002. Therefore, this company manages, operates, and develops silos activities.

Table (2-10): Existing Silos for Egyptian Holding Company for Silos

No	Silo Name	Location	Number of cells	Storage capacity/Ton
1.	Abnoub	Asyut	12	60,000
2.	Abu El Mtamir	Al behiyra	06	30,000
3.	Abu hamad	Al sharkiya	12	60,000
4.	Al husineya	Al sharkiya	6	30,000
5.	Al nobaria	Al behiyra	12	30,000
6.	Al sbhiya	Al exandria	12	30,000
7.	Al sheikh fadl	Al minya	12	60,000
8.	Al Tramsa	Qena	12	60,000
9.	Ataka	Suez	12	60,000
10.	Atfeh	Giza	06	30,000
11.	Bahnsa	Al minya	12	60,000
12.	Banha	Al kaliobya	12	60,000
13.	Bani mazar	Al minya	12	60,000
14.	Bani Ubaid	Al dkahliya	06	30,000
15.	berksh	Giza	12	60,000
16.	Com abo rady	Bani suif	12	60,000
17.	Desouq	Kafr Elsheikh	12	60,000
18.	Dmanhour	Al behiyra	12	60,000
19.	East owaynat	Al wadi El gdid	12	30,000
20.	East qantra	Ismailia	12	60,000
21.	El menia	El Minya	18	90,000
22.	El mrshda	Qena	12	60,000
23.	Elmfalsa	Aswan	12	60,000
24.	Hehia	Al sharkiya	12	60,000
25.	Kafr Dawood	Al monoufiya	06	30,000
26.	Marriott	Al behiyra	12	60,000
27.	Mittchamr	Al dkahliya	12	60,000
28.	Monouf	Al monoufiya	12	60,000
29.	Qasr el basil	Al Fayoum	12	60,000
30.	Sedi salm	Kafr Elsheikh	06	30,000
31.	Sherbin	Al dkahliya	12	60,000
32.	Soda	Bani suif	12	60,000
33.	Tamiya	Al fayoum	12	60,000
34.	Tanta	Al gharbiya	12	60,000
35.	Tanta	Sohag	12	60,000
36.	Wadi natrun	Al Behira	06	30,000
	Total		**396**	**1,890,000**

Source: https://www.ehcss.com

2.2.1.2 General Silos and Storage Company

The company was established by a decree issued by the Prime Minister on 25 May 1888 in the name of the Egyptian Stock Exchange Company - an Egyptian joint stock company. The name of the company then became the Egyptian General Silos and Storage Corporation under the Presidential Decree No. (563) of (1962). After that, the name of the company was changed to the General Company for silos and storage on 25/2/1967, the company carries out many important strategic activities that serve Egypt's economy and food security, as well as its main activity in receiving grain reservoirs in various ports, unloading them with the latest means at high rates and storing their cargo in silos owned by different ports and inside the republic.

Table (2-11): Existing Silos and Stores for General Silos & Storage Company GCSS

No	Silo / Store Name	Location	Number of cells	Storage capacity/Ton
1-	Embaba (silo)	Cairo sector	109	58,000
2-	Shobra (silo)	Cairo sector	72	100,000
3-	Al sowah (store)	Cairo sector	-	40,000
4-	Al shoffatat (store)	Cairo sector	-	70,000
5-	Al marouteiya (store)	Cairo sector	-	12,000
6-	Dumyat	Dumyat	67	100,000
7-	Dumyat (store)	Dumyat	-	50,000
8-	Al Exandria84 (silo)	Al Exandria sector	72	100,000
9-	Al Exandria85 (silo)	Al Exandria sector	-	24,000
10-	Al Exandria85 (store1)	Al Exandria sector	-	48,000
11-	Al Exandria85 (store2)	Al Exandria sector	-	24,000
12-	Al Exandria85 (store3)	Al Exandria sector	-	5,700
13-	Al Exandria85 (store4)	Al Exandria sector	-	25,000
14-	Sufaj	Sufaj	64	100,000
	Total		**384**	**756,700**

Source: General Silos and Storage Company, http://www.gcss-egypt.com

2.2.1.3 Projects Under Implementation

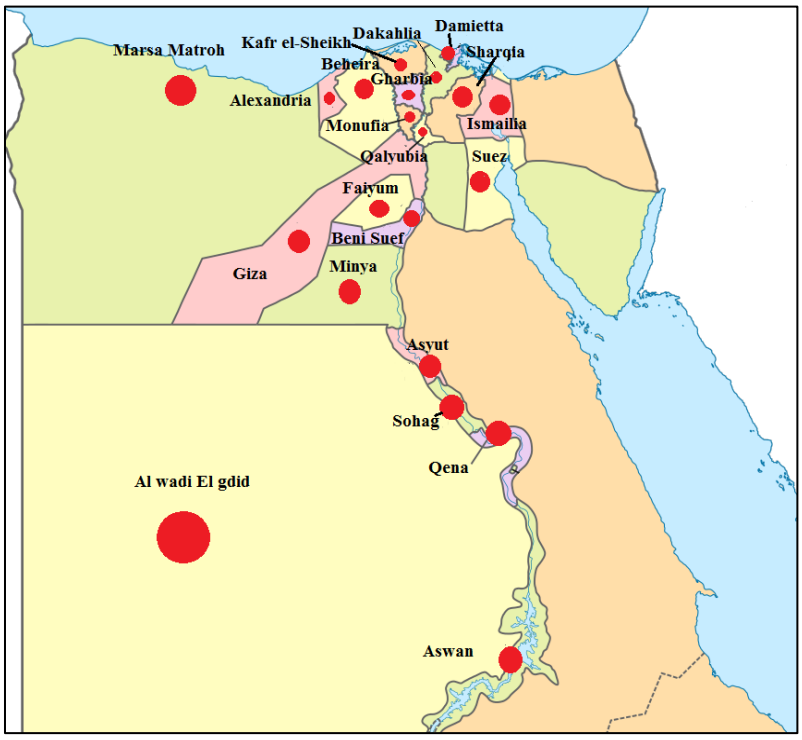
The Egyptian Arab Republic, in cooperation with various funds, is constructing silos with different storage capacities.

Table (2-12): Silos Under Implementation Through the Saudi Finance Fund

#	Governorate	Site	Number of Silos	Storage capacity/Ton
1	Al Qalupeya	Arab Al Elakat	3	90,000
2	Al Wad Al Jadid	Al Kharja	1,5	45,000
3	Geza	Bani Salama	2	60,000
4	Al Sharkeya	San Al Hajar	2	60,000
5	Marsa Matroh	Al Hamam	1.5	45,000
	Total		**14.5**	**300,000**

Source: Multi Source (FAO, European Bank, The World Bank and http://www.medagri.org/

There is also a vision for constructing (60) silos with a total capacity of (300,000) tons.



Figure(2-7) : Distribution of Silos and Stores in Egypt
Prepared by Researcher.

We observe the spread of silos in the closeness, of the Nile and the Nile Delta due to the abundance of water and soil fertility.

2.3 The Jordanian Experience

Wheat is considered one of the most important field crops in Jordan because it is related to bread, and it ranked first in terms of cultivated area and production.

Table (2-13): Area of Wheat Cultivated in Jordan (2011-2016)

Year	2011	2012	2013	2014	2015	2016
Cultivated Area	193,042.60	212,963.80	262,371.30	266,787.60	258,114.60	277,609.50

Source: http://jorinfo.dos.gov.jo

Table (2-13) shows that the area of wheat cultivated land in Jordan is growing at a rate of (1.22%), as a result of the Jordanian government's policy of land reclamation to grow wheat in order to reduce the importation of wheat from abroad.

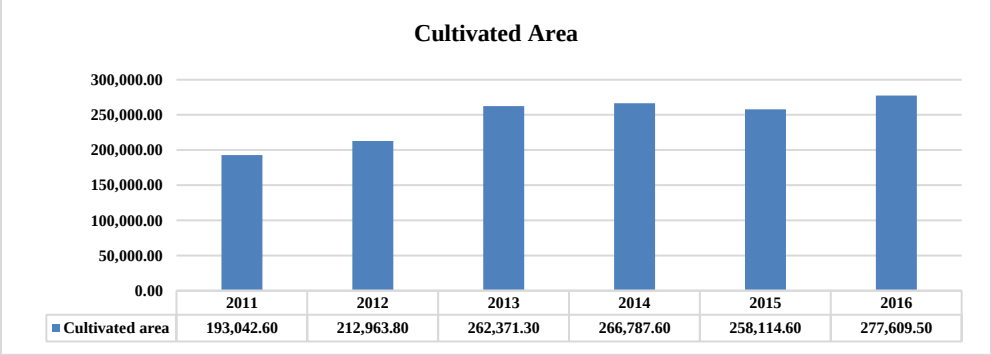


Figure (2-8): Area Cultivated with Wheat in Jordan (2011-2016)
Source: The Figure Was Prepared by The Researcher Based on The Previous Table (2-12)

Table (2-14): Self-Sufficiency Ratio of Wheat Crop in Jordan (2011-2016)

Year	Production (tons)	Imports (tons)	Self-sufficiency ratio%
2011	19,801	1,076,650	1.8
2012	19,205	851,240	2.2
2013	28,517	833,413	3.3
2014	27,452	1,307,197	2.1
2015	21,925	1,331,176	1.7
2016	31,150	1,018,645	3
Average	**24675.0**	**1069720.2**	**2.4**
Growth Rate	**12.7%**		

Source: http://jorinfo.dos.gov.jo
Growth rate = ((19,801/31,150) ^1/5) *100) = (12.7%)

Table (2-14) shows that wheat production increased in 2016 to (31,150) tons compared to previous years with a growth rate of (12.7%), due to the Kingdom's reclamation of large areas of land and its cultivation with wheat as mentioned above. On the other hand, we note that the quantity of wheat imported in 2016 decreased to (1,018,645) tons (-23.5%). This is logical due to the increase in the area cultivated with wheat. The rate of self-sufficiency of wheat in Jordan was (2.4%), the highest in 2013 by (3.3%) and the lowest in 2015 by (1.7%),

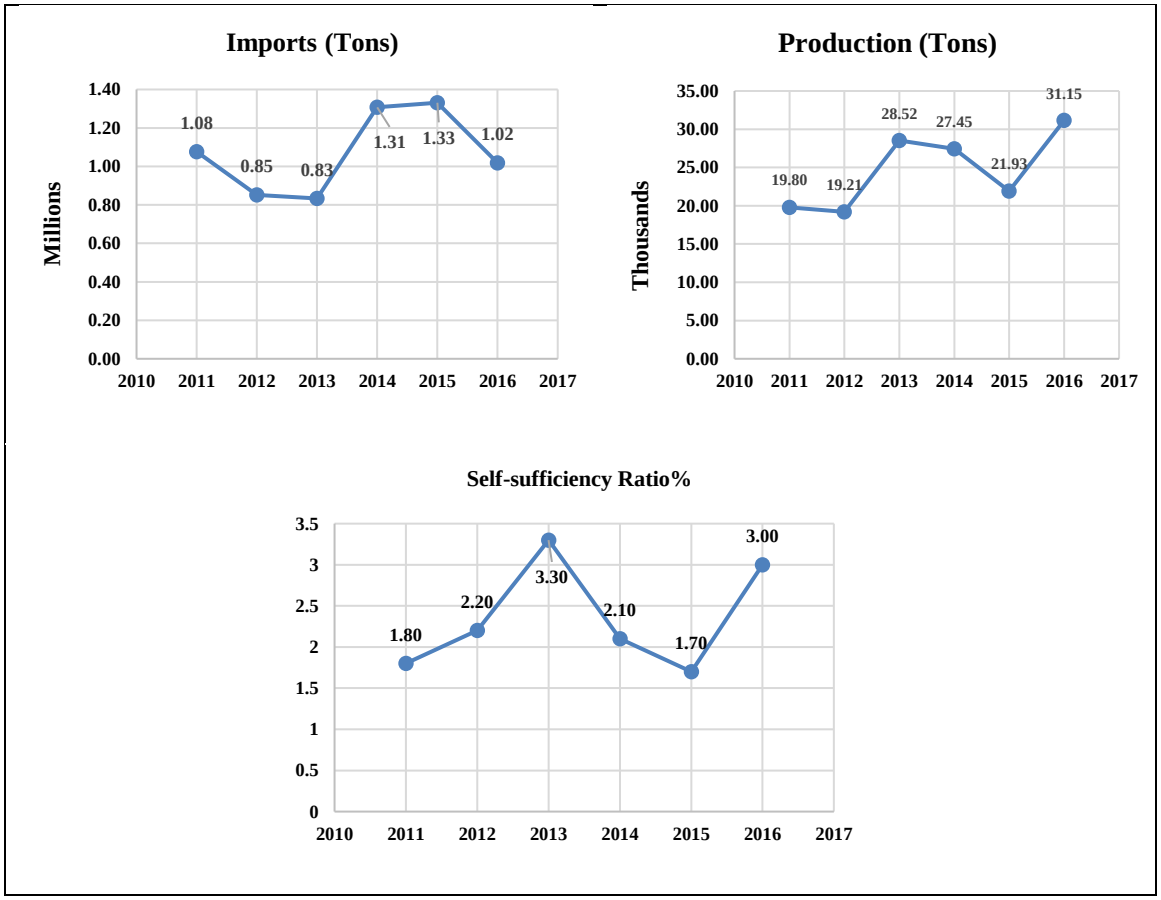


Figure (2-9): Imports, Production and Self-Sufficiency Ratio of Wheat in Jordan 2010 - 2017

The general trend of self-sufficiency growth is upward as a result of the general upward trend in wheat production.

2.3.1 Wheat Per Capita in Jordan

Table (2-15): Annual Jordan's Per Capita of Local Wheat (1997 – 2007)

Year	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	Average
Per Capita	3.67	7.78	1.95	5.24	3.88	8.59	8.13	2.46	6.28	4.09	3.67	5.07

Source: Karbalia, 2007.

It is noticeable that there was a clear fluctuation in per capita domestic wheat during the years 1997-2007, the highest per capita in 2002 was (8.59) kg, and the lowest per capita in 2005 by (1.96) kg. This fluctuation is due to changes in quantities produced due to various factors including climatic factors, population increase, population creep, and other factors (Karbalia, Emad, 2007)**.**

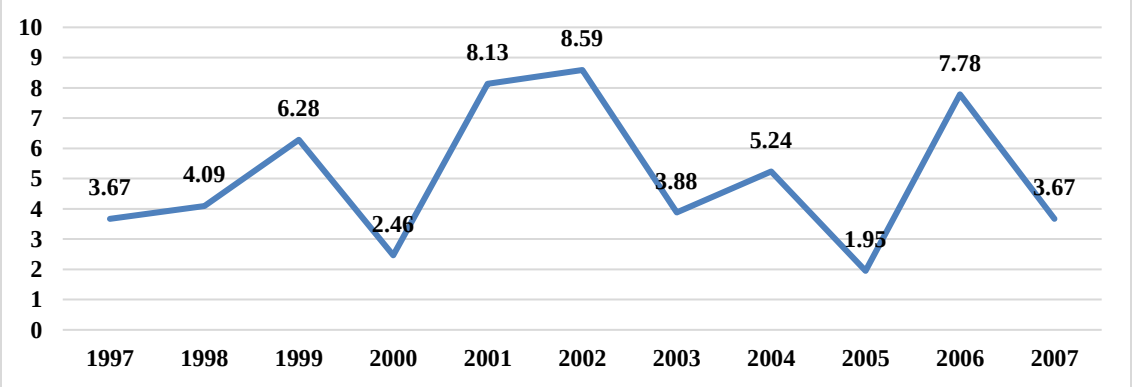


Figure (2-10): Annual Jordan's Per Capita of Local Wheat (1997 – 2007)

2.3.2 Directorate of Inventory Management in Jordan

Directorate of Inventory Management in Jordan is related to the Ministry of Industry Trade, and Supply. The directorate of stock management supervises the process of transporting and distributing the foodstuffs represented in wheat, barley, and feed materials to all warehouses and ration complexes. In addition, the mills are provided with wheat and mill production. It also supervises distributing bran for feed distribution centers, monitoring the

bakeries activity and meeting their need for flour and reducing the allocations of those having a surplus. The government of Jordan provides importers with (40%) of the strategic wheat stocks saving the rest to meet any potential emergency. (Ministry of Industry, Trade and Supply- Jordan, 2018).

2.3.3 Jordan General Silos & Storage Company

The Jordanian General Company for Silos and Supply was established on 5/9/2000 with a capital of forty million Jordanian Dinars, the government owns all the capital and manages the following complexes:

Table (2-16): Silos Complexes and Its Capacity Storage in Jordan

Silos complexes	Capacity/tons
• Al – Juwayda complex	175,000
• North complex	150,000
• Rsaifeh complex	135,000
• Al-Aqaba complex	350,000
• Juwaida mill	1,200
Total	**811,200**

Source: Jordan General Silos & Storage Company, http://www.josilos.com ,2018

2.3.4 Company Services

- Unloading public and private sectors' ships carrying different grains (wheat, barley, maize) using modern technologies.
- Shipping wheat to mills and transporting barley to feeding centers.
- Storing grains in silos and preserving them from insect infections.
- Sterilizing grain stored in silos.
- The mill produces several types of flour and semolina products.

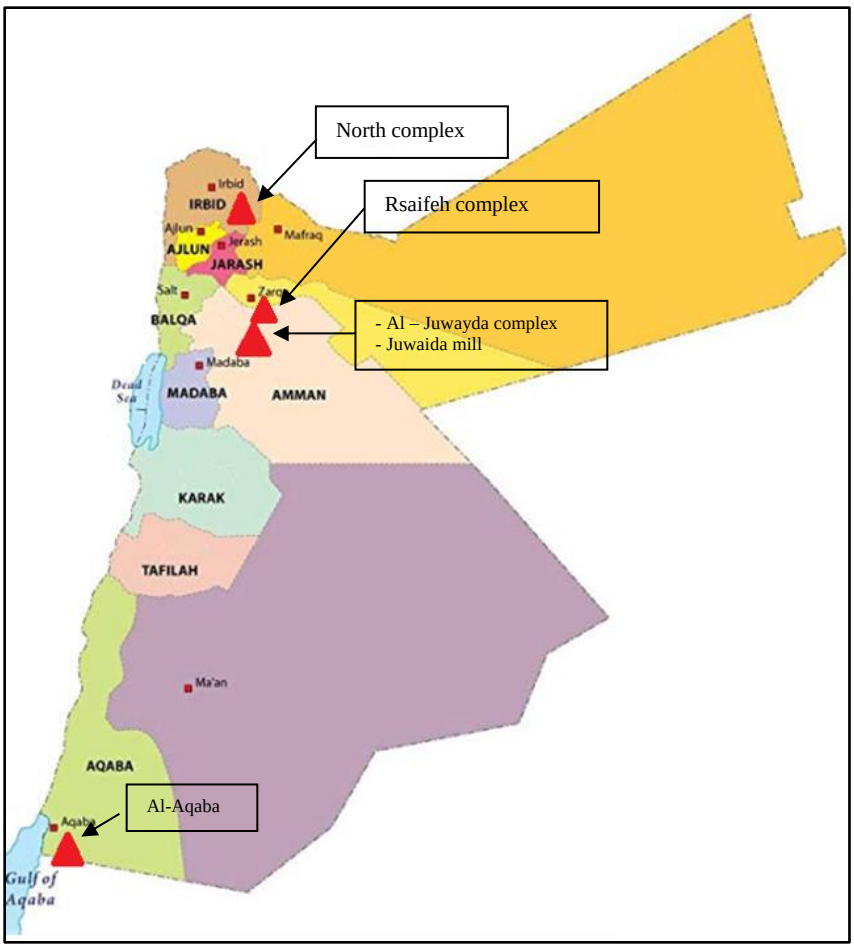


Figure (2-11) : Distribution of Silos and Warehouses in Jordan
Source: Prepared by Researcher

2.3.5 Wheat Strategic Reserve in Jordan

The Jordanian government has adopted a vision of developing economic policies and legislation, under the umbrella of strategic objectives, to ensure promoting the policies supply basis of food security, consumer protection, goods quality provided in markets at reasonable prices, and to manage silos expansion of strategic stocks, and to implement a rationing policy (Ministry of Industry- Jordan, 2016) The government has kept (972,000) tons of the Kingdom's wheat strategic reserve, (12.2 months) for the year 2017. (Ministry of Industry- Jordan, 2017)

2.4 The Syrian Experience

Agriculture in Syria is one of the economy main pillars which was a quarter of its GDP. Before 2011, Syria was only a country relying on its own resources for food, especially wheat, which came first among grain crops, as shown in table (2-17) and figure (2-11) below, Syria was interested in wheat cultivation as an important strategic commodity. It adopted a stimulating pricing policy encouraging wheat farmers to increase cultivated areas, especially high-yield wheat which was twice the world price (Asaad, 2012). In 2000, the wheat - planted area was (1679) thousand hectares with a significant leap in production due to land reclamation, dams, and the availability of good sterile seeds of all produced and improved varieties (Tarek and Susie, 2004).

Table (2-17): Development of Area, Production, and Yield of The Wheat Crop in Syria (2000-2011)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Area	1679	1684	1679	1796	1831	1904	1787	1668	1486	1437	1599	1521	1603	1374	1288
Production	3106	4745	4775	4913	4538	4669	4932	4041	2139	3702	3083	3858	3609	3182	2024

Source: The Arab Organization for Agricultural Development, Annual Journal of Agricultural Statistics, League of Arab States, Volume (35), Khartoum, 2015
production: 1000 Tons, Area: 1000 Hectare

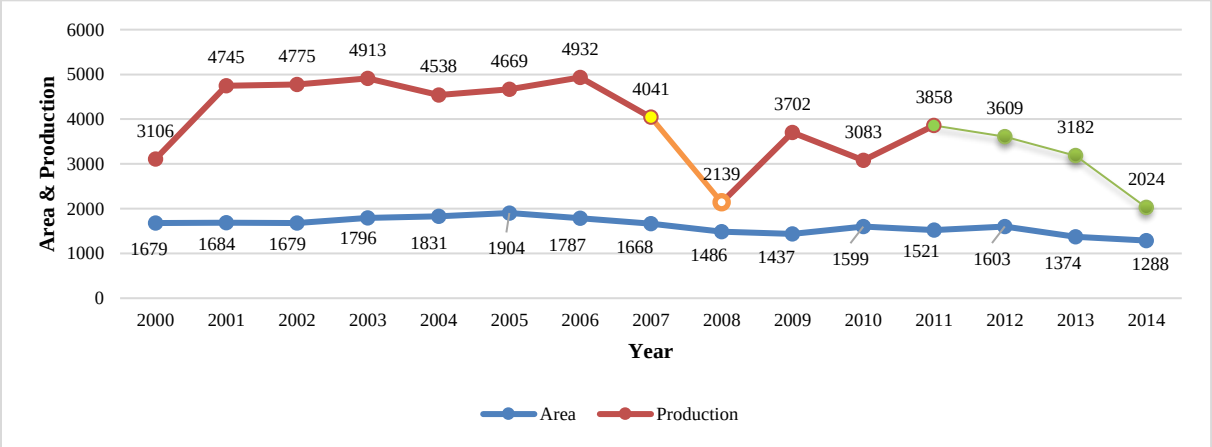


Figure (2-12): Development of Area, Production and Yield of Wheat Crop in Syria 2000-2011
Source: AOAD, Agricultural Agriculture Yearbook

Referring to figure (2-11), a decline is notable in production from 2007-2008 as a result of the global food crisis affecting developing countries, and the second decline from 2011-2014 is due to the Syrian civil war.

2.4.1 Per Capita of Wheat

Syria is among Arab countries with wheat per capita levels above the normal Arab average. According to the available data, the Arab per capita quota of wheat reached (160) kg. (Tarek and Faten. 2004, P.198).

Table (2-18): Evolution of Syrian Per Capita Consumption of Wheat (2000 – 2012)

year	Quantity of consumption	Population / 1,000 inhabitants	income / $	Annual per capita wheat / kg / year
2000	3122.8	16371	1180.5	190.75
2001	4733	16701	1263.4	283.40
2002	4223	16995	1269.9	248.48
2003	4510	17298	1261.9	260.72
2004	3980	17676	1419.3	225.16
2005	4104	18167	1588.5	225.90
2006	4995	18805	1772.6	265.62
2007	3084	19561	2065.5	157.66
2008	2283	20346	2283.49	112.21
2009	5361.8	21032	2277.48	254.94
2010	4192.9	21533	2450.13	194.72
2011	4343.3	21804	2399.68	199.20
2012	4164.6	21890	2803	190.25

Source: **Annual Agricultural Statistical Groups (2000-2012),**http://www.cbssyr.sy/
Annual Per Capita Wheat = Quantity of Consumption / Population.

Table (2-18) shows that Syrian per capita consumption of wheat ranged from (284.4) kg/ year in 2001 to (112.21) kg/ year in 2008, a decrease of (41.17%) compared to the base year, increased by a few percentage points until 2009, and then decreased until 2012. (Adrasi, Khetam, 2017).

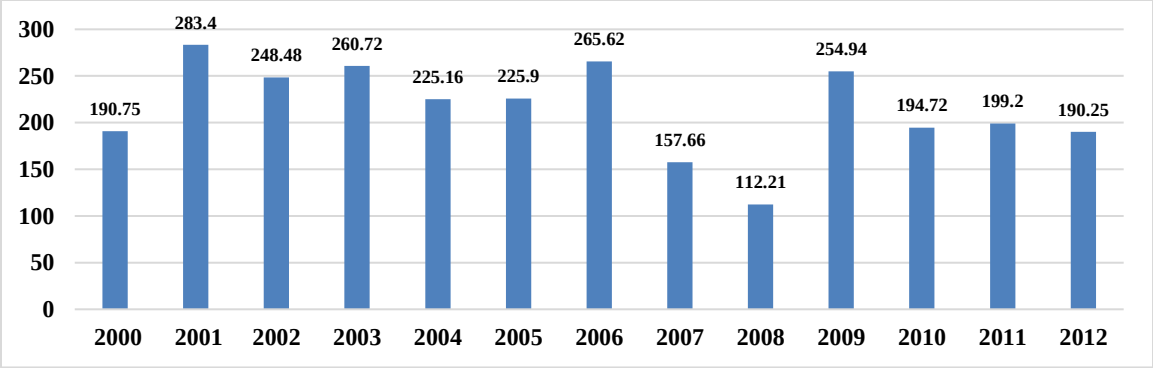


Figure (2-13): Annual Per Capita of Wheat in Syria 2000-2012
Source: Depending on Table (2-17).

2.4.2 Wheat Strategic Reserve in Syria

The strategic reserve is distributed to the different governorates of Syria to supply mills with their emergent needs for wheat within pre-prepared plans. The main means of shipping is cars and trains. This strategic reserve is based on the principle of renewing reserves and replacing them with new ones (AOAD, 2010). The number of silos is (32) with a storage capacity of (3.6) million tons distributed in various Syrian governorates as follows:

Table (2-19): Silos & Storage Capacity for Each Silo in Syria

#	Silo	Storage capacity (1000 tons)
1-	Tal Balat	100
2-	Adra	200
3-	Spinney	120
4-	Lathekia	120
5-	Tal Peder and Marous	250
6-	Hama	299
7-	Al Sahlabeia	12

Source: Multiple Sources

There are also several mills in Syria with high storage and production capacity. The Ministry of Internal Trade and Consumer Protection has established a number of companies to follow up wheat grain with all its production and storage:

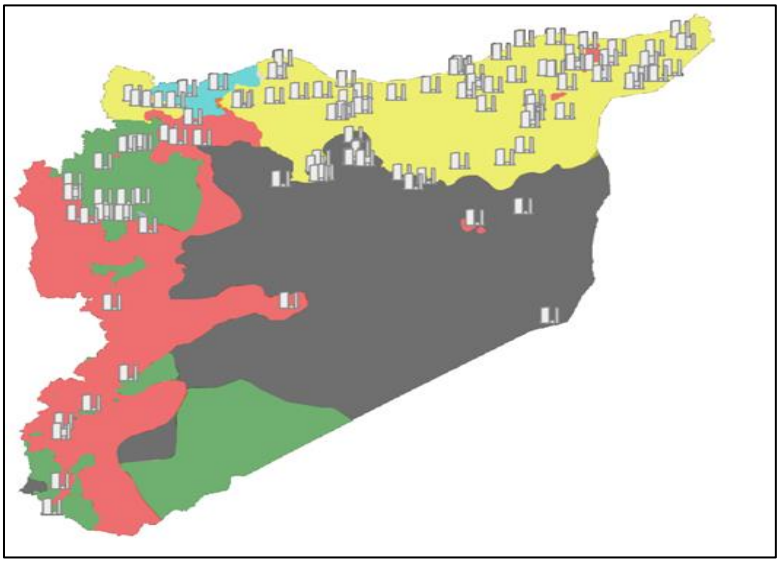
General Establishment for Grain Trade and Processing; General company for cereal silos; General Mills Company; General Company for Bakeries and General Company for Silos. (Ministry of Internal Trade and Consumer Protection-MITCP. (2019) ,http://www.mitcp.gov.sy)

Table (2-20): General Company for Cereal Silos in The Syria (2005 – 2012)

Year	2005	2006	2007	2008	2009	2010	2011	2012
NO. of silos	16	16	16	16	25	29	32	32
Maximum capacity (1000 tons)	1910	1910	1910	1910	2810	3210	3580	3650

Source: http://www.cbssyr.sy/yearbook/2010/Data-Chapter7/TAB-25-7-2010.htm.

According to the General Silos Company, Syria's wheat strategic reserves are adequate for more than a year. The most important characteristic of the Syrian experience is data availability involving meeting annual need for wheat local consumption and its production, considering the season and climatic conditions, monitoring the movement of international markets, following up all circumstances surrounding the reserve, and ensuring the best efficient ways of maintaining it; this allows Syria to overcome all potential difficulties coming to scene. Moreover, periodic reports are issued to decision makers indicating the stocks status in terms of quantity and the extent of their adequacy for both commercial stock and strategic reserve. (**AOAD**, 2010).



Figure(2-14) : Distribution of Silos and Stores in Syria
Source: https://imgur.com/a/rWdGh

It is noted in figure (2-13) that wheat silos are widespread in Syria since wheat is a strategic economic commodity, the Syrian economy depends basically on cultivating, storing, and exporting wheat achieving more self-sufficiency and food security in this country.

2.5 The Iraqi Experience

Wheat is one of the most important grain crops in Iraq containing a high percentage of carbohydrates, proteins and vitamins. It increases income of Iraqi farms and reduces imports from abroad. Iraq is one of the countries having rich natural resource, fertile land, favorable climatic conditions and accumulated agricultural experience which increase wheat production, reduce dependence on importing from abroad, and achieve self-sufficiency and food security for Iraqis, wheat is grown in most of all Iraqi regions and is suitable for climatic conditions. In northern side, it is grown in rainy season, and in a sedimentary plain it depends on surface water. Wheat has no need for deep soil and is the best crop responding to agricultural mechanization at all cultivation stages. Local varieties have been developed with high productivity and disease resistance. However, the fluctuation of rainfall in northern side causes fluctuating production with lower returns than other crops do. The average Iraqi wheat production is (1.5) million tons and the need is (3.5) million tons. The most important cultivated regions are Nineveh, Tamim, and Erbil in the north and Wasit in the plain. ((Oweida, M. A. ; W. O. Abdel-Hamid ; Hebat-Allah A. Mahmoud and S. H. Abdallah, 2016))

2.5.1 Production, Area, and Yield of Wheat in Iraq

2.5.1.1 Production

The production of wheat was estimated at (2178) thousand tons in winter season of 2018, with a decrease of (26.8%) when compared to (2974) thousand tons in 2017. Wasit

governorate ranked first in terms of production, which was estimated at (732) thousand tons of the total production, followed by Qadisiyah, which was estimated at (284) thousand tons (13%) of the total production, and followed by Babil where production was estimated at (222) thousand tons (10.2%) of the total production. as it is shown in table (2-21).

Table (2-21): Cultivated Area, Average Yield Per Dunum And Quantity of Wheat Crop Production in Iraq 2013-2018

Year	Total Area (1000) Dunum	Quantity of Production (1000) Tons	Average Yield (Kg / Dunum)
2013	7376000	4178000	566.5
2014	8437818	5055111	592.8
2015	4066467	2645061	637.9
2016	3680382	3052939	825.7
2017	4190123	2974136	705.5
2018	3134883	2177885	690.5

Source: Ministry of Planning, Central Bureau of Statistics, Production of Wheat and Barley, Numbers 2013-2018

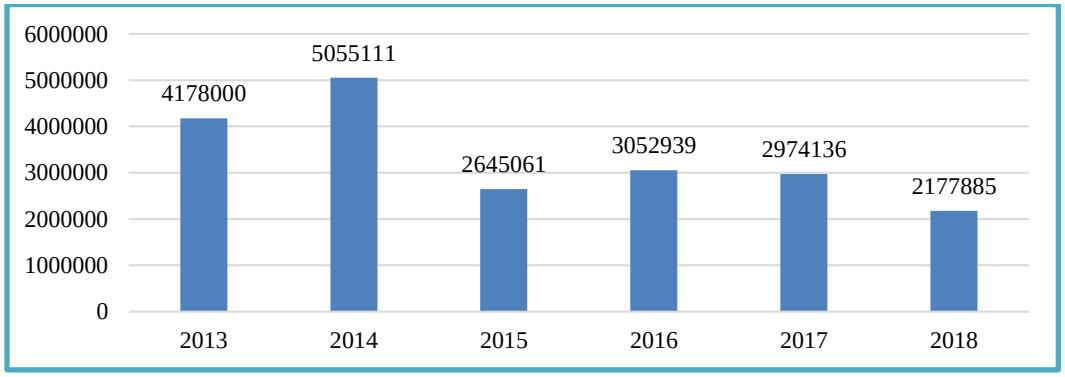


Figure (2-15): Quantity of Wheat Production (1000 Tons) in Iraq 2013-2018

2.5.1.2 Area

The cultivated area of the wheat crop was estimated at (3154) thousand dunums for the governorates irrigated by the winter season of 2018 with a decrease of (25.2%) compared to last year (4216) thousand dunums. The estimated harvested area for the same season was (3135) thousand dunums which was (99.4%) of the total cultivated area of the crop as is shown in table (2-21).

2.5.1.3 Average Yield

Table (2-22) shows that the average yield per dunum was estimated on the basis of the total cultivated area (690.5) kg for the winter season 2018, with a decrease of (2.1%) from 2017 estimated at (705.5 kg); the average yield per dunum was estimated according to the harvested area (694.7) kg, with a decrease of (2.1%) from the former season that estimated (709.8) kg.(Ministry of Planning- Iraq, 2018)

Table (2-22): Cultivated Area, Average Yield Per Dunum And Quantity of Wheat Production by Governorates in Iraq (2018)

Governorates	Area Cultivated (Dunums)		Production (Tons)	Average Yield (Kg / Dunum)	
	Total Area	Harvested Area		Total Area	Harvested Area
Kirkuk	348096	348096	201591	579.1	579.1
Diala	293994	293994	209748	713.4	713.4
Baghdad	128390	123068	91141	709.9	740.6
Babylon	254656	254656	222086	872.1	872.1
Karbala	37639	36965	28723	763.1	777.0
Wasit	947658	947658	731767	772.2	772.2
Al-Najaf	202114	192868	124286	614.9	644.4
Al-Qadisiya	430000	430000	283964	660.4	660.4
Al-Muthnna	100185	96632	48188	481.0	498.7
Thi-Qar	145772	145717	85479	586.4	586.6
Maysan	232704	232496	135275	581.3	581.8
Al-Basra	32733	32733	15637	477.7	477.7
Total	**3153941**	**3134883**	**2177885**	**690.5**	**694.7**

Source: Ministry of Planning, Central Bureau of Statistics, Production of Wheat and Barley, Iraq, 2018.

2.5.2 Iraq Wheat Per Capita Consumption

The table (2-23) shows that Iraq wheat per capita consumption ranged between (136.90) kg/year in 2014 and (130.08) kg in 2015, and it is (135 kg) a year. Figure (2-15) shows a sharp decline in per capita income in 2015 due to a low productivity of the wheat crop and the deceleration of agricultural development. This has led to a problematic food deficit and a gap between agricultural and population growth resulted from overconsumption of wheat

increasing the quantities taken from the reserves to meet the deficit and boosting imports (Oweida, M. A. ; W. O. Abdel-Hamid ; Hebat-Allah A. Mahmoud and S. H. Abdallah, 2016) [(74)]; in 2017, Iraq imported wheat various types estimated at (6,847,138) tons (Central statistical organization-Iraq, 2018).

Table (2-23): Iraqi Wheat Per Capita (2010-2015)

Year	Quantity of Consumption/ Million Tons	Population	Annual Per Capita Wheat / Kg / Year
2010	4.220	30868156	137
2011	4.333	31867757	136
2012	4.450	32957621	135
2013	4.569	34107366	134
2014	4.692	34273293	137
2015	4.738	36423395	130
		Average	**135**

Source: 1-Anbar Journal of Agricultural Sciences,2010.
2-www.populationpyramid.net
3-http://ar.wikipedia.org

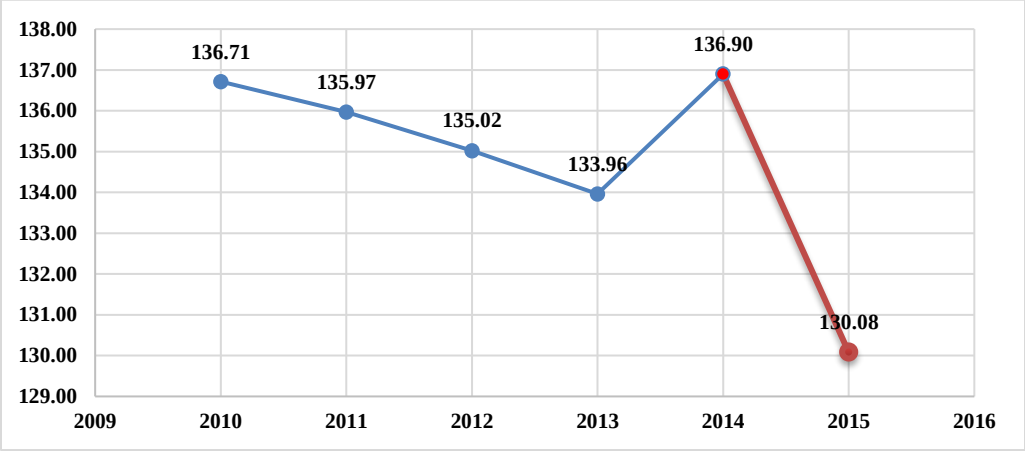


Figure (2-16): Iraqi Per Capita of Wheat (Kg / Year)

Figure (2-15) shows a decrease in per capita of wheat during 2010-2015 due to the war in Iraq, it is also noted the significant decline during 2014-2015 due to the outbreak of the civil war in Iraq causing a shrinkage of land suitable for wheat cultivation and the lack of agricultural development (Fearon, J. D. 2007).

2.5.3 Iraq Wheat Strategic Reserve

The aim of the storage process is to facilitate the flow of major food commodities to consumers, to cope with food crises occurring in local markets, to balance the supply quantities and to maintain prices. It is also a strategic objective maintaining food security and encouraging farmers to improve their production without fear of rapid fluctuations affecting their income (Al-Jubouri, 2015). The Iraqi government has established public companies managing the wheat importation, storage, distribution, and manufacturing operations to produce flour and bread for Iraqi markets and people.

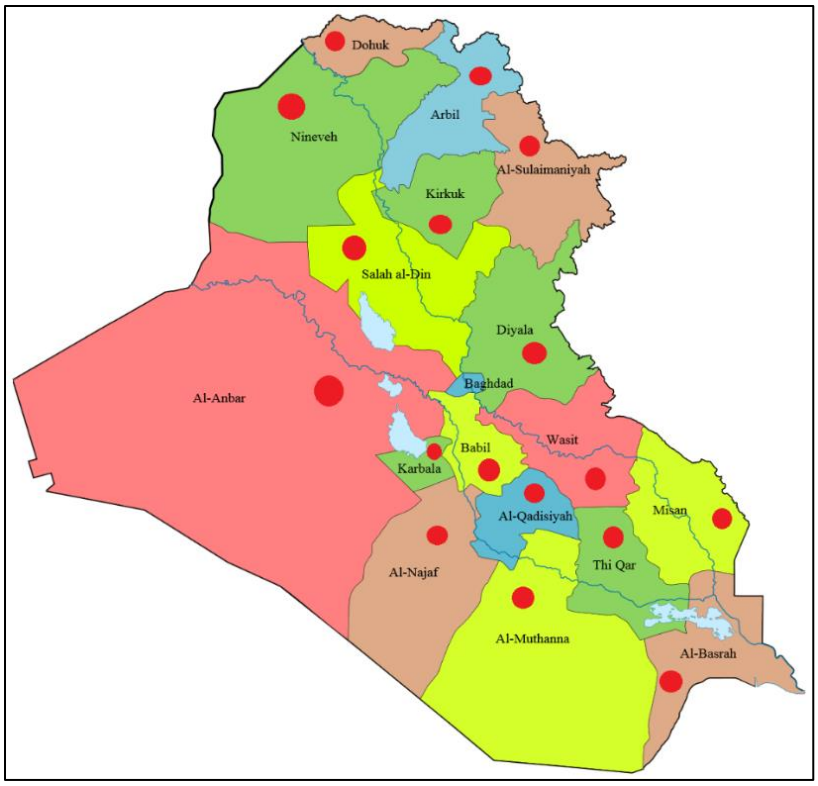
2.5.4 General Company for Cereal Trade

The company was established in 1939 and responsible for controlling prices and providing information about grain. Under Law No. (199) in 1969, it became one of the key bases of the general company for Grain. The duties of the company evolved after the issuance of the trade regulation board decisions of grain marketing in 1973. The company was canceled and linked to the Ministry of Commerce in 1987; it became the general company for cereal trade and processing in 1988, which was later split into two companies, and finally became the General Grain Trade Company in 1990. It succeeded in achieving the slogan of "the people's strength is sacred" during the period of economic siege imposed on Iraq in September 1990, where the company faced a difficulty in securing most important foodstuffs and meeting the country's needs of grain (Ministry of trade ,2019)

Table (2-24): Storage Capacity of Silos and Warehouses in Iraq

Governorate	Silos/Ton	Stores/Ton	Total/Ton
Dohuk	114,000	22,700	136,700
Nineveh	402,190	423,400	825,590
Erbil	97,000	100,000	197,000
Kirkuk	22,000	89,000	111,000
Salahaddin	245,600	243,000	488,600
Anbar	10,000	171,000	181,000
Diyala	155,800	170,500	326,300
Baghdad	290,200	490,375	780,575
Karbala	10,000	12,000	22,000
Babylon	107,060	130,000	237,060
Wasit	42,800	136,500	179,300
Najaf	116,000	118,000	234,000
Diwaniya	72,600	158,725	231,325
Al Muthanna	8,000	33,000	41,000
Dhi Qar	20,320	20,000	40,320
Maysan	26,720	50,500	77,220
Basra	133,960	38,000	171,960
		Total/ton	**4,280,950**

Source: Grain Board of Iraq – GBI, 2019



Figure(2-17) : Distribution of Silos and Stores in Iraq
Prepared by Researcher.

2.5.5 General Company for Grain Processing

It is one of the industrial productions and marketing companies affiliated to the Ministry of Commerce having 18 branches in Iraq and its general headquarter is in Baghdad.

2.5.6 Company Activities

- Supervising mills operation to ensure providing flour ration card and following up this process in accordance with the stated instructions.
- Meeting mill productive needs.
- Establishing modern flour mills in all Iraq governorates.
- Marketing for its products in local markets and citizens at subsidized prices.
- Fortifying flour with essential minerals.

Table (2-25): Daily Production Capacity of Iraq Mills / Ton

Mill	Production Capacity-Ton	Mill	Production Capacity-Ton
Alkut	200	Alnajaf	150
Sumar	150	Aldora	500
Dyala	150	Alanbar	150
Kurkok	200	Almukdadya	200
Alrusafa	150	Babil	150
Alhussein	150	Salahaddin	200
Sumawa	200	Maisan	200
Altajee	150		
Aldywanea	200		

Source: Ministry of Trade, 2019, Iraq, http://www.mot.gov.iq/index.php?name=Pages&op=page&pid=98

2.6 The European Union Experience

The EU is one of the largest wheat producers in the world, and the European continent contains a diverse climate and vast areas suitable for growing wheat, the following table (2-26) shows the amount of wheat produced in the EU for 2010 – 2019:

Table (2-26): EU's Wheat Production (2010 - 2019) MMT

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Quantities	136.7	138.2	133.9	144.6	156.9	160.5	145.4	151	136.9	150

Source: Index mundi,2019, https://www.indexmundi.com

As shown in Figure (2-17) below, the trend of rising wheat production in the EU for the same period caused by the high demand on this main commodity for industrial investment, production and export.

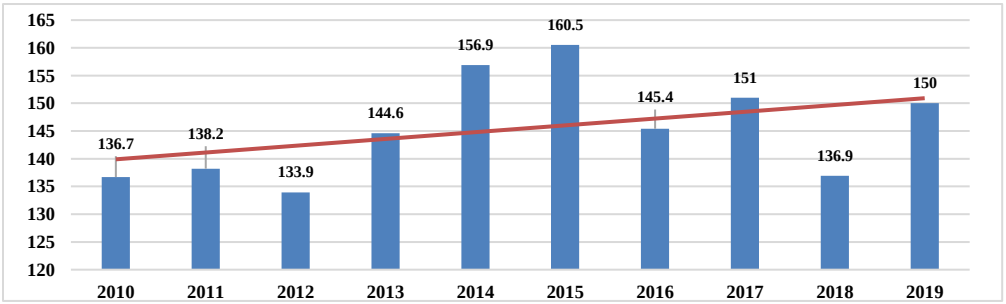


Figure (2-18): EU's Wheat Production (2010 - 2019) MMT
Source: Based on The Data in Table (2-25)

The European countries are different in terms of availability of wheat storage capacity, figure (2-19) shows their capacity in 2015; France is considered to be at the head of them with the largest storage capacity of (91,000,000) tonnes, followed by Germany (48,000,000) tonnes and Spain (30,000,000) tonnes. Among the Eastern Europe Member States, Poland (24,000,000) tonnes, Romania (23,000,000) tonnes and Hungary (20,000,000) tonnes. As a matter of fact, all 28 member states raised their storage capacity over the period. (Areté S.R.L, 2017)

European Union wheat ending stocks will have increased over (40%) by the end of 2019/2020 reflecting the large potential increase in production despite the expected rise in domestic consumption. (Knight ,2019)

Table (2-27): Production, Domestic Consumption and Ending Reserve in EU (2017 – 2020)

Year	Area Harvested (1000 HA)	Production (1000 MT)	Consumption (1000 MT)	Ending Reserve (1000 MT)
2017/2018	26150	151100	130600	13754
2018/2019	25700	137200	124100	10854
2019/2020	26600	153500	128000	15354

Source: USDA, Grain and Feed Annual,2019 **HA**: Hectares, **MT** = Metric Tone

It is noted in table (2-27) that the effort exerted by the EU to raise the quantity of wheat production in order to face the high consumption of wheat is shown in figure (2-18):

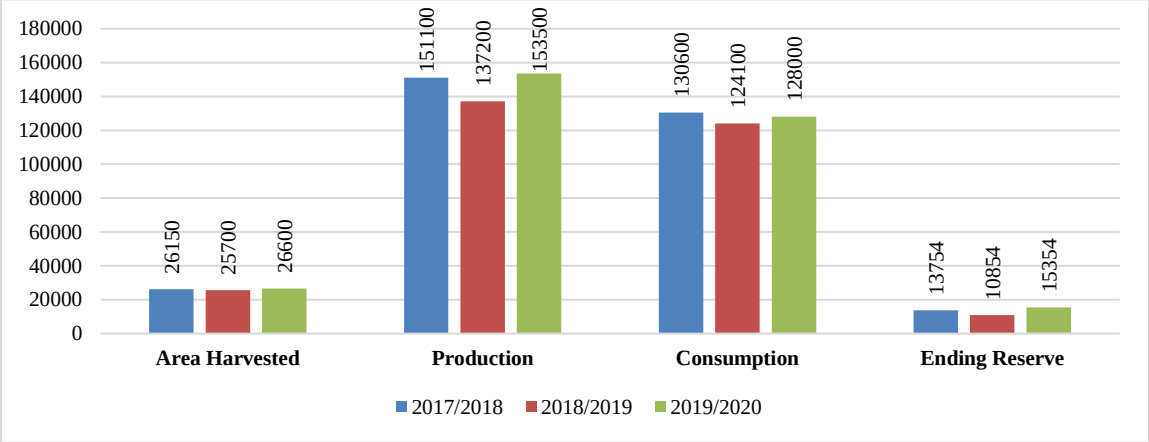


Figure (2-19): Production, Domestic Consumption and Ending Reserve in EU (2017 – 2020)
Source: Based on The Data in Table (2-27)

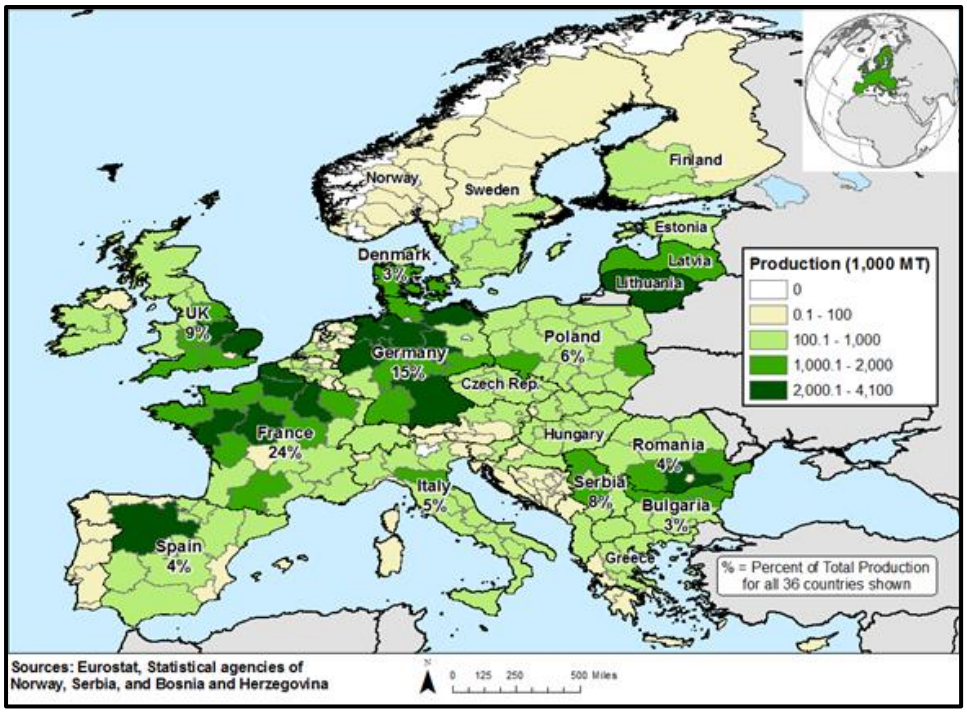


Figure (2-20): Europe Wheat Production, 2015.

USDA forecasts EU wheat production 2019-2020 will be (151,000,000) metric tons contrasting with (14,1000,00) metric tons in last year's harvest. In average, wheat production is predicted to remain at the same level the coming five years taking into account area is estimated at (26,100,000) hectares, with an increase of (2%) to the last year. Estimated area is (400,000) hectares below the 5-year average of (26,500,00) hectares. Yield is expected at (5.79) mt/ha, up (8%) to the last year, and (2%) over the (5-year) average of (5.66) mt/ha. According to USDA forecasts, France and Germany become the top wheat-producing EU countries. Harvest outcomes indicate that France's wheat harvest has been better than anticipated. According to the latest harvest data, USDA has over expectations that France wheat would rise from (1,500,00) metric tons to (40,200,000) metric tons. Meantime, Germany reports that its crops always used to be affected by

weather conditions; because of these reports, USDA has lower production expectations in Germany by (600,000) metric tons (USDA, 2019).

Germany and France rank first and second respectively in terms of wheat production, France represents 24% of the production of European countries, followed by Germany which does15% impacting on the volume of their strategic reserve. Figure (2-20) shows the distribution of wheat reserves in the EU countries.

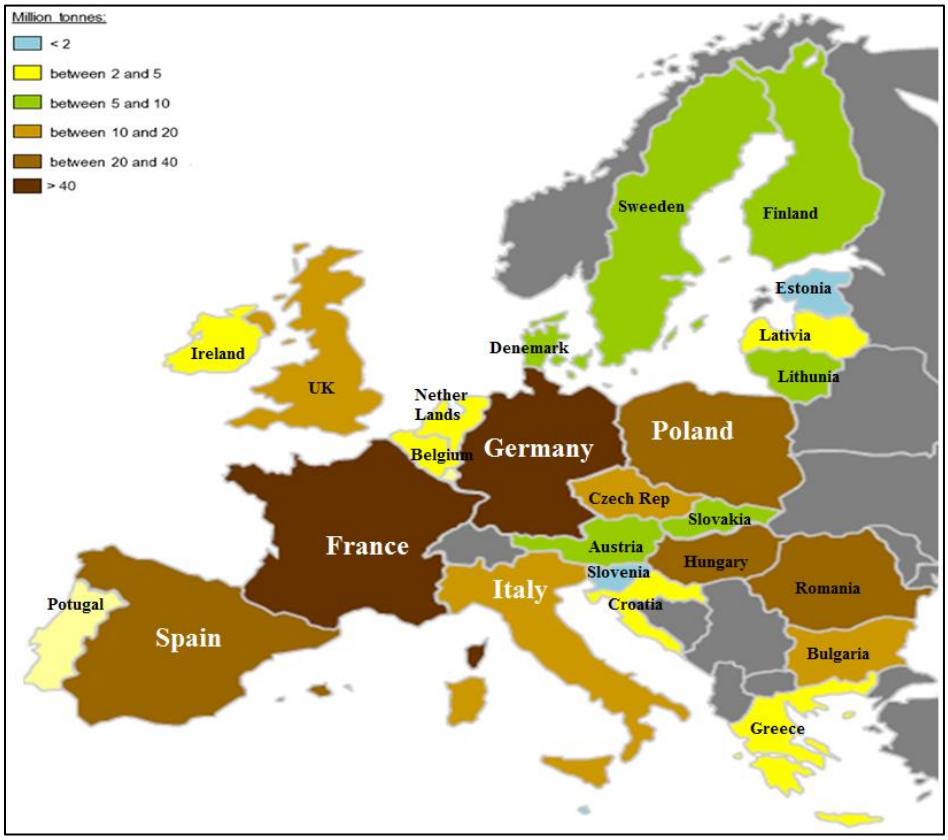


Figure (2-21): Distribution of Wheat Strategic Reserve in The EU Countries
Source: Eurostat

Like other countries in the world, the EU countries manage the strategic wheat stockpile through specialized institutions distributing and providing the stock needed to meet any emergency. It is noted that they are interested in building wheat strategic reserve, and improving agriculture to support their own wheat strategic reserve.

It also noted that each state has established an independent body for managing strategic stockpiles under its direct supervision to keep its economy and national security. Having reviewed readings of each of these countries' experience, the researcher found that Syria's one deserved to be taken as an example for Palestine to follow; Syria has improved and developed its agriculture sector paying a great interest in agriculture, especially wheat, and cultivating large areas of wheat. Syria's strategy was to create motivations and incentives for farmers to exploit more agricultural lands grown with wheat; this led to achieve wheat self-sufficiency and a significant increase in the wheat strategic reserve, supported by Syrian government to avoid importing wheat from abroad. Consequently, wheat has become one of the most important pillars of Syrian economy. Finally, it is noted from the above maps that these countries have accurately chosen locations of building silos and warehouses near the most fertile areas, crossings and ports as in Iraq, Syria, and Egypt, to facilitate the transport and storage of wheat; chapter four discusses this in more details. Table (2-28) shows what was mentioned in the second chapter.

Table (2-28): Summary of Wheat Production, Consumption and The Period Covered by The Strategic Reserve of Each Country

Country	Production (Tons)	Consumption (Tons)	Imports (Tons)	Food Gap	Number of Silos	Strategic Reserve\MMT	Reserve Duration\ Month
Egypt	**7,290,000**	**12,000,000**	**5,420,000**	**-47,10,000**	**55**	**3,000,000**	**6**
Jordan	**24,675**	**1,350,000**	**1,069,720**	**-1,325,325**	**5**	**202,000**	**12**
Syria	**3,609,000**	**4,164,000**	**484,960**	**-555,000**	**32**	**601,000**	**12**
Iraq	**2,177,885**	**4,738,000**	**400,000**	**-2,560,115**	**17**	**708,000**	**6**
EU	**137,908,000**	**128,000,000**	**24,000,000**	**9,908,000**	**-**	**12,936,000**	**12**

Source: Multiple Sources
Prepared by Researcher

Chapter Three: Current Situation in Palestine

Overview

It is important to shed light on Palestine food security current situation, the role of wheat strategic reserve in overcoming food security weakness, the role of agriculture, wheat and its current stock in pushing its economy, any hinders facing wheat strategic reserve, and the role of the government and other sectors of agriculture in building a wheat strategic reserve. The purpose of this chapter is to clarify the relationship between the agricultural sector with all its components (cultivated areas, improved seeds, labor, investment, etc.) and the wheat strategic reserve letting decision- makers take more advantage of agriculture in strengthening Palestinian food security through building a wheat strategic reserve, which is able to cope with any potential emergency crises.

3.1 Overview of Wheat Production at global, Regional and Local Levels

Wheat is a strong crop that can grow in a wide range of environmental conditions allowing large-scale cultivation and long-term storage; it has helped the urban communities to emerge for thousands of years. Currently, about (65%) of the wheat crop is used as food, (17%) for animal feed, and (12%) for industrial uses, including biofuels. Imports have facilitated global consumption of wheat, especially in developing countries, including many of non-wheat-producing countries, and where increased water and land strict limitations are hindering production growth (FAO, 2013).

Wheat (golden oil) is fundamental to feed (3 billion) people, especially in Arab world, where most of consumers are often unable to produce, and the Arab countries are the world's wheat first importer; they import one-third of the world's sales. Since they form (6%) of the world's population, they are considered to be a strategic important weigh. Five

countries produce more than half of the world's wheat (India, China, Russia, the USA, and the EU), in addition to several exporting countries including Canada, Australia, Ukraine, and Turkey; this total group produces (85%) of the world's production and provides a world market with (160 million) tons a year valued at (50$ billion).

Sébastien ABIS (2015), a researcher at the institute for international and strategic relations and a writer of geopolitics of wheat, considers North Africa and the Middle East, which account for (6%) of the world's population, to be one-third of wheat purchasers all over the world; from Morocco to Egypt, the highest consumption rate in the world is (100 kg) of wheat for every person a year, this is twice as high in the EU and three times for the rest of the world. Indeed, soil quality, climate, water scarcity, and population growth are driving people into excessive dependence on grains. He points out that this economic and strategic element is either neglected or underestimated by decision-makers referring to global demand exceeding eight times for the period 1998 – 2013, and the price of wheat was 80 % more expensive in 2013 than it was in 2005. He indicates that wheat is the most agricultural and food production in the world describing wheat market as a market of fear to strengthen its ever dominance.

Table (3-1) shows wheat production on global, regional and local scales, that's according to World Bank World Development Indicators:

Table (3-1): Quantity of Wheat Production in The World, The Arab World and Palestine (2010-2016)

Year	World (Million Tons)	Arab World (Million Tons)	Palestine (Thousand Tons)
2010	640	44.7	26.9
2011	697	49.6	24.6
2012	672	52.4	35.9
2013	711	60.1	59.1
2014	726	57.4	47.3
2015	751	54.1	44.2
2016	749	50.5	44.3

Source: The world bank, https://data.worldbank.org

The change rate in world wheat production in 2016 was (17%) from the base year 2010, and for Arab world was (13%), and Palestine was (63%); this increase was because of high demand on wheat as a strategic commodity.

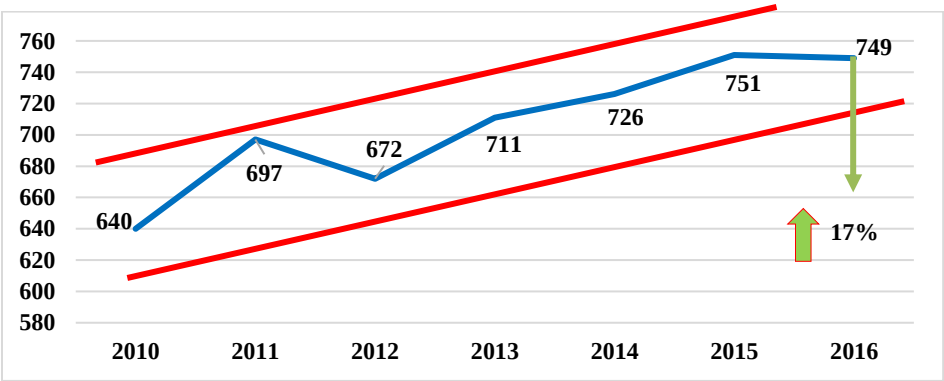


Figure (3-1): World Wheat Production (Million Tons) 2010-2016
Source: Prepared by The Researcher Based on The Data in Table (3-1)

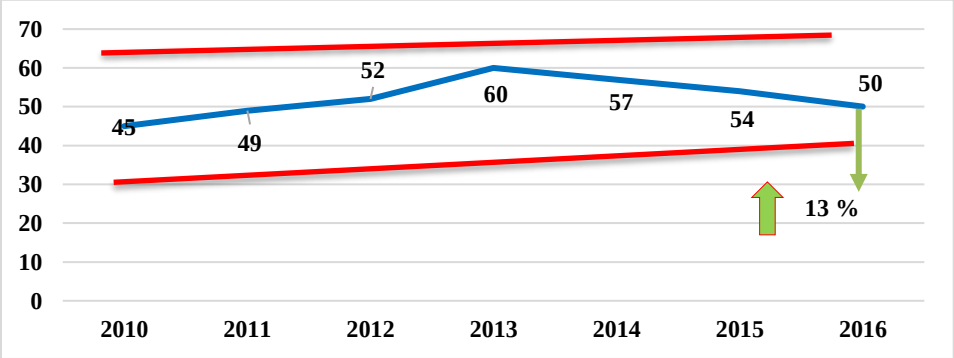


Figure (3-2): Wheat Production in The Arab World (Million Tons) 2010-2016
Source: Prepared by The Researcher Based on The Data in Table (3-1)

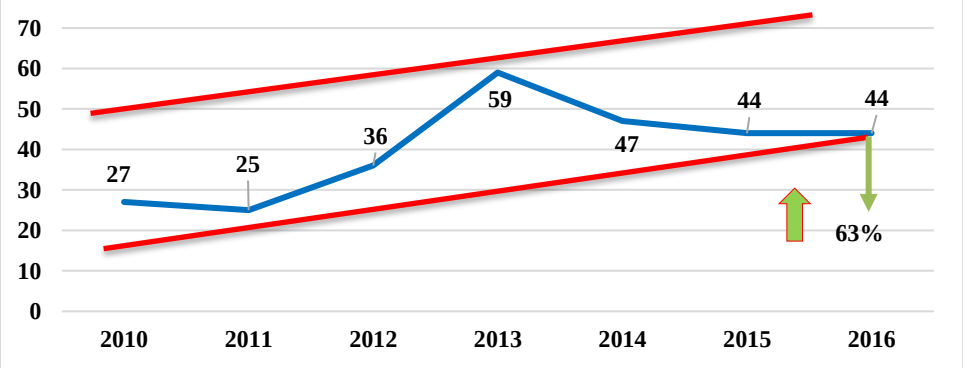


Figure (3-3): Palestine's Wheat Production (Thousand Tons) 2010-2016
Source: Prepared by The Researcher Based on The Data in Table (3-1)

According to FAO statistics (http://www.fao.org/faostat/ar/#data/qc), table (3-2) shows that the Palestinian wheat harvested areas in 2017 were (15,489 hectares) at a change rate (16.1%) higher than the base year 2012, while the quantity of producing wheat in 2017 was (34,542) ton, increased up to (29%) for the base year 2012 and these areas and quantities of wheat were insufficient to meet people needs. Indeed, it was not encouraging to build a wheat strategic reserve wholly and partially.

Table (3-2): Suitable Land Area for Growing Wheat and Quantity Produced 2012 - 2017

Year	Harvested Area /He	Production/Tones
2012	13,340	26,670
2013	17,360	41,720
2014	17,360	41,720
2015	13,270	26,320
2016	14,400	37,030
2017	15,489	34,542

Source: FAO, FAOSTAT,2019 **Area =** Hectare**; Quantity** = Tons

However, Palestinian wheat crop can be improved through vertical development strategy, (improving land productivity, using the best technological methods in agriculture and using improved seeds), and through horizontal development strategy (increasing the total cultivated wheat area adopting an expansion plan for land reclamation, rationalizing consumption, and giving farmers price incentives). (Ashraf Barakat, MOA, 2019)

3.2 Food Security Status in Palestine

The strategic reserves plays a key role in food security considering other countries' past experiences, including some developing countries, which suffered from the negative effects of the 2007-2008 global food crisis caused by the failure of the 2007 agricultural season, with a decline in the volume of food cereals stocks versus high oil prices; therefore,

food prices have rapidly risen and the crisis worsened affecting (25) major cereal-producing countries, either by banning or restricting their grain exports. This has led prices to increase preventing many of low-income countries from providing world markets with adequate supplies of food. Meanwhile, many countries have suffered from political and social instability (AOAD, 2014).

Palestine, as a part of international system, was like other countries affected by this hard crisis and has been suffering from the Israeli occupation, which practises arable land and water sources confiscation, demolition, displacement, closures and blockade, and settlements causing a major threat to food security; Palestine food-insecure areas lacking of public service sector are Jenin, Tulkarem, Qalqilya, Bethlehem, Hebron, Nablus and Tubas due to military zones existence, poor Bedouin rural communities near borders, closed areas, settlements, and dry areas (AOAD, 2007).

Based on what has been mentioned above, it is necessary to build a strategic reserve of cereals, especially wheat, which helps to overcome the obstacles of food security in Palestine, where strategic grain reserve concentrates on:

- Ensuring cereals supplies flow in emergency situations.
- Adopting a policy of cereal prices stabilization and reduce their fluctuations.
- Playing a key role in long-term strategies of food security ensuring that local producers' commodities of cereals, especially wheat, are protected when facing recession and low prices as a result of abundance.
- Preventing a sudden shortage of grain supplies in markets.
- Promoting domestic cereal production purchasing local agricultural production for food reserve sake, contributing the income of cereals rural producers to

improve, stimulating them to increase their production, and supporting long-term rural development.

- Responding to supply and demand on cereal quantities.
- Restoring confidence in markets through ensuring adequate grain are available (AOAD, 2014).

Palestinian territories have been subjected to political, social and economic conditions created by 71 years of Israeli occupation causing political instability, Israeli control over Palestinian natural resources, borders and crossings, restrictions on the movement of people and goods, settlement expansion, territorial fragmentation of West Bank and the siege imposed on Gaza Strip, a highly distorted economy, non-productive and non-tradable sectors such as agriculture, construction, services, finance and public sector (MAS, 2017, P.11).

The annual report of the survey of socio-economic conditions and food security (2013), implemented by PCBS, FAO, UNRWA and the WFP, about food insecurity in Palestine is very crucial. One third of Palestinian households, (1.6) million people are food insecure, according to the 2013 annual food security survey, the level of food insecurity in Gaza was much more widespread, reaching (57%), almost three times the level of West Bank, which is 19%; food insecurity levels have not changed compared to 2012. High levels in 2012 and 2013 were the opposite of that in 2009-2011, during this period, the level of food insecurity in Palestine dropped to (27%). The most significant impact on food insecurity levels in Palestine is the high poverty rate due to Israeli restrictions on movement, high food prices, and obstacles to the Palestinian economy. Although food is available and sufficient in Palestinian markets, prices are still increasing causing a lack of food diversity

and nutritional value. The results of the survey showed that the majority of households of West Bank and Gaza Strip spent more than half of their income on food (PCBS,2013).

There were several factors affecting food security levels in Palestine; economic growth fell to (0.1%) in the first half of 2013 compared to the same period in 2012 in terms of fixed prices (base year 2004), according to available data in PCBS, the decline in foreign aids and Israeli imposed restrictions on West Bank made economic growth unable to contribute to reduce food insecurity levels. Similarly, the siege imposed on Gaza did affect its local economy preventing productive sectors recovery and restricting importation to practice more pressure on employment; the unemployment rate was (40.8%) in the first quarter of 2014, which was about (180,200) people, the highest was in the last five years; food insecurity high levels with a decline in UN funding programs caused painful suffering to this group which grew in mid-2014. In addition, the decrease in vital humanitarian programs had significant implications while needs were increasing. However, Palestinian food insecurity situation could be sustainably improved by addressing crisis root causes, such as the siege on Gaza and restrictions on movement in West Bank (PCBS,2014).

Lahlouh (2017) explained that Israeli occupation still controls (62%) of West Bank under the so-called "C" areas, and (85%) of Palestinian water resources; moreover, it has been constructing the apartheid wall, which holds more than (80%) of West Bank fertile agricultural lands.

The World Food Program (WFP, 2006) indicates that the most important factors of food security deteriorating levels are the impact on household income because of reducing the direct payments of the Palestinian National Authority, suspension of tax payments, crossings closure, and the implications of apartheid wall construction.

The recent deteriorated economic growth accompanied by a dramatic increase in Palestinian population growth led to stagnation, a decline in per capita income, a reduced contribution of productive sectors in agriculture and industry, and socio-economic implications; this means that economic growth - which was weak during the previous period - was driven by activities with limited capacity to create jobs opportunities causing the unemployment high rate of the workforce to increase (30.2%) in 2018. (PCBS, 2018)

Article (10) of the Palestinian Basic Law in 2003 stipulates the need to protect human rights and personal liberties and urges the Palestinian National Authority to become without delay a party in international and regional treaties and conventions for protecting human rights (Amended Palestinian Basic Law, 2005), including the right to adequate food based on international human rights instruments. International human rights law has also clearly recognized the right to food as a fundamental human right, and it links it to fundamental rights guaranteeing human dignity (U.N, 2013).

When designing national and international policies responding to food insecurity, Palestine considers this a priority at the top of its concerns, to ensure the implementation of these international instruments aiming at guaranteeing the economic, social and cultural rights of the Palestinian people (MAS, 2017, P.11).

One of the causes of food insecurity in Palestine is a lack of economic potential for food because of poverty. Although instability and insufficient food supply can be sometimes a risk because of Israel procedures and practices (E.g. during periods of siege as in Gaza, restrictions on movement), markets are often able to meet the demand on. In other words, it is possible to say that there is national food security at a macro-level (food availability), but at a micro-level, Palestinian households suffer from food insecurity leading

consumption to decline; as a result, households of severe food insecurity earn, on average, about half per capita daily income of food security ones (MAS, 2017, P.15).

Hamidat (2017), explained that achieving food security comes through mobilizing the various potentials, both material and human, paying more attention to the agricultural sector, developing it, raising its production capacity and enhancing its competitive ability in order to provide food to the citizens and move them out of poverty (Hamidat, Abeer, 2017, P.106)

3.3 Agriculture and Wheat in Palestine

Agriculture for Palestinians has always been more than an economic activity, a means of providing food and decent living. Moreover, it is a pillar of steadfastness, attachment to the land and roots, and an integral part of deeply rooted Palestinian heritage. Therefore, agriculture and farmers support should not be included in fiscal feasibility and priorities since direct quantitative indicators do not reflect the importance of this vital sector. The role of Palestinian agriculture is to provide food, protect the land and environment, provide job opportunities, contribute to exports, and provide food industries with raw materials (PECDAR, 2007).

In 2015, Ministry of Agriculture put forward a plan of promoting agricultural sector as a productive sector and one of the Palestinian economy most important components through its contribution to GDP by (5.6%), providing employment by (11.2%), and its contribution to national commodity exports by (12.2%), enhancing agriculture food security, and supporting other economic sectors (Ministry of Agriculture, 2015).

Barakat (2019), emphasized the existing relationship between agricultural development and wheat strategic reserve by enhancing the independence of foodstuffs, and one of the

pillars of agricultural development is preserving food resources in quantity and quality, thus maintaining satisfactory and profitable price levels for producers and creating a balance between supply and demand.

3.3.1 Difficulties Facing Palestine Agriculture Sector

Although Palestine is considered to be an agricultural country, the agricultural sector in Palestine, like other sectors, faces many problems and difficulties, including the Israeli occupation, problems related to natural and environmental resources, technical problems, problems of a social and economic nature, and institutional and legislative problems, causing a decline in the agriculture sector contribution to the GDP, and farmers' reluctance to engage in agriculture because of agricultural production high costs compared to imported agricultural commodities. In addition, no organizations are found to protect farmers when their product prices decline; the Israeli occupation policies based on practicing annexation, expansion, and seizure of fertile agricultural land affecting the agriculture wherever it is (Besharat, MOA, 2019).

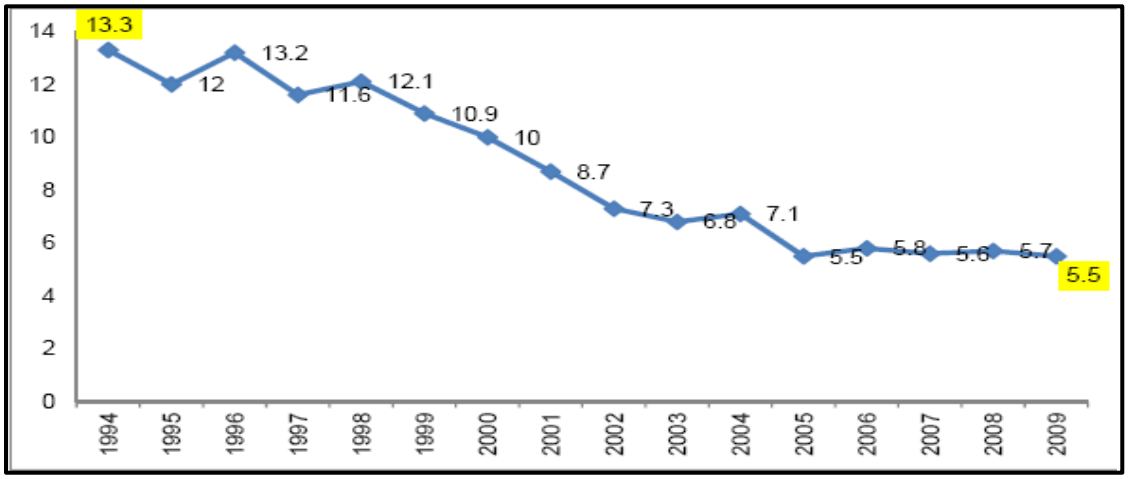


Figure (3-4): The Contribution of The Agricultural Sector to The Local Product 1994-2009

Source: PCBS.

3.3.2 The Role of the Agriculture Sector in Palestinian Economy

Agriculture is an important economic sector in Palestine, which provided employment with (11.5%) of the total labor force in 2010 (PCBS, 2012). In 2011, the agricultural production total value in the Palestinian territories, according to the PCBS, was about (1.295) million dollars divided into (70%) for West Bank and 30% for Gaza Strip (PCBS, 2012). In terms of agricultural trade, agricultural products were about (6.3%) of total exports and agricultural exports were (56.7) million dollars at the end of 2013 (PCBS, 2015). As a matter of fact, it contributes the income and food security to increase and preserves the environment and production inputs. Aslan (2015) indicated that the cultivated crops total area in occupied Palestinian territories in 1967 was (242,000) dunums, of which (102,124) dunums were planted with wheat, while the share of rain fed crops was (225,786) dunums by (93.3%), compared with (16,214) dunums irrigated by (6.7%), and the production rate of a wheat dunum was between (150-180 kg) in good rainy years; however, these figures are still unable to change the fact that the average per capita consumption of wheat is about (120 kg) a year and the production rate is (41,000) tons a year, while the need of wheat is (400,000) tons a year, and a self-sufficiency ratio of wheat -production/consumption- is about (10%) (Aslan, 2015).

3.3.3 Importance of Wheat in Palestine

The importance of the wheat crop in Palestine is shown as food for both humans and animals, and is the only material that makes bread containing ingredients that have a high nutritional value: (11-15%) protein, (2%) fat, and (63-68%) starch. Wheat is used in many food industries, including bread, pasta, biscuits, alcohol, starch, fodder, bran, and hay produced when harvesting wheat plants. Its cultivation is suitable for temperate weather

and moderate humidity; it cannot be cultivated in hot climates and cold weather (Ayoub, MNE, 2019). On the contrary, the heavy rainfall with high temperatures are always unsuitable for the wheat crop leading to fungal diseases spread and plant decomposition.

The suitable soil for wheat cultivation is a fertile, medium-sized, and good-quality soil realizing that sandy and poor land is not suitable for cultivation because of saline and alkaline soils. As a matter of fact, wheat cultivation comes in a bio-agricultural cycle through which the planting time depends on area and weather conditions; it is generally grown in October and November, the seed rate of wheat cultivation depends on the type of cultivar to be grown, germination and cultivation date, type of soil, weather conditions, and method of agriculture. The most important types of wheat grown in Palestine are locally cultivated varieties (hives, yellow shape, white shape, Number 8, Hawrani, Ammar, Mayki, Al Rabee, Sham 1, Sham 3, Sham 5, Umm Qais, Barkah, Class 870, and Amber). (Aziz Salama, Abdullah Al-Omari, Nasser Al-Abbadi, Sameh Jarrar, 2014, P.2)**.**

3.3.4 Wheat Grown Areas in Palestine

Wheat, which is a key pillar of Palestine national food security, is grown in January and harvested in June, its cultivation spreads over three areas: firstly, the eastern and southern regions, which are characterized by good soil and relatively high ownership rates; their annual rainfall rates are low ranging from (250-350 mm), these lands are the wheat production main contributor, accounting for (50%) of the total harvest in West Bank. Secondly, the central mountainous areas expanding from Jenin (north) until Hebron (south), their soil is described as medium-sized with an average annual rainfall of (350-450 mm/yr), and increasing further northward, eventually contributing (30%) of the crop.

Thirdly, the western and north-western areas of the "semi-coastal" area include Jenin plains and the surrounding areas, which are (100-300) meters above sea level contributing more than (450 mm/yr), they have a good soil so that they can contribute (20%) of Palestine's wheat production (Maan, 2015).

3.3.5 Self-Sufficiency Ratio and Food Gap of Wheat

According to Unified Arab Economic Report (2009), the food gap represented the difference between locally produced quantities and total quantities needed for domestic consumption (Arab Monetary Fund, 2009, P.172), in the sense that there was a local production capacity deficit in providing these quantities to cover food requirements shortage, and usually covered by import. The wheat self-sufficiency ratio and the food gap of the wheat were calculated in table (3-3) below:

Table (3-3): Self-Sufficiency Ratio and The Volume of The Wheat Food Gap in Palestine (2010-2016)

Year	Population	Local Production (Ton)	Consumption (Ton)	Degree of Self-Sufficiency from Local Production	Food Gap
2010	4,023,462	26,936	298,014	9.04%	91.0%
2011	4,124,795	24,638	304,407	8.09%	91.9%
2012	4,226,410	35,898	310,818	11.55%	88.5%
2013	4,327,751	59,051	317,212	18.62%	81.4%
2014	4,429,084	47,262	323,606	14.60%	85.4%
2015	4,530,416	44,208	329,999	13.40%	86.6%
2016	4,632,025	44,287	336,409	13.16%	86.8%

- **Source (1) FAO, Electronic Files and Web Site. (2) PCBS,2017.**
- **Annual Per Capita Wheat** = (120 Kg); **Self-Sufficiency**= (Local Production /Total Consumption)*100
- **Food Gap Ratio** = Self-Sufficiency - 1

By dividing the volume of domestic wheat production by the volume of available consumption, it equals the degree of self-sufficiency:

Wheat self-sufficiency = (local production / total consumption) X 100

(International Forum on Agricultural Production and Food Security Stakes, 2010)

The degree of food self-sufficiency measures the degree of self-reliance, when the degree of food self-sufficiency equals to (100%), this means full self-sufficiency, this occurs when local production is equal to that available for consumption. Non self-sufficiency is when consumption is greater than domestic production, table (3-3) above shows the size of the large food gap of the wheat commodity, this gap is bridged by imports.

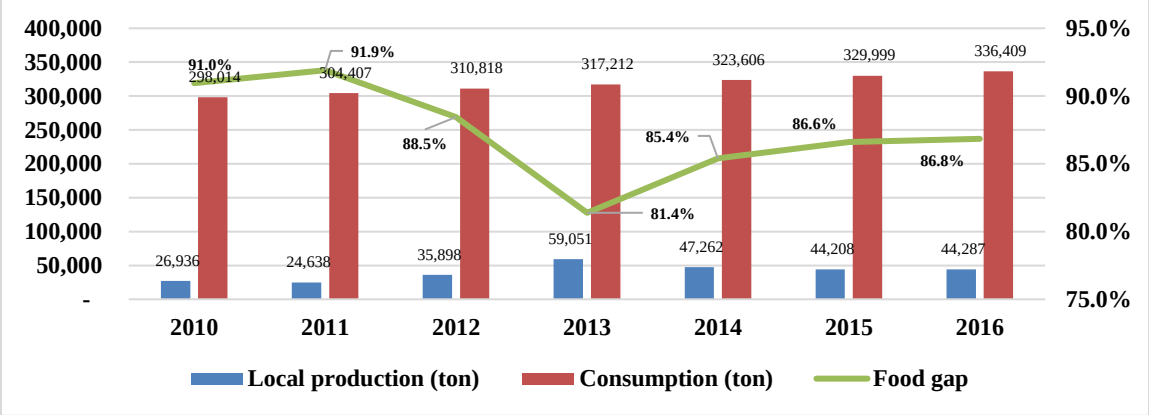
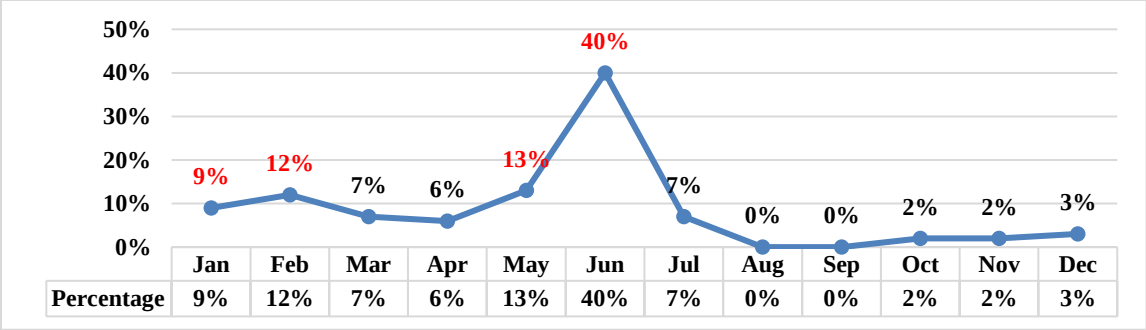


Figure (3-5): Volume of Local Production, Consumption and Food Gap of Wheat 2010 - 2016
Source: Prepared by The Researcher Based on The Table (3-3)

3.3.6 Field Crops:

According to the data of Ministry of Agriculture (2013), related to the cultivation and production of agricultural crops in 2012/2013 seasons, the area of cultivated land in West Bank was (31.1%) of the total agricultural productive lands including horticulture, olives, field crops and vegetables (Ministry of Agriculture, 2013).

Field crop production was (16%) of total crop production, with an average yield of field crops was (492 kg/dunum), and an annual production of (79,923) tons. (73%) of the agricultural field crops production was in four months: January, February, May, and June (ARIJ, 2015).



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Percentage	9%	12%	7%	6%	13%	40%	7%	0%	0%	2%	2%	3%

Figure (3-6): Distribution of Agricultural Production of Field Crops by Month - 2013
Source: Prepared by The Researcher, Multiple Sources

The total area of wheat cultivated in West Bank was (143,326) dunums, the wheat cultivated area constituted (2.22%) of the total area of field crops, the wheat total annual production was (25,926) tons, constituting (5%) of the total crop production, Jenin was the most productive governate of wheat, with (36%) of the total production, followed by Hebron (16%) and Nablus (11%) (ARIJ, 2015, P.9).

3.3.6.1 Problems Facing Field Crops

1. Volatility of rainfall from one rainy season to another.
2. The warm and dry wind blows: periodic (Khammasin).
3. Lack of farmers' concern for using fertilizers, pesticides, and herb control, in accordance with agricultural cycle.
4. Farmers are not interested in using appropriate plows.
5. The farmers' tendency to plant trees at the expense of field crops.

3.3.6.2 The Reasons for Cultivated Field Crops Areas Decline

1- Financial return decrease because of high costs, low productivity, and degradation of varieties and strains adapted to local environmental conditions.

2- Property fragmentation.

3- Urban crawling.

4- Farmers' reluctance to agriculture sector and the trend towards other ones.

5- Opening the door for foreign imports of wheat including Israeli one, making domestic production incomparable to wheat from abroad in terms of cost; importing wheat from abroad becomes less expensive than a domestic wheat production (Ubouri, 2015, P.12).

3.4 The Role of Strategic Stocks in Achieving Food Security

According to Al-assraj (2012), providing food has economic, social and political importance, in other words, providing food basic commodities to the population, such as wheat, which is a key pillar of human life. As a matter of fact, it is essential to avoid depending on imports from abroad to meet population food needs; therefore, the agricultural reality must be promoted to provide population requirements and directing the surplus towards a stock which keeps a countries' stability. As it has been mentioned before, strategic food reserve represents the defense first line against any sudden drop in food supplies and purchasing power affecting those who cannot afford food.

According to Al-Jubouri (2015), agricultural storage is an effective means of addressing the food problem of most developing countries and is an essential element of strategic planning. Strategic food reserves are considered to be factors reflecting the food security situation. Therefore, they are needed for a stock of food supplies, especially market stocks such as wheat, barley, rice, and maize to ensure an economic and political independence of any country. To achieve this, foodstuffs must have specifications, being suitable for storage and having strategic status, such as high nutritional value, availability and easy access to the markets, and acclimatization with food consumption base and repeated consumption; these specifications apply clearly to wheat.

Adam (2016) explained that food commodities reserve and quantities change in agricultural seasons are closely related to food supply; the strategic food reserves are used to balance prices; when they increase in the case of low supply, a country uses its food reserve to meet market needs, and vice averse when the price levels decrease in case of high supply, the country purchases additional quantities for food reserve. It is realized that an emergency reserve of foodstuffs is mainly for facing crises of potential food shortage.

Abu Hilal (2011) sheds light on the importance of storing a strategic food reserve as a food security tool. The food security system maintains a strategic food reserve of foodstuffs having nutritional value for a period before being released to markets, equivalent to 10% of its annual needs.

3.5 Wheat Reserve in Palestine

The AOAD (2014) classified the food reserves as (Buffer Stocks) to maintain price stability, which are stored by countries to maintain food price stability, prevent their spillage, and prevent producers going out of business because of a drop in prices (Mark Curtis, 2014, P.15); emergency food reserves, a government strategic reserve of food that is stored for emergencies and crises situations. (AOAD, 2014, P.2).

In Palestine, wheat stocks take several forms, such as individual storage, where people store their wheat needs along the year inside small warehouses in drums, large bags, or stock with traders and local market agents. The operational storage which is currently prevailing in Palestine, namely the wheat stock in companies being in West Bank and Gaza, is exploited in daily industries of each company, and is unreliable to face any emergency because this reserve suffices for several weeks at best.

Walweel (2015) indicates that the need to develop a strategic plan to deal with the strategic Palestinian stock of wheat, which is considered to be a strategic commodity; the need of West Bank and Gaza for wheat flour is (30-35) thousand tons a month, which means around (600,000) tons of wheat is annually needed. Providing strategic stocks of wheat flour requires the government to intervene and initiate such a move by keeping (150-200) thousand tons of wheat as a strategic stock, which is zero, exposing all sectors and citizens to wheat increasing prices at an international level, especially if natural disasters occur in the major wheat exporting countries. Therefore, establishing silos accommodating up to (200) thousand tons of wheat is the government responsibility through implementing more studies of finding a mechanism to ensure the realization of wheat strategic reserve.

The deputy minister of agriculture, Lahlouh (2017), said that it is absolutely necessary to provide a strategic reserve of commodities especially wheat, in local markets for the coming six months. Achieving this, silos are needed to provide sufficient strategic stocks of wheat for the coming months.

Abdel Rahman (2014) explains that Palestine has no silos to store wheat for the time being; the only reserve of Palestine is in private importers' warehouses. Therefore, Palestinian government has no quantities of wheat stocks to be used if an emergency comes to the scene; the entire reserve of wheat is enough for a short time and owned by the private sector which imports this crop from Israel. Moreover, negligible amounts of wheat are available to Palestinian farmers who cultivate it for their families' daily needs, and the government takes no practical steps to establish wheat silos since challenges and priorities are more important than providing a strategic stock. As a matter of fact, what has been mentioned above was discussed at the last meeting of the League of Arab States which concentrated on providing wheat strategic reserves to enhance Arab food security.

3.6 Obstacles of Establishing Wheat Strategic Reserve

3.6.1 Political Obstacles

The political obstacles are divided into external and internal ones. The external political ones come from Israel as follows: Firstly, it controls areas classified (C) which is most important (63% of West Bank) for establishing strategic projects; consequently, Israel makes it more difficult to grant permits and approvals for any project to be in (C) areas. Secondly, it restricts importation volume violating all the agreements signed with the PNA, Thirdly, the continual closures of these areas impede the movement of transporting materials and goods among all governorates. Fourthly, Israel separates Palestinian territories through establishing settlements and military zones. Fifthly, Israel controls water resources, arable agricultural land, and the establishment of a strategic reserve for wheat. (Reem Al-Najjar, 2019).

The internal political obstacles are the lack of serious national strategic plans to establish a wheat strategic reserve and the inability of the PNA to protect such facilities if they are established (C) areas, because PNA has no authority there according to the agreements signed with the Israel (Hisham Khafash, 2019). Moreover, the absence of national plans to support wheat local production in order to overcome the quantitative restriction problem of importing wheat from abroad.

3.6.2 Financial and Economic Obstacles

Investment in a wheat strategic reserve project needs a huge budget which can reach up to ($100 million) divided as follows: Preparing its infrastructure, cost of buildings, stores, equipment, labor, and most importantly is working capital, wheat, which costs tens of

millions. The price of a ton of wheat is ($ 500), so if (10 thousand) tons are required to store, then ($50 million) is needed, and this strategic reserve is sufficient for (4-6) months; indeed, it may reach (500 - 600 thousand) tons a year, which means (250 - 300 Million) annually. Although governments in corporation with the private sector usually establish such projects because of their size, budget, and governments' insufficient experience, they need planning, guidance, follow-up, and control of its administrative and practical performance to avoid the private sector intrusion and its absolute control on strategic stocks and prices; therefore, they take a full ownership of establishing and managing wheat strategic reserves, that is to say, the government runs all operations of strategic reserve far from private sector's participation such as Egypt, Jordan, Syria, and other countries. Because of its direct association with the concept of national security of any state, the strategic reserve is directly supervised by its armed forces (Ibrahim Abu Kamish, No Date).

Considering this, Palestinian government cannot afford at present time due to the financial difficulties it is experiencing; In 2019 Trump – President of USA- has cut more than ($500) million in Palestinian aid and then completely stopped that if PNA still refuses his conditions; similarly, Israel deducts ($10) million a month in taxes collected for the PNA trying to force it to accept deal of the century; even the financial aid that the government may receive, it is insufficient for such projects, which are transferred to less expensive projects or to other countries.

In addition, the national economy was affected by global financial and food crises, a weakness of the agricultural sector, climate change, and a lack of a clear financing strategy focusing on the importance of integrating all sectors for such a project to face rapid global challenges, especially when prices of major food commodities increase.

3.6.3 Technological and Technical Obstacles

Alongside political and economic constraints, technological and technical obstacles are emerging, which are the wheat silos weak infrastructure, lack of transportation and effective procedures, and the lack of trained and qualified staff to plan, organize and manage these silos leading to attract workers from abroad; this is an extra cost the state cannot afford. Moreover, a lack of technological and technical advanced systems that meet modern storage requirements, and a lack of information and researches on strategic stocks. (AOAD, 2010, P.52)

3.6.4 Logistics Obstacles

The road network weakness linking governorates one another, and a lack of Palestinian control at crossings hinder wheat supply chain, so the process of transporting wheat inside Palestine and even overseas trade must be smoothly connected in a flexible way to ensure that wheat reaches all places at all times.

Israel's separation policy and its control over all important crossings create difficulties for establishing a coherent strategic project like a wheat silos one; indeed, Palestine has no such a necessary infrastructure, at the border crossings, to apply procedures facilitating the above process such as reloading from one side to another, changing container load, preparing administrative arrangements, and manipulating all transportation challenges (National Export Strategy, 2014, P. 111)· However, Israeli control affects Palestinian markets and prices, it exploits Palestinian trade for its own good, and it directs Palestinian economy to its imports; this weakens the supply chain and communication with the world (National Export Strategy, 2014, p. 32.). According to IFCS (2011), strategic reserves are never effective if logistics systems fail to move wheat from storage silos to flour mills or

final customers; logistics services keep core import costs low and ensure delivering wheat on time. (IFC, 2011, P.4).

Table (3-4): The Main Obstacles of Establishing Wheat Strategic Reserve

Paragraph	Frequency	Percentage
Financial and Economic Obstacles	7	29%
Logistics Obstacles	2	8%
Political Obstacles	10	42%
Technological and Technical Obstacles	5	21%

Source: Prepared by The Researcher

Table (3-4) shows that the political obstacles are the highest, reaching 42%, followed by financial and economic obstacles at 29%, then technical and technological obstacles and logistical obstacles at 21% and 8%, respectively. The main reason for the political obstacles is the measures and restrictions of Israeli occupation, and its control of the important arable areas and the establishment of a wheat strategic reserve.

3.7 Government and Agriculture Sectors Role in Building Wheat Strategic Reserve

NGOs usually bridge gaps in workforce system. Many of them are known to have a lot of technical potentials and scientific ability. In some countries, these organizations carry out high-quality exploratory researches, for example, in agriculture and health. They are effective institutions in adopting research findings and expanding their dissemination. Palestine can be proactive in identifying and activating their role of addressing some of the Palestinian priorities and linking them to the research system, starting with verifying concepts of implementation and dissemination. They are engaged in identifying both farmers and the community needs as they have a vast knowledge of local realities and technical skills. (MOA, 2016, P.13).

There are many ministries and public institutions playing key roles in developing, organizing, and providing services to the agricultural sector, including Ministry of Agriculture, Ministry of Local Government, Ministry of National Economy, Water Authority, and agricultural councils such as the Palestinian Olive Oil Council, Milk and Grape Councils, which are semi-governmental institutions established under (Article.1) of the amended agriculture law No.11 of 2005.

Non-governmental organizations (NGOs), which implement programs through their main headquarters and branches extended in Palestinian territories, with civil society institutions play an essential role in Palestinian economic, social, and agricultural development despite the conditions experienced by Palestinian people, particularly before the establishment of the Palestinian National Authority.

These organizations continue to play key role in serving the agricultural sector depending on their vast experience, which are approximately (35) NGOs with civil society institutions in the field of agriculture, the number of non-governmental organizations and civil society organizations activating agriculture is (15), and a large part of donor funding for agriculture has been provided through them.(MoA, 2010, P.14-15.).

The private sector also plays a key role in developing the agricultural sector through carrying out land reclamation and cultivation, establishing mills with different production capacities, and providing experiences required for maintaining food stocks, especially wheat. This number of governmental, semi-governmental, non-governmental and civil society organizations forms a vast agricultural knowledge network through which food security can be achieved by both government institutions planning wheat strategic reserve, and private sector implementing and managing these projects. (Mark, 2014, P.21).

Al-Tamimi (2019) said that the main vision of NGOs before Oslo Agreement was to reinforce Palestinians' steadfastness through implementing agricultural land reclamation, rehabilitating water sources, organizing and strengthening farmers' agricultural capacities, reducing employment in Israel, and facing unemployment. There were simple ideas in the Union of Cooperative Societies to develop an idea of building a strategic reserve of food such as olive oil and wheat. After Oslo Agreement, NGOs had a dividing line between their political vision and social economic one; therefore, their number and financial potential increased, having a serious scenario for investing land, water sources, and strategic crops for food security. The role of non-governmental institutions is:

1- Rehabilitating field crops, especially wheat.
2- Pushing the government to adopt a policy of abandoning Israel, especially in importing and exporting wheat.
3- Managing land in a scientific manner and reviewing land use legally and institutionally.
4- Using unconventional water sources.
5- Conducting researches on this reserve and agriculture development in cooperation with relevant government institutions.

In this scenario, it is noted that the interrelationship among all bodies focus on strategic food reserves and the complementary role of all bodies altogether, taking into consideration providing food, especially wheat, is a matter of national security affecting all segments of society; this interaction can be invested in building and managing wheat strategic reserve effectively, figure (3-7) illustrates the relationship between all these bodies and the wheat strategic reserve.

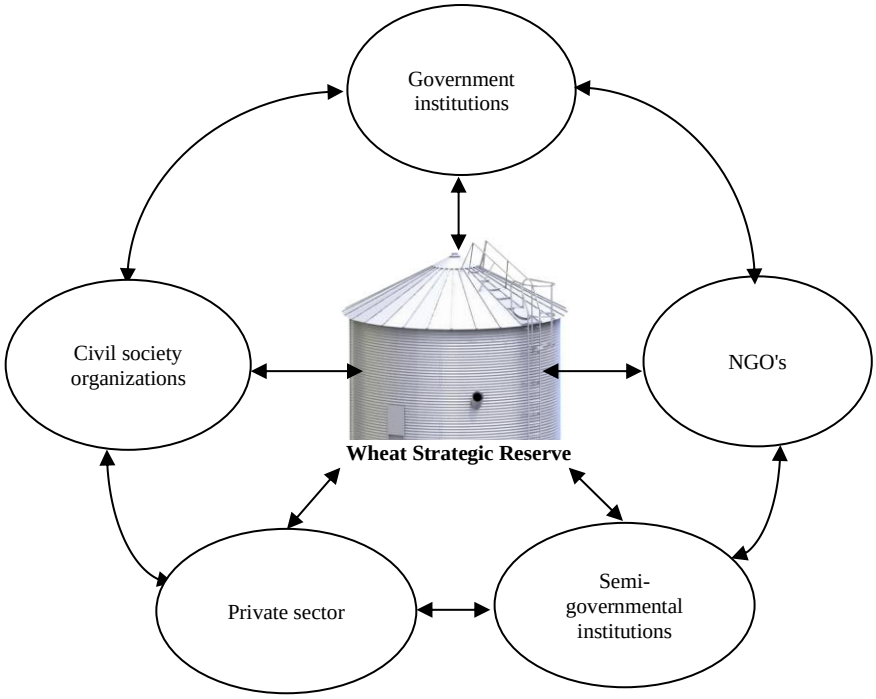


Figure (3-7): The Interrelationship Between All Sectors and The Wheat Strategic Reserve.
Source: Prepared by Researcher.

Chapter four

The Quantity and Spatial Distribution of Wheat Strategic Reserve

Overview

Providing food is an important strategic issue that the state must undertake, the state should not only consider the current need but also plan to establish strategic food reserve, depending on domestic production or import from abroad, the main function of the strategic food reserve is to provide the first defense line in a food emergency, as a resort when natural and human emergencies appear. (John Lynton-Evans, 1997).

Therefore, building food reserve is an important tool for a country to cope with emergencies and maintain its political and economic weight relying on its food reserve of cereals, as major food commodities especially (wheat), contributing to food security. There is a possibility to expand cultivating this crop in Palestine, where large areas are suitable for agriculture and labor availability in case the government vertically and horizontally supports wheat production. The following are the methods of estimating an optimal volume of the wheat strategic reserve, scenarios of distributing wheat silos through governorates, methods of building this strategic reserve, and sources of the wheat strategic reserve.

4.1 Wheat Strategic Reserve Volume

The reserve volume of major food commodities and the changes in their quantities through agricultural seasons are closely linked to the supply of food; the strategic reserve is used to balance prices when they increase in low supply, the state pumps quantities of food reserve into markets in cases of war, siege, and boycott; on the contrary, when price levels

decrease, the state buys additional quantities of food reserve, which is basically used to cope with the emergency food shortage. (Issa, 2003, P.23).

Fluctuated reserve volume of food commodities during seasons reflects supply and availability of commodities; an increase in a reserve volume between two agricultural seasons indicates an increase in the supply of goods, or a state's ability to obtain these goods. Whereas a decline in the reserve volume indicates a decrease in the supply of goods or a state's inability of purchasing the required quantity. Thus, the fluctuation in food reserve volume is an important indicator of food security situation at national, regional and international levels. (AOAD, 2008, P37). When determining the reserve volume, some basic issues are taken into account:

- There must be a minimum reserve volume to insure managing unexpected circumstances.
- There should be no maximum reserve volume, but normally, it should not be greater than the one required to meet market demand.

4.1.1 Estimating the Optimal Annual Volume of Wheat Strategic Reserve

The success of any state in creating surplus food reserve or surplus in international food markets (export) makes it have a privileged position in its foreign policy, international, and regional relations; moreover, it becomes powerful negotiator. Since Palestine has been subjected to political crises since 1948 and the Successive negative implications on all economic sectors, the most important of which is the deterioration of the standard living of most Palestinians, who could not afford food requirements because of high prices leading them to raise the slogan of (quantity rather than quality). Therefore, the country's need for

strategic food reserve is critical to face potential emergencies and political changes affecting both income and food security alike.

As a result of planning absence and the rural conditions deterioration causing a clear countryside migration to the cities, increasing unemployment rates and demand on because of population momentum, and food local production decrease. This makes Palestine suffer from economic and political fluctuations, even if there is an interruption in importation for any reason, there is no food reserve enough for more than a month; this may lead it to accept many conditions for providing food (Al-Jubouri, 2015, P.12).

4.1.2 Estimation of Wheat Reserve to Annual Consumption Volume

The concerned authorities should provide food reserve in a good nutritional situation, especially wheat, being locally produced or imported, is in its simplest form, as estimated by (FAO) to be around (17%) of annual consumption volume. In table (4-1), the researcher made a simple estimation of the wheat reserve volume for the period 2020-2030, which represents the minimum per capita food consumption a year, and the population was estimated according to the period mentioned using the moving mean, therefore, the need of wheat is calculated on a basis of an annual average per capita ration (120 kg). This reserve must be supplied according to the above sources.

Table (4-1): Estimation of The Volume of The Wheat Reserve in Palestine 2020-2030

Year	Population	The Per Capita Need of Wheat Per Year - Kg	Required Minimum Reserve Volume / Ton
2020	5,101,152	612,138,240	104,064
2021	5,227,193	627,263,160	106,635
2022	5,357,873	642,944,739	109,301
2023	5,491,820	659,018,357	112,033
2024	5,629,115	675,493,816	114,834
2025	5,769,843	692,381,162	117,705

Year	Population	The Per Capita Need of Wheat Per Year - Kg	Required Minimum Reserve Volume / Ton
2026	5,914,089	709,690,691	120,647
2027	6,061,941	727,432,958	123,664
2028	6,213,490	745,618,782	126,755
2029	6,368,827	764,259,252	129,924
2030	6,528,048	783,365,733	133,172

- **Source**: PCBS, Population Estimated From 2020-2021
- **The Population (2022 - 2030)** Was Estimated Using the Population Growth Equation Population 2022 = Population 2021 * (1+ Growth Rate) ^ (2022 - 2021). (Sadaqa, 2009,P.77)
- **Growth Rate** = (**2.5%**). (Http://Www.Pcbs.Gov.Ps/Site/Lang__Ar/881/Default.Aspx#Populationa) [151]
- The Volume of The Stock Was Calculated by The Researcher on A Basis of The Average Annual Per Capita Quota of Wheat (120 Kg/Person), And the Reserve Ratio (17%) Of Annual Consumption.
- **The Need of Wheat** = Population * 120 Kg - **Reserve Size** = The Need of Wheat (Consumption)*17%

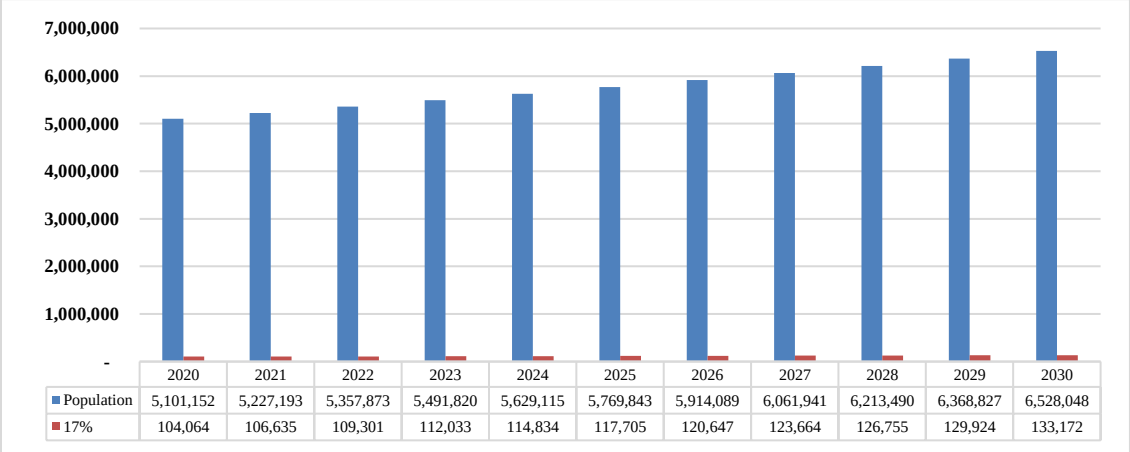


Figure (4-1): Population and Volume of Wheat Required for Storage in Palestine 2020-2030
- **Source**: Prepared by A Researcher Based on The Previous Table No. (4-1).

The proportion of the consumption volume, which is equal to (17%) (FAO, 2005) can be changed to other higher ratios if necessary, for the public interest achieving the best possible level of food security for citizens. Table (4-2) shows the scenarios for estimating the amount of wheat reserve required for annual consumption which is (17%, 20%, 25%, 30%, 35%):

Table (4-2): Scenarios of The Proportions of Wheat Reserve in Palestine (2020-2030)

Year	Population	The Need for Wheat Per Capita Per Year (120 Kg Per Capita) - Kg	Required Stock Volume - Ton				
			%17	%20	%25	%30	%35
2020	5,101,152	612,138,240	104,064	122,428	153,035	183,641	214,248
2021	5,227,193	627,263,160	106,635	125,453	156,816	188,179	219,542
2022	5,357,873	642,944,739	109,301	128,589	160,736	192,883	225,031
2023	5,491,820	659,018,357	112,033	131,804	164,755	197,706	230,656
2024	5,629,115	675,493,816	114,834	135,099	168,873	202,648	236,423
2025	5,769,843	692,381,162	117,705	138,476	173,095	207,714	242,333
2026	5,914,089	709,690,691	120,647	141,938	177,423	212,907	248,392
2027	6,061,941	727,432,958	123,664	145,487	181,858	218,230	254,602
2028	6,213,490	745,618,782	126,755	149,124	186,405	223,686	260,967
2029	6,368,827	764,259,252	129,924	152,852	191,065	229,278	267,491
2030	6,528,048	783,365,733	133,172	156,673	195,841	235,010	274,178

- Source: PCBS, 2017.
- The Volume of The Stock Was Calculated by The Researcher on The Basis of The Average Annual Per Capita Quota of Wheat (120 Kg/Person).

As it is mentioned above, the estimation (17%) of the per capita wheat consumption a year to the reserve volume is the minimum. Indeed, annual Palestinian citizens' demand on wheat amounts to (400) thousand tons. Therefore, it is necessary to raise this percentage to the highest ones (20%, 25%, and 30%) in order to provide sufficient wheat strategic reserve for (4-6 months). To make it clear, it is necessary to determine every governorate's share of wheat strategic reserve. Table (4-3) shows the scenarios for estimating the wheat strategic reserve volume for each governorate in 2020:

Table (4-3): Scenarios of The Proportions of The Wheat Reserve for Each Governorate For 2020

Governorate	Population	Wheat's need per year (120 kg per capita) - kg	Scenarios volume of the required reserve (ton)				
			%17	%20	%25	%30	%35
Jenin	332,050	39,846,000	6,774	7,969	9,962	11,954	13,946
Tubas & Northern Valleys	64,507	7,740,840	1,316	1,548	1,935	2,322	2,709
Tulkarem	195,341	23,440,920	3,985	4,688	5,860	7,032	8,204
Nablus	407,754	48,930,480	8,318	9,786	12,233	14,679	17,126
Qalqiliya	119,042	14,285,040	2,428	2,857	3,571	4,286	5,000
Salfit	80,225	9,627,000	1,637	1,925	2,407	2,888	3,369
Ramallah & Al-Bireh	347,818	41,738,160	7,095	8,348	10,435	12,521	14,608
Jericho & Aghwar	52,355	6,282,600	1,068	1,257	1,571	1,885	2,199
Jerusalem	461,666	55,399,920	9,418	11,080	13,850	16,620	19,390
Bethlehem	229,884	27,586,080	4,690	5,517	6,897	8,276	9,655
Hebron	762,541	91,504,920	15,556	18,301	22,876	27,451	32,027
North Gaza	403,457	48,414,840	8,231	9,683	12,104	14,524	16,945
Gaza	695,967	83,516,040	14,198	16,703	20,879	25,055	29,231
Dier al Balah	294,260	35,311,200	6,003	7,062	8,828	10,593	12,359
Khan Yunis	401,582	48,189,840	8,192	9,638	12,047	14,457	16,866
Rafah	252,703	30,324,360	5,155	6,065	7,581	9,097	10,614
The volume of the required stock (ton)			41,779	49,151	61,439	73,727	86,015

- Source: PCBS.

- The Reserve Volume of The Was Calculated by The Researcher on The Basis of The Average Annual Per Capita Quota of Wheat (120 Kg/Person), As Well As the Reserve Ratio (17%) Of Annual Consumption.

Table (4-3) shows that Gaza Strip population is (40.15%) of Palestine total population, being in a very narrow area (365 km^2); when comparing this with the area of West Bank, the percentage of wheat needed is (59.85%): it is founded that Gaza consumes wheat a lot, which means the possibility of raising the estimation ceiling of the wheat strategic reserve to (35%).

Al-Jubouri (2015) discusses that in cases where domestic production does not represent the largest amount of consumption, the design of the storage capacity of the reserve is about (3-4) times of the average annual consumption, as shown in table (4-4) below, to avoid international trade risks and world prices fluctuations, in terms of production trends.(Jabour, 2015, P.10)

Table (4-4): Estimation of The Wheat Strategic Reserve (3-4) Times the Annual Consumption Rate (2020 - 2025)

Year	Three Times						Four Times					
	2020	2021	2022	2023	2024	2025	2020	2021	2022	2023	2024	2025
Jenin	119,538	122,011	117,144	118,099	118,778	119,114	159,384	162,681	156,192	157,466	158,371	158,819
Tubas	23,223	23,729	22,729	22,926	23,066	23,134	30,963	31,639	30,305	30,568	30,754	30,846
Tulkarem	70,323	71,588	69,097	69,586	69,934	70,105	93,764	95,451	92,129	92,781	93,245	93,474
Nablus	146,791	149,618	144,053	145,147	145,923	146,306	195,722	199,491	192,070	193,529	194,564	195,075
Qalqilia	42,855	43,802	41,941	42,306	42,565	42,694	57,140	58,402	55,921	56,408	56,754	56,925
Salfit	28,881	29,556	28,228	28,489	28,674	28,766	38,508	39,408	37,638	37,986	38,232	38,354
RamallahandAl-Bireh	125,214	127,873	122,594	123,640	124,379	124,740	166,953	170,497	163,459	164,854	165,838	166,320
JerichoandAlaghwar	18,848	19,194	18,513	18,647	18,742	18,789	25,130	25,592	24,685	24,863	24,989	25,052
Jerusalem	166,200	169,860	162,603	164,041	165,055	165,552	221,600	226,480	216,804	218,721	220,073	220,736
Bethlehem	82,758	84,529	81,032	81,722	82,210	82,450	110,344	112,705	108,043	108,962	109,613	109,933
Hebron	274,515	281,602	267,617	270,376	272,327	273,287	366,020	375,469	356,822	360,501	363,102	364,383
W.B Total	824,631	841,760	807,934	814,603	819,324	821,651	1,099,508	1,122,346	1,077,246	1,086,138	1,092,432	1,095,534
NorthofGaza	145,245	150,086	140,578	142,443	143,768	144,424	193,659	200,115	187,437	189,925	191,691	192,565
Gaza	250,548	256,856	244,408	246,862	248,599	249,455	334,064	342,474	325,877	329,150	331,465	332,606
DairAlBalah	105,934	108,903	103,014	104,180	105,003	105,407	141,245	145,203	137,352	138,907	140,004	140,542
KhanYounes	144,570	148,942	140,325	142,022	143,223	143,816	192,759	198,589	187,100	189,362	190,964	191,755
Rafah	90,973	93,642	88,378	89,415	90,149	90,511	121,297	124,856	117,837	119,219	120,199	120,682
G.S Total	737,269	758,428	716,702	724,922	730,742	733,613	983,025	1,011,238	955,603	966,563	974,323	978,150
Total	1,561,900	1,600,188	1,524,636	1,539,526	1,550,066	1,555,263	2082533	2133584	2032848	2052701	2066755	2073684

- **Source**: PCBS
- The Reserve Has Been Estimated by The Researcher Based on Population Data and Average Consumption (17%).
- Quantity = Ton

Table (4-5): The Minimum Assumed Strategic Wheat Reserve in Palestine (WB and GS) (2010 – 2030)

Year	Population	Annual Domestic Production - Tons	Annual Consumption - Tons	Monthly Consumption - Tons	Daily Consumption - Tons	Period of Production Coverage for Consumption	%17of The Total Monthly Consumption (Thousand Tons)	Assumed Minimum Strategic Reserve - Month/Ton				
								2	3	4	5	6
2010	4,023,462	17,380	482,815	40,235	1,341	13	6,840	13,680	20,520	27,360	34,199	41,039
2011	4,124,795	17,840	494,975	41,248	1,375	13	7,012	14,024	21,036	28,049	35,061	42,073
2012	4,226,410	26,670	507,169	42,264	1,409	19	7,185	14,370	21,555	28,740	35,924	43,109
2013	4,327,751	41,720	519,330	43,278	1,443	29	7,357	14,714	22,072	29,429	36,786	44,143
2014	4,429,084	41,720	531,490	44,291	1,476	28	7,529	15,059	22,588	30,118	37,647	45,177
2015	4,530,416	26,320	543,650	45,304	1,510	17	7,702	15,403	23,105	30,807	38,509	46,210
2016	4,632,025	37,030	555,843	46,320	1,544	24	7,874	15,749	23,623	31,498	39,372	47,247
2017	4,733,357	34,542	568,003	47,334	1,578	22	8,047	16,093	24,140	32,187	40,234	48,280
2018	4,854,013	30,403	582,482	48,540	1,618	19	8,252	16,504	24,755	33,007	41,259	49,511
2019	4,976,684	32,031	597,202	49,767	1,659	19	8,460	16,921	25,381	33,841	42,302	50,762
2020	5,101,152	33,804	612,138	51,012	1,700	20	8,672	17,344	26,016	34,688	43,360	52,032
2021	5,227,193	34,696	627,263	52,272	1,742	20	8,886	17,772	26,659	35,545	44,431	53,317
2022	5,357,873	33,818	642,945	53,579	1,786	19	9,108	18,217	27,325	36,434	45,542	54,650
2023	5,491,820	32,831	659,018	54,918	1,831	18	9,336	18,672	28,008	37,344	46,680	56,017
2024	5,629,115	33,644	675,494	56,291	1,876	18	9,569	19,139	28,708	38,278	47,847	57,417
2025	5,769,843	33,221	692,381	57,698	1,923	17	9,809	19,617	29,426	39,235	49,044	58,852
2026	5,914,089	33,056	709,691	59,141	1,971	17	10,054	20,108	30,162	40,216	50,270	60,324
2027	6,061,941	33,388	727,433	60,619	2,021	17	10,305	20,611	30,916	41,221	51,527	61,832
2028	6,213,490	33,557	745,619	62,135	2,071	16	10,563	21,126	31,689	42,252	52,815	63,378
2029	6,368,827	33,526	764,259	63,688	2,123	16	10,827	21,654	32,481	43,308	54,135	64,962
2030	6,528,048	33,380	783,366	65,280	2,176	15	11,098	22,195	33,293	44,391	55,488	66,586

- Source Of Production Quantity for The Period 2010 to 2017 is FAO, Http://Www.Fao.Org.
- Production Quantity for 2018 to 2030 Was Calculated Using Simple Moving Average.
- The Daily Consumption of Wheat Was Calculated by Dividing the Total Consumption of Wheat by 360 Days.
- The Period of Production Coverage for Consumption Was Calculated by Dividing Domestic Wheat Production by Daily Consumption. (Abdul-Ghafoor, 2008, P.223).
- The Minimum Assumed Strategic Reserve Was Calculated by The Researcher.

Table (4-5) indicates that the annual wheat production ranged from (17,380) to (41,720) tons in 2010 and 2014 respectively with an average of (32,123) tons; it is assumed that since the monthly consumption was (40,235) tons in 2010, it will be (65,280) tons in 2030 with an average of (51,677) tons per month; the daily wheat consumption was (1,341) tons in 2010 and will be (2,176) tons in 2030 with an average of (1,723) tons. It is shown that wheat domestic production for daily consumption is insufficient for more than (29) days.

It is also assumed that if the minimum strategic reserve is sufficient:

- for 2 months, its volume is from (13,680) to (22,195) tons;
- for 3 months, its volume is from (20,520) to (33,293) tons;
- for 4 months, its volume is from (27,360) to (44,391) tons;
- for 5 months, its volume is from (34,199) to (55,488) tons; and
- for 6 months, its volume is from (41,039) to (66,586) tons.

It is noted that the assumed average minimum strategic reserve for six months is around (53,813) tons being the best of all because it covers a longer period, stabilizes wheat prices, and provides population with wheat needed for longer periods ensuring food security stability.

Table (4-6): The Minimum Volume Wheat Strategic Reserve That Can be Kept in

Paragraph	frequency	percentage
15 - 25	0	0%
26 - 36	3	15%
37 - 47	5	25%
50 >	12	60%

Table (4-6) shows the respondents' estimates of the minimum required from the wheat strategic reserve, and the result was that 60% said that the appropriate amount is greater than (50 thousand tons), which is a result very close to the result reached by the researcher

through the table (4-5), where the estimated amount was (53,813) tons, which it is somewhat close to the estimates of The Arab Organization for Agricultural Development in table (2-5), which estimated the wheat strategic reserves in Palestine at (48,000) tons.

4.2 Centralization and Decentralization of Storage

4.2.1 Centralization of Storage

There is a single wheat silo where all storage operations are carried out by a qualified storage officer having all the suitable powers for the nature of the storage activity.

4.2.2 Decentralization of Storage

The multiplicity of warehouse locations on several geographical locations far apart depending on the geographical extension of the project supervised by several officials who are attached to a director of the central stores in the main management of the project.

4.2.3 The Advantages of Centralized Storage

One head silo and one centralized management.

1. Reducing the storage cost of a central warehouse instead of distributing them to several sub-stores (transport, shipping, and unloading).
2. Having the ability to purchase specialized equipment and devices.
3. Employing specialized and trained staff.
4. Having flexibility to accomplish warehouse operations in large areas.
5. Applying best methods of storage management and control.
6. Enhancing coordination between warehouse departments and their central management.
7. Taking rapid decisions by a central manager in coordination with the warehouse one.

4.2.4 The Advantages of Decentralization Storage

Several silos (warehouses) in all governorates with several departments

1. Handing process is easily done since a warehouse is not overcrowded.

2. Reducing effects of potential fire hazards come to the scene.
3. Taking decisions directly by a silo or sub-store manager.
4. Providing a silo manager with powers without returning to the central manager. (**Ayoub, MNE,2019**)

4.3 Spatial Distribution for Wheat Silos

The Arab Organization for Agricultural Development (AOAD, 2009) explained that the spatial good distribution of strategic silos and warehouses is considered to be one of success factors of the strategic reserve management process in terms of reducing transport, storage, and operations cost; in this sense, storage is a complex process consisting of all wheat commodity stages moving from production places to warehouses and silos, and then to consumers; the associated costs, both visible costs, and hidden costs. According to FAO (1997), it is sometimes preferable to keep wheat strategic reserve at production sites or in places of consumption to reduce transport costs to a minimum. The strategic reserve must be maintained in appropriate facilities having sufficient capacity for long-term storage and large amounts of wheat. It may be advantageous to distribute strategic reserves to several sites shouldering the responsibility of maintenance, supervision, and control. Whenever strategic reserve is fragmented through warehousing at different sites, reserve safety and supervision costs increase. Therefore, it is preferable to distribute reserves to fewer strategic sites that can be easily monitored and supervised.

There are two perspectives of choosing the best geographic location for strategic reserve and determining the storage capacity, the first perspective is that it would be better to have a central location in strategic storage locations; the second one tends to decentralize in the storage location distributing warehouses to several places. However, both perspectives are

subject to a number of considerations, perhaps the most important of which are the economic, political, secure, and productive policies, import and distribution, the efficiency of internal and external transport, and international policies and conventions (Ayoub Hashesh, MNE, 2019).

To Palestinian case, the warehouse and the silo closeness to border crossings, and places of production and agriculture is very important to reduce transport and storage costs. Actually, several crossing points are between West Bank and Israel-controlled territories; in north, Jalameh crossing is in Jenin, Bisan crossing is near Tubas, and Ephraim crossing is near Tulkarem; Beituniya crossing is near Ramallah; in south, Tarqumiya crossing is in Hebron; the international crossing is in Jericho, King Hussein Bridge; in Gaza Strip, Erez crossing is in the north and Rafah is in the south. There are some criteria that must be taken into consideration when establishing wheat silos: (Environmental & Social Assessment& Management Framework, 2013)

1. That silos and warehouses should not be located in low areas in order to avoid flooding risks.
2. The silos project should not cause any negative environmental impact on population, air, and wildlife.
3. The project should not affect historical or religious sites.
4. Harmful social effects when selecting and designing a site have to be avoided.
5. Silos and warehouses establishment should not be on the cost of agricultural land.
6. The silos and warehouses must be close to public services, such as electricity and water.
7. Roads network must be constructed to be capable of carrying heavy loads of equipment, linking these roads to the main ones extended in all governorates, preventing traffic congestion and keeping nearby population.
8. The location must be geologically safe allowing any future expansion**. (Mario, 2012, P.5)**

4.3.1 Spatial Distribution Scenarios for Wheat Silos (5s – Scenarios)

Here we review five scenarios that can help identify and distribute strategic reserve:

Table (4-7): Scenarios for The Distribution of Silos and Wheat Stores

Scenario	Description
First	Centralization of the silo and warehouse
Second	Centralization of the silo and decentralization of the central warehouse
Third	Decentralization of the silo and central warehouse
Fourth	Centralization of the silo and the distribution of central warehouses
Fifth	Decentralization of the silo and the central warehouse, and the multiple spreads of sub-warehouse

Referring to the scenarios, the meaning of the (single silo) is defined as a set of storage cells, where strategic reserves is stored; figure (4-2) shows (12) cylinders cells constituting a single silo. While the meaning of (grain warehouse) is a considerable building of grain larger than a silo, where grain is stored for transporting wheat to production sites, as shown in figure (4-3). Basically, warehouses may be directly belonging to a silo or independent and distributed to several areas:

Figure (4-2): Shape of A Single Silo

Figure (4-3): Wheat and Flour Warehouses

4.3.1.1 Centralization of Silo and Central Warehouse

A central wheat silo and a large central warehouse for storing wheat are established in one area. Wheat is directly distributed to all governorates and production areas; the advantages of this scenario are as follows: concentrating on strategic reserve management, and reducing transportation and management costs because a silo and warehouse are in one area; however, the disadvantage of this scenario is a danger resulted from the silo nearness to Israel hindering wheat movement among governorates.

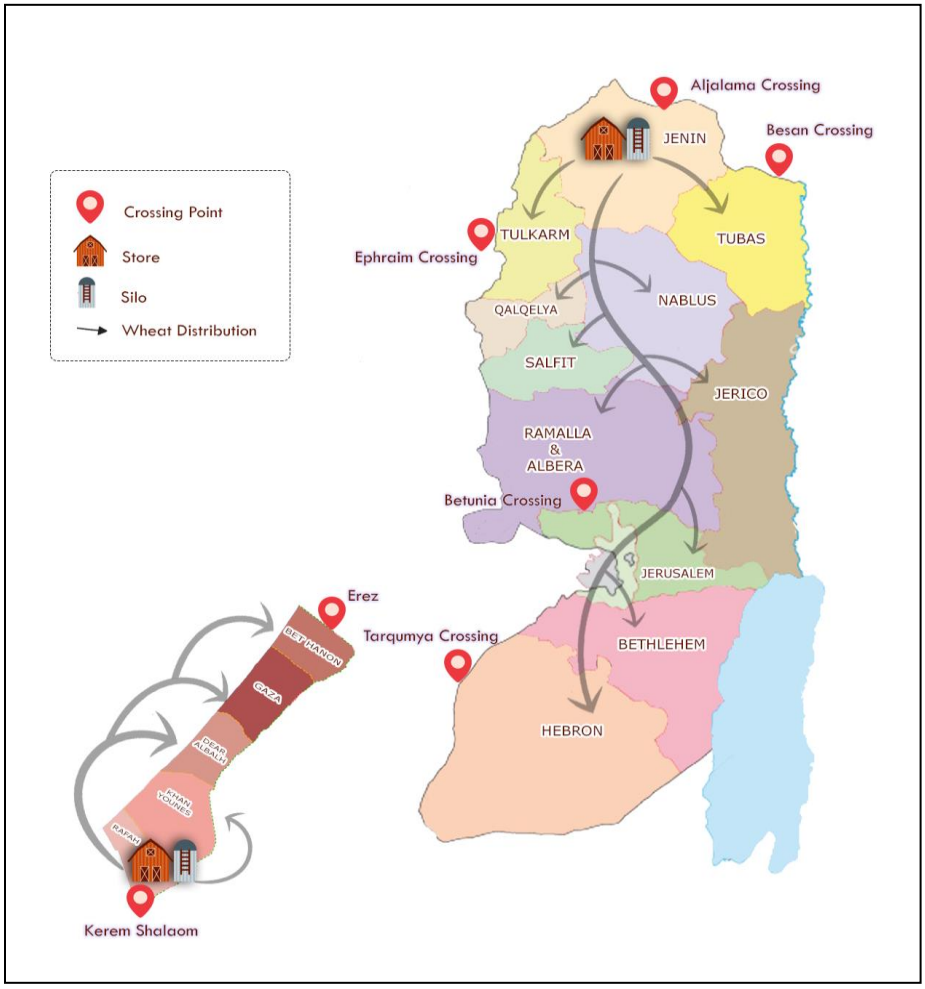


Figure (4-4): Centralization of Silo and Central Warehouse
Source: Prepared by The Researcher

4.3.1.2 Centralization of Silo and Decentralization Warehouse

A central wheat silo is established in a specific area and a central wheat reserve is distributed to several main areas (north, center, and south), where moving wheat from the silo to the central warehouses in the main governorates, and then to factories and mills in the remaining governorates. The advantages of this scenario are distributing the storage load to other major storage areas, and providing wheat for the governorates being near to sub-warehouses; while the disadvantages of this scenario are the high cost of storage, transportation, and reserve management.

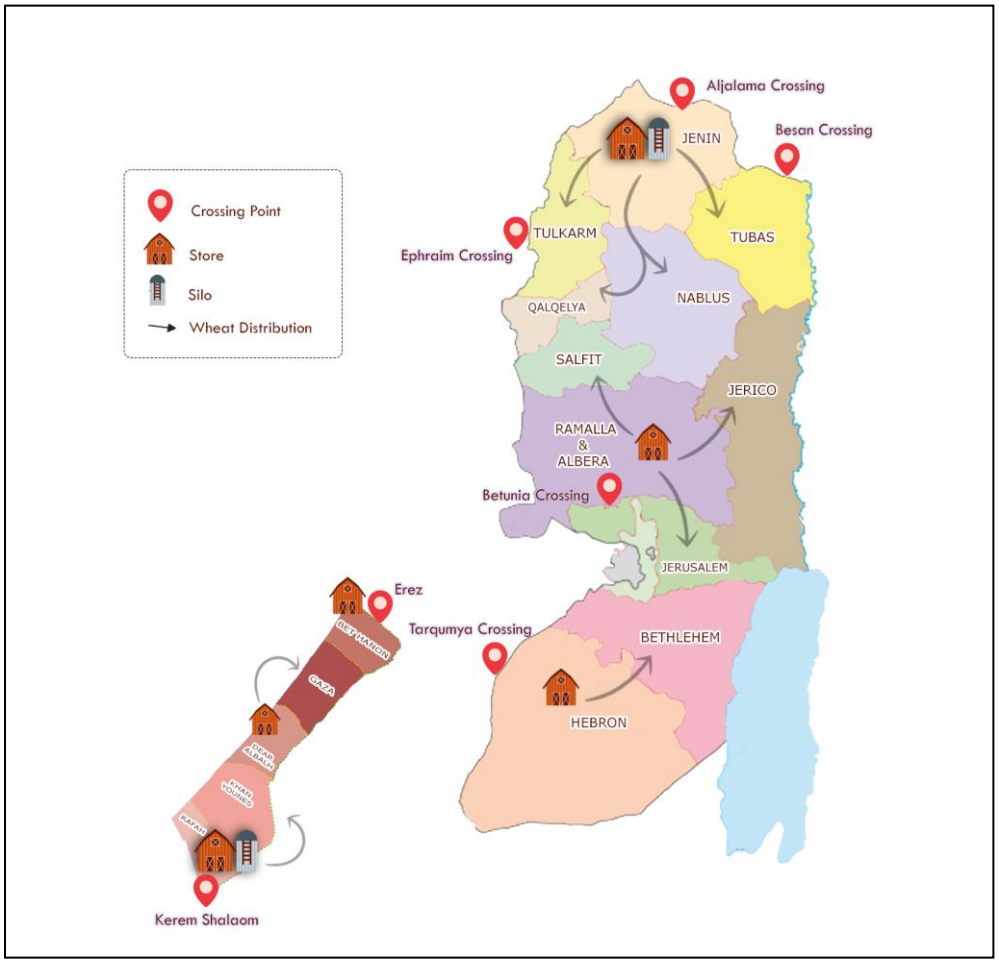


Figure (4-5): Centralization of Silo and Decentralization of Warehouse
Source: Prepared by The Researcher

4.3.1.3 Decentralization of Silo and Central Warehouse

Wheat silos and central warehouses extend in more than one main area (North, Central and South). Wheat is distributed to the governorates being near to each silo. The advantages of this scenario is a possibility of delivering wheat to neighboring governorates quickly and easily. The disadvantages of this scenario are the high cost of managing silos and warehouses, and lack of communication among all silos and warehouses.

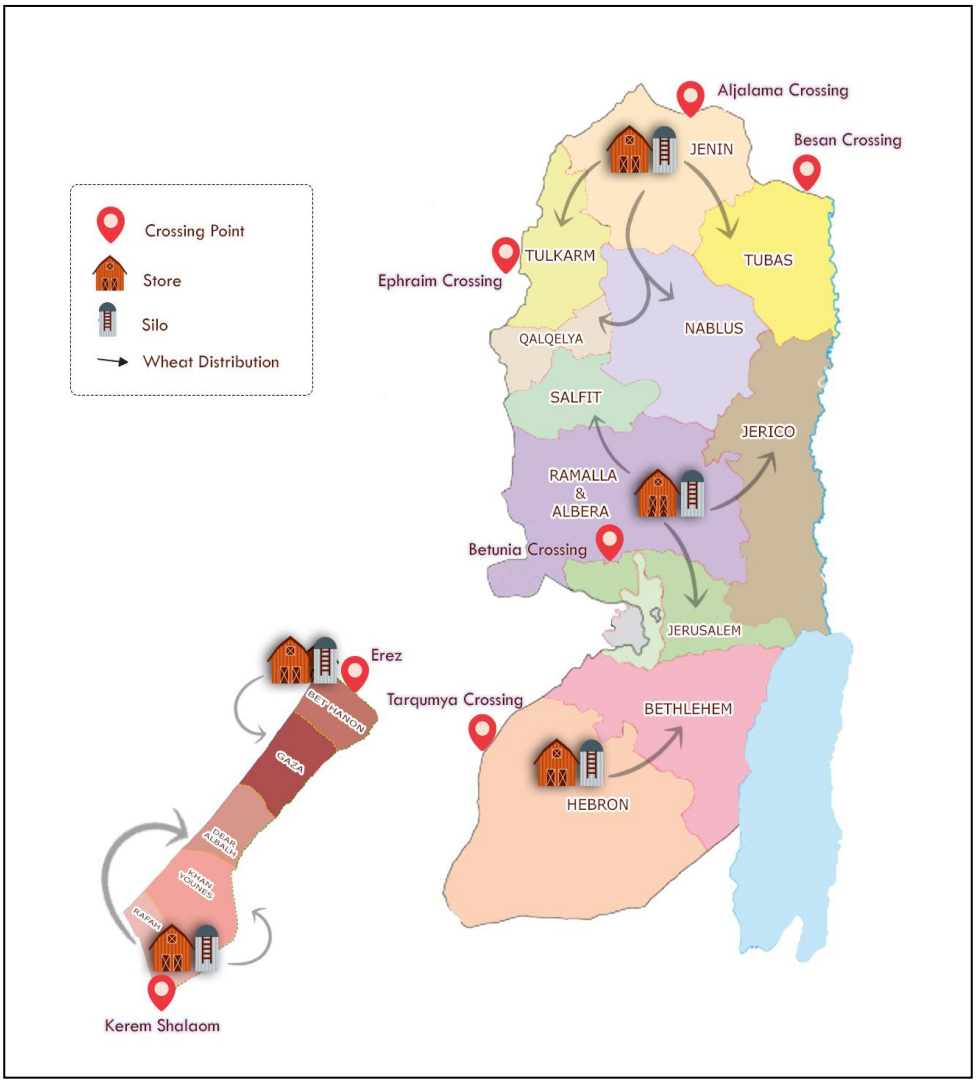


Figure (4-6): Decentralization of The Silo and Central Warehouse.
Source: Prepared by The Researcher.

4.3.1.4 Centralization of Silo and Central Warehouses Distribution

Through this scenario, one main silo and one central warehouse are in a specific area, and a secondary wheat warehouse in each governorate; the main central silo distributes wheat to all sub-warehouses in the remaining governorates; one of the scenario advantages is to ensure providing every governorate with wheat all times, being not worry about Israeli closures, and thus ensure food security; while the scenario disadvantages are the high cost of managing these warehouses, and supply interruption of governorates branch stores due to their connection to only one strategic storage area, in other words, because the secondary warehouses are not linked to each other, it is difficult to predict the quantities stored in them.

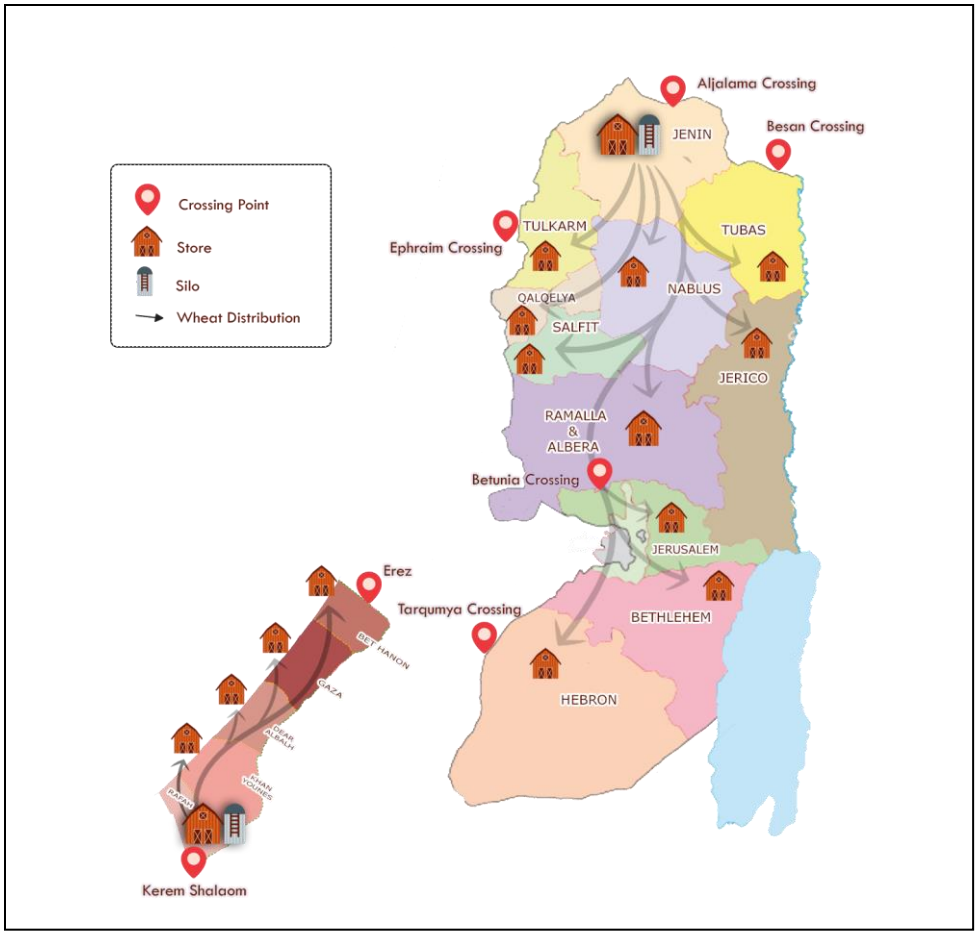


Figure (4-7): Centralization of The Silo and The Distribution of Central Warehouses
Source: Prepared by The Researcher

4.3.1.5 Decentralization of Silo, Central Warehouse and Sub-warehouse

It is noted from figure (4-8) that this scenario follows a non-high concentration policy, which is a progressive and integrated supply network. The state distributes silos and central warehouses in three areas (north, central and south) in both West Bank and Gaza Strip, where a single strategic central store is established in each of these areas being close to border trade crossings, considering the ease of feeding warehouses, distributing the strategic reserve to sub-warehouses, ensuring security aspects of maintaining these warehouse being far away from the population centers, and ensuring providing all the requirements for operational process and full protection.

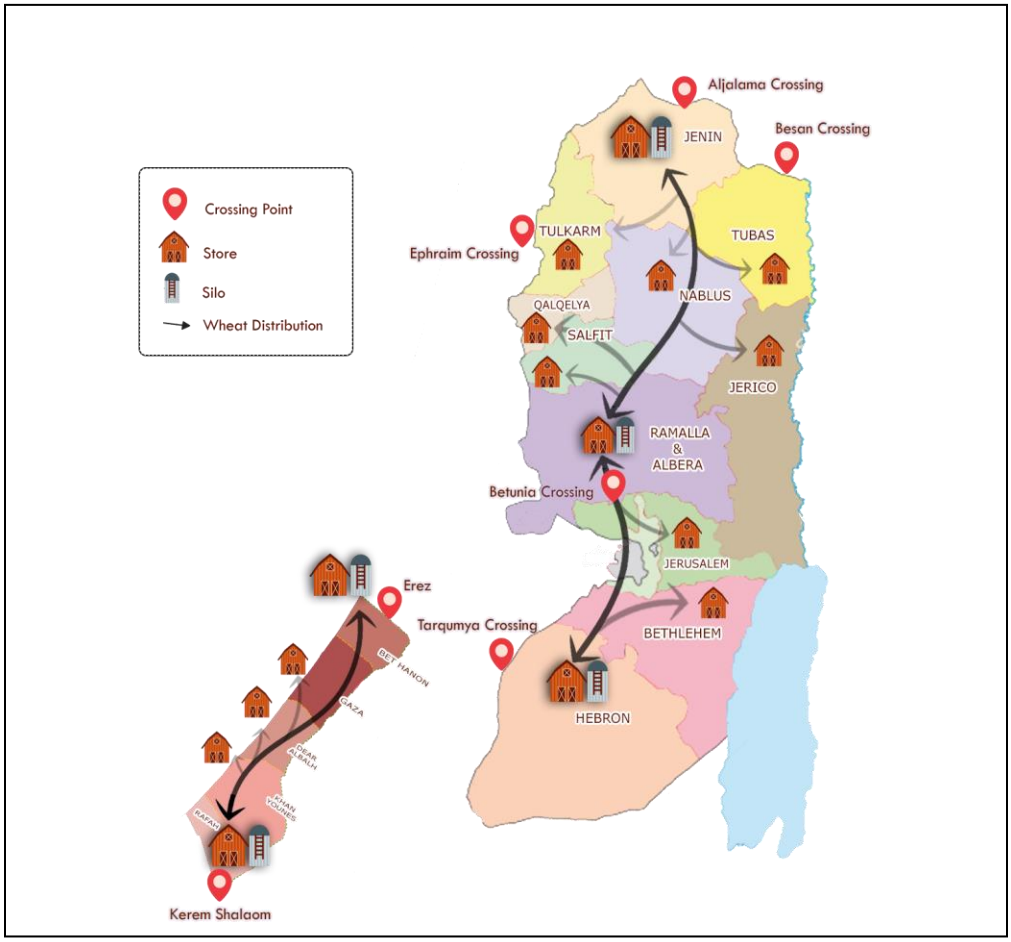


Figure (4-8): Decentralization of Silo, Central Warehouse, and Sub-Warehouse. Source: Prepared by The Researcher.

The model of decentralization in the fifth scenario aims to efficiently manage the risks and increase efficiency and effectiveness in managing silos and reducing bureaucracy in administration, and in the current Palestinian situation is to reduce the risks that may be used to impose the policies of the Israeli occupation on the Palestinian areas (**Ashraf Barakat, MOA, 2019**).

The disadvantage of this scenario is basically the high cost of managing silos and warehouses, but the cost positive effects are ensuring appropriate wheat flow to sub-warehouses quickly and effectively, thus ensure the arrival of wheat to consumers on time, increasing food security, and facilitating control over the silos and warehouses reserve.

To enhance the role of this scenario better, it can be linked to a system of wheat stocks management and control in both West Bank and Gaza Strip, the strategic reserve can be linked to a network of integrated early warning information systems of agriculture, land, water, climate, market, health, nutrition, and control (AOAD, 2009, P.58). These systems are related to all relevant authorities, which can forecast a wheat strategic reserve, the actual reserve volume and efficiency, and wheat optimal and fair distribution.

Table (4-8): The Importance of Each Scenario

Scenario	frequency	percentage
The first scenario	2	8%
The second scenario	4	15%
The third scenario	5	19%
The fourth scenario	5	19%
The fifth scenario	10	38%

Table (4-8) shows that the fifth scenario (Decentralization of silo, central warehouse, and sub-warehouse) is the highest by 38%, then followed by the third and fourth scenarios with

the same percentage 19% each, then the second and first scenarios with 15% and 8%, respectively. Experts considered the fifth scenario one of the best scenarios due to:

Focus more on inventory management; distribute the storage burden to the regions; the ability to deliver wheat to all governorates; availability of wheat at all times; reducing Israeli negative impacts; ease of predicting stored quantities and communicating between all spread silos and warehouses over the country.

Table (4-9): Estimated Distribution of Wheat Strategic Reserve in The West Bank and Gaza Strip According to The Five Scenarios

Scenario	% of consumption	(Jenin) (J)	Tubas	Tulkarem	Nablus (B)	Qalqilia	Salfit	(Ramallah and Al-Bireh) (R)	Jericho and Alaghwar	Jerusalem	Bethlehem	(Hebron) (H)	(North of Gaza) (N)	Gaza	(Dair Al Balah)	Khan Younes	(Rafah) (F)
First	%17	58,277	J	J	J	J	J	J	J	J	J	J	F	F	F	F	38,284
	%20	68,561	J	J	J	J	J	J	J	J	J	J	F	F	F	F	45,040
	%25	85,701	J	J	J	J	J	J	J	J	J	J	F	F	F	F	56,300
	%30	102,841	J	J	J	J	J	J	J	J	J	J	F	F	F	F	67,560
	%35	119,981	J	J	J	J	J	J	J	J	J	J	F	F	F	F	78,820
Second	%17	23,028	J	J	J	J	R	20,865	R	R	H	14,383	20,592	D	12,978	F	4,714
	%20	27,092	J	J	J	J	R	24,547	R	R	H	16,921	24,226	D	15,268	F	5,546
	%25	33,865	J	J	J	J	R	30,684	R	R	H	21,152	30,282	D	19,085	F	6,933
	%30	40,638	J	J	J	J	R	36,821	R	R	H	25,382	36,339	D	22,902	F	8,319
	%35	44,270	J	J	J	J	R	37,047	R	R	H	38,664	15,312	D	38,420	F	25,087
Third	%17	23,028	J	J	J	J	R	20,865	R	R	H	14,383	33,570	N	F	F	4,714
	%20	27,092	J	J	J	J	R	24,547	R	R	H	16,921	39,494	N	F	F	5,546
	%25	33,865	J	J	J	J	R	30,684	R	R	H	21,152	49,367	N	F	F	6,933
	%30	40,638	J	J	J	J	R	36,821	R	R	H	25,382	59,241	N	F	F	8,319
	%35	44,270	J	J	J	J	R	37,047	R	R	H	38,664	42,395	N	F	F	36,425
Fourth	%17	**6,368**	J 1,232	J 3,777	J 7,853	J 2,273	J 1,526	J 6,651	J 1,011	J 8,807	J 4,396	J 14,383	F 7,437	F 13,154	F 5,507	F 7,471	**4,714**
	%20	**7,491**	J 1,450	J 4,443	J 9,239	J 2,674	J 1,795	J 7,824	J 1,190	J 10,361	J 5,172	J 16,921	F 8,750	F 15,476	F 6,479	F 8,789	**5,546**
	%25	**9,364**	J 1,812	J 5,554	J 11,549	J 3,343	J 2,244	J 9,780	J 1,487	J 12,951	J 6,465	J 21,152	F 10,937	F 19,345	F 8,098	F 10,987	**6,933**
	%30	**11,237**	J 2,174	J 6,665	J 13,858	J 4,011	J 2,692	J 11,736	J 1,784	J 15,541	J 7,759	J 25,382	F 13,125	F 23,214	F 9,718	F 13,184	**8,319**
	%35	**13,110**	J 2,537	J 7,776	J 16,168	J 4,680	J 3,141	J 13,692	J 2,082	J 18,132	J 9,052	J 2 9,612	F 15,312	F 27,083	F 11,338	F 15,381	**9,706**
Fifth	%17	B 6,368	JN1,232	JN 3,777	JR 7,853	JN 2,273	JN 1,526	JH 6,651	JR 1,011	RH 8,807	RH 4,396	R 14,383	F 7,437	FN 13,154	FN 5,507	FN 7,471	N 4,714
	%20	B 7,491	JN1,450	JN 4,443	JR 9,239	JN 2,674	JN 1,795	JH 7,824	JR 1,190	RH 10,361	RH 5,172	R 16,921	F 8,750	FN 15,476	FN 6,479	FN 8,789	N 5,546
	%25	B 9,364	JN1,812	JN 5,554	JR 11,549	JN 3,343	JN 2,244	JH 9,780	JR 1,487	RH 12,951	RH 6,465	R 21,152	F 10,937	FN 19,345	FN 8,098	FN 10,987	N 6,933
	%30	B 11,237	JN2,174	JN 6,665	JR13,858	JN 4,011	JN 2,692	JH 11,736	JR1,784	RH 15,541	RH 7,759	R 25,382	F 13,125	FN 23,214	FN 9,718	FN 13,184	N 8,319
	%35	B 13,110	JN2,537	JN 7,776	JR 16,168	JN 4,680	JN 3,141	JH 13,692	JR 2,082	RH 18,132	RH 9,052	R 29,612	F 15,312	FN 27,083	FN 11,338	FN 15,381	N 9,706

- **Source: Prepared by The Researcher**.
- The Governorates Between Brackets (Table Header) Indicate to The Approved Governorates as A Strategic Storage Location.
- The Governorates Underlined (Table Header) Indicate to The Approved Governorates as Storage Sites or The Receiving Sites of The Allocated Quantities from The Warehouse and The Central Silos.
- The Following Symbols Indicate the Wheat Providing Places:
  J = Jenin, **R** = Ramallah & Al-Bireh, **H**= Hebron, **N**= North of Gaza, **D**= Dair Al-Balah, **F**= Rafah, **FN**= Rafah + North of Gaza
  B = Nablus**, JN=** Jenin + Nablus, **JR** = Jenin + Ramallah & al- Bireh, **JH** = Jenin + Hebron, **RH** = Ramallah & Al-Bireh+Hebron

4.3.2 Quantitative Distribution of Wheat Silos by Production

Silos and warehouses are distributed according to the quantity of wheat produced by the governorates. The following table (4-10) shows wheat production of each governorate:

Table (4-10): Production and Area of Wheat Cultivated in W.B Governorates (2008 – 2009)

West Bank	Area	Yield	Production
Jenin	51,795	270	13,985
Tubas	47,500	100	4,750
Tulkarem	5,335	250	1,334
Nablus	24,330	60	1,460
Qalqilia	1,506	200	301
Salfit	1,400	90	126
Ramallah and Al-Bireh	22,220	170	3,777
Jericho and Alaghwar	3,200	300	960
Jerusalem	2,123	130	276
Bethlehem	4,150	55	228
Hebron	40,719	55	2,240
Total	**204,278**		**29,437**

Source: PCBS, (2009), Agricultural Statistics, 2007-2008, Ramallah-Palestine.
Area: Dunum, **Production**: Metric Tons, **Yield**: Kg/Dunum,

Table (4-10) shows that Jenin is the highest producer of wheat with an annual production of (13,985 tons), followed by Tubas with (4,750 tons), these governorates are located in the north of West Bank; in the centre, Ramallah and Al-Bireh governorate, where its annual production volume is (3,777 tons); in the south, Hebron governorate, where the total annual production is (2,240 tons). Considering all of this, wheat silos are distributed to be nearer to wheat-producing areas.

Table (4-11): Production and Area of Wheat Cultivated in G.S Governorates (2008 – 2009)

Gaza Strip	Area	Yield	Production
North of Gaza	2,700	150	405
Gaza	1,863	150	279
Dair Al Balah	4,100	100	410
Khan Younes	14,000	80	1,120
Rafah	2,500	70	175
	25,163		**2,389**

Source: PCBS, (2009), Agricultural Statistics, 2007-2008, Ramallah-Palestine.
Area: Dunum, **Production**: Metric Tons, **Yield**: Kg/Dunum,

In Gaza Strip, it is noted that Khan Yunis has the highest wheat production with an annual production of (1,120 tons), it is one of the southern governorates, followed by Deir Al Balah with an annual production of (410 tons), Thus, it is clear that wheat silos distribution in both West Bank and Gaza Strip depends on their wheat production, figure (4-9) shows the distribution mechanism:

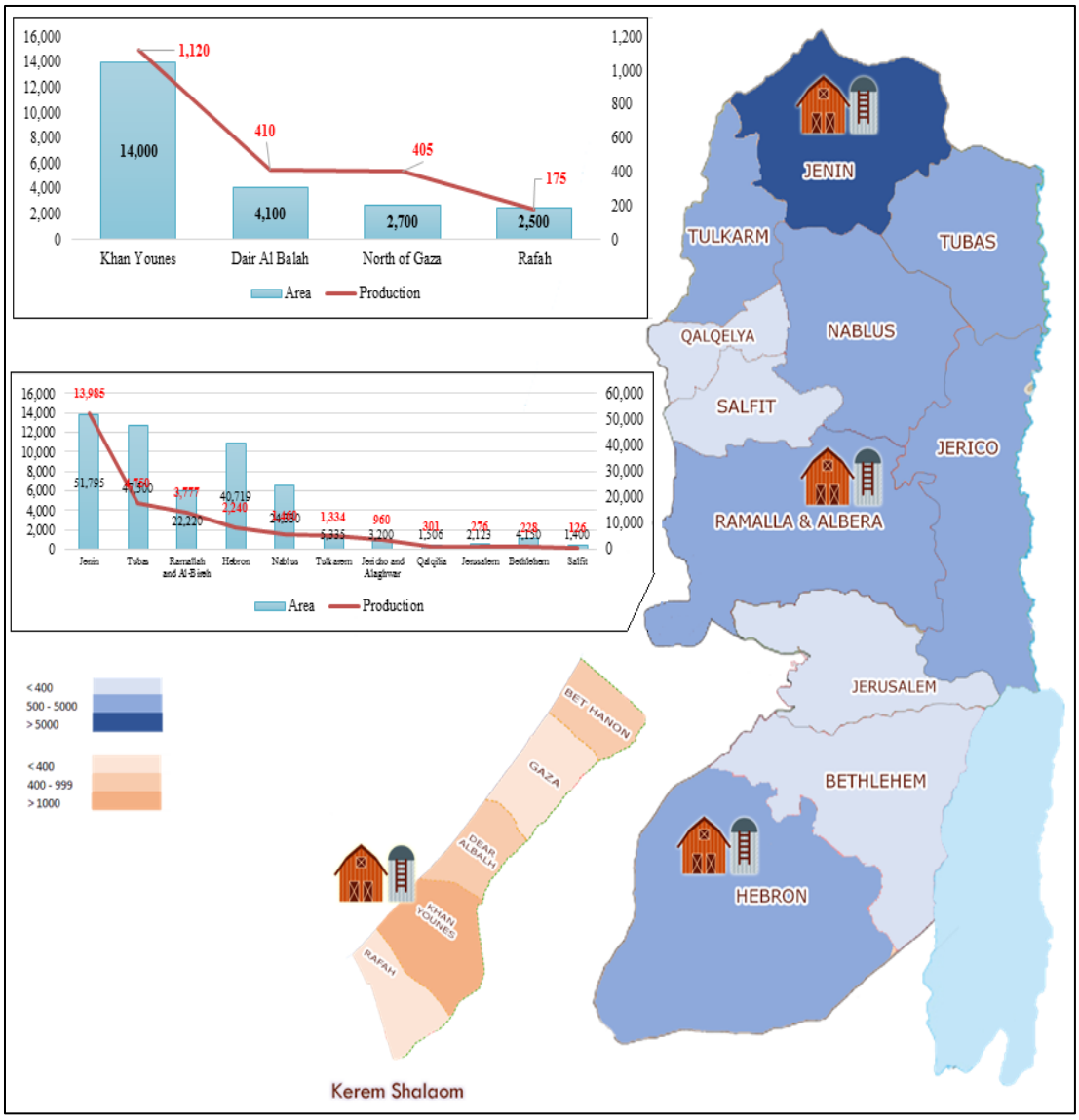


Figure (4-9): Distribution of Wheat Silos to Regions According to Area Production
Source: Prepared by The Researcher

4.3.3 Quantitative Distribution of Wheat Silos by Consumption Rate

Silos and warehouses are distributed according to wheat consumption average quantity. Table (4-12) shows each governorate wheat consumption:

Table (4-12): Estimation of The Average Quantity of Wheat Consumption in W.B - 2017

#	Governorates	Population (2017)	Total Consumption	%of Consumption Volume
1	Jenin	312,135	37,456	10.9%
2	Tubas	60,399	7,248	2.1%
3	Tulkarem	185,140	22,217	6.5%
4	Nablus	384,953	46,194	13.5%
5	Qalqilia	111,425	13,371	3.9%
6	Salfit	74,790	8,975	2.6%
7	Ramallah and Al-Bireh	326,008	39,121	11.4%
8	Jericho and Alaghwar	49,568	5,948	1.7%
9	Jerusalem	431,706	51,805	15.1%
10	Bethlehem	215,514	25,862	7.5%
11	Hebron	705,053	84,606	24.7%
	Total	**2,856,691**	**342,803**	

Source: PCBS.
Average Consumption: 120 Kg/year
Total Consumption = Population * Average Consumption

Table (4-12) shows that Hebron has the largest consumption of wheat with an annual volume of (84,606 tons) and (24.7%) of the total consumption, followed by Jerusalem governorate (51,805 tons) and (15.1%) of annual consumption, and Nablus (46,194 tons) and (13.5%), and it is noted that whenever population grows, wheat consumption proportion increases.

Table (4-13): Estimation of the average quantity of wheat consumption in G.S – 2017

Governorates	Population (2017)	Total Consumption	Percentage of consumption volume
North of Gaza	364,582	43,750	19.4%
Gaza	644,823	77,379	34.4%
Dair Al Balah	269,946	32,394	14.4%
Khan Younes	366,223	43,947	19.5%
Rafah	231,092	27,731	12.3%
Total	**1,876,666**	**225,200**	

Source: PCBS
Average Consumption: 120 Kg/year **Total Consumption =** Population * Average Consumption

Table (4-13) shows that Gaza has the highest annual wheat consumption (77,379 tons) and (34.4%) of total consumption, it is in the northern area of Gaza Strip, followed by the governorate of North Gaza and Khan Yunis. (43,750 tons), (43,947 tons), (19.4%) and (19.5%), respectively, figure (4-10) shows how silos are distributed to the areas according to the amount of consumption.

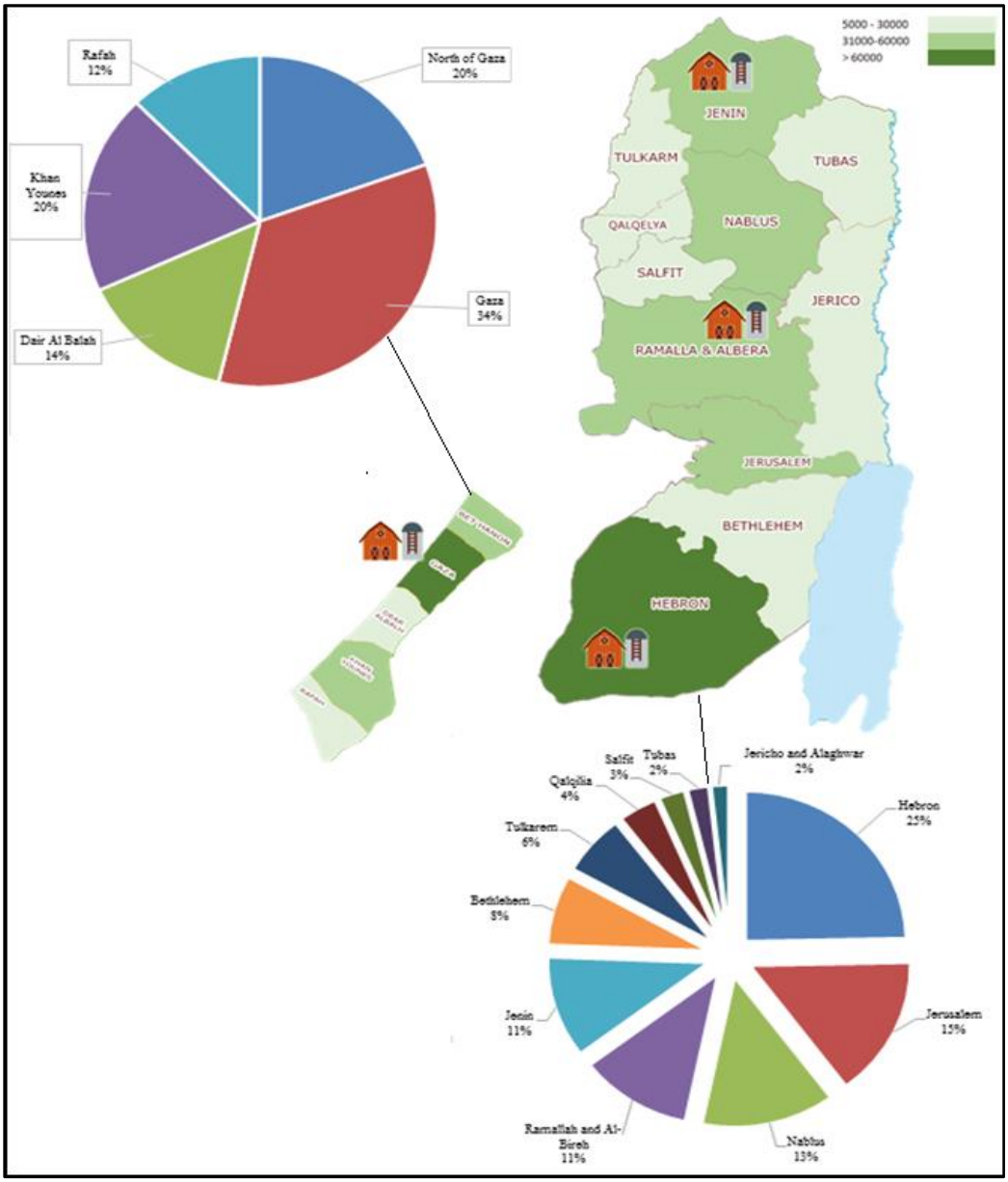


Figure (4-10): Distribution of Wheat Silos to Regions According to The Quantity of Production in Each Region

Source: Prepared by the researcher

4.3.4 Distribution of Wheat Silos by Population Density

Wheat silos are distributed according to governorate population density; the governorate having the highest population density builds silos and wheat reserve, more precisely, wheat silos and warehouses will be built in the densely populated regions. The term "region" may mean a number of governorates, not just a single governorate. Tables (4-14) and (4-15) show the population density of each governorate and region:

Table (4-14): Population in the West Bank (2017)

Region	% of total of region	Governorate	Population	Pic	% of total population
North	39.5%	Nablus	384,953		13.5%
		Jenin	312,135		10.9%
		Tulkarem	185,140		6.5%
		Qalqilia	111,425		3.9%
		Salfit	74,790		2.6%
		Tubas	60,399		2.1%
			1,128,842		
Center	28.3%	Jerusalem	431,706		15.1%
		Ramallah & Al-Bireh	326,008		11.4%
		Jericho & Alaghwar	49,568		1.7%
			807,282		
South	32.2%	Hebron	705,053		24.7%
		Bethlehem	215,514		7.5%
			920,567		
Total			**2,856,691**		

Source: PCBS, 2107
The Ratios and Zoning Were Calculated by The Researcher

According to table (4-14), West Bank governorates are divided into three regions (North, Central, and South); it is noted through this division that the population of northern regions is (1,128,842 people), representing (39.5%) of the total population of West Bank, followed by central governorates with a population of (807,282 people), representing (28.3%), and

finally the population in the southern regions with a population of (920,567 people), representing (32.2%).

Having explained governorates division, and population proportion and density, the construction place of wheat silos and warehouses in each region is required; referring to population density in Jenin, Tubas, and Nablus, it is noted that it is (757,486 people), representing (67.1%) of West Bank total population; therefore, the central silos and warehouses should be built in a middle area among these governorates, with the highest storage capacity; this is also true for Ramallah and Al-Quds in central areas, and Hebron in the south.

Table (4-15): Population in the Gaza Strip (2017)

Region	% of Total of Region	Governorate	Population	Pic	% of Total Population
North	54%	Gaza	644,823		34.4%
		North of Gaza	364,582		19.4%
			1,009,405		
Center	14%	Dair Al Balah	269,946		14.4%
			269,946		
South	31.8%	Khan Younes	366,223		19.5%
		Rafah	231,092		12.3%
			597,315		
Total			**1,876,666**		

Source: PCBS, 2107 The Ratios and Zoning Were Calculated by The Researcher

According to table (4-15), Gaza governorates are divided into three regions (North, Central, and South), the population in the northern regions is (1,009,405 people) representing (54%) of Gaza total population, in the central regions (269,946) representing (14%), and finally in the southern regions (597,315) representing (31.8%). Because the population high density in Gaza governorate is (644,823), representing (34.4%) of northern regions total population, constructing silos and central wheat warehouses in Gaza governorate is the

most suitable according to population density; the same applies to the Khan Younis in the south and Deir al-Balah in the central regions. Figure (4-11) shows the mechanism of distributing wheat silos and central warehouses in West Bank and Gaza Strip.

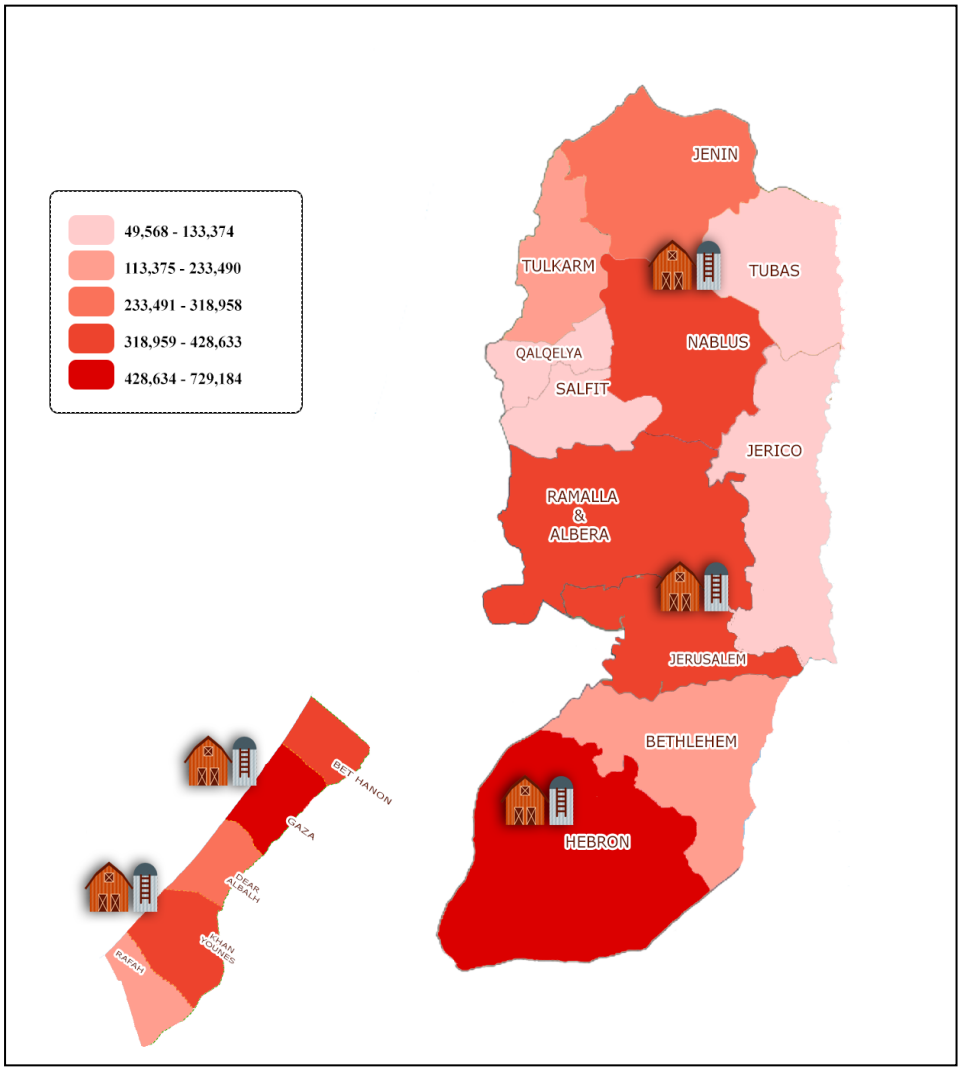


Figure (4-11): Distribution of Wheat Silos by Population Density
Source: Prepared by The Researcher

Based on explanations mentioned above, this a mechanism of distribution has taken more than a method - from the researcher's point of view - these mechanisms are constrained by many political, economic, climate and geographical considerations, which must be taken into account when establishing such projects; the decision is decision-makers

responsibility, the purpose of this distribution is to give them important indicators through which they may plan for these projects to implement according to citizens' interests and food security that must be given higher priority.

4.4 Methods of Building Wheat Strategic Reserve

The wheat strategic reserve is built through either local purchasing or importing from abroad, or by both methods; the purchase is done directly from the producers to absorb the local surplus preventing prices collapse and encouraging producers to continue producing wheat for the coming seasons. when the purchase is made in the main production areas, according to required quantities, the price shall be determined by those being responsible for the production process taking into consideration producers' interests; wheat is usually imported to fill the gap between the total needs and locally available quantities, and to reduce wheat prices stabilizing them at certain levels (The Agricultural Bank of Sudan, 2019).

4.5 Sources of Wheat Strategic Reserve

About half of the flour in the Palestinian market is Israeli and the other one is Palestinian, the remaining marginal quantities left are from UNRWA and other international aids. Palestinian large mills provide the local market with most of their available flour, while Israel imports its needed flour from the Black Sea countries, as Russia. Palestinians living in cities buy bread from local ovens, some of which use a mixture of Palestinian-Israeli flour. While those being in countryside depend on producing their own household bread; therefore, flour here is unprocessed or unfortified, which is more popular, because it is grown locally by small mills using traditional grinding methods (Maan, 2013).

4.5.1 External Sources

A financial report by ASWAQ (2018) which is specialized in monitoring commodities and raw materials movement in international markets and commodity exchanges, indicates that wheat total world production in 2018 was about (763.06) million tons.

Table (4-16): The Largest Six Wheat Producers in The Worlds For 2018

State	Total production - million tons
EU	151.26
China	134.33
India	98.51
Russia	84.99
USA	47.35
Ukraine	26.98

Source : Miltipel sources.

The European Union is wheat top producer with (151.26) million tons a year, followed by China with (134.33) million tons a year, India is third with (98.51) million tons, Russia, America, and Ukraine with (84.99), (47.95), and (26.98) million tons respectively. The global farming system of United States Department of Agriculture (USDA) predicts that global wheat production will reach (777) million tons, being higher than its global consumption (USDA, 2019).

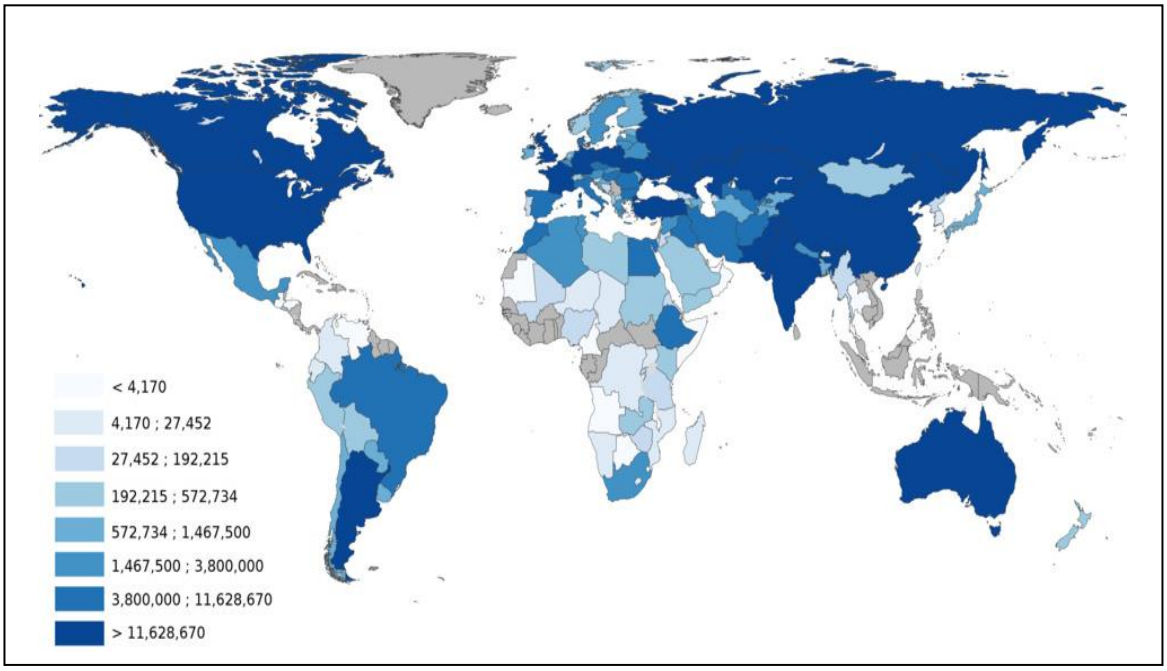


Figure (4-12): World Wheat Production - Ton
Source: FAO, 2014 (https://ar.actualitix.com, 2016)

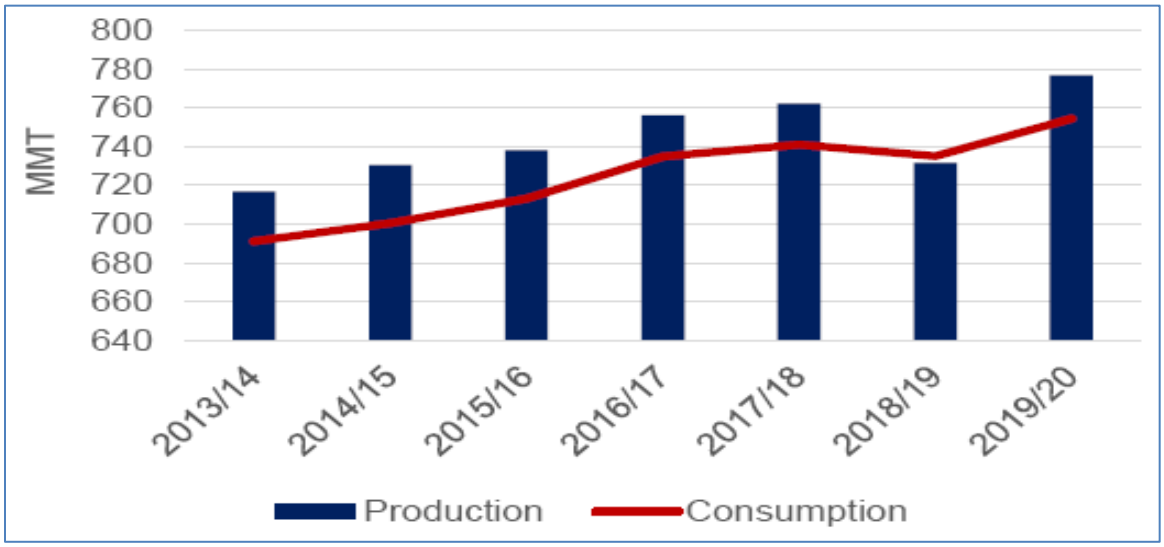


Figure (4-13): World Wheat Production and Consumption Forecast for 2019
Source: FAO

The total world wheat exports reached to (181.25) million tons, table (4-17) shows the top 10 wheat exporting countries in 2016-2020.

Table (4-17): Top Ten Wheat Exporting Countries in (2016-2020)

Exporters	2016-2019	2019-2020	Change %
	Average\Million Tones	Forecast\Million Tones	
Russian Federation	34.5	35	0.5
United States	26.6	27	0.4
European Union	23.7	23.5	-0.2
Canada	21.8	23	1.2
Ukraine	17.3	17	-0.3
Australia	16	14	-2
Argentina	13.1	13.6	0.5
Kazakhstan	8	8	-
Turkey	4.8	4	-0.8
Mexico	1	1.3	0.3

Source: (FAO, 2019)

Russia topped wheat exports with a rate of (34.5) million tons in 2016-2019, and is expected to increase in 2019-2020 to (35) million tons by (0.5%), followed by the USA by (26.6) million tons a year and is expected to rise to (27) million tons by (4%), followed by the EU (23.7) million tons annually, and is expected to decrease to (23.5) million tons by (-0.2%).

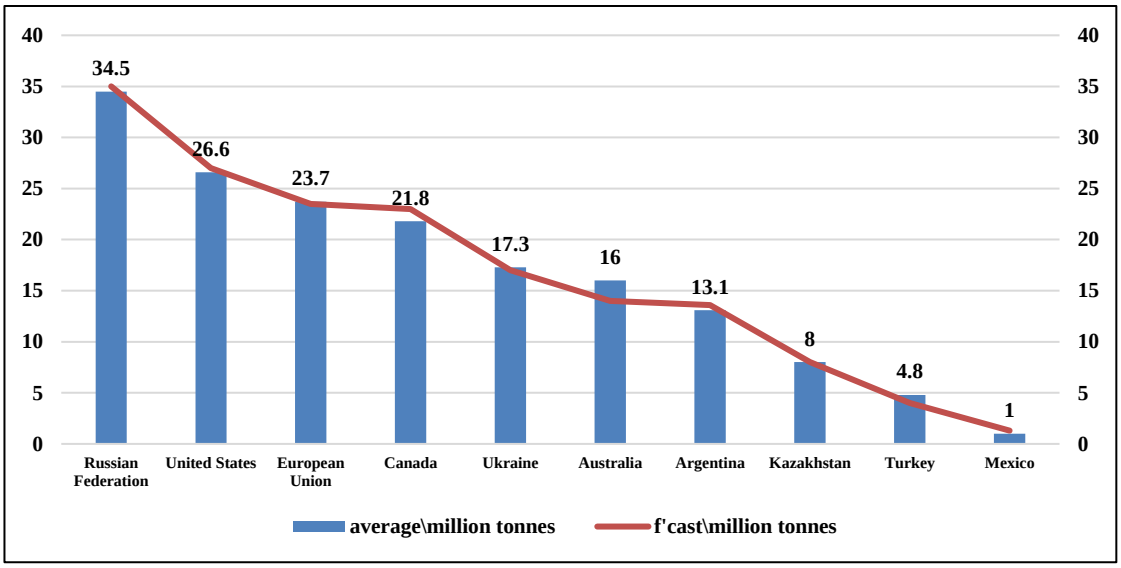


Figure (4-14): Average & Forecasts for Top Ten Wheat Exporting Countries 2016-2020
Source: Prepared by The Researcher

Arab countries heavily depend on imported food, especially wheat, they import a majority of wheat from North America, Western Europe, Russia, and Australia (IFC, 2011,P.1-4) table (4-16) shows most Arab countries wheat imports increased during 2009-2016, including Palestine, which imported (91.53) thousand tons in 2009, and imported (157.61) thousand tons in 2016, with an increase of (66.08) thousand tons, about (70%), this increase in imports was due to the increase in population, wheat consumption, and the agricultural sector distortions affected by Israeli occupation and farmers reluctance to grow wheat.

Table (4-18): Quantity and Value of Imported Wheat in Arab Countries (2009 – 2016)

Country	Average 2013-2009		2014		2015		2016	
	Q.	V.	Q.	V.	Q.	V.	Q.	V.
Jordan	826.82	249.19	1307.2	387.37	816.61	211.02	1998.87	448.08
Emirates	873.33	256.01	1661.93	418.91	895.37	264.31	809.96	204.16
Bahrain	78.09	28.16	116.95	36.35	55.04	29.06	86.07	26.47
Tunisia	1586.86	493.03	1664.9	530.43	1983.73	563.17	2056.82	429.37
Algeria	5869.88	1933.49	7417	1607.91	8504.85	1843.75	8225.6	1783.21
Djibouti	185.85	39.72	487.87	121.16	684.79	126.01	365.56	65.35
Saudi Arabia	1870.49	579.62	3237.58	705.4	1404.02	373.39	495.29	107.91
Sudan	2008.23	783.53	1673.26	659.29	1522.73	600	1343.7	348.02
Syria	843.27	199.2	568.05	135.17	542.07	97.81	67.22	12.41
Somalia	78.38	15	0.13	0.04	1.29	0.41	27.5	5.1
Iraq	97.53	124.61	112.6	161.86	423.74	121.8	175.09	41.84
Oman	233.01	84.37	688.57	222.5	476.07	141.61	593.85	137.96
Palestine	**91.53**	**28.84**	**142.03**	**42.61**	**124.43**	**37.33**	**157.61**	**38.65**
Qatar	112.61	34.17	80.83	26.81	229.33	62.4	185.38	58.48
Kuwait	342.19	80.83	497.47	166.67	304.98	98.66	497.63	124.66
Lebanon	524.62	155.82	615.42	186.51	625.66	150.44	538.99	111.38
Libya	1741.51	405.31	1694.97	434.16	1147.38	233.25	1003.21	183.36
Egypt	7548.66	2615.86	8115.06	2295.81	8981.65	2569.18	10788.3	2254.3
Morocco	3313.31	1082.4	5160.78	1070.51	3214.53	876.42	6288.07	1304.34
Mauritania	341.42	82.99	448.21	110.39	537.13	135.54	440.14	88.92
Yemen	2988.66	956.29	3327.73	759.9	2817.21	811.34	2322.11	530.26
Total	**31556.25**	**10228.43**	**39018.51**	**10079.75**	**35292.6**	**9346.88**	**38466.95**	**8304.23**

Source: (league of Arab States, 2018)
Quantity(Q): 1000 M.T. **Value (V): Million U.S. Dollars**

Table (4-18) shows that the Republic of Egypt topped Arab countries in importing wheat in 2016, which was (28%) of the Arab countries' wheat imports, followed by Algeria and Morocco with imports (21.4%) and (16.3%), respectively.

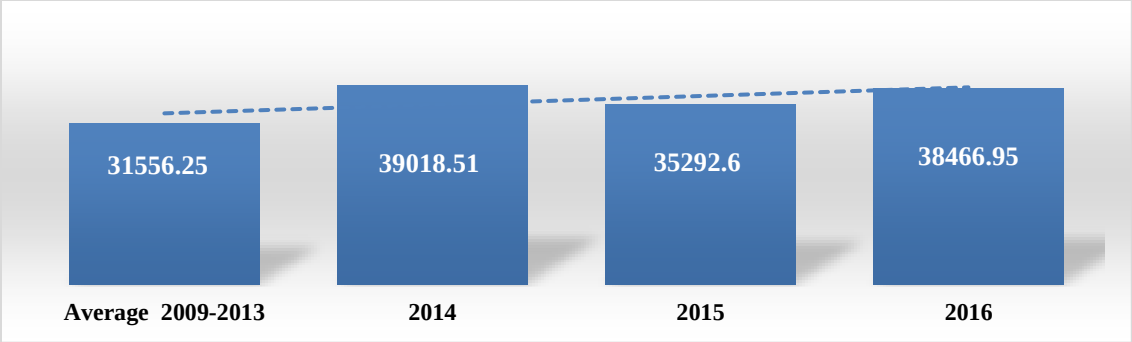


Figure (4-15): Quantity of Wheat Consumption in the Arab Countries (1000 M.T) 2009 -2016
Source: Prepared by the Researcher Depending on the Table (4-15)

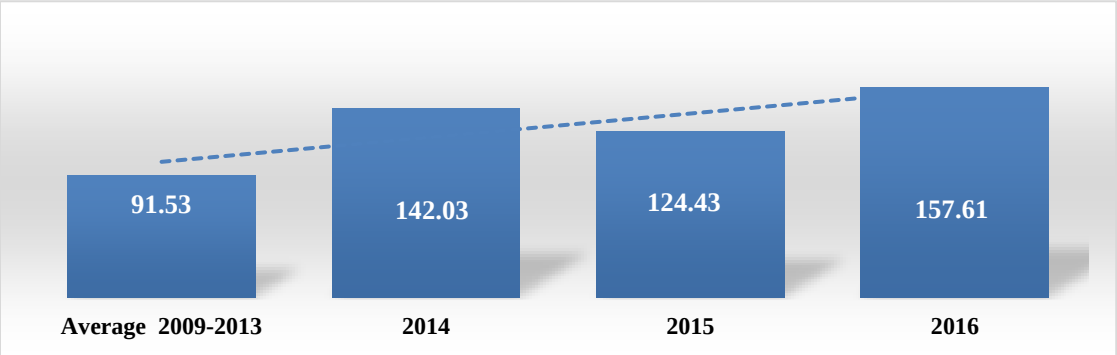


Figure (4-16): Quantity of Wheat Consumption in Palestine (1000 M.T) 2009 -2016
Source: Prepared by The Researcher Depending on the Table (4-15)

Figure (4-17) shows wheat purchase in the Middle East, North Africa (MENA) region, and wheat exporting countries.

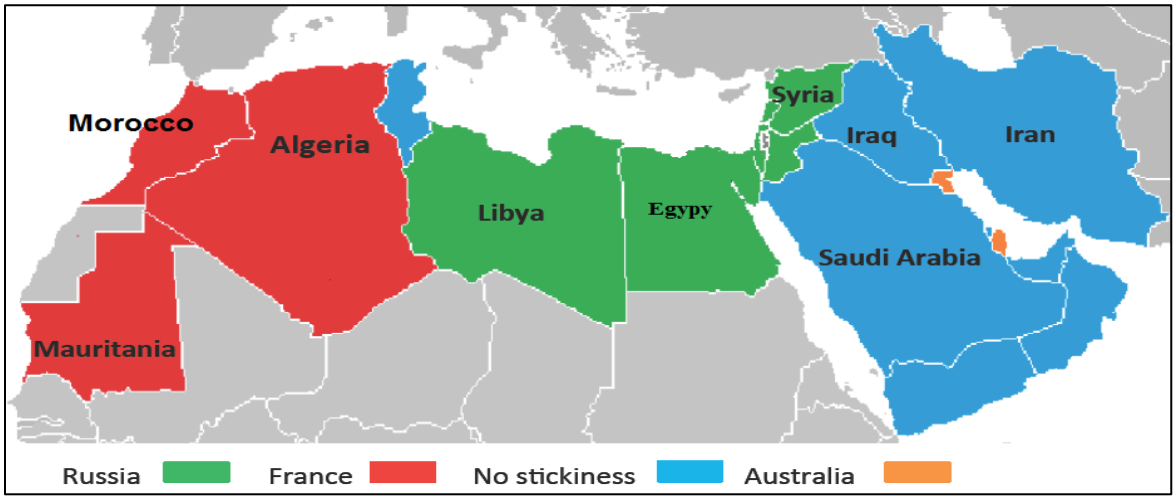


Figure (4-17): Purchase of wheat in the Middle East and North Africa (MENA)
Source: FAO, Total Tonnage of Wheat Exported

Some countries resorted to agricultural investment outside their borders to make use of this for production to reduce importing wheat costs, and to exploit other countries' available and suitable areas for cultivating wheat. This investment is either on a collective basis as the Arab Authority for Agricultural Investment and Development, which includes (16) Arab countries (Algeria, Sudan, Iraq, Saudi Arabia, Syria, Egypt, Kuwait, Morocco, UAE, Qatar, Somalia, Mauritania, Tunisia, Jordan, Oman and Lebanon) (Ahmad, Mohammed, 2014), or individually, such as Jordanian agricultural investment in Sudanese Macabrab plains.(AOAD, No Date),Technical and economic feasibility study. The purpose of identifying the largest wheat producing countries, the largest exporting ones, and wheat imports volume and value in Arab countries, particularly in Palestine, is to provide decision-makers and researchers with clear indicators of wheat strategic reserve and actual optimal volume for identifying imports volume from external sources. Al-Deek (2019) director of information technology at the Ministry of Finance said that Palestine imports wheat from the following countries:

Table (4-19): Quantity of Imported Wheat from Abroad (Ton) (2014-2018)

Country of Origin	2014	2015	2016	2017	2018	Total	% of Total Population
Ukraine	211	-	-	-	4,887	5,098	6%
Germany		-	9,000	-	-	9,000	11%
Russia		-	-	33,785	32,232	66,017	82%
Total	**211**	**-**	**9,000**	**33,785**	**37,119**	**80,114**	

Source: Interview with Basil Al Deek, Director of IT, Ministry of Finance, 28/07/2019

Table (4-19) shows imported wheat quantities from abroad during 2014-2018 was (80,114) tons, distributed to the Russian Federation by (66,017) tons, by a percentage (82%) of the total imported quantity, followed by Germany (9,000) tons, by (11%), and finally Ukraine (5,098) tons, by (6%).

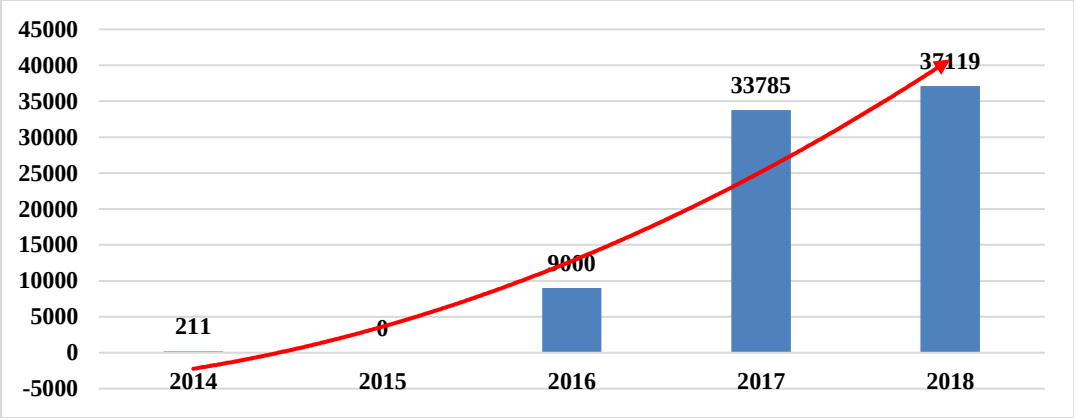


Figure (4-18): Quantity of Imported Wheat (Ton) From Abroad 2014-2018 Prepared by The Researcher Based on The Data in Table (4-19)

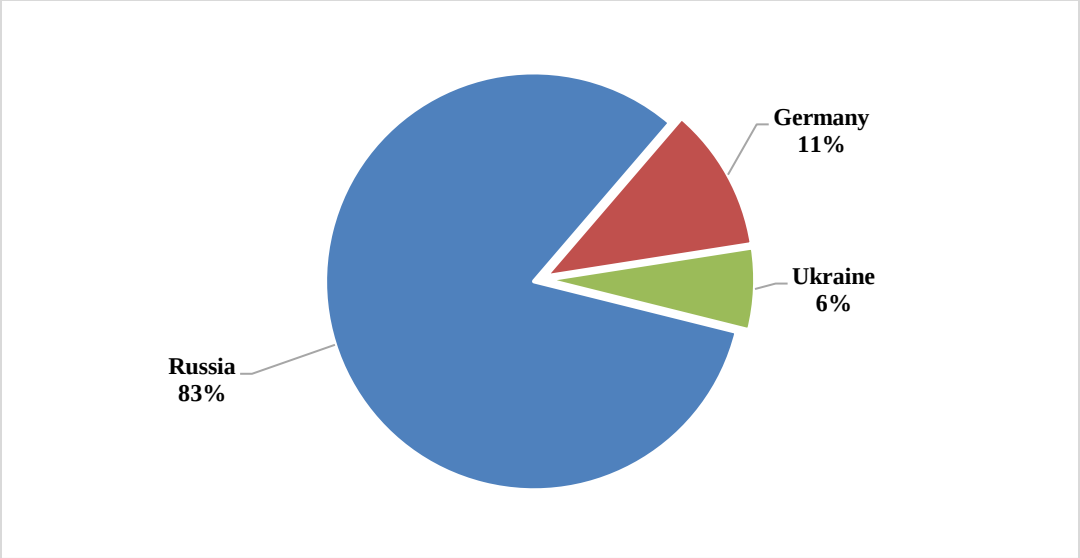


Figure (4-19): Share of Wheat-Exporting Countries for Palestine 2014-2018 Prepared by The Researcher

4.5.1.1 Share of Each Governorate from Imported Wheat

Table (4-18), (according to PCBS's data in 2017) shows wheat imports total value and quantity by governorate, where Jenin governorate topped the first with wheat imports from abroad by (43.6%), followed by Ramallah, Nablus, and Gaza with (15.23%), (13.7%), and (11.5%), respectively.

Table (4-20): Total value and quantity of wheat imports by governorate for 2017

Governorate	Value/Dollars	Estimated Quantity - Thousand Tons	Import Rate Per Governorate
Jenin	9,298,597	18,597	43.63%
Tubas	147,440	295	0.69%
Tulkarem	1,394,608	2,789	6.54%
Nablus	2,926,736	5,853	13.73%
Qalqilia	523,090	1,046	2.45%
Salfit	12,760	26	0.06%
Ramallah & Al-Bireh	3,246,020	6,492	15.23%
Jericho & Alaghwar	-	-	-
Jerusalem*	-	-	-
Bethlehem	3,379	7	0.02%
Hebron	1,306,001	2,612	6.13%
G.S	2,453,930	4,908	11.51%
	21,312,563	**42,625**	

- **Source: PCBS (2019).**
- **(-): No value.**
- **(*) The Data Does Not Include That Part of The Governorate of Jerusalem, Which Was Annexed by The Israeli Occupation Force After the Occupation of The West Bank In 1967.**
- **Quantity Was Calculated Based on The Price of Wheat ($ 500).**

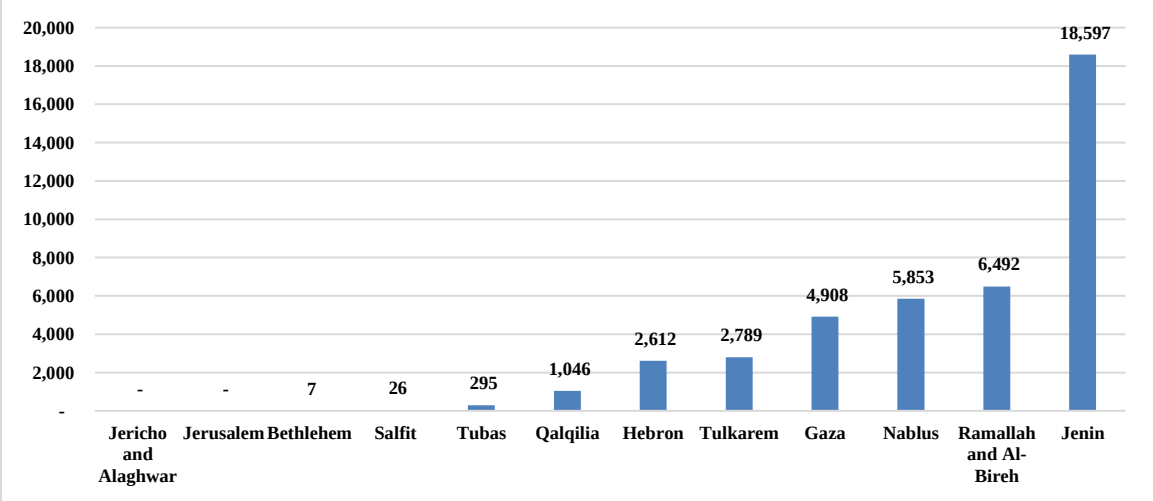


Figure (4-20): observed imports quantity of wheat by governorate for 2017
Prepared by the researcher

4.5.1.2 Wheat Imported from Israel

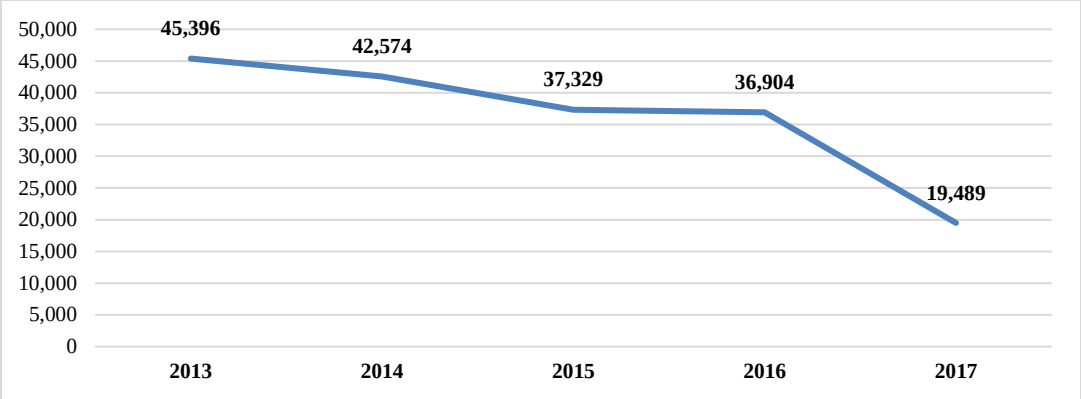
Israel has been the main source of the Palestinians' wheat need for a long time, being sold in a form of flour to Palestinian markets and bakery owners. Table (4-21) shows imported wheat value and quantity from Israel during 2013-2017.

Table (4-21): Total Value of Palestinian Imports of Wheat from Israel (2013-2017)

Year	Value/ 1000 USD	** Price / USD/ Ton	Estimated Quantity/ 1000 Ton
2013	45,396	249	182
2014	42,574	233	183
2015	37,329	184	203
2016	36,904	161	229
2017	19,489	171	114
			911

- **Source**: **PCBS, 2019. Observed Foreign Trade Statistics, Ramallah, Palestine.**
- Value in Thousand USD
- (*): The Data Do Not Include That Part of The Governorate of Jerusalem, Which Was Annexed by The Israeli Occupation by Force After the Occupation of The West Bank in 1967.
- (**) The Average Price Was Estimated According to Data Available on The IGC Website, https://www.igc.int/en/markets/marketinfo-goi.aspx

It is noted that the decrease in value and quantity of Israel-imported wheat during 2013-2017, was due to Palestinian trade dependence on importing wheat from abroad, especially from Russia and Ukraine, and the Palestinian government's strategy of gradual disengagement from Israeli economy. Wheat highest quantity imported from Israel was (229 thousand tons) in 2016 because world wheat price decreased at that time. In 2017, the imported quantity dropped to about half by (114) thousand tons. Figure (4-21) shows the decrease in wheat value imported from Israel during the mentioned period.



- **Figure (4-21): Value of Imported Wheat from Israel During 2013-2017.**
- **Prepared by The Researcher Based on The Data in The Table (4-19).**

4.5.2 Internal Sources

According to (PCBS), bread and cereals monthly per capita consumption in Palestine is about (10 kg), equivalent to (16%) of the average monthly household expenditure on food, in addition, the (project of publicizing and analyzing General Agricultural Census data, 2010) shows that cultivated areas decreased to about (220,000) dunums when compared to the previous years (PCBS, 2013, P39). Wheat is distributed to Jenin, Tubas, Ramallah, Hebron, and northern of Gaza and Rafah; Jenin has the most cultivated area, with (43.9%) of total area and (22.6%) of total wheat production.

Table (4-22): Area Cultivated with Wheat and Total Wheat Production Per Governorate

#	Governorate	Area	Production	Dunum's Production (Kg)
1	Jenin	51,795	**13,985**	270
2	Tubas	47,500	**4,750**	100
3	Tulkarem	5,335	1,334	170
4	Nablus	24,330	1,460	55
5	Qalqilia	1,506	301	60
6	Salfit	1,400	126	250
7	Ramallah and Al-Bireh	22,220	**3,777**	80
8	Jericho and Alaghwar	3,200	960	300
9	Jerusalem	2,123	276	100
10	Bethlehem	4,150	228	150
11	Hebron	40,719	**2,240**	200
12	North of Gaza	2,700	405	150

#	Governorate	Area	Production	Dunum's Production (Kg)
13	Gaza	1,863	279	130
14	Dair Al Balah	4,100	410	55
15	Khan Younes	14,000	**1,120**	70
16	Rafah	2,500	175	90
		229,441	**31,826**	

- **Source**: **Palestinian Central Bureau of Statistics, (2009), Agricultural Statistics, 2007-2008, Ramallah-Palestine**.
- **Area**: Dunum, **Production**: Metric Tons
- **Dunum's Production = (**Production / Area)

Table (4-22) shows that there is a considerable gap between the cultivated area and the amount of produced wheat because of rainfall rates, land fertility, seeds quality, fertilizers, and climate. Even high-yielding governorates cannot fully meet their population needs; most of produced quantities are locally consumed, stored as seeds for next seasons, or consumed for livestock feed because of a long storage period making them to be unsuitable for human consumption. (Jamal Eid, 2019).

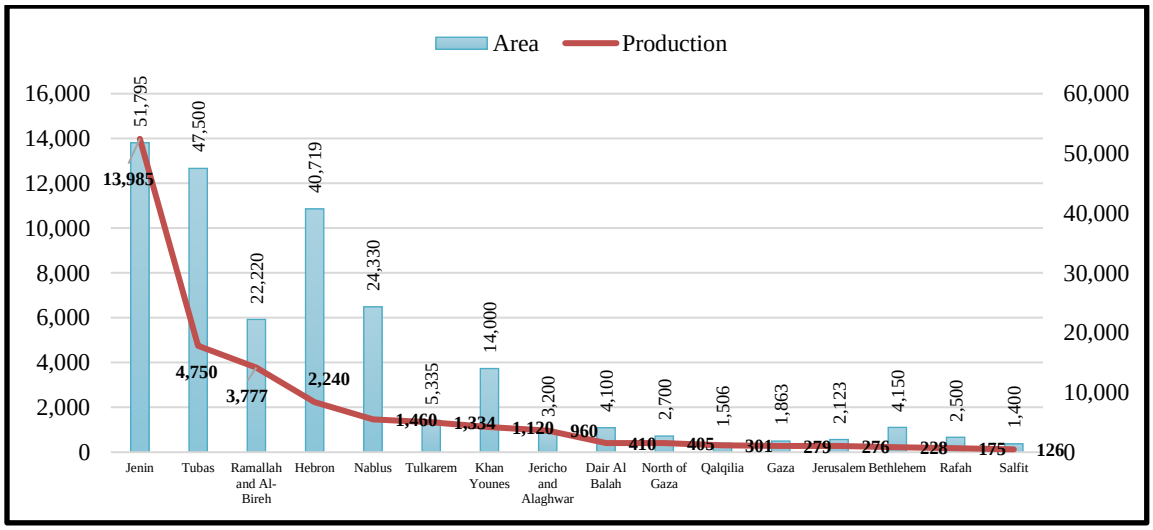


Figure (4-22): The Cultivated Area, The Volume of Production and The Quantity of Production Per Dunum in the Palestinian Governorates.

4.4.3 Mills in Palestine

West Bank and Gaza Strip have many simple mills and modern main ones; West Bank has Golden Wheat Mills, Arab Mills, and Jenin Modern Mill, whereas Gaza Strip has Palestinian Mills, Greater Gaza Flour Mills, Al Fayhaa Flour Mills, Al Huda Mills, Salam Mills, New Jaffa Flour Mills, and Middle East Flour Mills which all came after PNA had appeared. These mills are provided with wheat imported from Russia representing mainly about half the amount, followed by USA. According to wheat which is locally grown, it represents only (2.7%) of the wheat used by mills; in Palestinian market, the flour produced by these mills constitutes about half the available one, the other half is Israeli; indeed, Israel imports it from the Black Sea countries, mainly Russia. This means that the percentage of local flour in Palestinian markets is only (1%). (Maan, 2013).

The number of operating establishments in grain industry in Palestine is (117) ones, (74) in West Bank, and (43) in Gaza strip (PCBS, 2018), this indicates to what extent citizens depend on consuming wheat, its derivatives, and industries. The reserve held by these mills and establishments is an operational reserve being enough for a few weeks; it is an insufficient reserve for several months if political, economic or natural crises appear.

Chapter Five

Conclusions:

- The widened food gap of a wheat commodity results from economic, political and demographic factors at international, regional and local levels.
- World overpopulation accompanied with food reserve decrease, which threatens food security of non-food producing or self-insufficiency countries, requires intervention to achieve balance between population needs and food actual reserve.
- Dwindling areas of wheat cultivation are brought by occupation, urbanization, the absence of agricultural pricing policies and plans to save farmers, and the lack of viable strategic plans for advancing the agricultural sector.
- Wheat production severe shortage, regionally and locally, is found because of a lack of realizing agriculture importance; a direct relationship between agricultural development and wheat strategic reserve is found, so taking caring of agricultural development leads to an increase in wheat strategic reserve, and vice versa.
- Wheat domestic production (44 thousand tons) exceeds consumption volume (400 thousand tons), in other words, production is only 10% of consumption, and this shortage must be covered by importation, this makes a state dependent on another wheat-exporting state and increases the cost of importing wheat.
- No government support is for the agricultural sector, especially wheat cultivation causing farmers' reluctance to grow wheat and cultivate other types having greater financial returns, consequently, local wheat production reduces; no funding and real plans are found to develop the agricultural sector leading labor movement to other sectors to avoid unemployment preventing agricultural development.

- Palestine has no wheat strategic reserve; in fact, what currently exists is an operational stock which cannot be sufficient for potential crises.
- Establishing wheat strategic reserve does face political, financial, technical and logistical obstacles.
- The role of non-governmental, civil society and private sector institutions in building wheat strategic reserve is absent.
- Palestine lacks studies on wheat strategic reserve.
- Estimating wheat strategic reserve optimal volume is through:
    1. Selecting one of the assessment scenarios (17%, 20%, 25%, 30%, and 35%) of wheat consumption per capita.
    2. In the absence of consumption volume real figures and ratios, it can be adopted four times in estimating the strategic reserve volume.
- Five scenarios have been found in determining wheat silos distribution, which can be used for estimating the appropriate quantities of wheat strategic reserves and distributing them to the appropriate regions.
- Indicators like quantitative distribution by production volume, consumption rate, and population density help in determining the quantitative distribution of strategic wheat stocks.
- The Interview questions asked to experts were able to answer the research questions:
    1. The minimum required strategic wheat stock is more than 50 thousand tons.
    2. The fifth scenario is the best scenario for distributing wheat silos and wheat stores to all regions in Palestine

Recommendations:

- Supporting agricultural research centers to submit strategic studies for developing Palestinian wheat cultivation and production, in cooperation with local and international academic institutions.
- Improving Palestinian wheat production through a strategy based on vertical development, such as improving land productivity using improved wheat varieties, and horizontal development by increasing wheat-planted area.
- Providing incentives to motivate farmers to grow wheat and adopting an encouraging price policy for national crops.
- Focusing on linking food security to Palestinians' interests and security, considering that this national strategy harmonizes with state sovereignty criteria.
- Developing agricultural sector being responsible for providing agricultural crops and food commodities, supporting strategic reserve, and considering agricultural sector to be the main source of many food industries.
- Paying attention to comprehensive rural development creating proper conditions of improving farmers' living standards, enlarging their capacities of contributing more to agricultural development process, and preventing agricultural labor mobility to other sectors being not economically feasible ones.
- Creating a supreme public body including all governmental and non-governmental institutions being concerned with wheat and its cultivation. It is responsible for monitoring the amount of cultivated wheat, developing agricultural lands which are suitable for cultivating wheat, controlling the wheat strategic reserve, managing this reserve, and communicating with all relevant authorities.
- Encouraging academic institutions and scientific research to prepare wheat-related research in terms of the development of wheat grain varieties, fertilizers, soil, and

technical matters related to storage, warehousing, silos and transport, and the reduction of wheat losses; also, to include wheat research among the priorities of research programs to study it from various agricultural, economic and social aspects.

- Directing private sector to invest effectively in constructing and managing strategic wheat stocks through establishing public shareholding companies, and taking advantage of other of other countries' experience.
- Adopting a serious national strategy to support and develop agriculture in general and wheat in particular, which will be prepared by all relevant authorities.
- Increasing governmental support for agricultural sector budget, as an income-generating economic sector promoting Palestinian food security as a resisting economy form.
- Enhancing cooperation among all parties when preparing plans, procedures, and policies to face all difficulties facing the wheat silos establishment, and finding all possible solutions in advance.
- Taking advantage of regional and international countries' experiences in developing wheat cultivation and building strategic wheat stocks employing experts for training and supervising staffs, or training abroad.

References

1. Abdul-Ghafoor Ahmad, (2008), An economic view of the food problem in Iraq, Dar Zahran For Publishing, Iraq, P. 223, https://books.google.ps/books?id=tPiKCgAAQBAJ
2. Abu helal, Adel. (2011), Mechanisms proposed to activate the role of the Palestinian ministry of agriculture to support small farmers to achieve food security in the governate of Jericho and Jordan valley, unpublished master's thesis, P.1.
3. Abu Hilal, Bahaa al-Din. (2011), activating the role of the Palestinian Ministry of Agriculture in supporting small farmers to achieve food security in Jericho and Al-Aghwar Governorate, MA Thesis, Al-Quds University, Palestine, p.18.
4. Actualitix. (2016), https://ar.actualitix.com/country/wld/ar-wheat-producing-countries.php#ar-map, Accessed 21/7/2019, 08:00 PM.
5. Adam, Hadi. (2016), Food Security of Wheat Commodity in the Sudan (2001-2014), Journal of Economic Sciences, Ministry of Finance and Economy, Sudan, vol. 17, p.7.
6. Adrasi, Khetam. (2017), Economic Potential for Self-Sufficiency of Wheat in Syria, General Authority for Scientific Agricultural Research, Damascus, Syria, p. 59.
7. Agricultural Bank of Sudan-SAB,(2017). http://www.abs.sd/abscontl?action=handlepages2&modid=25. , Accessed 28-07-2018, 05:21 P.M.
8. Ahmad, Mohammed, (2014), The Future Vision for Taking the Problems of Agricultural Investment in Sudan, Unpublished Master Thesis, Sudan University of Science and Technology, Sudan.

9. Al haidar, Mohamad, Strategic Inventory (Road Map for Food Security), Riyadh Newspaper, Riyadh Economic, No. 15557, Riyadh, Saudi Arabia, 2011, p12.
10. Al marefa site, https://www.marefa.org/الأمن_الغذائي, Accessed 28-07-2018, 06:55 P.M.
11. Al youm al sabe. (2018), https://www.youm7.com/story/2018/12/24/6--دول-تتربع-على-عرش-إنتاج-القمح-فى-العالم-بإجمالى/4078823, Accessed 04/05/2019.
12. Al-assraj, Hussein. (2102), Arab Food Security Obstacles and Challenges, Cairo, P.3.
13. Alhayat al-jadedah, (2015), http://www.alhayat-j.com/arch_page.php?nid=136420, Accessed 26/04/2019 08:00 PM.
14. Al-Hayat al-Jadida,(without date), the debate between the government and the private sector on the construction of silos for wheat leads to the formation of a committee of the parties to follow up, http://www.alhayat-j.com/arch_page.php?nid=66726, Accessed 26/04/2019, 03:15AM
15. Ali Al-Khash, Mohammed Shaalan, Abdul Majid Gad, (1986). "Fundamentals of Crop Production", Alexandria University, Egypt, p. 26-29.
16. Al-Jubouri. (2015), Food Reserve and Their Role in Achieving Iraqi Food Security (Wheat Model), Wasit Magazine for Human Sciences, Qadisiyah University, Iraq, P12
17. Alkhaleej Website. (2010), strategic reserve and selection criteria ، http://www.alkhaleej.ae/analyzesandopinions/page/01f80ea9-9ef1-4070-8077-fbeade15e622 ،Accessed 28/04/2019, 06:00 PM.
18. Amended Palestinian Basic Law (2005), Public Rights and Freedoms, Article 10.
19. AOAD (2007), Arab Food Security Situation Report 2007, p.33
20. AOAD (2010), Strategic Stock Policies and Systems, Khartoum, P52.
21. AOAD (2014), Arab Strategic Food Stocks to Address Global Food Crisis, p. 3, www.aoad.org

22. AOAD, Technical and Economic Feasibility Study for Jordanian Agricultural Investment Projects in Makabrab Plain, (No date), Nile River State, Republic of Sudan, Main Report ، http://moa.gov.jo/Portals/0/studies/دراسة%20الجدوى%20الفنية%20والاقتصادية.docx
23. AOAD. (2009), Development Study of Strategic reserve Policy and Systems of Cereal Crops, Oilseeds and Vegetable Oils in the Arab World, Khartoum, p.46
24. AOAD. (2009). Development Study of Strategic reserve Policy and Systems of Cereal Crops, Oilseeds and Vegetable Oils in the Arab World, Khartoum, p. 58
25. AOAD. (2010), Development Study of Strategic reserve Policy and Systems of Cereal Crops, Oilseeds and Vegetable Oils in the Arab World, Khartoum.
26. AOAD. (2010), Development Study of Strategic reserve Policy and Systems of Cereal Crops, Oilseeds and Vegetable Oils in the Arab World, Khartoum, p. 38.
27. AOAD. (2014), Arab Agriculture Day, p.2
28. AOAD. (2014), Arab Agriculture Day, p.2.
29. Applied Research Institute – ARIJ. (2015), Palestinian farmer between reality and challenges, http://www.arij.org/files/arijadmin/IDRC/baseline/Farmers_Report_-_Executive_Summary-Arabic_Draft_1.pdf, P.9
30. Arab Food Security Situation Report 2007. (2008), Sudan, p. 37.
31. Arab Monetary Fund (2009), Joint Arab Economic Report, https://www.amf.org.ae/ar/content/2009-التقرير-الإقتصادي-العربي-الموحد
32. Arab Monetary Fund. (2009), Consolidated Arab Economic Report 2009, Arab Food Security, Chapter 10 (Axis), p. 172.

33. Arab Organization for Agricultural Development (AOAD). (2017), Annual Journal of Agricultural Statistics, League of Arab States, No. 37.

34. Arab Organization for Agricultural Development (AOAD). (2017), Annual Journal of Agricultural Statistics, League of Arab States, No. 37.

35. Arabic21, (2019), the causes of the global food crisis and its repercussions on the Arab world, https://arabi21.com/story/1195347/ أسباب-أزمة-الغذاء-العالمية-وتداعياتها-على-الوطن-العربي, Accessed 17/9/2019, 11:42 PM.

36. Areté S.R.L. (2017), Study on Storage Capacities and Logistical Infrastructure for Eu Agricultural Commodities Trade", European Commission, Final Report, P 22-25.

37. Aslan, Heba (2015), Palestinian Consumers Association, Palestinian Disability in Wheat Production, http://www.pcp.ps

38. Assad ،Monaf. (2012) , Wheat Production and its Reflection on Food Security In Syria, Unpublished Master Thesis, Tishreen University, Syria.

39. Aziz Salama, Abdullah Al-Omari, Nasser Al-Abbadi, Sameh Jarrar (2014), Wheat Varieties in Palestine, p.3

40. Beedle, P. L. (2001). Silos: an agricultural success story. Cooperative Extension, University of Wisconsin--Extension.

41. Bougara Rabeh, Kareed Mustafa, (2007). Optimal Management of Solid Wheat Stock in Al-Hadnah in Al-Maselah Mill, Algeria, p.3.

42. Central Bureau of Statistics, http://www.cbssyr.sy/yearbook/2010/Data-Chapter7/TAB-25-7-2010.htm

43. Central statistical organization. (2018), Trade Statistics, imports 2017, Iraq.

44. Committee on World Food Security. (2000), Assessment of the State of World Food Security, Twenty-sixth Session, Rome, 18-21 September 2000, http://www.fao.org/3/X7921A/X7921A.htm
45. CRS Report for Congress. (2005), Agriculture: A Glossary of Terms Programs, and Laws, 2005 Edition.
46. Deeb, Tariq, Susi, Faten,(2004). A Study of the Evolution of Wheat Consumption in the Syrian Arab Republic, Damascus University Journal of Agricultural Sciences, No. 1, P. 3.
47. Dolan, Brian .(2000), Malthus, Medicine & Morality: Malthusianism after 1798. Rodopi. ISBN 978-90-420-0851-9.
48. Egyptssp,(2015). food policy developments in the MENA region and future outlook ,http://egyptssp.ifpri.info/2016/07/20/food-policy-developments-in-the-mena-region-and-future-outlook/, Accessed 20/07/2019, 05:30 PM.
49. EHCSS's website, https://www.ehcss.com, Accessed 1/5/2019.
50. Elamwal site, (2014), Experts warn: a global food crisis in the coming years, https://www.elamwal.com/68573, Accessed 31/07/2019, 12:24 PM.
51. Environmental & Social Assessment& Management Framework, (2013). Bangladesh Modern Food Storage Facilities Project, Phase I, http://documents.banquemondiale.org/curated/fr/416241468208183928/pdf/E41790EA0P12050C0disclosed030310130.pdf , Accessed 28/06/2019, 10:50 PM
52. FAO and EBRD. (2015), Wheat sector review, Egypt, http://www.fao.org/3/a-i4898e.pdf.
53. FAO, (2005). Statement of the Committee on World Food Security, Thirty-fifth Session, Rome.

54. FAO, (2013). Feeding the world, Statistical Yearbook of FAO for the United Nations, Part.3, P132, http://www.fao.org/3/i3107e/i3107e03.pdf, Accessed 25/7/2019

55. FAO, http://www.fao.org/faostat/ar/#data/qc,18/4/2019,12:37PM

56. FAO, IFAD, UNICEF, WFP and WHO (2017), State of Food Security and Nutrition in the World, Building resilience to peace and food security, Rome.P-107. http://www.fao.org/3/a-I7695a.pdf

57. FAO. (2018), http://www.fao.org/worldfoodsituation/csdb/en/, Accessed 14/4/2018.

58. FAO. (1997), Size of reserve, http://www.fao.org/3/w4979e/w4979e0a.htm#size%20of%20reserve, Accessed 28-04-2019, 12:00 PM

59. FAO. (1997). Strategic grain reserves, Location of the reserve, http://www.fao.org/3/w4979e/w4979e0c.htm#TopOfPage,Accessed 01/05/2019 07:20PM

60. FAO. (2019), Food Outlook, Biannual Report on Global Food Markets, ISBN 978-92-5-131448-7, URL: http://www.fao.org/3/CA4526EN/CA4526EN.pdf, Accessed 13/06/2019, 05:56 PM

61. Fawzi, Amal. (2017), Food Security and Food Technology, First Edition, p. 68.

62. Fearon, J. D. (2007). Iraq's civil war. Foreign Aff., 86, 2.

63. GCSS 's website, http://www.gcss-egypt.com , Accessed 1/5/2019.

64. General Company for Grain Processing. (2019), http://tasneehobob.mot.gov.iq.

65. Gregory, P. J., Ingram, J. S., & Brklacich, M. (2005). Climate change and food security. Philosophical Transactions of the Royal Society B: Biological Sciences, 360(1463), 2139-2148.

66. Hadi Adam. (2016), "The Impact of Strategic Wheat Stocks on Wheat Consumption Insurance", Journal of Economic Sciences, Sudan University of Science and Technology, Sudan, Vol 17, p. 88.
67. Hamidat, Abeer,(2017). Potential and gaps in food security in the W.B from the point of view of governmental and non-governmental institutions working in the field of agriculture, Al-Quds University, unpublished master thesis, P.106.
68. Hisham Khafash, Head division of Industrial Development, MNE, 21/04/2019.
69. Holy Quran, Surat Yusuf (Josef), verse 47- 48.
70. http://www.palestineeconomy.ps/page.php?id=c12cy49452Yc12c, (2015), Accessed 12/10/2018.
71. Https://ar.wikipedia.org/wiki/مجاعة, Accessed 12/10/2018.
72. https://en.wikipedia.org/wiki/Malthusianism, Accessed 2/3/2019, 05:16 PM.
73. https://www.marefa.org/صومعة_غلال, Accessed 28/07/2018, 11:15 AM.
74. Ibrahim Abu Kamish. (No Date), newspaper investigation, Controversy between the government and the private sector over building wheat silos, http://www.alhayat-j.com/arch_page.php?nid=66726
75. IFC. (2011), The Grain Chain: Food Security and Managing Wheat Imports in Arab Countries, P1, P4.
76. IMGUR, Syrian Civil War - Grain Silos Map, https://imgur.com/a/rWdGh , 20/07/2019, 04:00 PM.
77. IndexMundi, (2019), https://www.indexmundi.com/agriculture/?country=eu&commodity=wheat&graph=production, 15/9/2019, 07:27 PM

78. International Finance Corporation – IFC. (2011), The Grain Chain: Food Security and Managing Wheat Imports in Arab Countries, P.4, http://documents.worldbank.org/curated/en/628951468338484967/pdf/681840BRI00PUB0portsinArabCountries.pdf
79. International Forum on Agricultural Production and Food Security Stakes (2010), Food Security in the Arab Countries, Baji Mokhtar University, Annab, Algeria 22-23 November 2010.
80. Issa Al-Ghazali, (2003), Agricultural Policies, A Periodic Series on Development Issues in Arab Countries, No. 21, p. 23.
81. Jabbara Murad, Ratul Mohammed. (2016), Food Security in the Arab World: Achievements and Challenges 2000-2012, The Academy of Social and Human Studies, No. 15, p. 73.
82. Jabour, Hassoun. (2015). Food reserve and their role in achieving Iraqi food security (wheat model), University of Qadisiyah, Iraq, P.10.
83. John Lynton-Evans. (1997), Strategic grain reserves: guidelines for their establishment, management and operation, FAO Agricultural Services Bulletin-126,http://www.fao.org/3/w4979e/w4979e06.htm#section%20two%20%20%20policy%20and%20strategy%20considerations , Accessed 12/06/2019, 01:52 AM.
84. Jordan General Silos & Catering Company, http://www.josilos.com, Accessed 5/5/2019.
85. Jubouri, Hassoun (2015), food stocks and their role in achieving Iraqi food security (wheat model), University of Qadisiya, Iraq, p.8, p12.

86. Karbalia, Emad. (2007), Analysis of Livestock and Vegetation Statistics and their Relation to Jordanian Food Security, Analysis of Agricultural Production Results, University of Jordan, Jordan.

87. Knight, Steve, (2019), Grain and Feed Annual, USDA report, P10.

88. Kovatch, P., Ezell, M., & Braby, R. (2011, August). The malthusian catastrophe is upon us! are the largest HPC machines ever up?. In European Conference on Parallel Processing (pp. 211-220). Springer, Berlin, Heidelberg.

89. Lahlouh, Abdullah (2017), FAO 40th Session, FAO, Rome, Italy.

90. league of Arab States. (2018), Arab Organization for Agricultural Development, Agricultural Yearbook, Vol.37, Ch.6., www.aoad.org/publications.htm

91. Lummus, R. R., Krumwiede, D. W., & Vokurka, R. J. (2001). The relationship of logistics to supply chain management: developing a common industry definition. Industrial management & data systems, 101(8), 426-432.

92. Maan development center. (2013), Wheat-subsidized Wheat Flour Invasion, A View of the Reality of Our Food System through First Basic Food: Bread, http://www.maan-ctr.org/magazine/Archive/Issue56/topic9.php, Accessed 10/06/2019, 10:54 PM.

93. Maan development center. (2015), Prospects for Environment and Development, 359 thousand tons Palestinian deficit in wheat production and self-sufficiency 10% only, www.maan-ctr.org/magazine/article/582/, Accessed 10/07/2019, 02:43 PM

94. Maan development center. (2017), a quarter of Palestinians are food insecure, http://www.maannews.net/Content.aspx?ID=890776 ،Accessed 26/04/2019,11:00PM

95. Mansour, Ahmed (2002), "Strategies for wheat producing and storing in Syria to achieving food security till 2025", unpublished thesis, Aleppo University, Syria, p.11.

96. Mario van Niekerk, (2012). How To plan a Silo Project, ABC Africa Group, P.5.

97. Mark Curtis, (2014), Why Wait Until the Next Food Crisis? P.16, www.acordinternational.org

98. Mark Curtis, (2014). Why Wait Until the Next Food Crisis? Improving Food Reserves Strategies in East Africa, P.21, P15, http://www.acordinternational.org/silo/files/why-wait-until-the-next-food-crisis-.pdf

99. Marwan Rajab. (2014), Measuring the size of the wheat self-sufficiency gap in Iraq for the period (2011-2001), Journal of Baghdad College of Economic Sciences, (38), 141-152.

100. MAS (2017), Strategic Review of Food and Nutrition Security in Palestine, Palestine, p11.

101. MAS (2017), Strategic Review of Food and Nutrition Security in Palestine, Palestine, p15.

102. Ministry of Agriculture (2015), Plan of Action of the Ministry of Agriculture for the period (4 Aug - 10 Jan) 2015, Palestine, p.2

103. Ministry of Agriculture -MoA, (2016), National Strategy for Agricultural Research 2017-2021, "Innovation and Creativity," p. 13.

104. Ministry of Agriculture, (2010), Agricultural Sector Strategy "Common Vision" 2011-2013, P.14-15.

105. Ministry of Agriculture. (2013), Agricultural areas for crops 2012-2013, unpublished data.

106. Ministry of Industry. (2016), Trade and Supply, Strategic Plan 2016-2018, Jordan.

107. Ministry of Industry. (2017), Trade and Supply, Annual Report, Jordan.

108. Ministry of Industry. (2018), Trade and Supply, Decision No. 61 on Wheat Import, Jordan.

109. Ministry of Industry. (2019), Trade and Supply, https://www.mit.gov.jo,Jordan , Accessed 5/5/2019.

110. Ministry of Internal Trade and Consumer Protection, http://www.mitcp.gov.sy-02-23 ، 05:00 ،2019 AM

111. Ministry of Planning. (2018), Central Statistical Organization (CSO), Wheat and Barley Production, Iraq, page 2

112. Ministry of Trade. (2019), http://www.mot.gov.iq,Iraq

113. Mohammad Migdad, Abu Thuwaib. (2015), The Impact of International Organizations and Governmental Policies in the Promotion of Arab Food Security, Human and Social Sciences, Vol.42, No.3, P.683.

114. Mudhi Abdullah, Hamid Bassem and Fas Ahmed. (2012), Self-Sufficiency of Major Grain Crops in Some Arab Countries, Iraqi Agricultural Science Journal, Issue 34, pp. 130-146, Iraq.

115. Munir, Siddiq,(2008)."Security Concepts in Food Security", Naif Arab University for Security Sciences, Center for Studies and Research, Riyadh, P.2.

116. Murphy, Sophia. (2009). Strategic Grain Reserves In an Era of Volatility, Institute for Agriculture and Trade Policy,P.4

117. National Export Strategy, (2014), Palestine, P. 32 - P.111.

118. Oweida, M. A.; W. O. Abdel-Hamid; Hebat-Allah A. Mahmoud and S. H. Abdallah. (2016), Measuring Analysis of the Economic Efficiency of Wheat in the Republic of Iraq, Agric. Econom. and Social Sci., Mansoura Univ., Vol.7 (6): 673 – 680.

119. P. R. Shewry; Wheat, Journal of Experimental Botany, Volume 60, Issue 6, 1 19- April 2009, Pages 1537–1553, https://doi.org/10.1093/jxb/erp058

120. Palestine News Agency (2014), Palestinians are threatened with a bread crisis ، https://www.pal24.net/content/print/48618 ،Accessed 26/04/201912:00 ، AM

121. Palestinian Economic Council for Development and Reconstruction - PECDAR (2007), manifestations of marginalization and distortion in the Palestinian agricultural sector،http://www.pecdar.ps/files/file/Reports/Agr_%20Report.pdf

122. Palestinian Economic Policy Research Institute - MAS, (2015). "Food Security Bulletin," Issue 12, page 2, 2015.

123. Palestinian News and Information Agency (WAFA), (2019), Field Crops in Palestine, info.wafa.ps/ar_page.aspx?id=8621, Accessed 1/10/2019.

124. Palestinian News and Information Agency (WAFA) ، http://info.wafa.ps/ar_page.aspx?id=8498, 2019/8/5 , 06:00 PM

125. PCBS (2014), levels of food insecurity in Palestine remain high, press release ،http://www.pcbs.gov.ps/post.aspx?lang=en&ItemID=1135

126. PCBS, (2013), Dissemination and Analysis of Agricultural Census 2010 Data, Evaluation of Plant and Animal Production in the Palestinian Territory, Ramallah, Palestine, p. 39.

127. PCBS, (2018). Population, Housing and Establishments Census 2017, Final Results - Establishments Report.

128. PCBS, (2019), Population Indicators, http://www.pcbs.gov.ps/site/lang__ar/881/default.aspx#PopulationA, Accessed 18/09/2019, 08:33 PM.

129. PCBS, (2019). Observed foreign trade statistics. Ramallah - Palestine.

130. PCBS, http://www.pcbs.gov.ps/Portals/_Rainbow/Documents/-2097%عربي%20المحافظات 2010.html, Accessed 03/05/2019, 12:14 AM.

131. PCBS. (2012), Agricultural Census.

132. PCBS. (2012), National Accounts Report at constant and current prices.

133. PCBS. (2014), http://www.pcbs.gov.ps/post.aspx?lang=en&ItemID=1135

134. PCBS. (2015), Foreign Trade 2013, unpublished data.

135. PCBS. (2018) Basic Results of the Labor Force Survey for the First Quarter 2018, http://www.pcbs.gov.ps

136. Porter, J. R., Xie, L., Challinor, A. J., Cochrane, K., Howden, S. M., Iqbal, M. M., ... & Mastrandrea, M. D. (2017). Food security and food production systems.

137. Rosana Radio, https://www.rozana.fm,23-02-2019,06:00 AM

138. Saadia Mazal, Ibtahal Naji, Iman Mohamed, (2014). Storage Status of Cereal in the General Company for Cereal Trade, No. 39, p. 100, Iraq.

139. Sadaqa, Ahmad, (2009), Future urban Structure and Infrastructural Networking for a Palestinian State, Scientific Model for a Sustainable Approach, P.77

140. Sama news. (2015), 359 ألف طن العجز الفلسطيني في إنتاج القمح ونسبة الاكتفاء الذاتي 10% - سما الإخبارية, Accessed 03-05-2019, 06:10 PM

141. Schmidhuber, J., & Tubiello, F. N. (2007). Global food security under climate change. Proceedings of the National Academy of Sciences, 104(50), 19703-19708.

142. Sébastien ABIS. (2015), Géopolitique du blé : un produit vital pour la sécurité mondiale. Paris, Institut de relations internationales et stratégiques / Armand Colin, coll. « Enjeux stratégiques ».

143. Tarek Deeb and Faten Susi. (2004), A Study of the Evolution of Wheat Consumption in the Syrian Arab Republic, Damascus University Journal of Agricultural Sciences, vol. 20, No. 1, pp. 191-213.

144. The Agricultural Bank of Sudan, http://www.abs.sd/abscontl?action=handlepages2&modid=25,Accessed 26/04/2019, 5:00 AM

145. The Food and Agriculture Organization of the United Nations (FAO), (2005). Statement of the Committee on World Food Security, Thirty-fifth Session, Rome.

146. The world bank, World Development Indicators,https://data.worldbank.org/indicator/ag.prd.crel.mt?end=2017&start=2000 ,18/05/2019, 11:07 PM.

147. U.N, (2013), General Assembly, Promotion and protection of human rights - The right to food, 68 session, section 69 (b) of the provisional agenda.

148. United States Department of Agriculture-USDA. (2019) ,Foreign Agricultural Service,https://apps.fas.usda.gov/psdonline/circulars/grain.pdf, Accessed 25/05/2019.11:33AM

149. University of Babyln (UOB). (2019), College of Education for Human Sciences, http://www.uobabylon.edu.iq.

150. USDA- International Production Assessment Division, (2019), World Agricultural Production, September 2019, p.3

151. WAFA, (no date), http://info.wafa.ps/ar_page.aspx?id=8621, 26-06-2019, 02:21 AM.

152. WFP. (2006), Food Security in the Occupied Palestinian Territory, p.2, https://documents.wfp.org/stellent/groups/public/documents/liaison_offices/wfp096230.pdf

153. Wijeratna, Alex. (2011). No More Food Crises: The Indispensable Role of Food Reserves. 10.13140/RG.2.2.15358.43845.

154. Wikipeadia ،https://ar.wikipedia.org/wiki/ ، قمحAccessed 2018/08/20, 03:31 P.M.

155. wikipedia, Food Security Wheat Reserve, https://en.wikipedia.org/wiki/Food_Security_Wheat_Reserve. Accessed 28-7-2018.

156. Wikipedia, https://ar.wikipedia.org /wiki/اكتفاء_ذاتي, Accessed 13/07/2019, 03:24 PM

157. WIKIPEDIA, Iraqi Civil War (2014–2017), https://ar.wikipedia.org/wiki/2017–2014)_الحرب_الأهلية_العراقية), Accessed 18/09/2019, 12:08 AM

158. Womach, Jasper. (2005), Agriculture: A Glossary of Terms,Programs, and Laws ,CRS Report for Congress, P.246.

159. WU,Wenbin ,(2012),Model-based Assessment of Potential Risks of Food Insecurity at a Global Scale, Institute of Agricultural Resources and Regional Planning, international conference on climate change and food security ,Chinese Academy of Agricultural Sciences, china.

160. Xie, Yu, "Structural Behavior of Grain Bin Steel Silo" (2015). Electronic Theses and Dissertations. 5312. https://scholar.uwindsor.ca/etd/5312, (28-07-2018; 11:51 A.M)

Interviews

- Ashraf Barakat, director of quality and post-harvest technologies, Ministry of Agriculture,18/7/2019.
- Ayoub Hashesh, Head of the Consumer Protection Department, Ministry of National Economy, 25/07/2019.
- Basil Al-Deek, Director of Information Technology, Communication Department, Ministry of Finance-Customs, 28/07/2019
- Besharat, Director of the Agricultural Directorate – Jenin, Ministry of Agriculture, 19/7/2019).
- Dr. Abdul Rahman Al-Tamimi, General Directorate of Palestinian Hydrology Group, 23/07/2019.
- Hisham Khufash, Head division of Industrial Development, Ministry of National Economy, 21/04/2019.
- Jamal Eid, Farmer, Burin – Nablus, 13/08/2019.
- Reem Al-Najjar, General Directorate of Sub-Offices, Ministry of National Economy, 18/04/2019.

Appendices

Interview Questions:

1. Is there a relationship between food security and food strategic reserve (wheat) in particular? Why?
2. Is there a relationship between agricultural development and wheat strategic reserve? Why?
3. What are the reasons for the decline in agriculture in Palestine and the reluctance of many farmers to grow wheat? And What are the methods to solve these causes?
4. What is the role of the private sector in such projects, if any, in the future? Do you think that the private sector can create and manage the wheat strategic reserve alone?
5. What are the best ways to build a wheat strategic reserve, is it by import, by agriculture, or both?
6. What is the government's role in building wheat silos, and does it have any serious plans for wheat strategic reserve?
7. What are the main obstacles preventing the construction of wheat silos?
8. There is a gap between the governorates with regard to its one donum of wheat production. What are your reasons?
9. What are the most important criteria for choosing a silo construction site?
10. What are the best locations to build wheat strategic reserve? Why?
11. Building silos has a high cost to the country, but what are your positive implications for the Palestinian economy and Palestinian citizen?
12. What are the methods to estimate the volume of wheat strategic reserve?
13. From your point of view, what is the minimum volume wheat strategic reserve which can be kept in?
14. What is the best method for distributing and managing wheat silos, is it the centralized or decentralized method?

15. There are five scenarios for distribution wheat silos and warehouses, please select the pros and cons of each scenario by placing a mark (X) in box □ under each selection.

Positives

1. Focus more on inventory management.
2. Low cost of transportation and handling.
3. Distribute the storage burden to regions.
4. The ability to deliver wheat to the neighboring governorates quickly and easily.
5. The independence of the administration for each silo and central warehouse in the region.
6. Wheat is available in every governorate at all times.
7. There is no effect of the Israeli closures.
8. Ease of forecasting the quantities currently stored in them.
9. There is communication between all silos and warehouses spread out.
10. Other Positives: ……...

Negatives

1. The danger of Israel closing the area in which the silo and warehouse are located.
2. The high cost of transportation and handling.
3. The occurrence of a natural or human disaster, which prevents wheat from reaching all regions.
4. The high cost of silos and warehouse management.
5. The absence of communication between all silos and warehouses in the governorates.
6. The possibility of interruptions in the supply of sub-stores.
7. It is difficult to predict the quantities currently stored in them.
8. Other negatives: …….

الملخص

تناولت الدراسة أهمية المخزون الإستراتيجي لسلعة القمح في فلسطين في تأمين الغذاء، وقد تم اختيار سلعة القمح باعتبارها واحدة من مكونات المخزون الاستراتيجي وأهم سلعة للأمن الغذائي. تمثلت مشكلة الدراسة في عدم وجود مخزون قمح استراتيجي تستطيع الدولة من خلاله مواجهة كافة الأزمات التي قد تواجهها.

هدفت الدراسة إلى تحديد الحجم الأمثل لمخزون القمح الاستراتيجي بالإضافة إلى تحديد الأماكن المناسبة لبناء هذا المخزون لضمان الأمن الغذائي في كافة المناطق، واتبعت الدراسة المنهج الوصفي التحليلي في وصف مشكلة البحث وتقدير الحجم الأمثل لمخزون القمح الاستراتيجي، وتحديد المناطق المناسبة لبناء المخزون الاستراتيجي وذلك بناء على البيانات التي تم الحصول عليها وجمعها وتحليلها من عدة مصادر.

تم الاستعانة بأسلوب المقابلات مع الجهات والأشخاص أصحاب العلاقة في جمع البيانات حول واقع الزراعة في فلسطين، والمعيقات التي قد تواجه مخزون القمح الاستراتيجي، بالإضافة الى المراجع الثانوية من كتب ومجلات ومواقع إلكترونية. كما تم استعراض تجارب بعض الدول المحيطة بخصوص مخزون القمح الاستراتيجي.

توصلت الدراسة الى أربعة طرق لتوزيع القمح والمخازن على المناطق وهي: التوزيع حسب السيناريوهات الخمسة، حسب الإنتاج، حسب الكثافة السكانية والتوزيع حسب معدل الاستهلاك. كما توصلت الدراسة أيضاً الى ثلاث طرق لتقدير حجم المخزون الاستراتيجي للقمح وهي: 17% من حجم الاستهلاك السنوي، السناريوهات التقديرية (17%، 20%، 25%، 30%، 35%) من حجم الاستهلاك السنوي، وطريقة (4–2) أضعاف حجم الاستهلاك السنوي.

وتوصلت الدراسة أيضاً إلى أن الحجم الأمثل للمخزون الاستراتيجي من القمح والذي يكفي لمدة ستة شهور هو (53،813) طن، وهو يمثل الحد الأدنى المطلوب لمواجهة الأزمات الغذائية. كما توصلت الدراسة أيضاً إلى أن السيناريو الخامس لتوزيع الصوامع والمخازن (لا مركزية الصومعة والمخزن

المركزي والانتشار المتعدد للمخازن الفرعية) هو أفضل سيناريو يمكن استخدامه في توزيع صوامع ومخازن القمح على كافة المناطق.

من أهم الاستنتاجات التي توصلت لها الدراسة بأنه لا يوجد مخزون استراتيجي من القمح في فلسطين، والإنتاج المحلي من القمح لا يكفي لدعم المخزون الاستراتيجي ولا يكفي لمواجهة الأزمات، والاعتماد بشكل كبير على الاستيراد من الخارج، وغياب السياسات التشجيعية لزراعة القمح، وهناك معيقات سياسية ومالية وتقنية ولوجستية قد تواجه إنشاء صوامع القمح، بالإضافة إلى قلة الدراسات حول المخزون الاستراتيجي للقمح.

ومن اهم توصيات الدراسة، تشجيع الاستثمار في مشاريع صوامع القمح واعتباره أهم مشروع في عنقود الزراعة بتشجيع من الحكومة وبالتعاون مع المؤسسات الغير حكومية، وزيادة المساحات الزراعية لزراعة القمح، وزيادة الإنتاج من القمح وتقليل الاعتماد على الاستيراد من الخارج، واتباع سياسة تشجيع المزارعين على زراعة القمح، وتذليل كافة المعيقات التي قد تواجه إنشاء الصوامع، وإجراء العديد من الدراسات المتعلقة بالقمح والمخزون الاستراتيجي للقمح.

كلمات مفتاحية:

الفجوة الغذائية، الأمن الغذائي، المخزون الإستراتيجي، صوامع القمح، القمح