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Agri-Food Supply Chain Management Analysis in Palestine (Jenin & Tubas Governorates)

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Agri-Food Supply Chain Management Analysis in Palestine (Jenin & Tubas Governorates)

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Dedication

To The Spirits of The Righteous

To My Father & My Mother

My Wife & My Daughters

My Sister

And

My True Friends

Mohammad Taysir Mohammad Qabha

Declaration

I certify that the thesis is submitted for the degree of master is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not be submitted for a higher degree to any other university or institution.

Signed MQabha

Mohammad Taysir Mohammad Qabha

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Abstract

The agricultural sector is one of the sectors on which the local economy is based and constitutes a main source of support. The agricultural sector is characterized by the large number of operations accompanying the production process and the large number of parties involved in this process. With the importance of this sector in providing the source of food for humans, but also characterized by instability and uncertainty.

Agricultural activity in Palestine is more than a practice for what the land means for the Palestinian citizen. However, with many of the problems facing agriculture in Palestine, the scarcity of resources, the difficulty of access to it, the harassment of the Israeli occupation and the weakness of government capabilities including financial and legal sides. The decline in the productivity and efficiency of the agricultural sector and the emergence of problems such as inadequate local products and fluctuations in product prices appeared to be apparent.

This study is intended to investigate the causes of rising production costs through the so-called agricultural supply chain. The aim of the study is to analysis the current agricultural supply chain in the study area and to identify the reasons for the high production costs, in addition to the importance of applying information technology in raising the efficiency of the agricultural sector and clarifying the responsibilities required by the regulators of agricultural work.

The agricultural sector in Palestine is characterized by its overlapping with the Israeli agricultural sector. This overlap has a great impact on the Agri-food Supply Chain Management in Palestine, in addition the agriculture sector suffer from other other problems including water scarcity, Israeli control of the agriculture land in area ‘c’ and weak supervision by those responsible for the agricultural sector due to lack of resources

and lack of attention to the use of information technology (IT) in dissemination of the desired data and information needed to improve the efficiency of agri-food supply chain management.

The rising of production cost as a result of these problems facing the agriculture sector has been disturbing the Palestinian farmers and is a burden on consumers at the same time, and therefore emerged interest in the implementation of the Agri-food supply chain to regulate intra-processes within the supply chain and find effective solutions to high production costs.

The study was conducted to analyze the reality of the Agri-food supply chain management and its components in the study areas. The study focused on Jenin and Tubas areas for the, which are considered the basket of the West Bank for the most agricultural crops.

The study adopted analytical and exploratory descriptive methods to understand the status of the agri-food supply chain management and the nature of the relationship between the components (suppliers, farmers, wholesalers, retailers and consumers) of the chain. The method of interviewing was adopted as a research tool in addition to the observation method. The search tool is designed to show the relationship between the components of the supply chain horizontally and between the components of the chain and the elements of the chain vertically, noting that the elements of the supply chain are production, inventory, transportation, location and information.

Through the discussion of the responses of the interviewees and their analysis, the results of the study were obtained through the adoption of the previous studies and their results as a reference.

The study reached the following; there is an agri-food supply chain management in the study areas but it is weak and fragile. And their adoption of traditional administrative methods that do not upgrade to the modern methods used in previous studies, weak confidence and data transfer between components of the supply chain, weak scientific research in the field of agriculture, whether scientific or administrative skills acquired by the components of the chain, Lack of prior vision or planning of the agricultural process by farmers, which leads to the emergence of variation in production processes, both in quantities or crops produced.

The study confirmed in its recommendations on the following; build national team comprising both the Ministry of Agriculture, academics and representatives of farmers, explain the concept and importance of applying the agri-food supply chain management, build-up a database that includes all parties to the agricultural process and adoption of information technology as a tool for disseminating data among all parties, the most important step is the enactment of laws and legislation to ensure implementation of agri-food supply chain management.

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Abbreviations

UN	United Nations
FAO	The Food and Agriculture Organization
AIM	Agricultural Information Management
ICT	Information and Communication Technology
IT	Information Technology
GDP	Gross Domestic Product
PCBS	Palestinian Central Bureau of Statistics
PECDAR	Palestinian Economic Council for Development and Reconstruction
SCM	Supply Chain Management
KM	Knowledge Management
PMMS	Performance Measurement and Management System
KPI	Key Performance Indicators
AFSCM	Agri-Food Supply Chain Management
OECD	Organization for Economic Co-operation and Development
IS	Information System
ARIJ	The Applied Research Institute–Jerusalem
MoA	Ministry of Agriculture
CSCMP	Council of Supply Chain Management Professionals

Chapter One

Introduction

1.1 General Background

Agriculture is the first activity practiced by man in his quest for stability. This endeavor led to the taming of animals, the building of barns and the reclamation of the land to ensure for himself and those around him to stay. For thousands of years, agriculture has been and continues to be the primary source of food, and the mainstay of the economy for the nations, through which prosperity and emergence of industry have been achieved, all because of the economic abundance of these peoples resulting from the practice of agriculture. Agriculture has evolved over time from primitive agriculture, which depends on grazing livestock, hunting animals and cultivating the land by primitive methods. At the present time, it has reached the use of machinery, modern technology and data in the service of this sector (Sims, et al., 2016).

One of the most important elements of stability for societies and people is the availability of food. Allah says "Who has fed them against hunger, and has secured them against fear" (Quran,106.4). The provision of food guarantees people the continuity of life and ensure healthy and disease-free health, but lack of availability will lead to great destruction, including wars and conflicts. Sinceancient times nations are fighting for the acquisition of sources of food and water and we are not far from what happened in the Middle East in 2011 and called the Arab Spring, while some called it a hunger revolution (Ayazra, 2016)

The provision of food and preservation of its sources are of the most priorities of the old and recent nations. At the conference which held in September 2015, the United Nations

(UN) called for the adoption of the 2030 Sustainable Development Plan, which in its first clause the eradication of poverty in all its forms and its repercussions on the nations, and poverty are not far from the practice of agriculture, especially in the third world countries as this sector has become a haven for the unemployed. The second clause is "eliminate hunger, provide food security and promote sustainable agriculture", the (UN) calls for the second item of the Sustainable Development Plan 2030 to provide safe food to communities. In this regard, the committee noted the adoption of means to ensure that this goal is reached in a sustainable manner. It was stressed that tackling hunger cannot be achieved by increasing food production alone. Factors such as well-functioning markets, increased incomes of smallholder farmers and the use of technology in the agricultural sector will necessarily ensure the creation of an active agricultural sector capable of providing food security to people (UN, Report on Sustainable Development Goals, 2017).

The golobal population growth in the world is becoming the alarm bell for economists, decision-makers and anyone involved in providing a decent life for these huge numbers of people. It is expected that the population of the earth in 2050 will be about 10 billion people (UN, 2017) with fear of increasing numbers of the poor because it is linked to political and economic conditions and conflicts, especially those associated with third world countries (FAO F. a., 2012).

The land space which is productive and fertile and that natural resources, most importantly water, are the subject of conflict between many countries of the world, especially developing countries. In Palestine 15% of water right is used while the rest is confiscated by Israel (PWA, 2011), not to mention confiscation of land and practices against Palestinian in general but also against farmers specificlly.

The total area of the West Bank and Gaza Strip is 5655km² and 365km² respectively, constituting 22%of the historic area of Palestine (Molg, 2009). The Oslo agreement allow the Palestinian National Authority to control 39% of the West Bank while the remaining 61% is the area "C" which still under Israeli control (Wafa, 2011), noting that most of the agricultural holdings fall within area "C", which also resulted in the difficulty of access to water sources because the Israeli side prevents access to groundwater and drilling wells in this area.

Agricultural activity has declined significantly in the Palestinian Territories because of the Isreali occupation Applied Research Institute–Jerusalem (ARIJ, 2007), the agricultural work was the mainstay of the Palestinian economy. The contribution of the agricultural sector to the gross national product in 1967 was 27%, and was taken back by the practices of the systematic occupation of the uprooting of Palestinian farmers from their land, which is considered the place of conflict and the source of survival. It'salso the source of livelihood and the legacy of parents and grandparents. Since the arrival of the Palestinian Authority in 1944 and with all attempts to promote the agricultural sector, but the proportion of the contribution of this sector in the Gross Domestic Product (GDP) did not achieve the required growth, the value of its contribution to the GDP registered a significant decline of 5% in 2014 (Palestinian Central Bureau of Statistics (PCBS), 2016).

Many of the attempts and practices pursued by successive Palestinian governments have come only from practices, since most of the policies lacked operational programs for many reasons. This sector can't continue, grow and achieve food security for this struggling people which is considered the land without any other source of survival, whilethe budget of the Ministry of Agriculture (MoA), the engine of the entire sector does not exceed 1%

of Palestinian Authority budget, and most of it goes to operating expenses and salaries (MoA M. o., Agricultural Sector Strategy "Stability and development", 2014-206, 2014).

1.1.1 The Palestinian Agricultural Sector

The total area of agricultural land in Palestine is 12000 km², the cultivated area in the West Bank is approximately 90% of the total area, while the remaining 10% is for Gaza Strip, where the area available for agriculture accounts for 21% of the total area of the West Bank and Gaza Strip, with the harassment of the occupation and the vagueness of the laws and regulations governing agricultural work, and with the emergence of the problem of fragmentation of property for agricultural holdings, where the holdings of agricultural under ten dunums are approximately 75% of agricultural land (PCBS, 2011). This indicator shows that the contribution of agricultural holdings in production agricultural has become less due to major dependence on rain fed crops reaching 96% in the West Bank. Rain fed agriculture and the problems it faces in the absence of agricultural extension, poor planning and the depletion of the soil with seasonal crops and direct dependence on natural conditions, uncertainty play a large role in the production efficiency and quantity (ARIJ, 2015).

The agricultural sector plays an active role in the employment of labor, which contributed to solve the problem of unemployment. The data of the Palestinian Central Bureau of Statistics (PCBS) for the year 2002 showed that the sector occupied 12% of males and 30% of females, while the recent data for 2016 showed a significant decline in ratios. The share of males was 7% while females 9% (PCBS, Palestinian Central Bureau of Statistics, 2016). In view of these ratios, its clear that there is a marked decline in agricultural activity on the one hand, and on the other hand, also about the role of women who are overlooked in support of this sector has also declined significantly, perhaps because of the social

reasons and changes that occurred in the last decade. So that this sector in light of the decline in productivity and the decline in its contribution to the GDP needs a pause to rehabilitate it.

In a study conducted by the Palestinian Economic Council for Development and Reconstruction (PECDAR), the most important problems that cause the marginalization and fragility of this sector were as follows (PECDAR, 2008);

a) Problems and constraints resulting from occupation practices;

- The policy of land confiscation, which resulted in the construction of the annexation and expansion wall, which enclosed thousands of dunums and denied access to owners.
- The Palestinian right to manage its natural resources, most importantly land and water.
- Since its inception, the Palestinian National Authority (PNA) has been bound by agreements restricting freedom of movement between it and the outside world, the Paris Economic Agreement was the most important of these agreements. It defined the free trade between Palestine and its surroundings, which leading to higher production and marketing costs.
- Prevention of pastoralists from reaching the pastures as most of the pastures are located in the so-called Area C and most of them are closed military zones as in the Jordan Valley.

b) Problems related to natural resources;

- Limited water and agricultural lands and increased competition by other sectors.

- Soil erosion and deterioration of properties, which reduced their productivity.
- Improper use of chemicals, especially pesticides.
- Degradation of vegetation and habitats of plant and animal due to overgrazing.
- The problem of urban expansion at the expense of agricultural land.

c) Technical problems and obstacles;

- Lack of potential of the extension and protection of plants and veterinary services.
- Weak infrastructure of the agricultural marketing sector.
- Weak agricultural and food production activities.
- Lack of data and information available about agriculture and sometimes conflicting.
- Weak agricultural capacity.

d) Problems and constraints of a social and economic nature;

- Small and fragmented agricultural holdings and their ownership, which reduced efficiency and productivity.
- Lack of return from agriculture and high risk, which led to the reluctance of many to work in this sector, in addition to the lack of agricultural investment.
- Lack of a system of agricultural and rural finance.
- Weak collective and cooperative action.

e) Institutional and Legislative Problems and Constraints;

- Lack of a system for agricultural insurance and compensation of farmers against disasters.
- Conflicts and duplication between the relevant institutions in the agricultural sector and the weakness of their capacity.

The dilemma in the reality of the agricultural sector in Palestine finds that the intentions are sincere but lack implementation. In light of the obstacles and problems faced by this sector at all levels, whether internal or external, this sector is responsible for providing safe food at fair prices for citizens, while preserving the rights of farmers and working on the development and sustainability of this sector (Bozzia, et al., 2016).

At the end of this quick introduction, the study finds that the agriculture sector plays a major role in the lives of citizens, as the first source for providing safe food and that it has great effects on economic growth as it contributes significantly to the development process in terms of manpower and reduce the spread of unemployment.

1.1.2 Study Area

The total area of Jenin Governorate is 583 km², while the cultivated area in the governorate is 176.0 km² with 30.2% of the total area and 19.9% of the total cultivated area in the West Bank, Tubas governorate has a total area of 402 km², while the cultivated area in the governorate is 67.6 km² with 16.8% of the total area and 7.6% of total cultivated area in the West Bank (PCBS, 2011).

Palestine is characterized by a climate that makes it suitable for all agriculture activities. The climate of Palestine is characterized by the climate of the Mediterranean basin, where

it is characterized by moderation and geographical diversity. The winter season is characterized by moderate rain and moderate cold. The summer is hot dry as it goes south, where it recorded the highest temperature of 42.8° C in Jericho city, while the lowest temperature in the town of Meithalon was minus 3.2° C and is the month of August the highest in temperatures, while December, January and February is the lowest in the temperature and rainfall amounts from 220 mm to 920 mm.

As shown in Appendix (1), the use of agricultural land in the study area, which refers to the high percentage of land use in agriculture, is considered a Palestinian agricultural basket.

1.2 Problem Statement

The problem of the study is to reach the reasons for the high costs of production and the phenomenon of fluctuations in the prices of agricultural products, one of the important reasons that led to the reluctance of many farmers from this activity, as the increase in production costs will reduce the profitability of farmers, so farmers will not be able to expand their agricultural activities.

1.3 Significance of Research

Due to the importance of the agricultural sector and the deterioration of this sector in more than one axis, including its contribution to the GDP and the decline in employment, there is a need for new studies that highlight these problems and improve the efficiency of the agricultural sector. Hence, this study is aimed at analyzing the reality of the agri-food supply chain management and highlighting its role in reducing the costs of production, which leads to the sustainability of this sector and raising efficiency to the benefit of all its components.

1.4 Research Question

The general question of the study is:

- How can supply chain management analysis contribute in reducing production costs?

1.5 Research Objectives

- Analysis of the agri-food supply chain management and clarifying its components in study areas.
- Identify the reasons for rising production costs.
- To call upon the responsible authorities to adopt the implementation of supply chain management in the agricultural sector with all the necessary support for its success.
- Explain the importance of information management and data in the sustainability of the agricultural sector

1.6 Research Methodology

After identifying the problem of the search and putting its question and its main objectives, the method of descriptive analysis and method of observation was adopted as a methodology for research. The study adopted the interviews as a research tool and thus the primary data source, the results of previous studies and statistical data were adopted as a source of secondary data. Data collection was carried out through the research tool so that a set of questions were designed to be built on the basis of agri-food supply chain analysis and its relationship with each component and elements of the chain. The process of analyzing the results was compared with the results of

previous studies adopted by the study as a reference, the research sample included components of the agri-food supply chain management, which are suppliers, farmers, the central market and wholesalers, in addition to the government side, a representative of the agriculture departments in the study area and municipalities.

Chapter Two

Literature Reviews

2.1 Overview

In this section of the study we will review the main concepts of the study through the previous studies and has been divided into axes so that the definition of the supply chain, the agri-food supply chain management, the components of the chain and its main elements, its working mechanism and the importance of information technology,

2.2 Origin of TheTerm and Definitions

The term "Supply Chain Management" entered the public domain when Keith Oliver, a consultant at Booz Allen Hamilton (now Booz & Company), used it in an interview for the Financial Times in 1982. The term was slow to take hold. It gained currency in the mid-1990s, when a flurry of articles and books came out on the subject. In the late 1990s, it rose to prominence as a management buzzword, and operations managers began to use it in their titles with increasing regularity.

"A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers" (Ganeshan & Harrison, 1995).

Lambert et al., 1998 …."A supply chain is the alignment of firms that bring products or services to market.

Chopra and Meindl, 2001…."A supply chain consists of all stages involved, directly or indirectly, in fulfilling a customer request. The supply chain not only includes the manufacturer and suppliers, but also transporters, warehouses, retailers, and customers themselves.

> "The systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole" (Mentzer, et al., 2001).

> "SCM is the coordination of production, inventory, location, and transportation among the participants in a supply chain, to achieve the best mix of responsiveness and efficiency for the market being served". (Hugos, 2003).

> "Supply chain is defined as a group of inter-connected participating companies, that add value to a stream of transformed inputs from their source of origin to the end product or services that are demanded by the designated end consumers". (Lu, 2011)

The difference between logistics management and SCM is, the logistics focus on the mechanism of work at one stage of the chain, to take care of the things like buying process or the mechanisms of sale, while in the SCM is focuses on the entire stages of the chain from the beginning of thinking in the product to achieve the desires of consumers, the advantage of SCM is the integration by sharing information through all stages. In addition, SCM is concerned with all results from consumer desires and orientations.

Traditional logistics services also focus on activities such as procurement, distribution, maintenance and inventory management. SCM understands all traditional logistics

services, also include activities such as marketing, new product development, financing and customer service, in the scope vision of supply chain thinking, these additional activities are now part of the work required to meet customer demands. SCM is looking at the supply chain and its existing organizations as a single entity, it brings an approach to a systems that understands and manages the various activities needed to coordinate the flow of products and services to provide the best service to end customers. The systems approach provides a framework that better responds to business requirements; it seems otherwise in disagreement with each other (Hugos, 2003).

The SCM in basis depends on tracking all stages of production and analyzing the information received from each stage especially the information that comes from the customers. The supply chain is not managed by processing the data of each stage alone, but the data handling is handled in an integrative way. For example, information is not deal with from the retail markets alone, which refers to a shortage of goods, but the rest of the data is considered at all stages and accordingly the appropriate decision is taken in production and supply of goods. One of the most important dimensions of the use of SCM is forecasting in prior knowledge and by analyzing data in understanding market trends, which is lacking in.

Each supply chain has a set of fundamentals imposed on it according to the nature of its activity, but we found that there are common fundamentals in all of the SCM, and they shared by all, here the five main drivers (Hugos, 2003):

- **Production:** What products does the market need? What quantities does the market want? Agricultural production is associated with seasons, so we should know when these quantities should be supplied**.** In this activity, all production inputs are determined by determining which kind of product and the size of the land and

provide, the necessary production factors by establishing the main production schedules, taking into account the control of production specifications and quality preservation.

- **Inventory:** One of the most important problems facing the AFSCM is the sensitivity of the agricultural product and its correlation with the factor of time. Hence the importance of a storage department that can identify the quantities that must be available at a specific time and keep the surplus and not put it in the markets, the use of inventory management to maintain product prices in the event of a balance between supply and demand and other advantage ensures that it maintains the quality and safety of the product, here we should know when to resort to inventory and what quantities stored.
- **Location:**The location of production plays a major role in the production process and the selection of the produced varieties. The selection of the place must be considered in a specification that ensures the availability of the factors of production at the appropriate cost, while preserving the resources without depletion. Therefore, the location management process and its good selection also choosing the appropriate items, proximity to the storage and distribution places play a major role in the success of the AFSCM.
- **Transportation:** Transport operations play a key role in the provision of raw materials for production and in transporting products, during the stages of the different supply chains until the goods arrive in the final form of the customers. Hence, the importance of transport and means of transportation available, as it adds value to the goods through the added costs of the transport, so, we must choose the means of transport that benefits us in the fastest time with the lowest costs.

- **Information:** What data should be available? What form it is? How we can deal with it? What the best channels are they collected? These questions and many of them should be asked if the supply chain is designed. Information one of the most important parts of the AFSCM, because the agricultural sector is distinguished from other sectors with a large number of parties operating in it, in addition to it is a sector characterized by uncertainty and the many fluctuations that have affected it**.**

An analysis of the above and an attempt to understand the mechanism of work of the agricultural sector, will lead us to understand the mechanism of supply chain action, therefore its application to the agricultural sector in Palestine.

2.3 How the Supply Chain Works

A supply chain is a system of organizations, people, activities, information, and resources involved in moving a product or service from supplier to customer. Supply chain activities transform natural resources, raw materials and components into a finished product that is delivered to the end customer. In sophisticated supply chain systems, used products may re-enter the supply chain at any point, where residual value is recyclable. Supply chains link value chains. SCM draws heavily from the areas of operations management, logistics, procurement, and information technology (IT), and strives for an integrated approach, where the terms are explained as (Rai TechnologyUniversity).

In the following, we will mention the areas that supply chain works to address, in order to achieve efficiency and quality of the product, which will work to achieve the development and sustainability of the agriculture sector:

- Operations management is an area of management concerned with overseeing, designing, and controlling the process of production and redesigning business

operations in the production of goods or services. It involves the responsibility of ensuring that business operations are efficient in terms of using as few resources as needed, and effective in terms of meeting customer requirements. It is concerned with managing the process that converts inputs (in the forms of materials, labor, and energy) into outputs (in the form of goods and/or services) (Rai Technology University), operations management is the management of systems or processes that create goods and/or provide services. Operations and supply chains are intrinsically linked and no business organization could exist without both.

A supply chain is the sequence of organizations—their facilities, functions, and activities—that are involved in producing and delivering a product or service, by take a look in the following figures 1&2, we will find that the operation management is a part of supply chain, where the supply chain it has an internal and external for the organization (Stevenson, 2015).

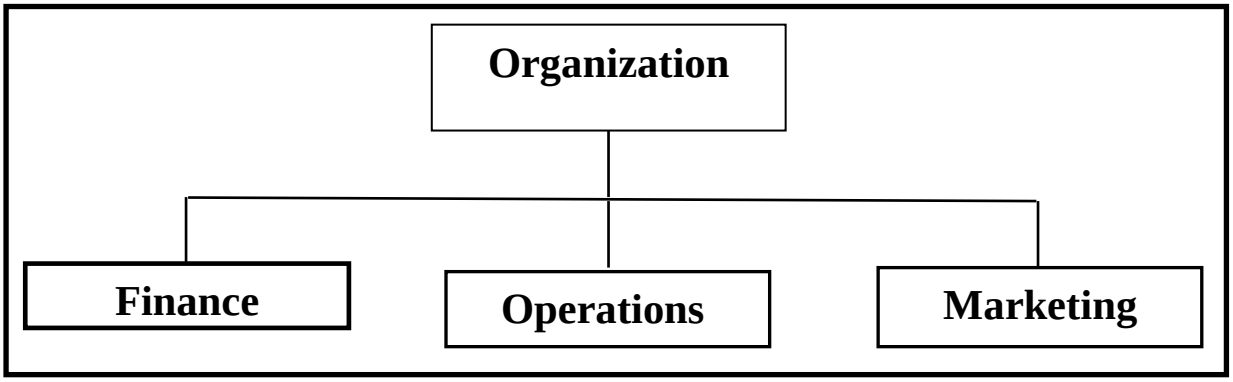

Fig.1. The three basic functions of business organizations

*sourceStevenson, William J. Operations Management, Twelfth Edition

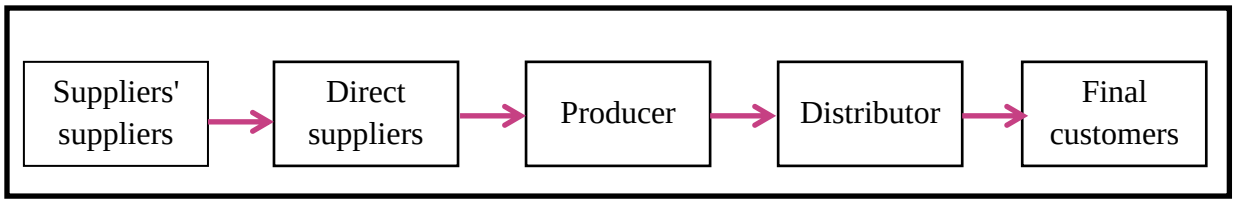

Fig.2. A simple product supply chain

*sourceStevenson, William J. Operations Management, Twelfth Edition

Supply chains are both external and internal to the organization. The external parts of a supply chain provide raw materials, parts, equipment, supplies, and or other inputs to the organization, and they deliver outputs that are goods to the organization's customers.

The internal parts of a supply chain are a part of the operations function itself, supplying operations with parts and materials, performing work on products, and/ or performing services.

- Logistics is the management of the flow of resources between the point of origin and the point of consumption in order to meet some requirements, for example, of customers or corporations. The resources managed in logistics can include physical items, such as food, materials, equipment and staff, as well as items, such as time, information, particles, and energy. The logistics of physical items usually involves the integration of information flow, material handling, production, packaging, inventory, transportation, warehousing, and often security. The complexity of logistics can be modeled, analyzed, visualized and optimized by dedicated simulation software. The minimization of the use of resources is a common motivation in logistics for import and export (Rai TechnologyUniversity).

- Procurement is the acquisition of goods, services or works from an outside external source. It is favorable that the goods, services or works are appropriate and that they are procured at the best possible cost to meet the needs of the purchaser in terms of quality and quantity, time, and location. Corporations and public bodies often define processes intended to promote fair and open competition for their business, while minimizing exposure to fraud and collusion (Rai TechnologyUniversity).
- Information technology (IT) is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data, often in the context of a business or other enterprise. The term is commonly used as a synonym for computers and computer networks, but it also encompasses other information distribution technologies, such as television and telephones. Several industries are associated with (IT), such as computer hardware, software, electronics, semiconductors, internet, telecom equipment, e-commerce and computer services.

2.4 Logistic Management

Simchi-Levi et al. (2005); fierce competition in today's global markets, the introduction of products with short life cycles and the heightened expectation of customers have forced manufacturing enterprises, to invest in and focus attention on their logistics systems. This, together with continuing advances in communications and transportation technologies (e.g., mobile communication, Internet and overnight delivery), has motivated the continuous evolution of the management of logistics systems. In these systems, items are produced at one or more factories, shipped to warehouses for intermediate storage and then shipped to retailers or customers. Consequently,to reduce cost and improve service levels,

logistics strategies must take into account the interactions of these various levels in this logistics network, also referred to as the supply chain. This network consists of suppliers, manufacturing centers, warehouses, distribution centers and retailer outlets, as well as raw materials, work-in-process inventory and finished products that flow between the facilities (Smchi-Levi ,et al., 2005).

Digiesi et al. (2016); global warming, congestion, air pollution and noise are examples of negative effects related to the transport activities that generate costs not fully borne by the transport users and hence not taken into account, when they make a transport decision: these are the so-called external costs. The internalization of the external costs of transport has been an important issue for transport research and policy development for many years worldwide (Digiesi, et al., 2016).

2.5 Supply Chain Management

In a study of hsuan et al. (2015), they found that no organization, whether business, government or non-profit, can stand-alone. It depends on connections to other organizations in a network relationship. The supply chain is a concept of closely coordinated, cooperative networks, competing with other networks. The focus is on managing processes that engage other firms, as partners in managed relationships to perform the activities necessary to fulfill the process. It is propelled by the realization that no organization can be good at all things and by the expanding reach and ease of access to information and communication technology. This perspective is necessary not only for growth, but for survival in the struggle for global markets. No firm alone can accomplish the complete process of meeting the demands of the market in the face of intense competition, rapidly changing technologies, and evolving customer requirements.

The supply chain is the new frontier in environmental responsibility– an area rich with opportunity that remains mostly unexplored, where a number of pathfinders are starting to show others the value that can be found**.** Large public and private sector organizations have enormous purchasing power, often engaging with thousands– or tens of thousands– of direct and indirect suppliers. By harnessing the power of their procurement decisions, it is possible for them to cascade their own commitments throughout the supply chain (CDP, 2017).

In a study of Beamonin (1998), he pointed out that attention in the supply chain was focused on the study of the internal processes of the chain itself, but recently became more emphasis on performance, design and supply chain analysis. This concern is due to high production costs, open markets and limited raw materials. (Beamon, 1998)

The term supply chain management refers to the flow of information, materials and fund between the supply chain components, and has been considered that recycling can be one component of the chain plus the after sales service as shown in figure 3. Those interested in the management of the supply chain are beginning to realize that the actions taken by any member within the chain will affect the profitability of the other members of the chain, hence the interest in the implementation of supply chain management as a key player in the competition process (Johnson &Pyke, 1999).

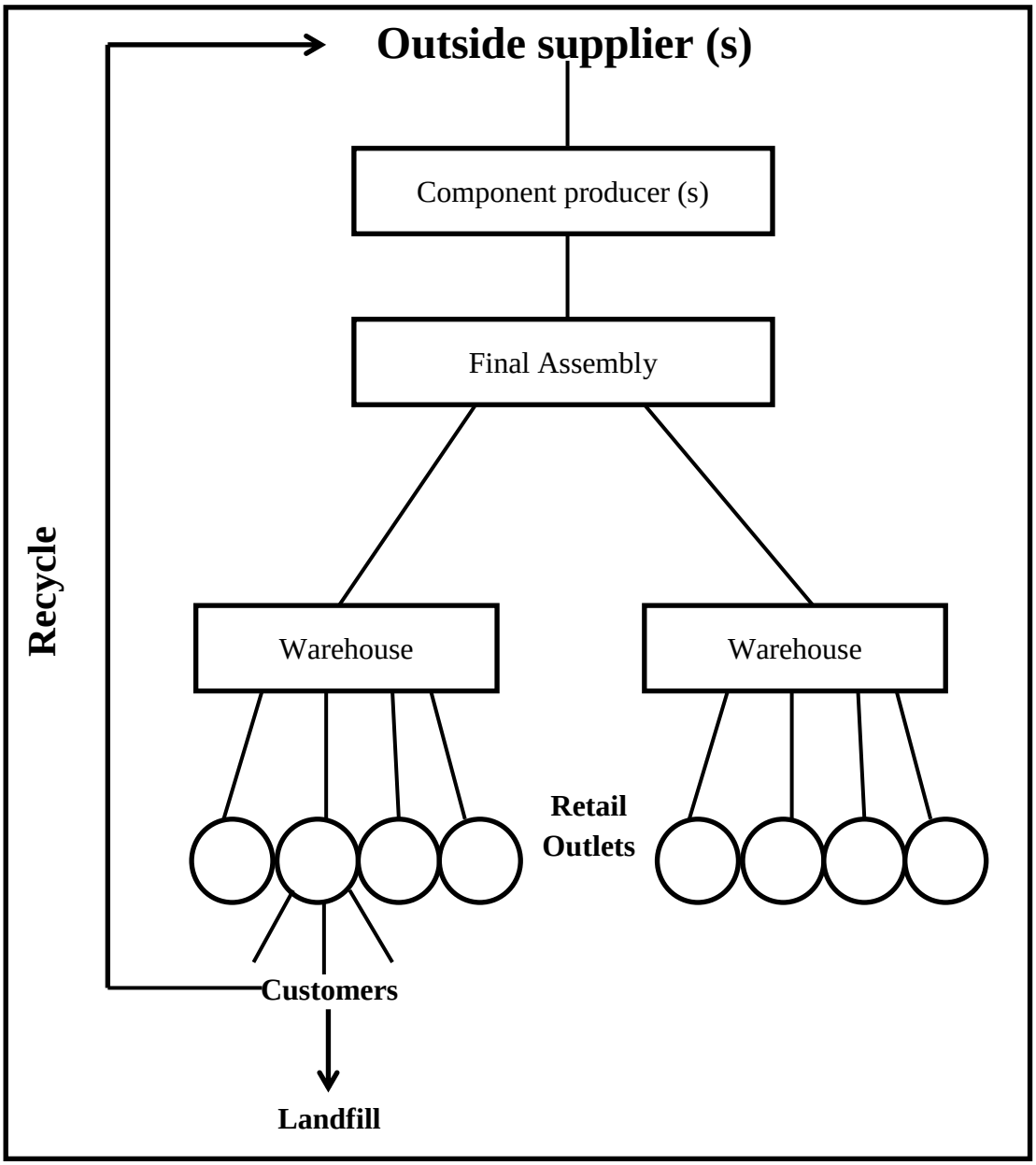

Fig. 3. A Schematic of a Supply Chain

*source Johnson, M. Eric; F. Pyke, David, Supply Chain Management

A supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain includes not only the manufacturer and suppliers, but also transporters, warehouses, retailers, and even customers themselves. Within each organization, such as a manufacturer firm, the supply chain includes all functions involved in receiving and filling a customer request. These functions include, but are not limited to, new product development, marketing, operations, distribution, finance, and customer

service (Chopra & Meindl, Supply chain management : strategy, planning, and operation, 2016).

The study by Liebetrutha (2017), noted that attention to sustainability with its three aspects economic, social and environmental has become more important for supply chain management. However, this has created a challenge to the supply chain as sustainability focuses more on descriptive processes than on quantity. The process of measuring sustainability is critical to the implementation of supply chain management and sustainable management in daily business. The integrative relationship between Guidelines for Performance Measurement and Management Systems and supply chain management was illustrated as shown in table (2-1).

Guidelines for (PMMS) can be grouped into criteria for particular elements, criteria for the Performance Measurement System or Instrument and criteria for the Performance Management Process, that aim to align the system with their environment. So, the guidelines are structured according to the above-mentioned three elements: Single performance element, performance instruments and performance management process.

Table (2-1): Guidelines for Performance Measurement and Management Systems

1 Criteria for particular Performance Elements	2 Criteria for the Performance Measurement System or Instrument	3 Criteria for the Performance Management Process
▪ Validity	▪ Multidimensionality	▪ Consistency with goals, business strategy and incentive system
▪ Robustness	▪ Understandable and evidence-based cause-effect- relationships	▪ Reliability of measurement process and acceptance by users
▪ Availability of Information	▪ Free of redundancies and inconsistences	▪ Action orientation, usefulness and economy
▪ Controllability		
▪ Control- Span adherence		

2.6 Importance of Applying Supply Chain Management

The SCM Professionals Council (CSCMP) has summarized the importance of applying SCM as follows (CSCMP):

"It is well known that SCM is an integral part of most businesses and is essential to company success and customer satisfaction"

2.6.1 Customer

1. The supply chain meets customer needs in the required quantities and certain time.
2. The supply chain is concerned with product quality and safety.
3. The supply chain is concerned with the after sales service and obtaining feedback from customers for the improvement process.

2.6.2 Reduce Operational Costs

1. Reduces purchasing costs: when applied at the end of the retail chain, the supply chain accelerates the sales process, so as not to decrease the prices of the products, especially the expensive ones.
2. Decreases production cost: producers rely on the application of supply chains, in order to find the source of the earliest and cheapest raw material, so as not to cause a defect in production and result in any delay.
3. Decreases total supply chain cost: manufacturers and retailers depend on supply chain managers, to design networks that meet customer service goals at the least total cost. Efficient supply chains enable a firm to be more competitive in the market place.

2.6.3 Improve Financial Position

1. Increases profit leverage: working on the efficient application of supply chains, will help reduce total production costs and thus increase the profits of producers.
2. Decreases fixed assets: this is what is always sought by the managers of the supply chain in order to reduce the number of warehouses and the state of access to raw materials in the easiest and fastest ways, and work to reduce the times of transport and thus reduce the use of more assets.
3. Increases cash flow: the supply chain provides the goods to the customers as quickly as possible, while maintaining the quality and safety of the product, thus accelerating the cash flow from customers to the suppliers faster.

It is no secret that the implementation of the supply chain will certainly benefit society as a whole; it achieves many benefits like:

2.6.4 Ensure Human Survival

1. SCM helps sustain human life: the role of supply chain implementation is very important in delivering basic human needs, especially food and water, particularly in emergency situations.
2. SCM improves human healthcare: the design of the supply chains is to provide the desired quantities with the desired quality in a timely manner, and thus help to maintain the health and survival of the human at all times and in all circumstances.
3. SCM protects humans from climate extremes: SCM contributes to reducing climate change, especially as it is always working to reduce costs and look for cheaper and safer alternatives, such as solar energy and other alternatives. Another example of its application is that it seeks to reduce transport routes to mitigate additional costs.

2.6.5 Improve Quality of Life

1. Foundation for economic growth: the good implementation of the supply chain, will reduce costs, thus contribute to the spread of goods, which will lead to increased economic exchange, which is evident in developed countries, which have transport networks and high-quality infrastructure, unlike developing countries.
2. Improves standard of living; if the SCM is applied in agricultural crops, we will find that farmers have made profits from their agricultural activities and thus will benefit their standard of livin.

In this section, we will address the concepts of measuring AFSCM performance.

Aramyan (2007) addressed that there are four main categories to measure the AFSCM performance indicators: efficiency, flexibility, responsiveness and food quality, these indicators are the tool to measure the performance of the supply chain, where the **Efficiency** measures the efficiency of resources use, and also includes many procedures such as production costs, profit counting, storage efficiency, and return on investment. When talking about **Flexibility**, we are talking about the supply chain's ability to any variables or emergency requests by customers, including the satisfaction of customers and the ability to deal with the change in quantities and response time, and work to reduce the percentage of loss. We mean by the **Responsiveness** to provide the required quantities on time, including the calculation of the time of transport, and the time of packing and any delay factors occur on the product, as well as calculating the time of customer response and errors caused by shipping. Moreover, to talk about the fourth indicator the **food quality**, we mean three things:

1. Health and safty for product.
2. The shelf-life of the agricultural product and its validity.
3. Product compatibility and reliability.

Where the product safety and health Indicates that the products are free of contaminants while allowing for the minimum allowable. The sensitivity perception of the food is determined by a general sense of taste, smell, appearance, texture and color, this is done by knowing the physical properties, chemical composition of the product, the validity is also defined as the period between harvesting, and processing until the product becomes unacceptable for consumption. Product compatibility refers to the conformity of product specifications with the actual product and the ability of customers to obtain that product in accordance with its specifications.

Aramyan (2007) did a study to evaluate the Netherland-German tomato supply chain, the objective of the research was to assess the conceptual framework for measuring the performance of the AFSCM and to include financial and non-financial indicators combined with the specific characteristics of the AFSCM, the research covered all stages of the chain from suppliers to retailers.

The four performance indicators measurements were adopted, efficiency, flexibility, responsiveness and quality of food, as reference. The results showed that the performance measures are considered in some chains links while not measured in others according to the different objectives of the chain.

She found that the most appropriate measure to measure the performance of the entire chain is related to costs, profit calculation, customer satisfaction, lead-time and product quality. At the same time, she found that some performance measures are difficult to

measure from some members of the chain, such as the flexibility of delivery and related to market operations. The results of the study showed that the measurement criteria can be adjusted according to the needs of each member of the chain.

Based on the results, the four categories of measurement were adopted as the main key performance indicators (KPI), taking into consideration the existence of some additional internal indicators according to the needs of each member, this system has also shown the importance of monitoring policies, regulations and innovations over the entire performance of the chain.

As shown in the figure.4 the relationship shows the effect of the four indicators on efficiency

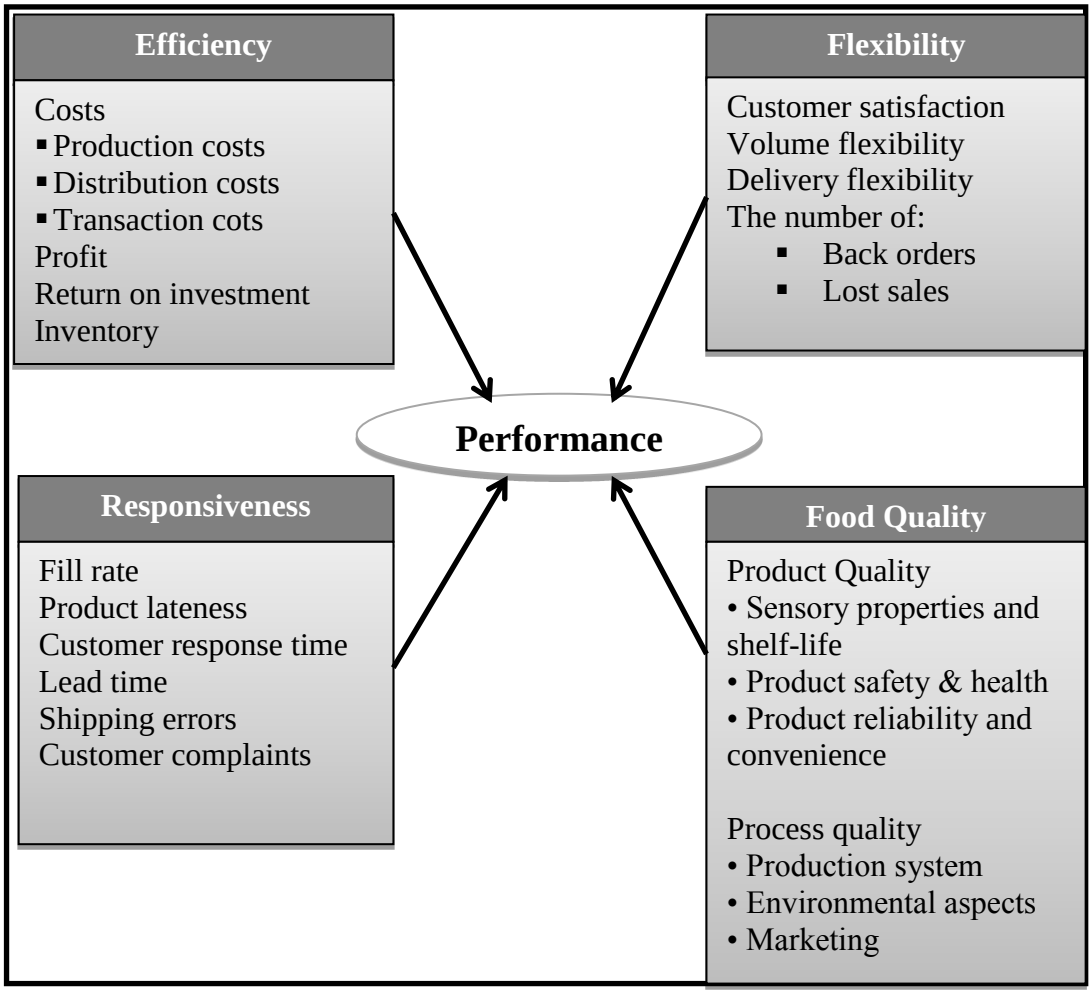

Fig.4. Conceptual framework of AFSCM performance indicators

*source Aramyan (2007)

At the end, the study pointed to the difficulty of circulating this model to the rest of the agricultural products, and recommended more experimental research due to the length of the chain and the large number of its elements.

In another study conducted by Warade (2016) on the tomato supply chain in Maharashtra, India, a comparison was made between the implementation of traditional and modern supply chains for farmers and consumers and their respective benefits as described in figures 5 and 6.

The traditional supply chain has depended on the strategy of producing goods and pushing them through the supply chain, without receiving any feedback or obtaining information

related to quantities or specifications of the desired product, and often results in many gaps between the supply and demand, either lead to a decrease in quantities or damage if increased quantities from market need. While the modern supply chain is based on a draw strategy that relies mainly on meeting customer requirements, and takes into consideration the feedback and information received from customers and traders, so that the production is accordingly adapted (MBA, 2012).

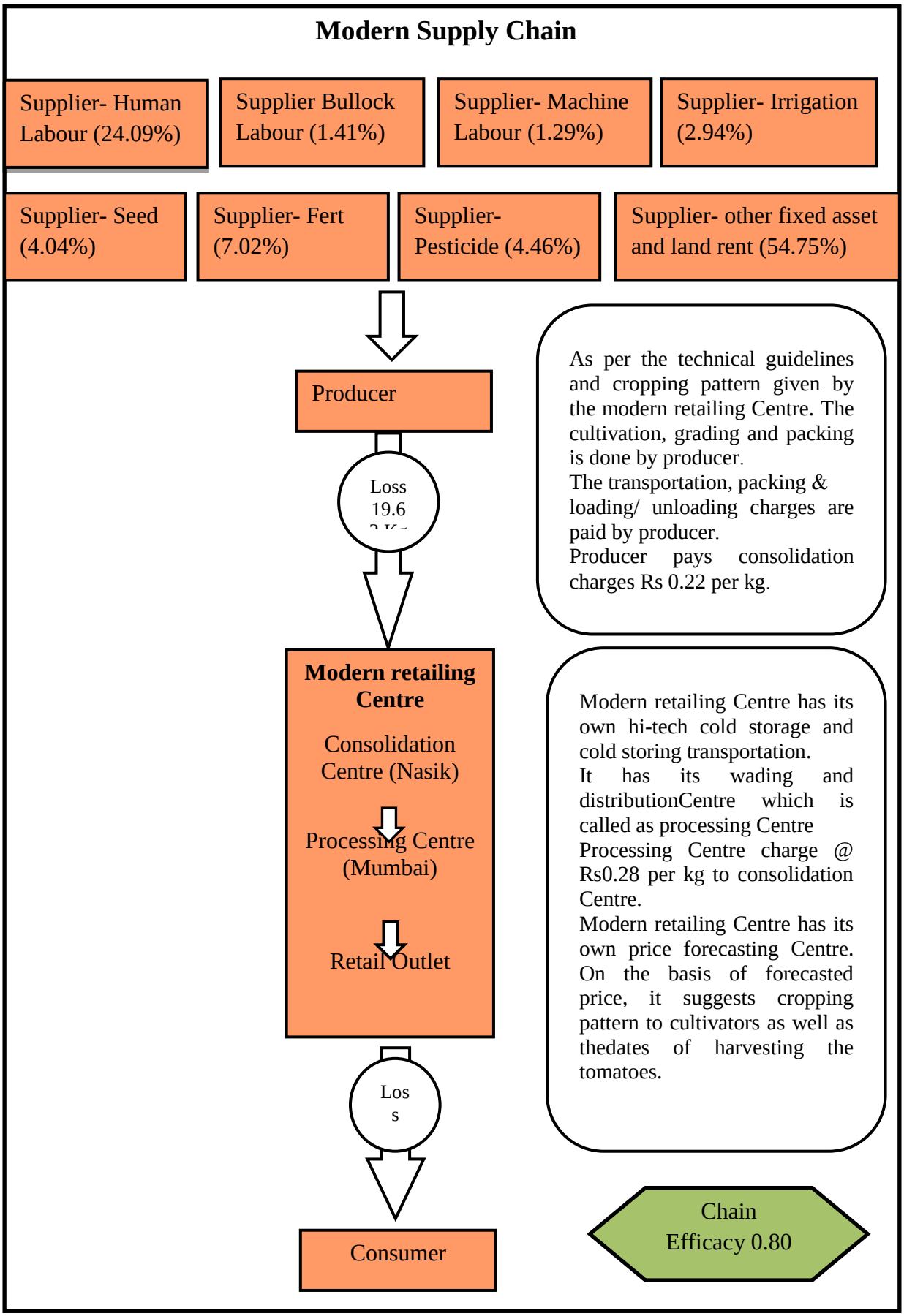

Fig.5. Modern Supply Chain *Source: Warade (2016)

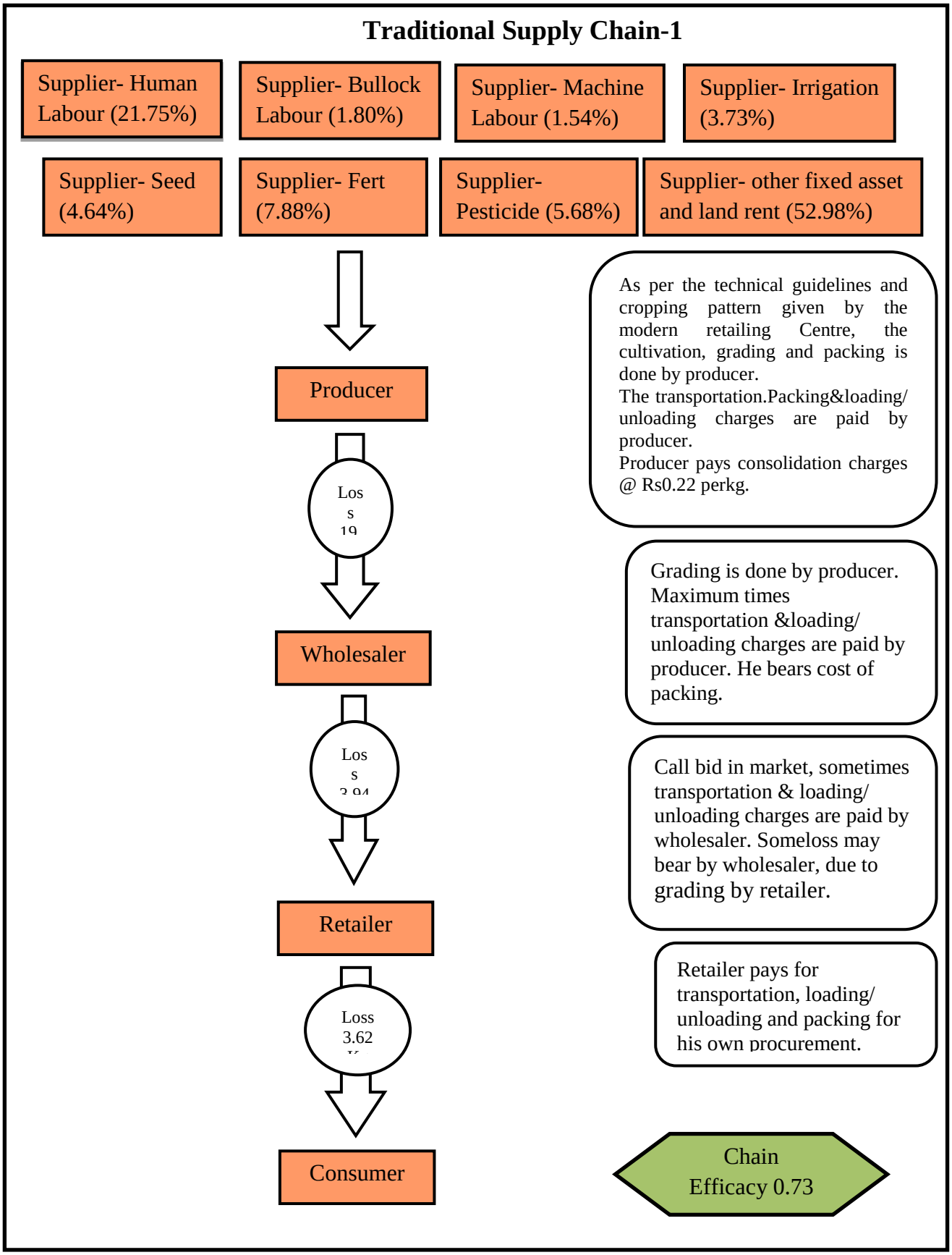

Fig.6. Traditional Supply Chain *Source: Warade (2016)

The study concludes that both farmers and consumers working under the modern supply chain have been found to have a higher, benefit than those who use traditional supply chains.

2.7 Agri-Food Supply Chain Managment

In the Van der Vorst et al. (2007), They pointed out that the current competition in the markets needs to focus on the relationships between customers and suppliers, in addition to the interest in raising the efficiency of operations within the system, so was the attention to the modern management thinking, which calls for integration and cooperation among stakeholders and respond to the needs of customers in order to build a successful strategy. In a related context, the study pointed out that attention to supply chain management has become an approach of many institutions in Western countries since the 1990s, and recently increased attention to AFSCM, both in developed and developing countries. Officials in the agricultural sector have realized that the successful coordination, management and integration of AFSCM members will lead to the success of the chain because they believe that success is not only on one level but through all levels of the AFSCM.

As a result of the growing interest in supply chain management, the importance of information and communication technology (ICT) has become evident in the link between the members of the supply chain, which allows the exchange of large amounts of information through various channels of communication. This mode encourages cooperation and paves the way for an efficient supply chain. The importance of ICT has been most strongly demonstrated in the AFSCM due to the privacy of agricultural products as it is characterized by short marketing life, so it is very important that information among members of this chain be exchanged more widely.

AFSCM and networks play an important role in providing access to markets for producers from developing countries, as well as for local, regional and export markets. Changes in Agri-food systems affect the ability of agro-industrial enterprises to compete; small and large alike will have to innovate and reduce costs, while being more responsive to consumer needs. This is where SCM can help (van der Vorst et al., 2007).

Figure7, the so-called supply chain network appears as the influencing major players in AFSC. It shows how difficult and overlapping the elements of the chain are. In each horizontal level there are many processes that take place, so we find more than one supplier at each level and more than one trader at the same time, in addition to the existence of similar operations at the vertical level, which makes it difficult to implement supply chain management (Ministry of Agriculture).

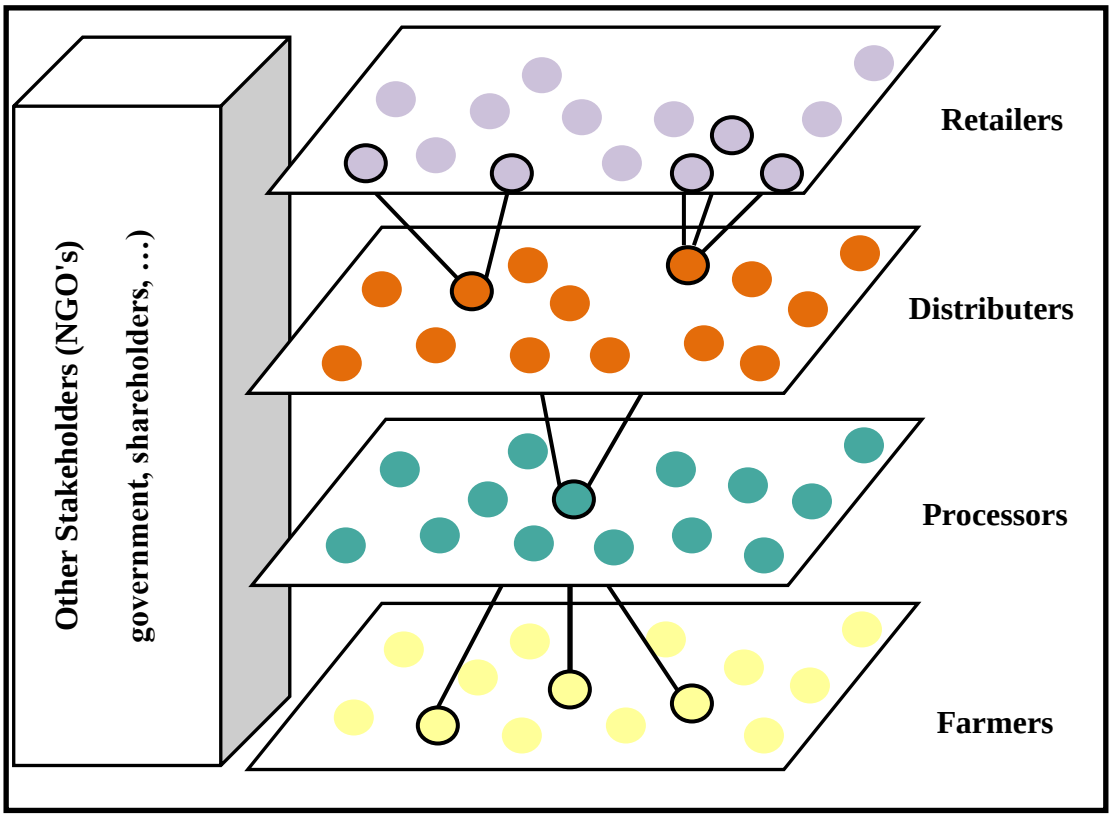

Fig. 7.Schematic diagram of a supply chain from the perspective of the processor (bold flows within the total FSC'N (based on Lazzarini et al., 2001)

A study for Chen et al. (2016), they concluded that the AFSCM is a long and complex chain to deliver vegetables meat fish and other agricultural products to end customers, they found that many of the previous studies on the subject focused on measuring the quality of the performance of the chain, but they found that attention to the development of management services is considered an administrative capital is intangible, which should be taken care of. They proposed a five-step managerial framework to scan the chain to improve the level of services.

The proposed five-step scanning functions is aimed to understanding the attributes, scope and service problems , the scanning means the manageral functions applied in the scanning of each step of the chain, and they are explained as follows:

- Step 1: Knowing and understanding of the characteristics of the operations of agricultural food.
- Step 2: Determine the limits of the AFSCM and the scope that it serves.
- Step 3: Identify problems between internal components of the AFSCM on the one hand, and the problems between these components and consumers.
- Step 4: Identify the problems between the AFSCM and the external organizations.
- Step 5: Work to alleviate the problems surrounding the chain in order to achieve excellence for its services.

The study stressed the importance of the flow of materials and information, where the flow of materials is called logistics flow that meet the needs of production and provided by suppliers, on the other hand, the provision of information depends on the data provided by the customers, which benefit producers. Therefore, the study concluded that the process of establishing an AFSCM needs organisations that follow it and follow up its activities, so

that this organisationsis responsible for the production, processing and delivery of agricultural crops to the end consumer(Chen et al., 2016).

In order for the AFSCM to achieve its goals, the components of the chain must be integrated from suppliers, farmers, collectors, wholesalers, retailers and consumers. Moreover, this integration must take place at all levels in the village, city and whole country (Chen et al., 2016).

Van Roekel et al. (2018), integrated supply chains are one of the most powerful competitive tools in today's globalizing business economy. For agricultural products, successful supply chain development projects reduce not only the transaction costs, but also the institutional barriers that decouple individual links in traditional distribution channels. They allow participants to achieve higher levels of service and to capture substantial added value thereby serving as leverage points both for economic growth and for poverty alleviation. This paper also draws on the experience of the Agri-Chain Competence Center to discuss the critical issues and step-by-step actions necessary to stimulate and support the emergence of supply chains in developing countries.

AFSCM are also economic systems that distribute benefits and apportion risks among participants. Thus, supply chains enforce internal mechanisms and develop chain wide incentives for assuring the timely performance of production and delivery commitments. They are linked and interconnected by virtue of shared information and reciprocal scheduling, product quality assurances and transaction volume commitments. Process linkages add value to agricultural products and require individual participants to co-ordinate their activities as a continuous improvement process. Costs incurred in one link in the chain are determined in significant measure by actions taken or not taken at other links in the chain. Extensive pre-planning and co-ordination are required up and down the entire

chain to affect key control processes such as forecasting, purchase scheduling, manufacturing programming, sales promotion, and new market and product launches (van Roekel et al., 2018).

Under the circumstances surrounding the agricultural sector in Palestine, there is a need to use modern management methods, including managing the supply chain for agricultural crops. The use of the supply chain is one of the most powerful tools of competition for development and economic benefit**,** at the same time the use of the supply chain will not only reduce production costs, but also help reduce technical barriers between the parties, in addition, the implementation of SCM will contribute to raising the value added of agricultural products (van Roekel et al., 2018).

Roekel et al., 2002 They said thatAFSCM is considered to be a complex chain because it serves many functions, Suppliers, producers, processors, marketers and distributors are all connected to one entity. AFSCM take a form of industrial organization where a value is added at each stage of the chain gradually to the final consumer product.

The stages within the chain were described as:

- The transfer of product from producers to consumers.
- the movement of cash comes from consumers to producers.
- Information is disseminated within the whole chain.
- Transfer of ownership rights from producers to distributors and access to markets.
- Information reflects the customers demand at all levels.

The AFSCM is one of the economic systems where benefits and risks are distributed among all participants. Thus, AFSCM impose internal mechanisms that ensure timely performance in order to meet production and delivery commitments. In order to implement

this, the internal mechanisms of the chain are linked with mutual information to ensure the quality of the product. Thus, these mechanisms can add value to AFSC (Roekel et al., 2002).

2.7.1 The impact of AFSC affiliation

- Build long-term mutual relationships among the members of the chain
- Minimize production losses in storage and transport operations.
- Improving the quality and freshness of products.
- Improved safety of food products can be assured.
- Having a system to disseminate market information well will increase the sales ratio.
- Applying the supply chain system properly will increase the added value of the products.

2.7.2 Key issues in AFSC development

Saturation of organization for economic cooperation and development (OECD) food markets and changing consumer demands, powerful application of information and communication technologies and the internationalization of the Agri industrial sector are the major driving forces, affecting supply chain development and forcing the strategic realignment of traditional buyer/ seller relationships along the chain. Moreover, consumer demands with respect to the ecological and socio– economic sustainability of agricultural production and issues of food safety are coming more and more to the fore (Roekel et al., 2002).

2.8 Chain knowledge: A critical success factor

Developing AFSCM is a complex task. In order to create and organize chains, a good deal of knowledge and expertise is required in chain knowledge; chain knowledge includes several interrelated types of knowledge about:

i) product design and packaging.

ii) market requirements and customer preferences.

iii) production/ distribution processes and their integration.

The agricultural sector in Palestine is going through a new curve. In addition to Israeli practices, there are other problems such as climate change, problems of providing basic materials and manpower shortage problems, and we do not forget that there has been a change in consumption patterns in Palestinian society. The list of problems facing the agriculture sector in Palestine is the same as the agriculture sector in most of the developing world. Hence, most of the literature contained in this study indicate that the supply chain consists of three main stages: first, to provide products to consumers and come across the various stages of production, through manufacturing and distribution to reach the consumer, while the second phase comes to cash flow through consumers To the producers, the third stage, which is the most important point of view of most literature in the exchange of information across all stages of the chain and all elements according to the internal mechanisms adopted as shown in Figure 8.

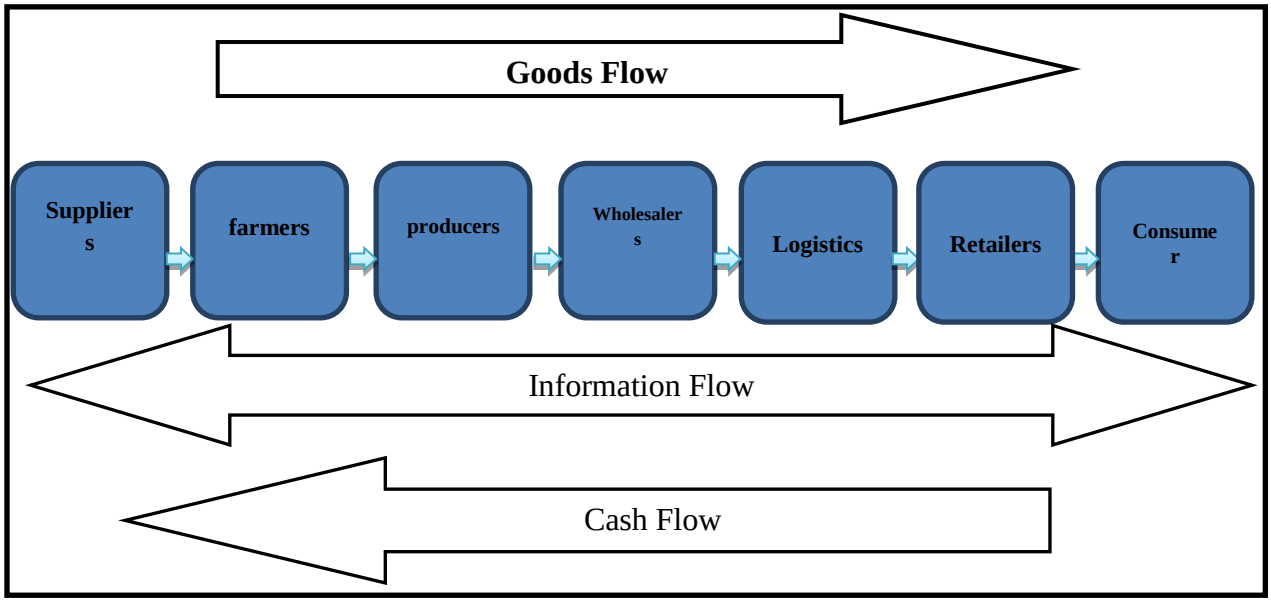

Fig.8 SCM block diagram

At the conclusion of this literary review of the previous literature, which talked about the subject of the study of AFSCM, the study confirms the problem of research in the study area in particular and in Palestine in general as the problem of fluctuating prices of agricultural products is a phenomenon worthy of study. The research question was about the relationship between the application of AFSCM and the solution of the problem of rising production costs, which was the main reason behind the rise in prices of agricultural products.

The study aims to analyze the AFSCM in the study area in order to achieve the following objectives:

- Analysis of the supply chain of agricultural crops and clarifying the parties.
- Identify the reasons for rising production costs and clarification.

- To call upon the responsible authorities to adopt the implementation of supply chain management in the agricultural sector with all the necessary support for its success.

- Explain the importance of information management and data in the success and sustainability of the agriculture sector.

The need for this study emerged from the agricultural sector, which is suffering a lot of neglect that was mentioned by many statistics, the aim of this study is to analyze the AFSCM in Jenin and Tubas areas. The study area is considered one of the most important agricultural production areas in the West Bank (PCBS, 2011).

Chapter Three

3.1 Research Methodology

To achieve the objectives of the study, the following methodology was adopted

In the beginning, reference was made to the previous literature review and to study what was reached a globally and regional situations, and that was the basis of research, the stakeholders were divided into the Directorate of Agriculture, Suppliers, Farmers, Central Market and Wholesalers. In the beginning, the research was based on the exploratory method and then the research tool was built on interviews. The interviews were organized in order to answer the research question, which also achieves the overall research objectives. The research tool was judged to ensure its accuracy and clarity.

The research encountered a lack of relevant studies locally and regionally to be able to match the results, therefore, it was based on the availability of previous studies and literature on the subject of the study in analyzing the results and finding gaps.

3.1.1 Sources and tools for data collection

The primary data were collected by the researcher using observation and interviews directed to the stakeholders. The interview questions were designed to cover all aspects of the study and were presented to stakeholders who were selected to include all components of the AFSCM.

The secondary data were obtained by reviewing the previous literature whether published articles, books or reports issued by official bodies such as reports issued by the (PCBS),

the World Bank, and the Food and Agriculture Organization. In addition to the web and scientific journals.

3.1.2 Methodology and methods of analysis

The study adopted a qualitative approach to achieve the objectives of the study through field research and conducting interviews and taking observations on the subject of the study. This method provided a clearer and more comprehensive picture of the study problem, and It has been implemented as follows:

1. The questions were designed based on the observations received by the researcher during a period of one month, which included elements of the agri-food supply chain management.
2. The stakeholders were interviewed and the directorates of agriculture in the study area were selected as the representative of the government side responsible for the agriculture sector.
3. The municipality of Qabatiya was adopted as a direct control body on the work of the Central Market.
4. Interviews were conducted with representatives of wholesalers in the central market and in study areas as a sample selected from other wholesalers.
5. For farmers, the Tammoun Agricultural Association represented a sample of Tubas governorate, with more than 70 farmers. In the Jenin area, a livestock farmer was selected as a senior dairy cow farmer. From Jalameh village, the Jalameh Cooperative Society and its nursery were selected as representative of the town. In the town of Deir Abu Da'eef, a group of large farmers were selected to hold large holdings. In Kfar Dan, Kfar Dan Cooperative Society was chosen as a representative of farmers.

The research also encountered many difficulties, including the lack of clarity of information and the lack of data on all components of the supply chain, the directorate of agriculture, suppliers, farmers, the market, and the wholesalers.

The research methodology is summarized as follows:

1. Reviewing previous literature.
2. Identifying the problem and the research objective.
3. Data collection: the objective of data collection was to analyze the current situation of the AFSCM.
4. Data analysis:

i. Clarifying the form of the supply chain and comparing it with the findings of research studies.

ii. Finding the actual AFSCM and what it should be.

iv Building an AFSCM network.

3.1.3 Field of study

- Scientific field: In this study, the research was based on an analysis of the agricultural reality, the problems encountered, and the mechanism of action in the existing AFSCM.
- Time domain: 2018-2019
- Spatial domain: west bank, Jenin and Tubas governorates.

3.1.4 Contents of the study

This study was divided into five chapters distributed as follows:

Chapter One: Introduction

Chapter Two: LitertureRivew

Chapter Three: Research Metodology

Chapter Four: Results & Discussion

Chapter Five: Agriculture Information Management

Chapter six: Conclusion & Recommendations

In the following figure 9, the researcher shows the extent of the overlap of the Palestinian local market in the Israeli agricultural market, and here lies one of the most important problems facing the AFSCM in Palestine.

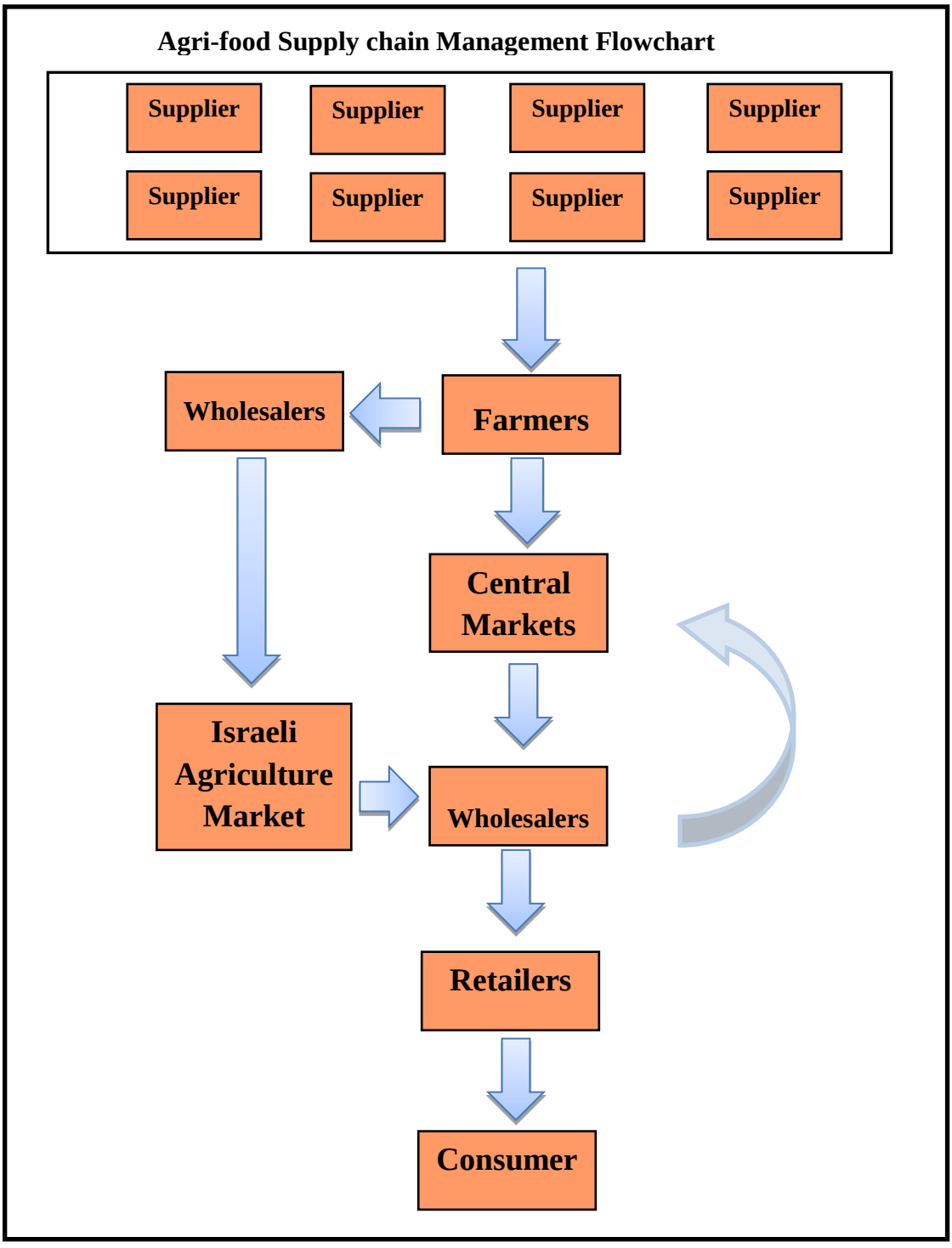

Fig. 9.Agri-food SCM Flowchart in Palestine

Chapter Fou

Results and Discussions

4.1 Results analysis of the interviews

The results were divided into two parts, the first section related to the governmental side, which is the directorates of agriculture in Jenin and Tubas governorates. The second section deals with the components of the AFSCM in the study area.

More than one study was adopted in order to compare the results of the research and to confirm its credibility such as Agricultural Sector Strategy: A Common Vision (2009), Van Roekel et al. (2018), Aramyan (2007), Warade (2016).

The table (4-1) below show the information analyzed according to the interviews with the stakeholders.

Table (4-1) Stakeholders Analysis

Stakeholders	Group	Function	Type	Importance
	Jenin Agriculture Directorate	Guidance and Development	Governmental	Agricultural Extension, Follow-up and Guidance, Legislation and Laws
	Tubas Agriculture Directorate	Guidance and Development	Governmental	Agricultural Extension, Follow-up and Guidance, Legislation and Laws
	Municipality of Qabatiya	Supervision	Governmental	Supervision, Services and Organization
	Farmers	Producing Agricultural Product	Local	Providing Agricultural Product
	Qabatiya Central Market	First Sale Center	Local	Facilitate the Sale Process to Farmers
	Wholesalers	Intermediary Between Farmer and Retailers	Local	Complete the Purchase Process from the Farmers in Cash and in the Quantities Offered

Appendix 1 the names of the arbitrators for the interviews.

A list of interview questions with stakeholders is provided in Appendix 2.

Appendix 3 provides a list of interviews conducted with the stakeholders.

Hence, through the field observations observed by the researcher, a set of questions was developed by the researcher directed to the stakeholders and those who were divided into the next:

1. Directorates of Agriculture.
2. Municipality of Qabatiya.
3. Suppliers of raw materials
4. Farmers.
5. Wholesalers (Distributer Center).

The questions are designed as a guided interview based on an analysis of the researcher and an indication of the situation as it is.

In the beginning, the researcher went to the Directorate of Agriculture in Jenin governorate, specifically the Agricultural Extension Department, which is the first department concerned with the agricultural production process. During a month of visits to the headquarters of the Directorate of Agriculture, the researcher concluded some of the questions that he directed to the Department of Agricultural Extension in the Directorate.

Through interviews, the researcher attempted to shed light on the extent to which management tools are applied in the agricultural production process, which are carried out through regular operations through a series of supply operations to reach a final product at the consumer side.

Following is the first section of the questions addressed to the Directorate of Agriculture; the questions in this section have been divided into three sections:

1. Role of the agricultural extension and guidance.
2. Its role in monitoring and supervision.
3. Its role in economic support.

4.1.1 Analysis Related to The Official Side

- **Means or interventions by the MoA to reduce production costs.**

The MoA does not have direct intervention in controlling the prices of inputs or selling prices, and there is nothing forcing it to intervene in determining prices. Note that the authority responsible for monitoring and setting input prices is the Ministry of National Economy, and that responsible for selling prices is the mechanism of supply and demand in the market. Therefore, the role of the Ministry is limited to providing technical support and follow-up technical procedures such as showing prices of primary products and conforming to specifications only (Directorates of Agriculture, 14, October, 2018, Personal Interview).

While in EU law farmers are at the heart of the food supply chain to improve the balance of the food supply chain in Germany, EU tools (such as producer organizations) help farmers get better regulation and market their products better (EU, 2016).

- **Working mechanism of agricultural extension department with farmers from the beginning of their thinking to practice agricultural activity until marketing the product**.

The Department of Agricultural Extension and the rest of its sections provide technical support to farmers by informing them of the solutions to the problems they face. The extension department needs a lot of governmental and material support to meet the needs of the farmers from field visits and to identify their problems. The officials replied that

agriculture as a science has become unconventional It needs a lot of effort to follow this development (Directorates of Agriculture, 14, October, 2018, Personal Interview).

While the farmers responded that the role of extension department is limited to the few visits that do not reach the required level, and that in many cases there is no intervention of the ministry in the follow-up of their agricultural activity, for example, what happened in the village of Jalameh when planting green pumpkin in greenhouses (Khalaf, 20, October, 2018, Personal Interview).

- **The relationship between farmers, agricultural engineers, and their compliance with instructions.**

Agricultural Extension Service said that the agricultural engineers are ready to respond to any queries from the farmers and that their technical staff whether they serve the vegetable or animal sector are qualified and able to help the farmers. However, there are problems faced by agricultural engineers often in the difficulty of accepting farmers to guide, and this problem comes from the lack of confidence of farmers receiving government service, while the farmer accepts service from private parties or by marketing companies for primary products.

There is no measure of farmers' compliance with the guidance provided due to poor monitoring and follow-up of the extension process (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **The supervisory role exercised by the MoA**

The Ministry exercises a supervisory role through its technical staff, through field visits to various agricultural activities, but this role is limited to monitoring, often without

intervention. The reason for the ministry's non-interference is its inability to provide the farmers with an alternative opportunity due to poor funding possibilities.

Examples of what the Ministry provides to farmers are the follow-up of poultry and livestock herds and the provision of the necessary rations from veterinary services, in addition to the field follow-up of vegetable and horticultural products.

As the supervision process requires the ministry to provide trained staff and able to communicate with farmers, although most of the farmers are traditional farmers and adhering to traditional agricultural patterns, here lies the difficulty of the supervision process, the process of two parties, one sender and the other receiver. Since the farmer's confidence in the agricultural engineer is virtually nonexistent, it is difficult to supervise (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **Role of the MoA in the pricing of agricultural products**

There is no direct role for the MoA in the process of pricing agricultural products, which governs prices here is the law of supply and demand. However, the ministry indirectly has the responsibility to protect farmers in terms of preventing the import of any agricultural products to which we have self-sufficiency, in order to keep prices stable locally (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **Data sources available at the MoA**

The agricultural engineer is the source of primary data for the MoA, through registration of field data and follow-up of agricultural activities and inventory, whether the activities of plants or animals, in addition to tracking what happens to the farmer from any damage to the crop and registration. While in many activities there is no data system that allows the

MoA to predict the quantities of production, for example, or the possibility of the spread of a particular type of pests, and the PCBS is the secondary source of information for the MoA and its directorates in different governorates, And its data is fairly accurate as it is capable of collecting and analyzing data (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **Methods of data collection in the MoA**

The methods used in collecting data at the MoA depend primarily on the engineers working in the MoA various departments and research centers affiliated with the MoA. However, in the nature of the case, the nature of the agricultural engineer's work is limited to the abstract scientific aspect and lack of administrative skills. Data collection methods are therefore limited to data available to farmers or by observation to agricultural engineers. This failure is due to the weakness of the MoA ability to cover all field data, train engineers and acquire data collection and analysis skills (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **Extent of capacity of sub-directorates to collect agricultural data**

There is no department in the directorates that specializes in collecting information, but each agricultural engineer collects the information in the scope of his work. This information is then collected and transmitted to the MoA. It is mostly information on the cultivated areas of the different varieties and the quantities expected. There is no consumer information collected so farmers are directed to specific crops and quantities according to consumer behavior (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **Role played by the MoA for the development of agricultural engineers**

There is a training department at the MoA, through which the engineers are informed of everything that is new, but because of the weakness of the possibilities, there are some shortcomings in its work (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **How the MoA deals with the problems and obstacles faced by farmers**

Obstacles and problems facing the agricultural sector are divided into two parts, the first section is technical, and this section of the specialization of agricultural engineers where agricultural engineers follow up the technical problems facing farmers within the possibilities available to them. The second section is administrative and here lies the weakness in the services provided (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **Role of the MoA in the follow-up of elements of agricultural production**.

The components of production in agricultural crops are divided into the following: water, fertilizers, pesticides, seeds, seedlings, equipment, feed and labor. As for water, the MoA does not have any intervention in the prices and distribution mechanism to the farmers and is subject to the Palestinian Water Authority. Which controls their prices are distributors. As for pesticides, fertilizers and seeds, they are subject to the MoA only in terms of technical specifications in addition to the Ministry of Health and the Ministry of National Economy and the MoA has no relation to the prices because most of these items come through the Israeli side. For feeders, they are entirely imported from the Israeli side, which is fully manufactured, or imported as araw material from the Israeli side and manufactured locally. With regard to equipment, traditional agricultural patterns still dominate most agricultural activities. As for agricultural employment, it is one of the most important

problems in the agricultural sector, where there is a large shortage on it, and if there it will be high operational prices, so that many farmers used to run their families (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **The role played by the MoA in maintaining the agricultural products market**

The MoA plays a role in maintaining the local market by preventing the importation of agricultural products and flooding the markets. There are laws that regulate this process, but the geographical overlap with the Israeli side weakens these procedures and thus the difficulty of controlling markets locally.

In addition to the lack of clear information about the size of the market and the desire of consumers, and another element affects the process of adjusting the markets is the lack of knowing of the trends of farmers and the inability to force them to exercise certain activities (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **Services provided by the MoA to farmers in terms of infrastructure**.

Again, because of the ministry's poor capacity, it does not have such facilities for farmers such as warehousing, refrigerators, packing centers, where its just provide a technition services and limitation of damages (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **The relationship of the private sector and the extent of partnership in agricultural investment**.

The Palestinian farmer continues to practice agricultural activity individually. The roles of the cooperative societies have declined significantly, weakening the simple farmer and making him face all the changes and difficulties alone. The Palestinian private sector is

still lagging behind in the practice of agricultural work, especially in the plant production sector. This sector is characterized by instability and obstacles. Capital is always looking for profits, so the private sector avoids investing in agriculture (Directorates of Agriculture, 14, October, 2018, Personal Interview).

- **Services provided by the municipality to wholesalers and farmers**

The role of the municipality is to provide the appropriate place for the exchange of goods within the market. The central market accommodates 22 shops for wholesale, in addition to the loading and unloading yard, parking, yard for brokearge operations. For these services, the municipality receives 10% of the sales of farmers collected from wholesalers (Zakarneh, Qabatiya Municipality, 18, October, 2018, Personal Interview).

- **Role played by the municipality in managing the central market**

The role of the municipality in the market is only the role of control of sales and registration in order to collect the proportion of the municipality of farmers, there is a permanent office of the municipality in the market and the function of all employees follow sales. In addition to maintaining security and order (Zakarneh, Qabatiya Municipality, 18, October, 2018, Personal Interview).

- **Responsibility for supervising the follow-up mechanism of the Central Market**

The municipality follows the Ministry of Local Government according to the laws governing the work of local authorities. There is no intervention by any ministry in the work of the municipality in the central market. The municipality has a department that is responsible for the affairs of the central market (Zakarneh, Qabatiya Municipality, 18, October, 2018, Personal Interview).

- **The relationship of the municipality in determining prices within the central market**

The municipality does not intervene in the pricing process of products, this leaves the mechanism of supply and demand within the market, which determines their prices wholesalers, there are more than one standard within the market including the size of the fund, product quality, supply and demand (Zakarneh, Qabatiya Municipality, 18, October, 2018, Personal Interview).

4.1.2 Analysis Addressed to AFSCM Components

- **On any basis, the product to be planting is selected**

Farmers often exercise the same activity to avoid risk, and the majority answer that no preliminary economic feasibility study is being conducted, but profits are calculated at the end of the harvest season. There are some individual efforts by some farmers to study the market need and to choose new varieties to suit consumer demand.

There are two examples of individual attempts by two cooperative association, the Jalama Cooperative Association and the Kfardan Cooperative Association. Al-Jalama Cooperative Association has experimented with cultivating green pumpkins inside green houses. This experience has won the satisfaction of farmers and proved profitable. While in the Kfardan Cooperative Association has been cultivating varieties of cucumber inside the greenhouses, which are suitable for the process of pickling, and this experience has achieved great successes at the level of the region (Sha'aban, Marei, 1, November, 2018, Personal Interview).

- **The formal steps taken by the farmer before starting his agricultural activity**.

Of the sample that was asked, no one said there was a connection between farmers and the MoA in order to select specific crop. However, things are done so that the farmer chooses the activity he intends to practice himself or by observing the behavior of other farmers (Khalaf, 20, October, 2018, Personal Interview).

- **Availability of production elements in the domestic market**.

As for water, all farmers reported that there is scarcity, and that the quantities of water currently available are sufficient only for cultivated areas (Khalaf, 20, October, 2018, Personal Interview). Regarding the availability of water in the area of Tammun, the farmers said that there are sufficient quantities, but the Israeli side's interventions prevent them from exploiting them in the optimal manner (Hussain, 21, Otober, 2018, Personal Interview). For prices, none of the farmers in the study area objected to it and it is expensive and increases production costs.

As for fertilizers, pesticides and veterinary treatments, all farmers reported that the sources of these inputs are mostly from the Israeli side or are imported by the Israeli side (Hussain, 21, Otober, 2018, Personal Interview). In this case, the farmer bears the added taxes twice, which increases production costs. This is in addition to the farmers' lack of confidence in the local varieties, which are re-manufactured locally, especially veterinary medicines (Al-Akhras, 21,October, 2018, Personal Interview). Other agricultural treatments are considered expensive in comparison to their size. For example, a 50 cc bottle sold for 80 NIS for farms, which is very expensive (Khalaf, 20, October, 2018, Personal Interview).

Regarding feed, it is considered one of the highest production costs, especially since most of the feed is imported from the Israeli side, in addition to transport costs (Al-Akhras, 21,October, 2018, Personal Interview).

Labor in agriculture is expensive and unavailable when agricultural work is seasonal, so many farmers are required to work with their families in harvest seasons (Sha'aban, Marei, 1, November, 2018, Personal Interview).

- **The extent to which the components of the agricultural production of the quality are matched**.

Most of the farmers reported that production inputs in the local market need to be monitored in terms of quality and conformity to specifications, through experiments in which they have been tested. During the tomato season, the farmers of the Deir Abu Deif area suffered from problems of wilting seedlings and did not find proper treatment in the local market, resulting in heavy losses for farmers (Souqi et al., 20, 11, 2018, Personal Interview).

- **Type of relationship between the Palestinian farmer on the one hand and the public and private sectors on the other**.

There are no solid relationships between farmers and the public sector represented by the MoA, the real agricultural extension is not available and agricultural engineers need continuous training and capacity building as needed. For example, if we look at the Agricultural Research Center in Qabatiya and we searched for its scientific work, we find very weak in its practical production in terms of published scientific papers and observations that concern the problems of the agricultural sector (Abu- Elrub, 15, October, 2018, Personal Interview).

As for the private sector, most farmers responded to the disappearance of its role and lack of existence, because it is afraid to invest in agricultural activities and does not venture capital to enhance the role of farms or the sustainability of the agricultural sector. The private sector is always looking for profit and this is its nominal goal. If there are attempts to invest in the agricultural sector, it is rare and will be through donors (Khalaf, 20, October, 2018, Personal Interview).

- **The quantities produced cover the local market.**

There are some varieties of plant production sufficient to need the local market in terms of quantities raised during the harvest period, but the problem is short marketing period under normal circumstances. For example, potatoes during the harvest season there is a surplus in quantities produced, but because of the lack of storage places, the production is quickly eliminated by export, and after the season traders to import this variety of different places (Hussain, 21, Otober, 2018, Personal Interview).

- **Sales methods used in the marketing of agricultural crops**.

In most cases, the burden of marketing the agricultural product lies on the farmer himself in the absence of marketing associations. The sales process is carried out by sending the crops to the central markets by the farmer himself or through some traders who collect the crops. In both cases, the farmer bears the transportation costs, while he does not intervene in pricing his product.

There is a problem facing the marketing process. The Palestinian farmer sells his produce to the central market by means of boxes, which is the sales unit, not the kilo, which constitutes another loss for the farmer and reduces his profits (Sha’aban, Marei, 1, November, 2018, Personal Interview).

- **Steps taken by farmers to reduce production costs**

The Palestinian farmer is still not fully aware of the practice of agriculture within an economic perspective, in addition to not resorting to diversity in the crops he cultivates. The other side is the absence of the role of the MoA in the direction of more economic practices and work on the implementation of laws, and unify the efforts of all parties in order to exercise better and impose more control on the mechanisms of the market, both in the process of purchasing production inputs or sales of agricultural products(Abu- Elrub, 15, October, 2018, Personal Interview).

The following table (4-2) shows the analysis of the interviews conducted with the stakeholders in terms of clarifying the proposals required for the implementation of the AFSCM

Table (4-2) Analysis of the interviews conducted with the stakeholders in terms of clarifying the proposals required for the implementation of the AFSCM.

	Type	Function	Action
Steakholders	Governmental	Directorates of Agriculture	• Activating laws governing the agricultural sector • Agricultural engineers shall be required to provide the necessary skills, whether economic or technical • Activate the supervisory role of the MoA • Holding workshops for farmers to clarify the importance of implementing the AFSCM • Consolidate the efforts of all institutions dealing with the agricultural sector • Clarify and disseminate the importance of implementing AFSCM to reduce the increased production costs and raise profitability • Encouraging the private sector to work and participate in the agricultural sector • Take advantage of the experience of others in the success of AFSCM
	Local	Farmers	• Clarify the mechanism of AFSCM action • Market regulation, especially imports of products from the Israeli side • Holding workshops to clarify the mechanism of AFSCM work • Participation of the MoA and the enactment of laws to protect the agricultural sector and farmers • Organizing the work of the markets and working to disseminate the necessary information, especially the wishes of consumers • Support the farmers technically and work to solve the problems they face

4.2 Discussion

The agricultural sector is characterized by the nature of work under conditions of uncertainty, which often constitutes pressure on the production process, it was found that the production process does not directly depend on the demand from consumers, in addition to other conditions surrounding the production process, such as the availability of production materials and quality to produce the desired quantities of production (MoA, 2016).

In our Palestinian case, there are some conditions that go beyond the control of farmers and all concerned parties, because the Israeli side and the Israeli agricultural market indirectly control Palestinian agricultural activities, for example, in our study of the tomato product, the researcher found that if there is a shortage of production in The Israeli market, the demand for this product will increase from the Israeli side, which is a burden on the Palestinian farmer and consumer. Therefore, there is irregularity in prices. There is no comparison between the income of the Palestinian citizen and the income of the Israeli citizen.

The study found that the work of the MoA depends only on the routine work provided to the farmer. This is what the researcher reached through the results of the second section. In our analysis of the AFSCM, the burden is primarily on the regulator of the sector to enact laws, monitor their application on the ground and improve access to farmers' needs.

This is what the research showed through his findings, which is also mentioned in the report of the FAO "To ensure long term effects of its technical assistance, FAO should aim to equip the Government with the capacity to undertake tasks autonomously and include

the development of an exit strategy, as part of its capacity development strategy in the West Bank and Gaza strip. Important areas on which FAO should focus its support to the Palestinian Government include technical innovations, rural finance, nutrition sensitive agro-food systems and safe agriculture, as well as enhancing MoA capacity to support preparedness of farmers to respond to seasonal challenges, and in general involving the government more in community level assistance. Ensuring coordination and synergies with the Ministry of Health could be important in areas such as food safety, zoonoses and antimicrobial resistance" (FAO, 2017).

This is what the FAO focused on in its 2015 report "Governmental entities need to be fully committed and involved for their partnership with FAO to be effective, and on the other hand FAO should make sure that the Country Programming Frameworkis a fully nationally owned process to guarantee its uptake (FAO, 2017).

Chapter Five

Agriculture Information Management

One of the most important factors for the successful implementation of AFSCM is the availability and timely access of accurate data and information to farmers. The researcher reached this result in a paper published at the IRC 2018 conference in Dortmund, Germany. And included into the study after the approval of the rest of the authors

IMPLEMENTAION OF AGRICULTURE INFORMATION MANAGEMENT (AIM) IN PALESTINE

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Abstract: *The agricultural sector is characterized by uncertainty. However, in Palestine it is slightly different from the rest of other countries. It is still under occupation; more than 70% of its agricultural lands are under the control of the other side, in addition to the multiplicity of governmental and non-governmental bodies in this sector. There has been a marked decline in the sector as a result of the lack of resources and lack of awareness in the management of this sector. One of the most important objectives of the applying information management in the agricultural sector is to reduce the decline in production quantities resulting from technical and scientific conditions in order to reach the food security of the Palestinian citizen. Therefore, we expect the implementation of information management to lead us to achieve this in case of applying the proper application and its adoption by the responsible authorities.*

Keywords: Palestine, agriculture, information management, Information Technology, sustainable development.

1. Introduction

The agriculture sector has become a source of concern for both the decision makers and economists, as well as farmers who are directly involved, with rabidly increasing of numbers of people and the emergence of modern consumption patterns and poverty in many developing countries, so that the need for data to help workers in this sectors is becoming increasingly urgent, while there are declining in quantities of natural resources of land and water [1].
With the environmental changes of the past two decades, such as climate change and the emergence of new diseases and pests, all of which have led to decline in the agriculture sector, making it necessary to resort to information and knowledge management as solution [2], addition change such in the seasonal loop of agriculture crops also its led to decline in quantities as a result, all the above and more has placed a burden on agriculture sector in supplying the required quantities and meet the needs especially in those countries that suffer from lacked and poor distribution [3].
As mentioned above, resource constraints for agricultural production have become more stringent than in the past while growth of yields is slowing down. This is a primary reason why people express fears that there are growing risks that world food production may not be enough to feed a growing population and ensure food security for all [4].
Agriculture is no longer a craft as it is known but it has become an industry and has been applied to many modern industrial tools [5], also many industries and experts from various fields are working to serve this sector, agriculture sector become a huge platform for R&D and also for IT's [3], all this stems from the importance of this sector and its sensitivity.
The agriculture process is characterized by a large number of parties operating as the operations from the provision of the basic supplier to the final product in the hands of consumers [6].
This paper should focus on benefits of Information Management in agriculture sector especially in Palestine, in our case; Palestine lacks the application of information management in the

management of the agricultural sector, so that we like to go through the other developing countries experiments of applying information management on agriculture.
The objective of applying information management is to help us to reach the benefit of farmers and thus achieve efficiency that leads to reducing production costs, which will benefit the whole agricultural chain and achieve sustainability of this sector, all through the conservation of basic resources (land, water) in addition to appropriate practices They provide us with information management by giving the necessary advices and data in a timely manner such as [7];

(i) Appropriate agriculture, according to the quality of the available soil and its available soil.
(ii) Suitable crops, according to available water quantities.
(iii) Information on pests and diseases spread and methods of prevention and treatment.
(iv) Providing economic data as production costs and expected profitability, according to the type of activity.
(v) Provide climate information for temperature, cold and rainfall.
(vi) Providing data related to the market and the wishes of citizens.
(vii) This is in addition to the provision of technical support and agricultural extension within a well thought out long-term plan for the prosperity of this sector.

2. Research Methodology

The research method used is to refer to previous literature and research in addition to the scientific and practical experience. However, we found that there are a few previous studies in this field related to the country of study, so we tried to conclude from the various studies that concern in this field as much as possible with our study.

3. Information Management

Agriculture Information Management "Agricultural information management (AIM) is concerned with all activities and resources necessary for acquisition, storage, updating, and making agricultural information and data of all kinds and formats – scientific research reports, growers' testimonies, market information, details of practical crop production technologies, machinery, weather forecasts, sources of credit, production, education and training and other instructional manuals, 'grey zone' literature – accessible to agricultural stakeholders at all levels [8].
The application of information management in the Palestinian case makes us able to manage this sector properly and meet the needs of the community in addition to the application of this tool contributes to reduce the prices of products and reduce the burden on the citizen as it operates according to the mechanisms studied and according to a scientific approach under the available data.
In addition, it reinstates the sector's vitality and re-attracts investments to work in this important sector. Therefore, it will benefit the society in the first place and its employees, as a large part of the distrust that characterizes this sector will disappear when the necessary data are available.
We find that there are certain mechanisms and more than the level of data handling [9], government-led, market driven, and community self-support.
There are many models in the world for dissemination among stakeholders at the level of the Palestinian situation, and it is not difficult to harmonize with the conditions of the Palestinian situation. Many of the problems facing the global agriculture sector are similar, and many are applied. Information systems based on ICT, Information and Communication Technology (ICT)
In light of the widespread availability of modern digital devices, it is now possible to access and transmit information via the Internet, in addition to the use of sensors, which can transmit data such as temperature, humidity and a lot of field readings and send them to the Information Processing Center [10].

4. Literature Reviews

When we talk about the application of the information technology in the agricultural sector, we consider that agricultural practices are recurrent projects and every time there are different circumstances such as budget and operational tools and the type of activity itself, farms move between more than one activity in the agricultural cycle and the surrounding circumstances, whether natural conditions such as climate or Soil or even the ages of animals that he intends to cultivate or were technical conditions such as the availability of tools and appropriate experience according to the activity practiced and all variables and we also know that the agricultural activity is characterized by uncertainty.

Here we want to drive some articles that address the project from more than one side;

In this study for Marnewick (2017), the objective of the study was to determine the level of capability regarding sustainability. Determining sustainability project management capability provides insight into how project managers as well as organizations are incorporating sustainability. The analysis indicates that the focus is on the economic dimension of sustainability. The results also highlight the complete lack of integrating social and environmental sustainability into project management. The research highlights that sustainability in business or IS projects is not being considered. The second contribution is more of a philosophical nature. Exploratory factor analysis indicates that there should be five dimensions when it comes to IS project management instead of the usual three [11].

This article Sanchez et al (2017) they talk about the benefits of applying IS on cost and time for projects" Successful development of Information Systems (IS) Projects has been a source of competitive advantage for many organizations. This paper proposes the Cost and Time Project Management Success – CTPMS, an essential measure in this context because projects must dynamically address cost and time success under an agreed scope. The goal of the paper is to identify the project management practices through which an organization can optimize the CTPMS of IS development projects. Because multiple factors can influence project management success, we analyze a real-world sample of 899 IS projects of a leading bank, using hierarchical models to account for the effects of predictors at four levels of analysis: portfolio network, project, project manager, and team. In addition to proposing and discussing a new measure of project management success for information systems development projects, we identified that project size, duration, postponement, and project manager formal power showed positive effects, whereas team size and team allocation dispersion presented negative effects. The results suggest guidance for factors such as team member allocation and prioritization, among others [12].

Wolfert et al (2017) say" Smart Farming is a development that emphasizes the use of information and communication technology in the Cyber-physical farm management cycle. New technologies such as the Internet of Things and Cloud Computing are expected to leverage this development and introduce more robots and artificial intelligence in farming. This is encompassed by the phenomenon of Big Data, massive volumes of data with a wide variety that can be captured, analyzed and used for decision-making. This review aims to gain insight into the state-of-the-art of Big Data applications in Smart Farming and identify the related socio-economic challenges to be addressed. Following a structured approach, a conceptual framework for analysis was developed that can also be used for future studies on this topic. The review shows that the scope of Big Data applications in Smart Farming goes beyond primary production; it is influencing the entire food supply chain. Big data are being used to provide predictive insights in farming operations, drive real-time operational decisions, and redesign business processes for game-changing business models. Several authors therefore suggest that Big Data will cause major shifts in roles and power relations among different players in current food supply chain networks. The landscape of stakeholders exhibits an interesting game between powerful tech companies, venture capitalists and often small startups and new entrants. At the same time there are several public institutions that publish open data, under the condition that the privacy of persons must be guaranteed. The future of Smart Farming may unravel in a continuum of two extreme scenarios: 1) closed, proprietary systems in which the farmer is part of a highly integrated food supply chain

or 2) open, collaborative systems in which the farmer and every other stakeholder in the chain network is flexible in choosing business partners as well for the technology as for the food production side. The further development of data and application infrastructures (platforms and standards) and their institutional embedment will play a crucial role in the battle between these scenarios. From a socio-economic perspective, the authors propose to give research priority to organizational issues concerning governance issues and suitable business models for data sharing in different supply chain scenarios [13].

It is clear to us that the problems facing the agricultural sector, especially in the developing world are similar with the difference in some circumstances for each country, we find that the problems limited in the following [14].

(i) Increase population growth and achieve food security for citizens.
(ii) Limited resources and unfair use.
(iii) Climate change and its changes in temperature, rainfall and fluctuation in agricultural seasons.
(iv) High input prices.
(v) Changing consumer demands.

4.1 Palestinian Situation

When we talk about Palestinian situation in the agricultural sector, we are not far away from our counterparts in the developing world except in some particulars that come from the Israeli control over many of the axes of this activity. At the same time, we have certain privacy in the following [15].

(i) Problems and obstacles caused by the Israeli occupation;
(ii) Problems related to natural and environmental resources;
(iii) Technical problems and obstacles;
(iv) Problems and obstacles of a social and economic nature;
(v) Institutional and Legislative Problems and Constraints;

Problems and obstacles caused by the Israeli occupation:

The problems caused by the Israeli occupation, including the confiscation of land, the restrictions on farmers and the sources of grazing, and the areas available for fishing, also control the water supply and the Palestinians are not allowed access to water sources, in addition of the signed agreements and the attempt of the other side to flood the Palestinian market with agricultural products.

Problems related to natural and environmental resources:

(i) Limited land and water and competition of other sectors on these two suppliers.
(ii) Soil erosion and deterioration of its properties.
(iii) Improper use of chemicals, particularly pesticides.
(iv) Degradation of water quality in irrigation due to over-pumping, degradation of vegetation and habitats of plant and animal habitats due to overgrazing.
(v) Urban and random expansion of construction at the expense of agricultural land.

Technical problems and obstacles:

The lack of potential and lack of interest in research and development as the budget of the Ministry of Agriculture amounted to 1% for 2014 of the total budget of the Palestinian National Authority [16], The lack of resources and lack of interest in R&D, as the budget of the Ministry of Agriculture amounted to 1% in 2014 of the total budget of the Palestinian National Authority has led to a weakness in the potential of the human and technical staff of the ministry, we find few in the potential of the Department of Agricultural Extension and Marketing, as well as the limited availability of veterinary services, more importantly, the focus of our research is that there is a paucity of data and information available on agriculture and sometimes conflicting. Hence the

necessary need for the use of information management and knowledge management so that we can solve all these problems, which is ultimately the result of the weakness of the necessary data on time.

Problems and obstacles of a social and economic nature:

(i) Small and fragmented properties, which reduced the economic efficiency.
(ii) Lack of financial return, which led to the reluctance of many farmers.
(iii) Weakness of the concept of collective action and lack of work through cooperatives.

Institutional and Legislative Problems and Constraints:

(i) Weak legal construction and legislation regulating the agricultural sector.
(ii) Conflicts and duplication between the relevant institutions in the agricultural sector, and weak capacity.

All of these problems have led to the reluctance of many farmers to exercise this activity according to the statistics issued by the Palestinian Central Bureau of Statistics for the year 2016 where the participation rate was 7.4% compared to the base year 1995 where the rate was 12.8% and thus led to the emergence of other problems such as increasing the unemployment rate [17].
The objective of this paper;
The objective of this study is to shed light on the agricultural situation in Palestine and to try to apply the concepts of information management in order to find durable and sustainable solutions for this important sector for the Palestinian citizen, in addition the Palestinian citizen has a different relationship with the land, which is considered a source of existence and survival.

5. Discussion

It is clear from the above that the agricultural sector activity like other economic activities is based on data collection in order to reach the best results and agricultural activity is a recurrent project has a beginning and end and each time is planning the activity to be practiced and monitors a new budget and being a sector that touches the needs of citizens Daily in terms of providing basic needs for them came the importance of an information management system based on data collection and analysis according to the mechanisms studied and technological development and modern means of research are possible and available at any time and place.
However, in the Palestinian case, we found that there is no department in the structure of the Ministry of Agriculture to sponsor the activity of this sector, which is concerned with data or information management, which would provide such data to various departments in order to study the state of the sector and the necessary procedure of providing services, whether technical or marketing, There should have been a database to be stored and returned to it constantly and to give the appropriate information to the beneficiary parties on a continuous basis in order to achieve real and sustainable development in the agriculture sector in Palestine [18].
In Palestine, there is more than one government agency that has a direct or indirect relationship with the agriculture sector such as the Ministry of Local Government, the Ministry of Economy, the Ministry of Finance, the Water Authority and the Water Sector Council, Such as The Agricultural Development Association (PARC), ARIJ Research Center, the Development Center MAAN, the Agricultural Work Union, and many other foreign institutions, such as Oxfam foundation, CARE foundation , this sector is large in that it deals with a wide range of Palestinian society. This greatness is a source of strength and weakness at the same time. Therefore, we highlighted in this paper the importance of having an information department covering all these activities and ensuring the availability of accurate information through databases and the ability to Analyze and publish them at appropriate times.
One of the greatest tools of information management application is to reduce the cost of production, which means increasing the profitability of farmers and encouraging the continuation and expansion of its agricultural activity, thus access to a viable sector, reducing production costs

will have an indirect and significant impact on consumers, reducing production costs will inevitably lead to fair market access for agricultural products and thus a measure of consumer welfare. This is another positive factor for the implementation of information management in this important sector.

6. Conclusion (Recommendations)

In the end, the agriculture sector is the ancestral craft and the source of survival. The interest is derived from the doctrine of survival and continuity [19]. Therefore, it is necessary to work on transferring the experiences of others and the latest in global research in the use of information management in the agricultural sector in order to provide food security for the Palestinian citizen. Which will provide tools to address environmental changes, whether environmental such as climate change and the spread of pests and diseases or economically, such as open markets and global competition.

We recommend making a survey for collecting data from all agriculture parties through the agriculture chain and make a steering committee to manage the agriculture practice led by the Ministry of Agriculture, in parallel work on establishing an information department to handle all the data collected.

The elements of the success of such a step in Palestine are high because they have technical cadres and expertise that lack guidance only and provide a supportive environment for that, whether laws, legislation or community incubator.

The basis of success and survival is the knowledge and knowledge is based only on the existence of accurate information and information comes only with a comprehensive accurate database.

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Chapter Six

Conclusion and Recommendations

Supply chain derives efficiency and strength from the efficiency and strength of its surrounding environment.

Through what has been monitored and matched with other cases in some countries, we have a fragile AFSCM

that can not grow and sustain the agricultural sector in Palestine in its present state. With regard to sustainability, it refers to the three main economic, social and environmental aspects. For example, when talking about the economic sustainability of the agricultural sector, there is a significant decline in the sector's contribution to GDP, according to official reports. The value of agricultural production has declined significantly. In 1998, it was contributing by 12.1% but in 2009 it contributed only by 5.5% (PCBS, 2013).

The research findings that there is a lack of close association and mutual trust between the Palestinian farmer and the regulator of this sector. Where the regulator of this sector has been guided by the non-directed and non-based on a participatory strategy to solve the problems of farmers and meet their needs,for example, as mentioned earlier, most farmers follow an individual approach in the planning process. If we return to the focus of research, which is to work on the AFSCM, the goal is to achieve comprehensive integration throughout the chain and the role of the MoA is the sponsor of the success of this application by increase productivity, improve farm conditions and increase profitability.

It is noted that there is insufficient production. and in some agricultural products up to 50% (PCBS, 2013). This is one of the important indicators that indicate the fragility of the Agri-

food supply chain and in view of the public problems facing the agricultural sector, one of the most important problems was overlooked which it is not to use the basics of management in the service of Agriculture sector.

The study also reached the large number of parties involved in the management of the agricultural sector and the lack of adequate coordination among them.

One of the main reasons for the high production costs is the large overlap with the Israeli market, which appears in the continuous fluctuation in prices of agricultural products. For example, there are often two suppliers of one commodity, which increases the profits and taxes of each resource, on the economic level, while there is another technical problem, the Palestinian supplier forced to lower quality items in order to compete in the local market, which leads to the emergence of large problems.

When considering the components of the supply chain, we find that the integrative relationship is almost nonexistent and if it exists, it is at a small level.

- For example, the relationship between suppliers and farmers is a utility relationship aimed at completing the sale of production products, and there is often no control over prices and quality. As a result of this, a weakness in production is often occurred.
- And the relationship between farmers and workers, it is divided into two parts either the work of the farmer and his family in all agricultural work and here it is not calculating the employment of the same family, the second case is the system of labor versus part of the profits. Here, labor is involved in the risks facing production, while it cannot bear the mistakes of the agricultural process, since its

work is limited to the harvest period, and this is considered an oppressive factor for agricultural labor.

- As for the relationship between the traders and the central market with the farmers in a one way road, the farmers have no choice but to go to the central market or to traders and accept the prices displayed, which are often unfair. In an interview in the Central Market in Qabatiya on January 13, 2019 of the type of "Mayla" by six shekels while selling in the market for the consumer between 10 to 12 shekels. Here we note the margin that is taken by traders, note that the farmer is the one who bears the process of transferring the crop to the central market and also pays 10% of its sales to the central market instead of services, and the central market does not provide any guarantees to the farmer to sell his product.
- One of the most important components of the supply chain are the consumers. It was noted that they have no active role in the process of product selection as it does not take any information from the consumers, and the process of production in traditional ways without reference to the needs and desires of consumers, there are some cases, especially in cities where sales are by quality and grading, but they remain individual attempts and overcome the market of agricultural products randomly and lack of organization.
- The analysis shows that there is a great overlap between the local market and the Israeli market at all levels and in all stages of the chain, from raw materials to marketing.

The researcher recommends several points based on the results of the study.

- The MoA should play a more effective role in leading the agricultural sector. and also it should work on fundraising to ensure the efficiency of its staff, keep updated also to adopt the scientific research method in its way of dealing with the all parties.
- For collective action there must be a steering committee of all parties whose objective is to promote the agricultural sector within a unified vision.
- The MoA should adopt the dissemination of knowledge among farmers and familiarize them with the basics of administrative work in the agricultural sector, and work analysis of all parties working in the agricultural sector, paving the way for the implementing of a supply chain in the future efficiently.
- The MoA is responsible for implementing the laws and enacting the necessary legislation to facilitate and control agricultural work and expand its supervisory role.
- The agricultural work is dominated by the individual mode of work, so they must be encouraged to work in a group-specific manner through collective purchases of production inputs and marketing associations.
- Work on establishing a database of all parties and managed by the MoA, and the importance of this in guiding farmers and guide them according to a scientific approach.
- Working to regulate the handling of agricultural crops with the Israeli side in order to protect Palestinian farms and maintain the agricultural sector from decline.
- As for the role of farmers, the study recommends the importance of finding farmers who rely on modern experiences in managing their activities and the transformation

from the traditional type in agriculture to modern patterns and using technology in their agricultural operations.

- It is the responsibility of the farmers to establish cooperatives or joint stock companies whose purpose is to serve their members in modern marketing operations, purchase of production inputs according to scientific methods, Providing the basic services of transportation, storage, packaging and the gradualization of their products in order to add value to their crops and achieve a competitive advantage for those products.
- Work on the dissemination of consumption patterns studied among consumers.
- Promoting employment in the agricultural sector. And appreciation the role of women in the keeping of agricultural activity.

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Appendix 1 the names of the arbitrators

1. Dr. Salwa Barghouthi
2. Dr. Ahmad Herzallah
3. Dr. Abed El-hamed Sha’aban
4. Dr. Shahir Obaid
5. Dr. Ahmad Rabaya’ah

Appendix 2 list of interview questions with stakeholders

Group One- Directorates of Agriculture

1. Does family work still represent the majority in agricultural activity?
2. What are the most important inputs of production in agricultural activity "factors of production"?
3. How agricultural extension operations are directed to the farmer from the beginning of his thinking to practice agricultural activity until the marketing process?
4. Are there any interventions by the Ministry of Agriculture in the process of selecting the farmer for the type of activity intended to be practiced?
5. How the farmer accepts the services provided by the staff of the Ministry of Agriculture?
6. Do farmers comply with the instructions given to them?
7. What role does the Ministry of Agriculture play in the follow-up of agricultural products in the markets?
8. What role does the Ministry of Agriculture play in the pricing of agricultural products?
9. Where the Ministry of Agriculture obtains agricultural information?
10. Does the Ministry of Agriculture have computerized information gathering systems?
11. Do you have a specialized department in collecting and analyzing information?
12. How to keep your staff up-to-date?
13. How do you assess the performance of agricultural activity?
14. What marketing services does the Ministry provide to farmers?
15. Does the ministry provide special places for packaging and storage?

16. What is the role of the Ministry of Agriculture in encouraging the private sector to invest in the agricultural sector?
17. Is there an overlap in the managing of the agricultural sector?

Group One – Qabatiya Municipality

1. What kind of services do you offer to the central market?
2. What is the role played by the municipality in managing the central market?
3. Who is responsible for supervising the follow-up mechanism of the Central Market?
4. Does the municipality determine the prices of selling agricultural products?
5. How many refrigerated warehouses are provided by the municipality in the market?
6. Are services provided within the Central Market free of charge?

Group Two- AFSC Components

1. How to choose the agricultural activity to be used?
2. What are the most expensive production factors?
3. What is the benefit of conducting a feasibility study and studying the size of the market
4. Do you review the Ministry of Agriculture for guidance on the type of activity to be carried out?
5. What kind of assistance is provided by the Ministry of Agriculture or any other entity?
6. Do you receive any kind of financial support and financial compensation?
7. How fair are selling prices?
8. How do you sell your agricultural products?

9. Are brokerage operations in the central market transparent?
10. Is the sale through marketing associations?
11. Is there any guarantee by the authorities responsible for the sales processes?
12. If you have a surplus in production, how do you deal with it?
13. Are agricultural products sold in accordance with specific criteria?
14. Do you have storage warehouses?
15. Are agricultural products being graded?
16. Who bears the costs of delivering products to the central market?
17. Are the damaged quantities calculated?
18. how do you affected by the israeli agriculture market?
19. Do you have prior knowledge of selling prices?
20. What is the source of information for you?
21. Is the sale based on prices from the Israeli market?

Appendix 3 A list of interviews conducted with the stakeholders

No	Name	Position	Date	Resident
1	Monzer Salah	Director of Agricultural Extension	14.10.2018	Jenin & Tubas
2	JawadZakarneh	Agronomist	14.10.2018	Jenin
3	Ashraf Faleh	Agronomist	14.10.2018	Jenin
4	QoutaybaKhanfar	Agronomist	14.10.2018	Jenin
5	RaedBsharat	Director of Agricultural Extension	14.10.2018	Jenin
6	Lama Abu Bakier	Director of Directorate	15.10.2018	Qabatyia
7	Mahir Al-Akhras	Farmer/ Dairy Milk Farm	21.10.2018	SelatEldahir
8	Ahmad Al-Souqi	Farmer	20.11.2018	Deir Abu Daeef
9	Ali Yasin	Farmer	20.11.2018	Deir Abu Daeef
10	Mojahid Yasin	Farmer	20.11.2018	Deir Abu Daeef
11	Ahmad Abed El-karem	Faremr	20.11.2018	Deir Abu Daeef
12	Mohammed Hussain	Farmer/ Tamoun Cooperative	21.10.2018	Tamoun
13	Ahmad Zakarneh	Employe	18.10.2018	Qabatiya Municipality
14	Mohammed Marei	Farmer/ Kafr Dan Cooperative	01.11.2018	Kafr Dan
15	Abed El-salam Sha’aban	Farmer/ Aljalamh Cooperative	01.11.2018	Aljalamh
16	Moaz El-Sharafy	Wholsaler	20.11.2018	Deir Abu Daeef
17	Ahmad Khalaf	Farmer/ Aljalamh Cooperative	20.10.2018	Aljalamh
18	Hassan Abu-Elrub	Agronomist/ Maan	15.10.2018	Jenin

تحليل إدارة سلسلة الإمداد للأغذية الزراعية في فلسطين دراسة حالة محافظتي جنين وطوباس

إعداد الطالب: محمد تيسير محمد قبها

إشراف: د.عامر كنعان

الملخص

القطاع الزراعي هو أحد القطاعات التي يعتمد عليها الاقتصاد المحلي ويشكل مصدراً رئيسياً للدعم. يتميز القطاع الزراعي بعدد كبير من العمليات المصاحبة لعملية الإنتاج والعدد الكبير من الأطراف المشاركة في هذه العملية. مع أهمية هذا القطاع في توفير مصدر الغذاء للبشر ، ولكن يتميز أيضًا بعدم الاستقرار وعدم اليقين.

النشاط الزراعي في فلسطين هو أكثر من مجرد ممارسة لما تعنيه الأرض للمواطن الفلسطيني. ومع ذلك ، مع وجود العديد من المشكلات التي تواجه الزراعة في فلسطين ، وندرة الموارد ، وصعوبة الوصول إليها ، ومضايقة الاحتلال الإسرائيلي وضعف القدرات الحكومية بما في ذلك الجوانب المالية والقانونية. يبدو أن انخفاض إنتاجية وكفاءة القطاع الزراعي وظهور مشاكل مثل عدم كفاية المنتجات المحلية والتقلبات في أسعار المنتجات أمر واضح.

تهدف هذه الدراسة إلى دراسة أسباب ارتفاع تكاليف الإنتاج من خلال ما يسمى سلسلة التوريد الزراعية. تهدف الدراسة إلى تحليل سلسلة التوريد الزراعية الحالية في منطقة الدراسة وتحديد أسباب ارتفاع تكاليف الإنتاج ، بالإضافة إلى أهمية تطبيق تكنولوجيا المعلومات في رفع كفاءة القطاع الزراعي وتوضيح المسؤوليات المطلوبة من قبل المنظمين للعمل الزراعي.

يتميز القطاع الزراعي في فلسطين بتداخله مع القطاع الزراعي الإسرائيلي. هذا التداخل له تأثير كبير على إدارة سلسلة التوريد الزراعية الغذائية في فلسطين ، بالإضافة إلى أن القطاع الزراعي يعاني من مشاكل أخرى مثل ندرة المياه والسيطرة الإسرائيلية على الأراضي الزراعية في المنطقة "ج" وضعف الإشراف من قبل المسؤولين عن القطاع الزراعي بسبب نقص الموارد وقلة الاهتمام باستخدام تكنولوجيا المعلومات (IT) في نشر البيانات والمعلومات المطلوبة اللازمة لتحسين كفاءة إدارة سلسلة التوريد الزراعية الغذائية.

أدى إرتفاع تكلفة الإنتاج نتيجة لهذه المشكلات التي تواجه القطاع الزراعي إلى إزعاج المزارعين الفلسطينيين ويشكل عبئًا على المستهلكين في نفس الوقت ، وبالتالي فقد ظهر اهتمام في تنفيذ سلسلة الإمداد بالأغذية الزراعية لتنظيم التجارة البينية. عمليات داخل سلسلة التوريد وإيجاد حلول فعالة لارتفاع تكاليف الإنتاج.

وقد أجريت الدراسة لتحليل واقع إدارة سلسلة الإمداد بالأغذية الزراعية ومكوناتها في مجالات الدراسة. ركزت الدراسة على مناطق جنين وطوباس التي تعتبر سلة الضفة الغربية بالنسبة لمعظم المحاصيل الزراعية.

عتمدت الدراسة طرقًا وصفية تحليلية واستكشافية لفهم حالة إدارة سلسلة الإمداد بالزراعة الغذائية وطبيعة العلاقة بين المكونات (المورّدين والمزارعين وتجار الجملة وتجار التجزئة والمستهلكين) من

السلسلة. تم اعتماد طريقة إجراء المقابلات كأداة بحثية بالإضافة إلى طريقة الملاحظة. تم تصميم أداة البحث لإظهار العلاقة بين مكونات سلسلة التوريد أفقياً وبين مكونات السلسلة وعناصر السلسلة رأسياً ، مع ملاحظة أن عناصر سلسلة التوريد هي الإنتاج والمخزون والنقل والموقع والمعلومات.

من خلال مناقشة ردود المستجوبين وتحليلهم ، تم الحصول على نتائج الدراسة من خلال اعتماد الدراسات السابقة ونتائجها كمرجع.

توصلت الدراسة إلى ما يلي ؛ توجد إدارة لسلسلة الإمداد بالأغذية الزراعية في مناطق الدراسة ولكنها ضعيفة وهشة. وتبني الأساليب الإدارية التقليدية التي لا ترقى إلى الأساليب الحديثة المستخدمة في الدراسات السابقة ، وضعف الثقة ونقل البيانات بين مكونات سلسلة التوريد ، وضعف البحث العلمي في مجال الزراعة ، سواء كانت المهارات العلمية أو الإدارية التي اكتسبتها المكونات السلسلة ، عدم وجود رؤية مسبقة أو تخطيط للعملية الزراعية من قبل المزارعين ، مما يؤدي إلى ظهور تباين في عمليات الإنتاج ، سواء في الكميات أو المحاصيل المنتجة.

أكدت الدراسة في توصياتها على ما يلي: بناء فريق وطني يضم كل من وزارة الزراعة والأكاديميين وممثلي المزارعين ، وشرح مفهوم وأهمية تطبيق إدارة سلسلة التوريد الزراعية الغذائية ، وبناء قاعدة بيانات تضم جميع الأطراف في العملية الزراعية واعتماد تكنولوجيا المعلومات على النحو أداة لنشر البيانات بين جميع الأطراف ، وأهم خطوة هي سن القوانين والتشريعات لضمان تنفيذ إدارة سلسلة التوريد الزراعية الغذائية.