TURKISH OLIVE AND OLIVE OIL SECTORAL INNOVATION SYSTEM:
A FUNCTIONAL - STRUCTURAL ANALYSIS

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ABSTRACT

TURKISH OLIVE AND OLIVE OIL SECTORAL INNOVATION SYSTEM:
A FUNCTIONAL - STRUCTURAL ANALYSIS

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The main purpose of this thesis is to explore problems that inhibit development of the olive and olive oil sector in Turkey. Olive productivity and olive oil product quality is low in Turkey compared to leader olive producing countries, Spain and Italy. Turkey is at the low end of the global olive oil value chain with high share of bulk olive oil exports and low share of high value added, branded exports. The competition in global markets is increasing and product standards are more stringent. Informal production, adulteration and low olive oil consumption are among the problems. The sector faces challenges specific to agricultural and food sectors, such as climate change.

Tackling these challenges requires product, process and organizational innovations based on multidisciplinary knowledge. A holistic sectoral policy based on innovation system (IS) approach that target problems and enhance innovation is needed. According to IS approach, innovation is a result of interactive learning of sectoral actors, which is context specific and path dependent.

In this study, coupled functional-structural analysis framework with IS perspective is used to identify barriers to innovation processes in olive and olive oil sector. Actors of olive and olive oil sectoral innovation system are defined. Current structural (actors, institutions, interactions and infrastructure) weaknesses, i.e. systemic problems that negatively affect functioning of the sector are identified. The analysis of systemic problems indicates the need for a sectoral policy in congruence with national, regional and technological policies of the government. Policy recommendations that target systemic problems are proposed accordingly.

Keywords: Olive, olive oil, sectoral innovation system, systemic problem, functional structural analysis

ÖZ

TÜRK ZEYTİN VE ZEYTİNYAĞI SEKTÖREL YENİLİK SİSTEMİ:
FONKSİYONEL - YAPISAL BİR ANALİZ

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Bu çalışmanın temel amacı Türkiyede zeytin ve zeytinyağı sektörünün gelişimine engel olan problemlerin araştırılmasıdır. Türkiye'de zeytin verimliliği ve zeytinyağı kalitesi lider zeytin üretici ülkeler olan İspanya ve İtalya'ya göre düşüktür. Türkiye, küresel zeytinyağı değer zincirinin aşağı kısmındadır. Dökme zeytinyağı ihracatı yüksek ancak katma değeri yüksek, markalı zeytinyağı ihracatı düşüktür. Küresel rekabet ortamı artmaktadır ve ürün standardları sıkılaşmaktadır. Sektör, iklim değişikliği gibi gıda ve tarım sektörlerine özel zorluklarla da yüzleşmektedir.

Söz konusu sorunların üstesinden gelebilmek, çok disiplinli bilgiye dayalı ürün, süreç ve organizasyonel yenilikleri gerektirmektedir. Mevcut sorunları hedefleyecek ve yeniliği teşvik edecek, yenilik sistemi yaklaşımıyla bütüncül bir sektör politikasına ihtiyaç vardır. Yenilik sistemi yaklaşımına göre yenilik, sektördeki aktörlerin beraber öğrenmesinin bir sonucu olup mekan ve patikaya bağlı gelişmektedir.

Bu çalışmada, zeytin ve zeytinyağı sektöründe yenilik süreçlerinin önündeki engelleri belirlemek amacıyla, yenilik sistemi yaklaşımına dayanan fonksiyonel - yapısal analiz çerçevesi kullanılmıştır. Sektörün işleyişini olumsuz etkileyen mevcut yapısal (aktörler, kurumlar, etkileşimler ve altyapı) zayıflıklar yani sistemik problemler tespit edilmiştir. Sistemik problemlerin analizi, devletin ulusal, bölgesel ve teknolojik politikalarıyla uyumlu bir sektörel politika oluşturmasının gerekliliğine işaret etmektedir. Bu çerçevede, bu çalışmada tespit edilen temel sistemik problemler için politika önerilerinde bulunulmuştur.

Anahtar kelimeler: Zeytin, zeytinyağı, sektörel yenilik sistemi, sistemik problem, fonksiyonel yapısal analiz

To olive tree and olive farmers

"Zeytin Emekçisi"

"… kutsal zeytin ağacının meyvesi, Zeytin;
Hangi çabalarla hasat edilir?
Hangi acılarla? Ayazda, yağmurda, hastalıklarla,
traktör sırtlarında; sakatlık ve ölümlerle
sonuçlanan kazalar sonunda toplanır, Zeytin.
…
Yeşil zeytin, kara zeytin, o güzelim zeytin!
Ne diyordu Bedri Rahmi?
"Önde zeytin ağaçları, arkada yar,
Yar, yar, seni karasaplı bir bıçak gibi
sineme sapladılar…"

Sevgili zeytin, seni çok seviyoruz da,
Hak ediyor muyuz acaba?

Toplanır zeytin, O altın renkli kutsal su,
Kimlerin gücüyle üretilir?
Verilen onca emeğin karşılığı nedir?
Yoksulluk mu, hastalık mı, ölüm mü?
Bu mu zeytin emekçisinin kaderi? ..."

Tuncel Kurtiz
Turkish Actor
(1936-2013)

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ABGS	Ministry for EU Affairs
ABIGEM	European Turkish Business Centers
AIS	Agricultural Innovation System
AKIS	Agricultural Knowledge Information System
AKS	Agricultural Knowledge System
ASTI	Agricultural Science, Technology and Innovation
BSTB	Ministry of Science, Industry and Technology
BÜGEM	General Directorate of Plant Production
CAC	Codex Alimentarius Commission
CAP	Common Agricultural Policy
CMO	Common Market Organization
CTA	Technical Centre for Agricultural and Rural Cooperation
DİR	Inward Processing Regime
DPT	State Planning Organization
EC	European Commission
EİB	Aegean Exporters Union
EU	European Union
EUROMED	Euro-Mediterranean Partnership
EUROSTAT	Statistical Office of the European Communities
EYYDB	Department of Training, Extension and Publications
EZZİB	Aegean Olive and Olive oil Exporters Union
FAO	Food and Agricultural Organization of the United Nations
GKGM	General Directorate of Food and Control
GTB	Ministry of Customs and Trade
GTHB	Ministry of Food, Agriculture and Livestock

HAACP	Hazard Analysis of Critical Control Points
IOC	International Olive Council
IS	Innovation System
ISO	International Organization for Standardization
KB	Ministry of Development
KOSGEB	Small and Medium Enterprises Development Organization
MAM	Marmara Research Center
MARMARABİRLİK	Marmara Olive Agricultural Sales Cooperatives Union
MEB	Ministry of Education
NARS	National Agricultural Research System
NIS	National Innovation System
OECD	Organisation for Economic Co-operation and Development
RIS	Regional Innovation System
SANAEM	Sarayköy Nuclear Research and Education Center
SIS	Sectoral Innovation System
TAEK	Turkish Atomic Energy Authority
TAGEM	General Directorate of Agricultural Research and Policies
TARİŞ	Aegean Olive and Olive Oil Agricultural Sales Cooperatives Union
TBMM	Grand National Assembly of Turkey
TİM	Turkish Exporters Assembly
TIS	Technological Innovation System
TOBB	Union of Chambers and Commodity Exchanges of Turkey
TPE	Turkish Patent Institute
TRGM	General Directorate of Agricultural Reform
TSE	Turkish Standardization Institute
TTKK	Central Union of Turkish Agricultural Credit Cooperatives
TÜBİTAK	Scientific and Technological Research Council of Turkey

TÜİK	Turkish Statistical Institute
TZOB	Union of Turkish Chambers of Agriculture
USITC	United States International Trade Commission
UZZK	National Olive and Olive Oil Council
WHO	World Health Organization
WTO	World Trade Organization
ZAE	Bornova Olive Research Institute
ZZTK	Olive and Olive Oil Promotion Committee

CHAPTER 1

INTRODUCTION

This thesis deals with identifying main problems those inhibit development of olive and olive oil sector in Turkey i.e. barriers for innovation in olive and olive oil sector. For this aim, weaknesses in structures (i.e. actors, institutions, interactions and infrastructure) those negatively affect functioning of the sector have been underlined with an innovation system perspective.

1.1 Statement of the Problem and Aim of the Research

Turkey is one of the main olive producer countries. It has been the fourth largest olive producer country in the last decade with around 8 percent share of the total World olive production after Spain, Italy and Greece. Turkey has been at second or third rank in total World table olive production, with Egypt depending on seasonal olive productivity. Similarly, Turkey's rank in total world olive oil production has been changing from fifth to third rank with Syria and Tunisia. As of 2013/2014 season, Turkey has been the second largest table olive producer with around 18 percent share and third largest olive oil producer with around 5.8 percent share in total world production.

Among Mediterranean countries, Spain is the leader country in olive, table olives and olive oil production. Spain's share in world olive production has been around 35 percent, in table olive production around 22 percent and olive oil production around 45 percent, on average, for the last five years.

Though Turkey has been among the first four largest olive producers in the last decade, olive productivity is significantly low compared to Spain and Italy. In the world markets, Turkey is at the low end of global value chain of olive oil. In world export markets, Turkey's share of low value added, bulk olive oil exports is significantly higher than branded, small packed, high value added olive oil exports.

Spain and Italy are the dominant exporters of branded olive oil in international markets. One of the main reasons behind this is attributed to the misapplication of olive cultural practices[1] by farmers, preservation and the transportation of olives. Olive fruit is easily perishable and good quality of olives is a prerequisite for the good quality of table olives and olive oil. Hence, empowering farmers with relevant knowledge and infrastructure for good cultivation practices is one of the essential to ensure efficiency in olive production stage.

In food sector, in both table olives and olive oil industries, there are technical inefficiencies during the processing of olives, which negatively affect product quality. For instance, high salt ingredient in table olives or applying high heat to get more olive oil which leads low quality of olive oil are examples for these inefficiencies. Moreover, olive oil processing technology in Turkey lags behind Spain and Italy. Although in the last decades, application of three and two phase continuous processing technologies gained ground significantly in the olive oil industry in Turkey, part of the industry still uses pressing technologies for batch olive oil production.

Briefly, due to problems in olive production and processing stages of the value chain of table olives and olive oil, the share of low quality products is significant in olive and olive oil sector. Besides, significant informal part in olive, table olives and olive oil production as well as adulteration problem contribute considerably to product quality problem in domestic markets.

In domestic markets, contrary to substantial consumption of table olives, olive oil consumption is very low, whether branded or not. Per capita consumption of olive oil is around two kilograms in Turkey whereas it is around fifteen kilograms in Spain, Italy and Greece. The low consumption of olive oil in Turkey is a barrier for market development of high quality olive oil in domestic markets. There are multiple reasons for the low domestic consumption of olive oil: the price of branded olive oil is significantly high relative to purchasing power, consumer palate is prone to vegetable oil and animal fats consumption.

[1] See glossary of International Olive Council (IOC) for commonly used terminology of olive and olive oil sector http://www.internationaloliveoil.org/glosario_terminos/index

Moreover, lack of consumer awareness on olive oil benefits and types of olive oil is another reason for low consumption level.

In addition to challenges in domestic markets, there have been changes in the World olive and olive oil market structure in the last decades creating increased global competiveness as a challenge to all olive and olive oil producer countries. Olive oil and table olives have become more and more globalized products. Olive production area has expanded more than 20 percent since 2000. Along with olive production, world supply and demand for table olives and olive oil have significantly increased. Table olive production increased more than 70 percent and olive oil production increased around 28 percent between 2000 and 2014. During the same period, World table olive exports increased 88 percent and olive oil exports increased around 63 percent.

Along with the expansion of world markets, European Union (EU) has become a major player in international markets as a producer, consumer and trader. As of 2013/14 season, EU accounts for 75 to 80 percent of table olive and olive oil production, 60 percent of olive oil consumption, 25 percent of table olive consumption, 60 percent of olive oil and 47 percent of table olive export markets excluding intra EU trade. Hence, EU countries, mainly Spain and Italy, have not only a substantial share in global value added but also play significant role in the direction of changes in international standards on olive and olive oil which bind other producer countries including Turkey.

New world countries[2] are increasingly becoming significant players in international markets. Their share in production as producers reached observable levels, one percent in 2000 to three percent in 2014. Recent growth in olive oil consumption is realized outside Mediterranean region. In the last couple of decades 80 to 85 percent of production was consumed locally by Mediterranean producer countries, but in recent years 70 to 75 percent is consumed locally and the rest of production goes to exports. Main importer countries' share (e.g. US, Brazil, Japan, China, Australia and Canada) accounts for around 60 percent of total olive oil world imports. Almost 95 percent of total world exports are by

[2] Currently Argentine, Australia, USA, Chile and Peru are the producers in which production increased significantly. In addition, China, El Salvador, Mexico and Uruguay have some production.

International Olive Council (IOC) member countries[3] where as around 80 percent of total world imports are by non-IOC countries. Besides being significant consumers, food and trade standards set by these countries have also a determining role in the market share and competitiveness of producer countries. Briefly, all of these developments in the world olive and olive oil markets are challenging olive producer countries by leading increased competitiveness with more stringent international food and trade standards on table olives and olive oil.

Existing problems of olive and olive oil sector in Turkey are known by policy makers. There have been some policy attempts to improve the sector since the beginning of 2000s. In 2004, the Minister for Agriculture announced targets for the sector, to be realized by the year 2014. These targets were on olive production level, productivity of olive trees etc. In addition, Turkey has targeted to be the second main producer after Spain by 2014. Along with these targets, significant direct supports are given to extend olive production areas and to increase olive production. Unfortunately, realizations in 2014 have been far below the targets announced in 2004. Main reason behind the undershot of targets has been the lack of a sectoral policy that defines strategies and sets policy tools to reach these targets.

In fact, an important step has been taken to lay down sectoral problems and formulate a sectoral policy in 2008. A research commission for National Assembly was established to identify problems in the sector and to propose policy solutions. After a thorough analysis with related organizations, regional sector representatives, olive processors and farmers, an exhaustive report was prepared and presented to General Assembly for action. Unfortunately, findings of this report could not be converted into an explicit sector policy paper for action. Currently, there are some fragmented discussions on sectoral targets for 2023 of different groups of sector actors without an articulation of a sectoral policy. The probability that these targets will be undershot is high as before. In short, though some targets are occasionally announced by the government, a sectoral policy to overcome

[3] EU countries and 16 other countries, http://www.internationaloliveoil.org/estaticos/view/103-list-of-ioc-members

existing problems, to improve olive productivity and product quality in the olive and olive oil sector does not exist in Turkey.

Turkey has to improve its olive productivity, olive processing technology and olive oil product quality, i.e. "catch-up"[4] with leader producer countries, Spain and Italy, so that she can compete in international markets and upgrade in the global value chain. Therefore, a sectoral policy that can enable these improvements by overcoming existing problems in the sector is needed. Moreover, low productivity in olive production, the low quality of olive oil, weak domestic market, low share in high value added segments of international markets indicate low levels of innovation in olive and olive oil sector. Hence, in Turkey, a sectoral policy that would enhance innovation in olive and olive oil sector is needed.

Innovation is defined as "*the implementation of a new or significantly improved product (good or service) or process, a new marketing method or a new organisational method in business practices*…"in Oslo Manual (OECD and Eurostat 2005). Innovation is the main driver of productivity growth at sectoral level; helps to create higher value added, competitiveness and economic growth at national level; improves allocation of resources, productivity and income at farm (or firm) level (OECD 2013). According to the World Bank (2012) farmers, agribusinesses and even nations must innovate continuously in order to cope and compete in the midst of significant changes that take place in the social and economic landscape of agriculture. Therefore, fostering innovation is the policy challenge (OECD 2013).

Olive and olive oil sector in Turkey faces challenges not only arising from current situation of domestic and global market structures, but also face many challenges arising from various other sources. Olive and olive oil sector is embedded in climatic, environmental,

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[4] In economics literature, the concept of "catching up" has been widely used to indicate the ability of a country or a sector to close productivity gaps with leader countries. For a successful catch up, levels of accumulated technological capabilities and social capabilities (Fagerberg et al. 2010, Abramowitz 1986) are defined as determining factors to take advantage of windows of opportunities that open up in the prevailing techno-economic paradigms (Perez 2001, Perez and Soete 1988). Catching up in not simply imitating the technology and organizational structures of leading countries, but it depends on the extent of relevant domestic capabilities and institutions, and on the capability to build up them rapidly (see Abramowitz 1986, Perez and Soete 1988, Perez 2001, Bell and Pavitt 1993, Nelson 2008, Lundvall et al. 2009, Malerba 2004, Malerba 2009, Fagerberg and Godinho 2005, Fagerberg et al. 2010)

macroeconomic, financial, political and technological conditions. For instance, overcoming problems as result of climate and environmental changes is important for the sustainability of olive productivity, which is vital for sustainability of table olives and olive oil sector. Moreover, olive oil sector has to compete with vegetable oil sector to sustain its viability. This in turn is important for the sustainability of olive sector as olives cannot be consumed without processed as olive oil and table olives.

The competitive position of Turkey is shaped by its sectoral actors' level of recognition and strategic response to challenges they face. Therefore, actors of olive and olive oil sector in Turkey have to learn, develop skills and innovate in order to face these challenges. It is important to keep in mind that different paths of socio-historical, political, economic, technological and geographical evolution of national and regional factors define the current level of competitiveness of olive producer countries in global markets. Hence, context specific conditions should be taken into account in sectoral policymaking.

Furthermore, the multi-functionality of agriculture[5] has significant implications for government policy making in developing countries. Agriculture is not only valued for its contribution to food production and economic development, but also to a much wider range of socio-cultural, environmental and ethical concerns those should be integrated in government policy making[6]. Therefore, in addition to its economic importance, the social, rural, cultural and environmental specificities of the olive growing have to be taken into account for sectoral and regional policymaking[7].

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[5] See OECD glossary for definition http://stats.oecd.org/glossary/detail.asp?ID=1699,

[6] See for instance Renting et al. 2008, van Huylenbroeck et al. 2007

[7] For instance, olive is a perennial crop that can live years and it takes at least 5 to 7 years to become productive. Therefore, olive growers cannot adopt to economic trends in the short term. Olive tree biologically alternates and its productivity varies from one year to another. This has technical implications: the strength of its alternation depends on olive variety, agricultural methods as well as the soil and climate conditions of the territory. As the peak of production coincides to winter, olive growing allows farmers to practice other agricultural and non-agricultural economic activities. Olive can grow in hilly areas and adopt poor soil conditions in which other crops cannot survive. Therefore, it has strong environmental and rural development aspects. Finally, olive production is mostly composed of small producers, which has to be taken into account in policymaking.

Besides, changes in the techno-economic paradigm of agricultural sector[8] from "green revolution" to another path should also be considered in government policy making.

The fact that both technological and social factors interact in the process of development of a sector supports the view that a systemic approach, an innovation system (IS) approach (Freeman 1987, Nelson 1993, Lundvall 1992, Edquist 1997), that take these factors into account is relevant for sectoral policy formulation.

IS approach has evolved since 1980s and it has been established as one of the main approaches for government sectoral policy making. IS approach is holistic and attempts to cover a wide range of factors, such as organizational, social, economic and political factors, which play role in innovation processes. IS approach is about "*the determinants of innovation, not about their consequences*" (Edquist 2005). Therefore, policymakers should intervene in those areas where the system is not operating well, i.e. when there are systemic problems.

In the last decades, IS perspective gained ground in designing agricultural policy. Contributions of organizations such as the World Bank, Food and Agricultural Organization of the United Nations (FAO), the Organisation for Economic Co-operation and Development (OECD), the European Commission (EC) as well as G20 platform strengthened Agricultural Innovation System (AIS) perspective to be established as mainstream approach in government policy making for the agricultural sector.

Briefly, given the existing productivity and product quality problems, there should be innovation in olive and olive oil sector in Turkey to tackle challenges in global olive and olive oil markets, in addition to challenges to agricultural and food sectors in general. Hence, main aim of this thesis is to underline barriers inhibiting innovation in olive and olive oil sector, with an IS perspective, that should form the basis for a sectoral (innovation) policy of the government.

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[8] See Barrera (2011) http://repiica.iica.int/docs/b2199i/b2199i.pdf

The focus and aim of this thesis can be summarized into the following research question:

- What are the main systemic problems that hinder the effective functioning of olive and olive oil sectoral innovation system?

Related to the main research question, the sub question is as follows:

- What type of policy targets should be set and policy instruments be used to improve the functioning of olive and olive oil sectoral innovation system?

For this aim, Functional–Structural Analysis Framework of Wieczoreck and Hekkert (2012) based on IS perspective is used in this research.

1.2. Significance of the Research

This study contributes in a couple of ways. The main contribution of this study is that it is the first attempt to define and evaluate olive and olive oil sector with an innovation system perspective for sectoral policymaking. There are national research papers discussing problems of the sector and some studies offering policy tools, but there is no study of a sectoral policy for olive and olive oil sector with a holistic approach.

Furthermore, this study contributes empirically to the current literature of IS studies. This contribution is in a couple of respects. First, IS studies on agriculture and agro-food sectors are proliferating but studies on agro-food sector using functional-structural analysis framework are very few. Moreover, this framework evolved based on empirical studies of technological innovation systems of developed countries. Therefore, applying this framework to traditional agro-food sectors in a developing country enriches the applicability of this framework for policymaking purposes.

Another contribution is that this study builds on the knowledge stock of innovation system perspective in Turkey related to agricultural and food sector policy making. In line with international trends in agricultural policymaking, though with a slow pace, innovation system perspective is gaining ground in formulating agricultural policy in Turkey. For instance, TÜBİTAK used IS perspective with functional dynamics approach to develop “National R&D and Innovation Policy” of food, energy and water sectors in 2010.

In addition, the FAO-Turkey Partnership program for "Capacity Development for Analysis and Strengthening of Agricultural Innovation Systems (AIS) in Central Asia and Turkey" has been implemented between 2010 and 2012. The drafted report on Turkey is a guideline for developing agricultural knowledge system in Turkey. Furthermore, Ministry of Agriculture is joining Agricultural Knowledge and Innovation System (AKIS) work of Scientific Committee on Agricultural Research (SCAR) of EU. AKIS perspective is occasionally applied by the Ministry to improve the agricultural extension system in Turkey.

1.3 Organization of the Thesis

The thesis outline is as follows.

Second chapter is about olive and olive oil sector. In the first part of this chapter, historical evolution of olive and olive oil sector in time is summarized. In this respect, based on previous studies, main historical developments and institutions those played role on differing sectoral developments of leader producers and Turkey are broadly stated. In the second part of Chapter 2, after giving a picture of the current situation of global olive markets, olive and olive oil sector in Turkey is presented with figures. Later on, after briefly underlining main organizations and institutions affecting global trends in the sector, current global challenges and domestic challenges to olive and olive oil sector are broadly overviewed.

Third chapter is related to innovation system approach. In this chapter, main contributions of the literature to the IS perspective are broadly summarized. The types of IS proposed by the literature (e.g. national, regional, sectoral and technological IS) and how they evolved in time; attempts to make innovation system as a framework of analysis and evolution of various approaches to application of it as a framework (e.g. functional, structural, functional-structural approaches) are summarized. Besides, how systemic problems and systemic problems are defined and covered in the IS framework, benefits and limitations of IS as a framework for policy making are broadly underlined.

Moreover, the evolution of Agricultural Innovation System (AIS) perspective in parallel with developments in the mainstream IS literature, the role of international and supranational organizations in mainstreaming AIS framework as a tool for government policy making is broadly overviewed. Main literature contributions to AIS perspective are briefly discussed.

Chapter 4 is about the methodology of this research. The coupled functional-structural analysis, as part of a systemic policy framework, proposed by Wieczoreck and Hekkert (2012) forms the main framework of analysis in this research. Initially, main axis of this framework is broadly summarized in this chapter. Moreover, methods are used for the application of this framework, time span of the study, the coverage and delineation of olive and olive oil sectoral innovation system, are presented. The seven functions of IS proposed by Hekkert et al. (2007) those are used in the application of Functional-Structural Analysis Framework are explained. These seven functions include knowledge development, knowledge diffusion, guidance of search, market formation, entrepreneurial activities, lobbying activities and mobilization of resources. These functions are modified to agro-food sector specificities with developing country perspective.

Chapter 5 is on functional-structural analysis of olive and olive oil sectoral innovation system in Turkey. In the first part of this chapter, main actors of olive and olive oil sectoral innovation system are defined. Later on, systemic problems in knowledge development, knowledge diffusion, guidance of search, market formation, entrepreneurial activities, lobbying activities and mobilization of resources functions are discussed respectively. At the conclusion part of this chapter a summary table for the systemic problems are presented.

In Chapter 6, based on systemic problems of olive and olive oil sector discussed in the previous chapter, policy recommendations those target these systemic problems which should form the basis of government sectoral policy framework are proposed. In this respect, best practices in selected countries and policy guidelines in the literature are presented to enhance soundness of these policy recommendations.

Chapter 7 concludes. Based on the findings of the study and policy recommendations, a brief overview of the study is presented in this chapter. Moreover, limitations of this research and further work that will enrich and complement this study are underlined. After briefly discussing the contributions of this research, the benefits of using IS approach to government policymaking and sectoral studies is reminded as a conclusion of the study.

CHAPTER 2

OLIVE AND OLIVE OIL SECTOR

2.1 Historical Evolution

Olive tree (*Olea europaea* L.) has always been a key crop in Mediterranean societies. Olive tree was present in Mediterranean landscapes since 12.000 BC. There are numerous historical remains from North Africa to Italy, Anatolia to Spain, which indicate that olive cultivation in Mediterranean basin goes back to ancient times, around 4000 BC.

Archeological findings indicate the near surroundings of Anatolia as the cradle of olive tree and its cultivation. A recent scientific study on the DNA of cultivated and wild olive varieties of Mediterranean basin testifies that the cultivation of wild olive tree first occurred approximately 6000 years ago at the borders of Syria and Turkey (Besnard et al. 2013). Later on olive tree had spread to whole of Mediterranean basin through trade routes of Mediterranean economies. Though olive tree has been cultivated around 4000 BC, the production of edible olive oil goes back to early Bronze Age, 3150 to 1200 BC (Vossen 2007).

Throughout various Mediterranean civilizations, olive tree occupied an important position in agricultural economy and trade. Tablets those are found in Northern Syria dating middle of 3000 BC mention large scale of olive oil production, whereas Hittite texts and Egyptian records testify olive cultivation in Anatolia, around Cilician region (Blazquez 1996a p.19). Ancient jars containing olive oil have been discovered in Palestine dating 6.000 BC (de Barry, 1999 p.21). Hundreds of olive presses dating Iron Age have been found in Ekron city in Palestine, indicating demi-million liters of yearly production capacity (Ünsal 2008 p.21). Tablets from Mycenaean civilization dating 1550 BC mention olives, both the wild and cultivated ones (Blazquez 1996a p.20). There are frescoes in palace of Knossos, Crete, with probably the oldest representation of an olive tree, older than 3.500 years (Schafer-Schuchardt 1996 p.21). Syrian and Palestinian regions were also the places where olive oil commerce first took place. There are documents of Northern Syria dating around 2500 BC mentioning the number and different varieties of olive trees as well as the export of high quality of olive oil to other kingdoms (Rodriguez 1996 p.47).

Food, cosmetics, medicine, temple offering, anointment of kings and priests, olives and olive oil have always occupied a central position in Mediterranean life for centuries. Olive tree had a sacred place in all religions[9] and all of the holy books mention olive tree. In the ancient times, olive tree was a symbol of wealth fame and peace. It has also been the subject of myths[10].

In the Bronze Age, Phoenicians who lived in the current Syria region have traded olive oil and diffused the cultivated olive tree to Mediterranean basin (Blazquez 1996a p.19, Rodriguez 1996 p. 48-49) from Syria through Anatolia. Phoenicia[11] was "an early version of a World economy" according to Braudel (1984). Through their trade networks, they took olive tree to Egypt from 2600 BC, to the Greek Islands around 16th century BC, to the Hellenic Peninsula from 14th to 12th centuries BC, later on to all over the Mediterranean basin. They diffused it to Northern Africa and southern Spain around 1000 BC. Trade contacts between the two ends of Mediterranean basin began to flourish around 1000 BC and olive oil was the important trade item. The words that stem from the Semitic word for olive, *zeit* (zayt), followed the Phoenician trading routes: *sait, taiti,* even *tat* in Egypt, *aceite* in Spanish and zeytin in Turkish.

In the Bronze Age, Minoan civilization (around 3000- 1100 BC) in Crete was a significant olive oil producer and exporter. They owed their wealth to olive oil production (Schafer-Schuchardt 1996 p.21). Olive oil was Crete's most important export item in exchange for

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[9] The olive oil had a religious meaning and symbol for the Egyptians. Egyptian death rites decreed the t of the bodies with olive oil and wearing olive wreath necklace (Schafer-Schuchardt 1996 p.22). The documents dating from the time of Ramses III (1191-1168 BC) testify the offering of first class olive oil to illuminate temple of the sun god, Ra, produced from special olive groves dedicated for this purpose (Schafer-Schuchardt, 1996p.22, Ünsal 2008 p.20).

[10] The most famous myth related to the olive tree is the contest between Athena and Poseidon to reign Athen, of which there are many literary references and illustrations, which refer this myth (Schafer-Schuchardt, 1996 p.22). Poseidon presents a horse (Ünsal 2008) / a sacred lake (Blazquez 1996 p.20) whereas Athena presents an olive tree. Athena wins the contest as the olive tree is found to be superior: it is a very long living tree, a source of nutrition, heals illnesses and illuminates houses.

[11] Phoenicia, a group of coastal cities situated at the shores of Mediterranean, were a navy power and famous merchant traders of the antiquity. They established and colonized cities throughout the Mediterranean from Cyprus to Sardinia, Malta, Sicily, Spain, Portugal and Carthage. Phoenician's highest point in their trade power was around 1200-800 BC.

costly and rare items. Olive oil produced in Crete during the Minoan period supplied an important part of the olive oil consumed in Egypt.

Exchanges of olive oil accelerated during 600 BC when the Carthage[12] and the Greek cities have risen in the Mediterranean. Carthagians established hegemony on the former settlements of Phoenicians, throughout the Mediterranean basin including North Africa and Spain. The cultivation of olive tree in North Africa was improved by the Chartagians.

The Greeks, who took the leadership in the Mediterranean trade around 800 BC, had further spread olive cultivation. During the time of Phonecians, the Greeks imported olive tree into Italy. The 6th century onwards, olive tree had been spread throughout the Mediterranean basin reaching Tripoli, Tunisia and Sicily, from where it was taken to South Italy, later on to North Italy, Calabria and Liguria (Blazquez 1996a p.20). By 4th century BC olive tree became a very wide spread crop in Greek peninsula[13].

Olive cultivation reached its peak during Roman times and olive branch was more than ever a symbol of peace (Camps-Fabrer 1996 p.33). The Roman Empire (500 BC-500 AD) had an important role in the improvement of olive production and olive oil processing. In addition to Hellenic Greeks, the technological achievements of the Romans were impressive (Lucas 2005 p.8). First recorded agronomic writings on olive cultivation and olive oil production can be attributed to the Romans (Rodriguez 1996 p. 47)[14].

Though the Phonecians introduced olive to Spain, it has developed and improved significantly under the Roman domination. The rise of Baetica, today called Andalusia, as a main producer and trader of olive oil goes back to Roman times (Blazquez 1996b, Rodriguez 1996). From the middle of 2nd AD onwards, Andalusian olive oil was distributed all over the

[12] A Carthagian Empire rise in Carthage, a former city-state of Phonecians, around 1000 BC.

[13] The Athenain stateman Solon (638-558 BC) issued decrees regulating olive cultivation and olive oil became the only food product that could be exported from Athena (Blazquez 1996, p.19, Rodriguez, 1996 p.49). This indicated the high value attributed to the olive cultivation in ancient Greece as Athens was obtaining the grain it needed in return of the olive oil exports (Rodriguez, 1996, p. 49).

[14] The Roman quote of “olea prima arborum est” that values the olive tree above others is from a treatise on agriculture *“De Re Rustica V.8.1.”* written in the year 60 AD (Schafer-Schuchardt 1996 p.21).

Roman Empire, from Britain to Egypt by amphoras[15]. Romans used olive tree as an instrument of their economic presence by installing olive plantations and olive mills (Camps-Fabrer 1996 p.31-32). They expanded olive cultivation in North Africa as well.

The history of the Iberian Peninsula took a radical turn at the beginning of 8th century as in 711 Arabs crossed Gibraltar and take over Spain. Olive cultivation that Phoenicians and Greeks introduced later on the Romans improved, was further elaborated by Arabs. Islam remained a potent force in the Iberian Peninsula for approximately the next 800 years. In Andalusia, Spain, olive production growth was continuous. Arabs in Spain had developed agriculture on an unprecedented scale. They constructed irrigation channels, applied techniques increasing the yield and introduced new crops (Watson 1974). The Muslim rule in the Iberian Peninsula ended with the fall of Granada in 1492. This year is also significant as Spain decided to finance an expedition by Christopher Columbus. The conquests of Spanish and Portuguese in 16th century took olive tree to the other side of the Atlantic, to Americas.

The rise (1250-1450) and the waning (1550-1870) of the "Mediterranean World Economy" have affected olive production in the Mediterranean basin significantly (see Tabak, 2008). Between 13th century to the mid of 15th century, olive production shrank in the Mediterranean due to taxes, labor scarcity as well as medieval warm period that lasted till mid of 16th century, leading to an increase in the livestock husbandry changing the oil consumption patterns in favor of animal fats (Tabak 2008 p.111).

The volume of olive oil trade was comparatively limited in 14th and 15th centuries as oriental goods, sugar and cotton, constituted the staples of the Mediterranean commerce. It was during the long sixteenth century (1450-1650) that Mediterranean crops gained wider commercial appeal, as the "Low Countries" of the North Western Europe broke the Italian monopoly in the long-distance spice trade and became the Atlantic trade power with Portuguese discovery of the new route to the Indian Ocean as well as the Spanish discovery of the Americas. From 16th century onwards, Mediterranean trade structure was reshaped:

[15]In Rome, empty amphoras that were used were thrown to a tip named Monte Testaccio. The registrations of transactions on these amphoras had been important references for the trade routes and amount of olive oil traded in Roman times.

“Exports of grain, sugar, woolen cloth and spices were on the decline, but exports of wine, olive oil and ... finance were on the rise. In exchange, imports of grain and cloth arrived in increasing amounts from the North” (Bateman 2010 p.10).

The “general trends and common destinies” of the Mediterranean during 1550-1870 that shaped the course of Mediterranean World economy (Tabak 2008 p.10-24) directly and indirectly affected olive cultivation. This period of almost three centuries was the period of “waning” of Mediterranean World Economy but the rise of Mediterranean crops, including olives:

> Ironically enough, it was during its autumn, and not heyday, that the Inner Sea … reassumed …what we today recognize as its quintessential properties. Vine and olives — the “civilizational crops” of the Mediterranean— which, in its golden age, were commercially produced in select locales, extended their dominion mostly from the seventeenth century throughout the width and breadth of the basin (Tabak 2008 p.16).

The three temporalities - geo-historical, world-hegemonic and world-economic- reinforced the contraction of arable area in the lower plains of the Mediterranean (Tabak p. 16-19): The geo-historical temporality “the Little Ice Age” which started around 1550s and lasted until the 1870s, created wetter and colder conditions for the Mediterranean and increased the climatic variability. The second temporality, following the cycles of hegemony in the capitalist world-economy, lasted from around 1590 to 1815. During this period, commercial cereal production shifted out of the Mediterranean in the era of Dutch hegemony, after the waning of Italian city-states. The influx of northern Baltic grain to the Mediterranean, during the climatic changes leading to the retreat of the population to the uplands furthered the decline of land devoted to wheat. The third temporality was that of the secular trends of the World economy. The 17th century crisis, the long demographic and economic slowdown endured from around 1650 to 1750, led to a fall in demand for grain and facilitated the conversion of the Mediterranean arable land into pastureland and olive orchards.

During this period, developments in the western part of the basin differed from those in the Levant (Tabak 2008 p.121-122): In Iberia, agrarian production was diversified significantly. As the newly conquered lands were devoted to grain cultivation, more land in the coastal regions of Iberia were devoted to lucrative cash crops, such as wine and olive oil. Arrival of

Caribbean gold pushed up prices and this price increase rewarded some crops, such as olive oil, more than other crops. Moreover, the demand of Spanish settlers during the sixteenth century also placed a premium on olive oil that led to an increase in wine and oil prices compared to the wheat. "By the mid-sixteenth century, the process had progressed to such a degree that even a region as rich in grain as Andalusia had started to import grain as the city's olive orchards were spreading at a rapid rate "(Tabak 2008 p.122).

The price increase during the mid16th century affected the agricultural specialization of the Ottoman Empire quite differently. As result of the inflation created by the precious metal trade during the mid16th century, Ottoman grain became relatively cheaper and almost half of the grain circulation in the Mediterranean originated in the Ottoman lands (Tabak 2008 p.123). These developments of the 16th century led increase in cereal production in Ottoman Mediterranean whereas olives in the Genoese Mediterranean (Tabak 2008 p.125).

From 16th century onwards, the demand for olive oil was further reshaped. Olive oil trade was enhanced by "… Reformation and the new ecclesiastical rules governing the consumption of meat and animal fats" and olive oil spread "throughout the Protestant realm, both as a condiment and for cooking, not to mention the needs of the cloth industry, from Antwerp to England" (Tabak 2008 p.164). In the 18th and early 19th centuries olive orchards were pushed to its maximum limits where in Iberia "... tree crops—olives and vines—occupied almost half of the total land area in the eighteenth century" (Tabak 2008 p.162). In Andalusia and in Tunisia olive tree cultivation even took the form of monoculture (Tabak 2008 p.165).

Along with the rise of olive oil as a cash crop in international trade, technical changes in olive processing gained pace with mechanization of production. For the good functioning of the mechanical parts of industry, overcoming the friction problem was important. It led to an increase in demand for olive oil as it was "one of the most outstanding natural substances for the reduction of friction that the world has known" (Muendel 1995 p.388).

The use of olive oil as a lubricant could goes back to 6th century, but olive oil, especially high quality olive oil, was widely recognized as an exceptional lubricant against friction significantly from the 14th century onwards (Muendel 1995 p.388-392).

Olive oil production became closely tied to the growth of industrial machinery in northern Europe from 16th century onwards. This led to the need of more and better olive oil production capacity. As the olive oil production was one of the most important commercial activities in the European Mediterranean countries, improving the olive oil sector was also a way of catching up with the Northern Europe. In the second half of the 18th century, under the influence of enlightenment ideas, European Mediterranean "reformer-entrepreneurs advocated rationalizing and mechanizing olive oil production as a way of meeting this increased demand" (Mazzotti 2004 p.278). The 18th century European reformers wanted not only to increase the production of olive oil but also the quality of olive oil as high quality olive oil prices were much higher in the international market due to its durability in long distance trade and higher lubricant qualities. The basic conditions for progress were "first the recognition of full, exclusive rights of ownership over land, and second, the rationalization of production—meaning mechanization, standardized procedures, and work discipline" (Mazzotti 2004 p: 283). Hence, significant technical changes in olive oil mills and presses took place along with changes in organization of olive production in regions where sociotechnical landscape was favorable, mainly in bourgeoisie-controlled trading centers of Mediterranean Europe (Mazzotti 2004).

Starting from the first globalization period (1870-1914), we can argue that current leaders of the world olive and olive oil sector emerged widening the technological and skills gap with other olive producer countries.

The British Industrial revolution, the reduction of tariffs in the mid19th century as well as the reduction in the transportation costs created new opportunities for international trade. World trade expanded enormously throughout the 19th century. By the end of 19th century and in early 20th century, olive oil was one of the major goods exported by the Mediterranean countries. In descending order, Spain Italy, the Ottoman Empire, Greece, Algeria, Tunisia and France produced more than 90 per cent of olive oil exported in the World (Ramon-Munoz 2000 p.159).

The British Industrial Revolution and its spread throughout the north-west of the Europe was the driving force causing world olive oil trade to grow. With the expansion of industrialization, olive oil demand for industrial processes significantly increased. In the last quarter of 19th century, the demand from northern European countries, mainly the United

Kingdom, constituted almost 80 per cent of the total world olive oil imports (Ramon-Munoz 2000 p.164). Olive oil exports almost doubled between 1850s and 1880s, leading to further extension of olive cultivation areas in southern Spain and southern Italy (Ramon-Munoz 2011b p.27).

From the late 19th century onwards, the development of low-cost extraction, purification and manufacturing techniques for seed oils as well as the use of other sources for light led to a drop in the industrial demand for olive oil (Vossen 2007). Technological developments led vegetable oils (soya, palm, sunflower and rape) to dominate the world markets in the 20th century (Pitts et al 2007 p.15). The demand for olive oil in Russia for lightning churches, in England for oiling wool and in America for technical purposes continued until the end of World War II, but industrial markets for olive oil fell significantly by the eve of World War I (Ramon-Munoz 2000 p.164).

With the drop in industrial demand, international demand for edible bulk olive oil has increased, mainly from France and Italy, as well as from the United States. The aim of the demand for bulk olive oil was varying: in France and Italy, olive oil exporters were using it as a raw material for branded olive oil mainly for re-export, in United States and Norway it was used in canned fish industry (Ramon-Munoz 2000 p.164-167).

In the first decades of 20th century, establishment of industrial refineries was another major reason for the increase in demand for bulk olive oil. Industrial refining was a significant technological change in the olive oil sector, which affected both the amount of demand for olive oil and its structure (Ramon-Munoz 2011a p.5-8). Improvements of the refining technology in 20th century allowed the transformation of low quality of olive oil to edible oil, previously suitable for industrial use. Introduction of industrial process was a new technological paradigm in the olive oil sector as “it allowed massive production of edible and neutral olive oils, namely a product being tasteless, odorless, colorless and, finally, lacking in acidity” (Ramon-Munoz 2011a p.6).

New refining technology led to product standardization and regular supply of the standard product, which was very essential for the viability and the reputation of the brand names in the market (Ramon-Munoz 2000 p.184). As result of the new refining technology, the factor proportions changed with the substitution of labor by capital (Ramon-Munoz, 2011a p.8).

In the first quarter of the 20th century international markets for branded olive oil was developed and by the second half of 1920s, the share of branded imports was 40 percent of the total World imports (Ramon-Munoz 2000 p.167). The most part of the demand was from the American continent, especially the USA. Main reasons for this demand were the mass migration from southern Europe to the American continent and the trust in the quality of the European brands. The massive and earlier presence of Italians in the American markets had long term consequences, as this fact might have facilitated the control of commercial networks and presented Italian firms first entrants' market power (Ramon-Munoz 2000 p.192).

Increased competition among the Mediterranean olive oil producers contributed to the transformation of the olive oil market starting from the end of 19th century to the end of World War II (Ramon-Munoz 2000 p.168-171). Italian leading position in the World olive oil market as a producer and an exporter has changed due to this competition and Spain became the leader country. By the end of first decade of 20th century, Spain was the main producer and two decades later, it was the main exporter (Ramon-Munoz 2000).

All these developments led to a process of specialization among the Mediterranean countries, which has already started before World War I (Ramon-Munoz 2000 p.171-175). They tended to export the type of olive oil in which they had a comparative advantage (Ramon-Munoz 2000 p.175-182). On the eve of World War II, southern and eastern Mediterranean countries were too far behind France, Italy and Spain in olive oil technology and labor skills to catch up easily (Ramon-Munoz 2000 p.188-189):

- France and Italy were exporting high value added, branded olive oil. Spain's one third of exports was branded olive oil and the rest was high to medium quality olive oil. Spain's oil prices in international markets were lower than French and Italian ones. Tunisia and Algeria were producing bulk olive oil. Greece and Turkey were exporting low quality and high acidity bulk olive oil mainly to industrial market, mostly used in Italian refineries.
- There were differences in relative costs and technology, reflecting differences in factor endowments. Therefore distinctive patterns of specialization among olive oil producers emerged. Northwestern Mediterranean countries had higher cost per

unit of output due to higher wages and lower yields compared to South and East Mediterranean countries. Technology and labor skills were the significant factors explaining French, Italian and later on the Spain's leadership in olive oil sector in the first decades of the 20th century.

- Existence of low cost labor, low capital investment and domestic tastes prone to high acidity olive oil inhibited modernization of southern and eastern Mediterranean olive oil producers. In the Northwestern Mediterranean countries, the high cost labor but relative abundance of physical and human capital led specialization in exporting high quality olive oil. Comparatively low efficiency in producing bulk olive oil led them to import bulk olive oil to refine and blend, pack and re-export them.

Until the mid of 20th century, olive oil production remained a process based on the traditional crushing and pressing operations and "the real breakthrough took place from 1945 onwards, when the continuous production processes came into use" (Ramon-Munoz, 2011a p. 2).

The situation of olive and olive oil Sector in Turkey in the first quarter of 20th century could be related to differences in its institutions compared to European olive producing countries. First, changes realized in the agrarian structure of olive producer European Mediterranean countries did not take place in the Ottoman Empire's territory, including current territory of Republic of Turkey. It was due to specificities of its institutions governing its agrarian structure significantly different from the European countries[16]. Hence, commercial

[16] Ottoman Empire's agrarian structure was characterized by an independent peasantry, the propertied hereditary noble class was absent, monarch could eliminate and confiscate the wealth of private individuals (Keyder 1991 p.5). Peasants were paying customary tax to the representatives of states and they were protected from expropriation.

The legal status of the peasant and his right of access to land could not be changed by a landlord. In the Ottoman Empire, the "enclosure" of lands was never realized and landlords remained as collectors of taxes. A landholding class, with autonomy from the central authority, did not develop. Therefore, they could not assume the significant role that the Italian or French proprietor-entrepreneurs played in the development of olive and olive oil sector. The political and legal context of the Ottoman Empire did not allow the absolute private property rights to flourish as in the feudalist Europe of the pre-capitalist period (Keyder1991 p.10). There was the confiscation power of the central authority always preventing the wealth accumulation and the heritage of the landlords.

opportunities arising from the increase in the volume of trade from 15th century onwards did not lead to a change in the relations of production in Turkey.

Secondly, export trade never developed to a significant degree as in the western European olive producing countries. An olive monoculture similar to Spain did not evolve even towards to the end of 19th century, reflecting the absence of large-scale commercial exploitation[17].

Third, Ottoman Empire's fiscal policies also shaped olive and olive oil production, export volume and the technological improvements in the olive processing. In the early modern period, in contrast to mercantilist European countries, Ottoman Empire was still a welfare state and "interested only in those products whose value was great enough that a tax would be lucrative" (Artan 2000 p.147). The wealth was expected from new tax sources from the conquest lands instead of income generation by increasing agricultural productivity via technological improvements[18].

Fourth, priority of İstanbul, the capital of Ottoman Empire, was also an obstacle to improvements in external trade of olive oil. Ottoman Empire's primary aim was to meet the demand of İstanbul[19]. Moreover, the target was to balance domestic supply and demand of

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Therefore, the agricultural land, including the olive orchards, was not economically rationalized in the Ottoman Empire territory.

[17] "Exports originated predominantly in peasant production and derived from peasant surpluses, not from landlord-managed estates. Peasants were not quick to change their patterns of diversified production, hence the volume of exports increased slowly; the Ottoman lands exhibited a mediocre performance in terms of integration into World economy networks" (Keyder 1991 pg.8).

[18] The abundant olive oil producer Crete, after its conquest by the Ottomans in 1669, shared the same destiny. Crete has been the "breadbasket" of Venice in the 15th century. From 16th century onwards, during the waning of Mediterranean as Tabak (2008) argues, the island replaced wheat fields with vineyards and olive orchards for exportation. This "*attracted the attention of Ottomans who were always hungry for tax revenues*" (Artan 2000 p.146). In the 17th century, Ottoman Empire's traditional sources of royal patronage had already exhausted and the Ottomans were hoping to raise riches from Crete, therefore they raised the taxes on oil exports from Crete (Artan 2000 p.147).

19 Main olive producing regions in Aegean region, such as Ayvalık, Midilli, were primarily supplying their olive oil production to İstanbul, instead of engaging more in foreign trade activities.

agricultural production. Therefore, exportation of olive oil was restricted as long as the domestic demand was met (Arıkan 2006 p.13-14).

Fifth, food consumption patterns in Ottoman Empire also affected demand levels and domestic market formation for olive oil. In 18th century Europe, with changes in consumption patterns, high quality olive oil became a part of "conspicuous consumption". During this period the superior taste of low-acidity oil and on its beneficial health effects were highly advertised. The taste of olive oil was socially shaped and it became a mark of social distinction as "low-acidity olive oil became a mark of the affluent Mediterranean bourgeoisie" (Mazzotti 2004 p.292). In contrast, a significant population of "affluent bourgeoisie" that could affect the demand for olive oil, with its changing consumption patterns and tastes, did not emerge in the Ottoman Empire Anatolia[20]. The Mediterranean-ness of Middle East, where olive oil was restricted to vegetable dishes and animal fat was preferred, is arguable (Artan 2000 p.143).

Moreover, during the first globalization period that significantly singled out Italy and Spain as the leading producer countries, there were deep changes in the political context and weaknesses in the regulatory environment of Ottoman Empire, which led olive producing regions in Anatolia to lag behind. Olive production in the Western Anatolia was significantly affected from the restless political atmosphere starting from the dissolution of Ottoman Empire from 1790s to the establishment of the Turkish Republic in 1923.

Western Anatolia including Ayvalık region and the Aegean islands, Midilli as well as Crete, were main olive oil producer regions under the reign of Ottoman Empire in 18th century. A significant part of the population in Ayvalık region was Greek ethnicity. During the Greek upheavals (1821-1830) olive production in these areas were affected negatively as the

[20] Only the Ottoman Palace elite showed changes in olive oil consumption patterns, though slower, similar to the European bourgeoisie. The butter was highly favored in the Ottoman palace and the alternative for those who could not afford butter was not olive oil, but animal fat (Artan 2000: 144). At the beginning of 17th century, the olive oil for the palace was imported form Greek islands, where olive oil share of Sultan was from Crete, when the island was still Venetian (Artan 2000 p.145). From the 17th century onwards, the greater access to Crete's olive after the island's conquest changed the Ottoman elite's culinary tastes and consumption patterns. High quality olives and olive oil, mainly from Crete, appeared in the rations of elite with an increased share compared to other oils (Artan 2000 p.149-151).

Greek peasants run away from Ayvalık to the islands, leading to a drastic fall of population and olive cultivation know how. Though these peasants were recalled with an assurance of safety, previous production and consumption balances were hardly achieved (Arıkan 2006 p.19).

Furthermore, “Capitulations” was another significant reason that prevented the improvement of olive oil industry in the 19th century. In 1826, monopoly of trading (yed-i vahid) of certain goods, such as grain, wool as well as the olive oil, was granted to Ottoman citizens assigned by the Ottoman government. These goods were important inputs for the industrialized countries, especially for Britain. The rise of customs duty applied by the continental Europe for British goods around 1830 led Britain to search for other markets for its products and the supply of inputs. The Ottoman government could not resist the influence of British government and the monopoly of trading rights of domestic traders was abolished. In 1838, in addition to importing rights, domestic trading rights were presented to British with “Baltalimanı trading agreement”. Hence, one can conclude that initial monopoly system of domestic traders and later on the capitulations not only prevented the development of olive oil industry but also the flourish of entrepreneurship in olive oil sector.

By the end of 1870s, in addition to non-existing private sector and entrepreneurship, the lack of technical knowledge, lack of capital, weak financial system were other reasons which prevented industrial development of olive oil sector[21].

Finally, the mandatory exchange of population between Turkey and Greece in 1923-24 has been another breakeven point for olive production. The people who were forced to migrate to Greece inhabited in olive producing regions and there has been a significant loss on the accumulated know how on olive cultivation. Although, newcomer peasants from Greece

[21] For instance, in Midilli, where the economy was based on mainly olive production, after the strong winter of 1849, which has frozen the olive trees, the regeneration of trees and increasing the productivity was difficult because of lack of knowledge and capital (Arıkan 2006 pg. 21-22). By the end of 19th century, in Ayvalık, the main olive oil producing region of western Anatolia, there were 26 soap factories, 78 olive mills and 7 olive oil plants (Ünsal 2003 pg.62), a significant industry domestically but it was very modest compared to the industry of Spain and Italy by the end of 19th century.

who knew olive production were to be settled in the olive producing regions, many olive orchards were left abandoned by themselves (Kocadağlı 2010 p.36).

In Turkey, olive production gained importance starting from 1929[22]. Know how on olive production has improved with the training of Turkish agricultural engineers by Italian experts and by study visits to leader olive producer countries. In 1937, Olive Research Institute was established. In 1939, the law on olive culture[23] has been enacted. This law was important for the improvement of olive production as it also foresaw sanctioning of the owners who do not look after their olive orchards. In the 1929-1950 periods, developments in olive and olive oil sector were significant. Starting from 1950s and in 1960s though developments continued, its speed slowed down (TBMM 2008). First olive oil export was realized by Turkey in 1961-62 (Özkaya et al. 2010 pg.1) and Turkey became a member of International Olive Council (IOC) in 1963.

In 1970s, aggressive promotion of cheaper vegetable oils, instead of high benefits of olive oil, deteriorated the domestic demand for olive oil that was already at very low levels. In 1970s and 1980s, domestic producers neglected the domestic market so much that olive oil was almost forgotten by the Turkish consumers (Ünsal 2003 p. 211). In Turkey, 1980s also witnessed the tremendous conversion of olive orchards in coastal regions to touristic and habitation areas (Özkaya et al. 2010 p. 1). In 1990s, some of the big olive oil firms launched campaigns to improve domestic demand but it was not so easy to overcome the effects of lost years (Ünsal 2003 p.211).

Unfortunately, Turkish government exit from the membership of IOC in 1998. The argument was not being able to full benefit from IOC's policies. This further hampered the sector in many respects. The IOC was the main external platform for Turkey to overview the sectoral developments and foreign markets. Besides, as result of this separation, R&D projects with

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[22] There have been significant studies on olive sector. See for instance Recai Efendi, Mehmet Şakir (1930) "Zeytin ve Zeytinyağcılık Hakkında Tetkikat"", İstanbul, İktisat Vekaleti 1930; Onart, Yahya Kerim (1937) "Türkiyede Zeytin Ziraatinin Ehemmiyeti", İzmir; Turgay, Nizamettin (1938) "Sofra zeytinciliği üzerinde yepılan etütler raporu" İstanbul: Ziraat Vekâleti, 1938

[23] In Turkish "Zeytinciligin Islahı ve Yabanilerinin Asılattırılması Hakkında Kanun"

IOC have been suspended[24]. This decision was criticized by many of the sector representatives[25]. In 1999, an informal Turkish olive and olive oil advisory council has been established as a response. The aim of this council was to set the priorities for the sector. By the beginning of 2000s, many initiatives were taken to discuss the problems of the sector and improve the situation. First national olive summit was realized in 2002 and the second one was in 2004. In 2004, the Minister of Agriculture announced the targets of the sector to be realized by the year 2014. Besides, the application process for the membership of IOC started same year. Establishment of National Olive and Olive Oil Council (UZZK) in 2007 has been a significant step for the development of the sector. Furthermore, IOC membership process has been completed in 2010.

2.2 Current Situation of the World Olive and Olive Oil Sector

Olive is a Mediterranean crop and 99 % of olives are harvested in Mediterranean countries. As of 2013, the World olive harvest area has been expanded to 10.3 million hectars, with an increase of 23.5 % from 2000 to 2013 (FAOSTAT 2015).

During the same period, the World olive production has increased to 20.4 million tons with around 30 percent increase in production. Around 48 % of the world harvest area belongs to EU Mediterranean countries. Spain is the leading country who has around a quarter of the total area (Figure 2.1).

Tunisia has the second largest area with an 18 %. Italy, Morocco, Greece and Turkey are the following countries with 11 % to 9 % area. Olive plantation areas in most of the southern Mediterranean countries, in Algeria, Morocco, Tunisia, Syria and Turkey, have extended significantly in the last decade. Turkey has shown 39 % increase since 2000.

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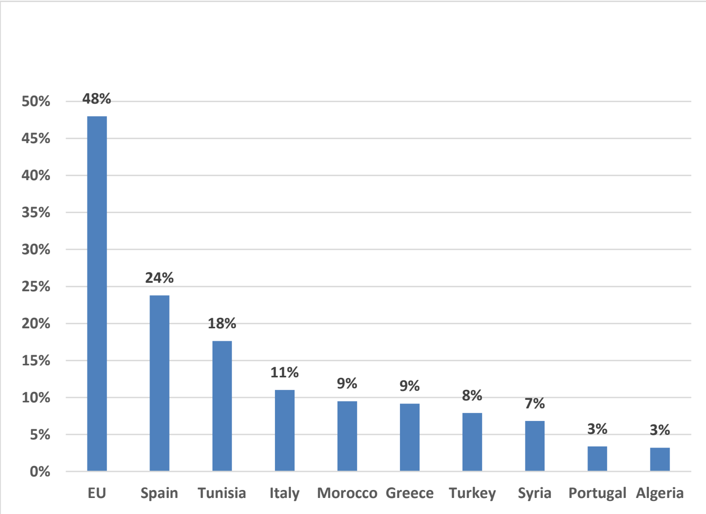
[24] One of the main projects suspended was the national olive germplasm Project (TBMM 2008:180). If this project could have been completed, a national olive variety catalogue could have been developed since then.

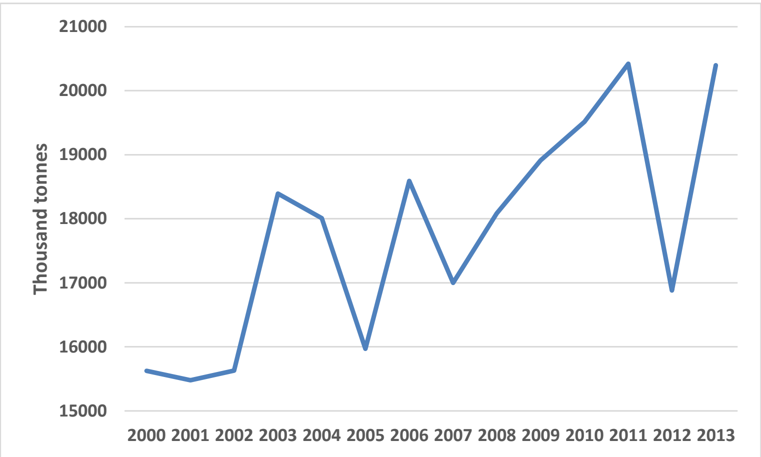
[25] See http://uzzk.org/Belgeler/uzzk_tarihce.txt



Source: FAOSTAT http://faostat3.fao.org

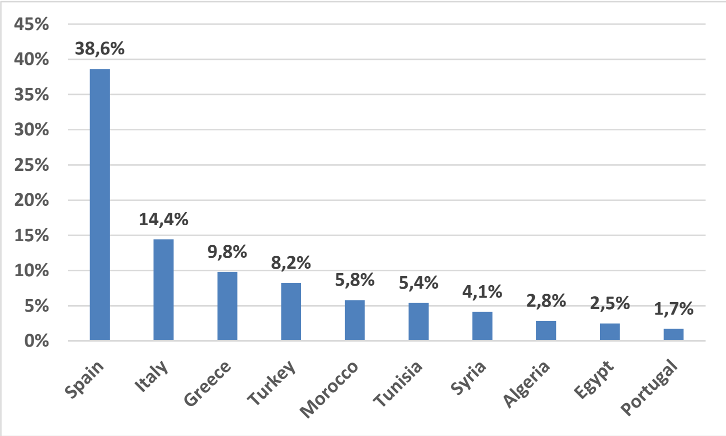
Figure 2.1 Distribution of Olive Harvest Area, 2013

World olive production has increased from 15.6 million tons in 2000 to 20.4 million tons in 2013 with a 31 % increase **(Figure 2.2).** As of 2013, 65 % of the world olive production belongs to main EU producer countries. Spain leads with a share of 38.6 % **(Figure 2.3).** Turkey has a share of 8.2 % and 4th in ranking as of 2013.



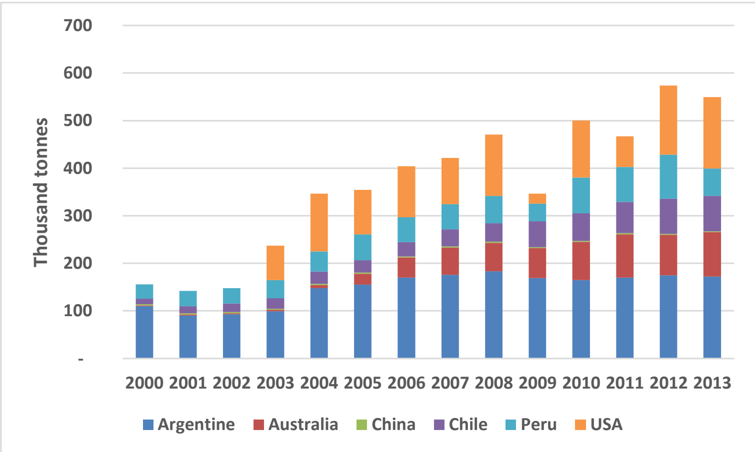
Source: FAOSTAT http://faostat3.fao.org

Figure 2.2 World Olive Production 2000 - 2013



Source: FAOSTAT http://faostat3.fao.org

Figure 2.3 Share of Main Olive Producer Countries in Olive Production in 2013

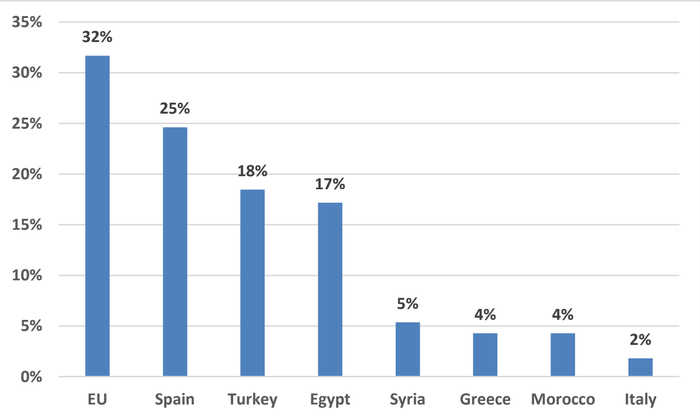


Source: FAOSTAT http://faostat3.fao.org

Figure 2.4 Production of olive in Non-traditional Countries, 2000-2013

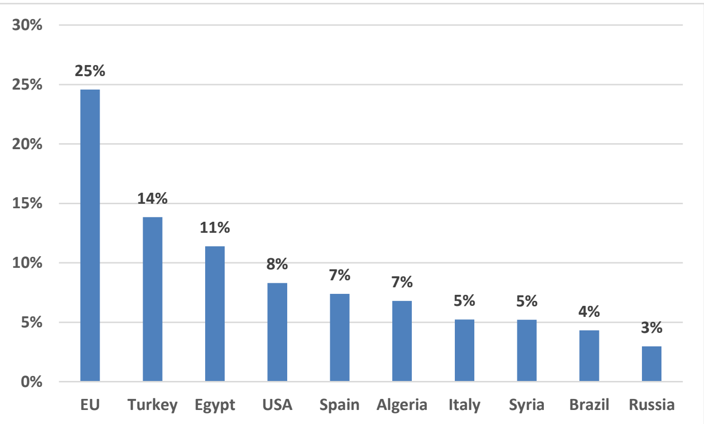
Olive production is increasing not only in traditional producer countries but also in non-traditional countries (**Figure 2.4**). Share of olive production in non-traditional countries has increased from around 1 % in 2000 to 3 % in 2013.

As result of increase in the olive plantation area and olive productivity, World table olive production has reached to 2.3 million tons in 2013/14 from 1.3 million tons in 2000/2001, with an increase of 80 % (IOC 2015). Turkey has been at second or third rank in total World table olive production with Egypt depending on seasonal olive productivity. As of 2013/14 season, it is the second biggest table olive producer with a share of 18 % **(Figure 2.5).** Turkey and Egypt are leading table olive consumers with a total share of 25 % in 2013/14 **(Figure 2.6).** USA is the third highest consuming country with a share of 8 %.



Source: IOC http://www.internationaloliveoil.org/

Figure 2.5 Share of Table Olive Production in 2013/14

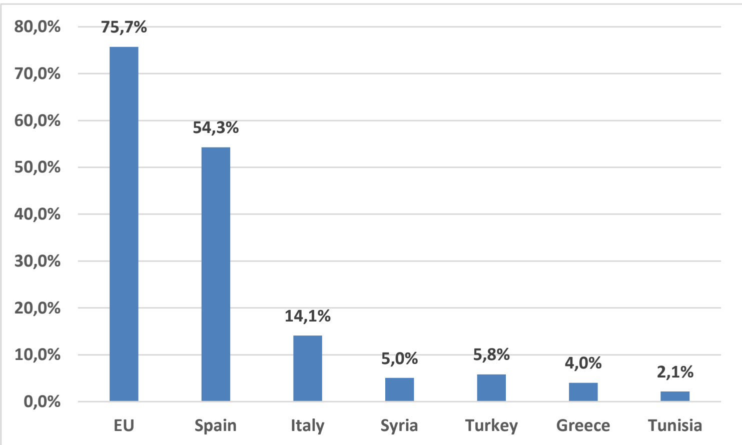


Source: IOC http://www.internationaloliveoil.org/

Figure 2.6 Share of Table Olive Consumption in 2013/14

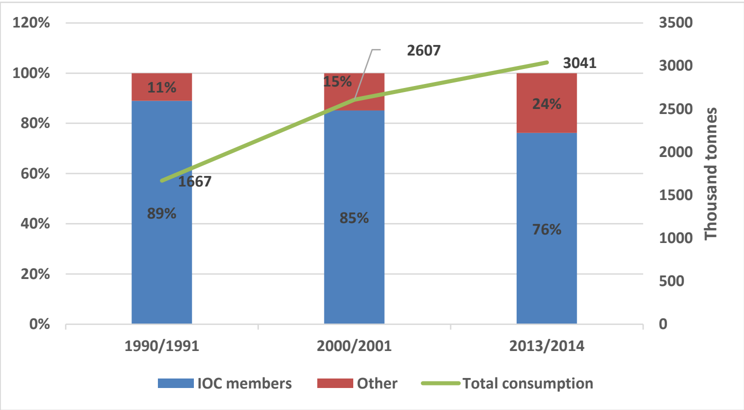
World olive oil production has increased from 2.6 million tons in 2000/01 to 3.3 million tons in 2013/14, with an increase of 27.5 % (Source: IOC). The 54 % of the world olive oil is produced by Spain. Total olive oil production in EU is around 74 % of the total world production **(Figure 2.7)**. In the last decade, Turkey's rank in total world olive oil production has been changing from fifth to third rank with Syria and Tunisia. As of 2013/14 Turkey has a share of 5.8 % in and Tunisia altogether has a share of 18 % in total World production.

World olive oil consumption is around 3 million tons as of 2013/2014 **(Figure 2.8)**. Total consumption has shown an around 82 % of increase in the last two decades. Moreover, consumer profile has also changed. In 1990/91, almost 90 % of consumers were IOC member countries, but as of 2013/14 IOC non-member countries share has increased to 24 %. Main reasons behind the significant increase in world olive oil consumption and change in consumer profile are increased global awareness of the health benefits of olive oil and aggressive promotional activities of IOC.



Source: IOC http://www.internationaloliveoil.org/

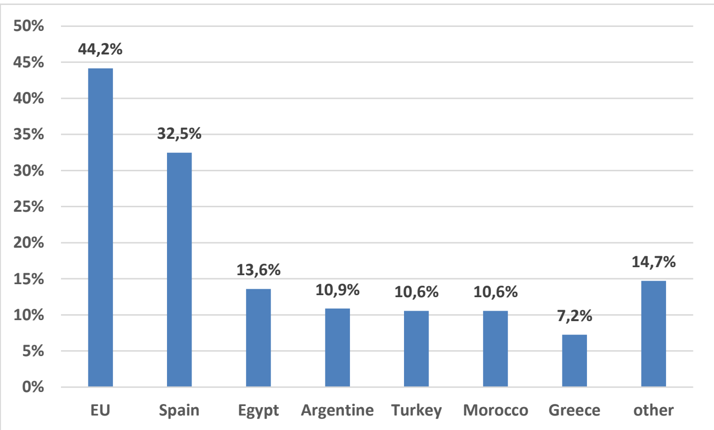
Figure 2.7 Share in total World Olive oil Production, 2013/14



Source: IOC http://www.internationaloliveoil.org/

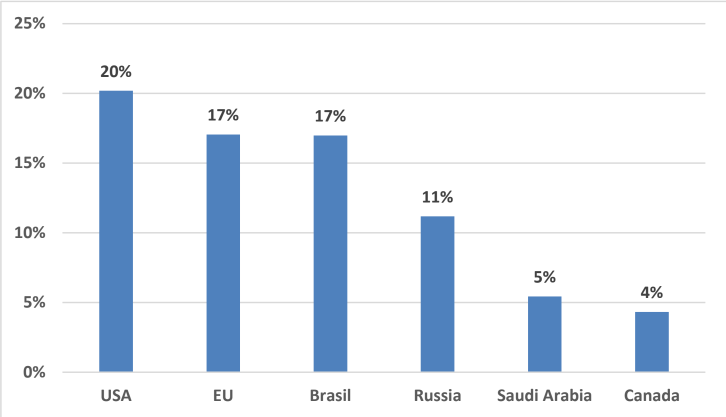
Figure 2.8 World Olive oil Consumption

In 2013/14, total amount of table olive exports has been 663 thousand tons excluding intra EU trade. EU countries exported 44.2 % of the total, of which 32.5 % belongs to Spain **(Figure 2.9)**. Primary importer country of table olives in 2013/14 is USA, with a share of 20 % (**Figure 2.10**). Since 2000/01, table olive imports' volume has been almost doubled. In 2003/04, Russia was importing 5 thousand tons whereas in 2013/14 import amount has been increased to 75 thousand tons. In Brazil, imports have risen to 114 thousand tons from 45 thousand tons in 2000/01.



Source: IOC http://www.internationaloliveoil.org/

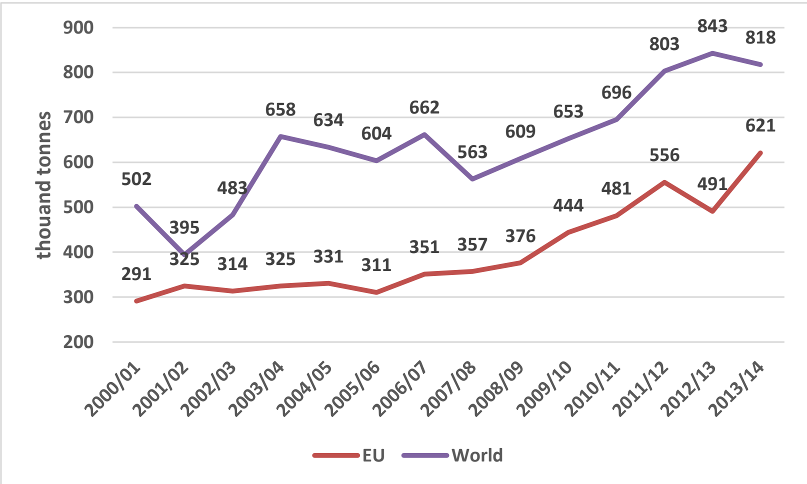
Figure 2.9 Share of Table Olives Exports, without intra EU trade



Source: IOC http://www.internationaloliveoil.org/

Figure 2.10 Share of Table Olives Imports, without intra EU trade

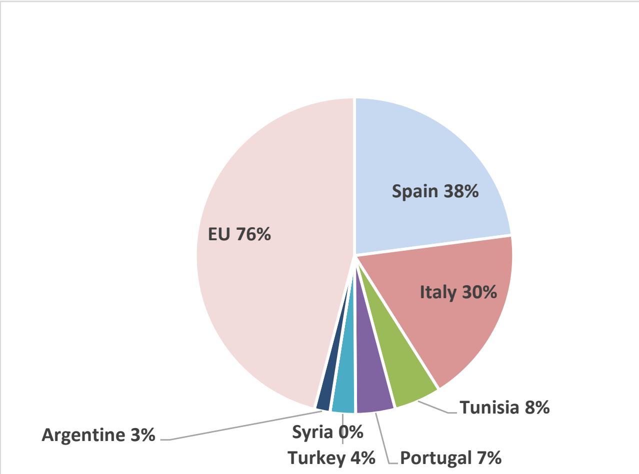
Total volume of world olive oil exports, without intra EU trade, has increased from around 500 thousand tons in 2000/01 to 843 thousand tons in 2013/14 (**Figure 2.11**).



Source: IOC http://www.internationaloliveoil.org/

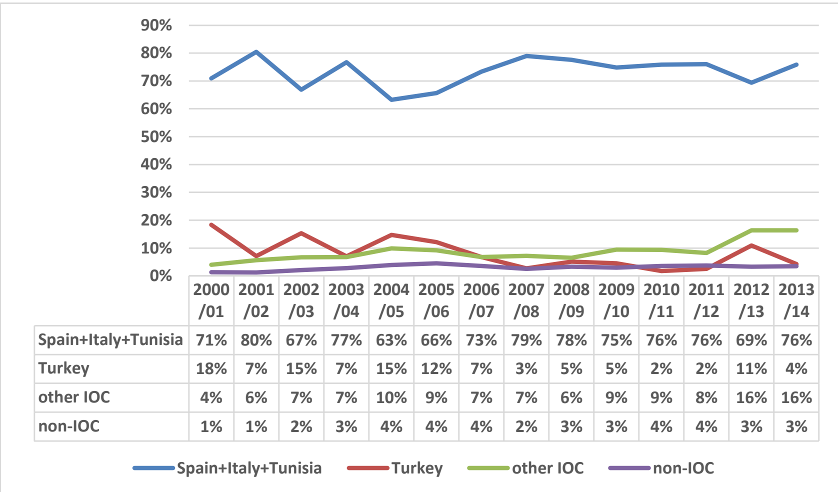
Figure 2.11 Olive Oil Exports, without intra EU trade

This increase is mainly arising from the olive oil exports of the EU countries. As of 2013/14, 76 % of olive oil exports belong to EU countries, mainly Spain and Italy who have a total share of 68 % (**Figure 2.12).**



Source: IOC http://www.internationaloliveoil.org/

Figure 2.12: Olive Oil Exports in 2013/14, without intra EU trade

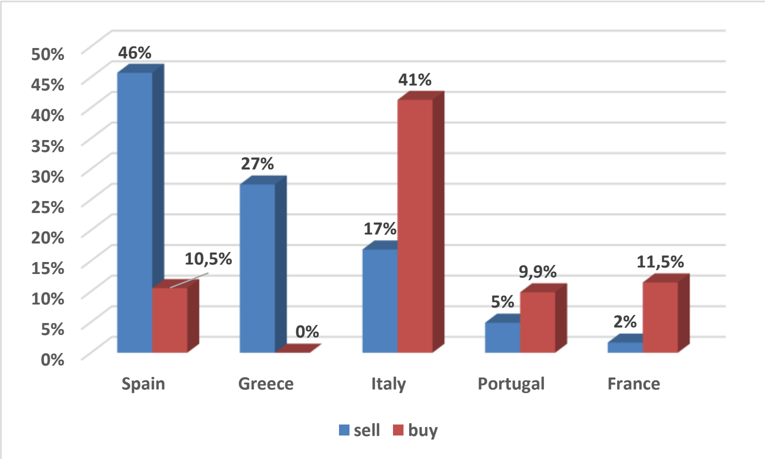


	2000 /01	2001 /02	2002 /03	2003 /04	2004 /05	2005 /06	2006 /07	2007 /08	2008 /09	2009 /10	2010 /11	2011 /12	2012 /13	2013 /14
Spain+Italy+Tunisia	71%	80%	67%	77%	63%	66%	73%	79%	78%	75%	76%	76%	69%	76%
Turkey	18%	7%	15%	7%	15%	12%	7%	3%	5%	5%	2%	2%	11%	4%
other IOC	4%	6%	7%	7%	10%	9%	7%	7%	6%	9%	9%	8%	16%	16%
non-IOC	1%	1%	2%	3%	4%	4%	4%	2%	3%	3%	4%	4%	3%	3%

Source: IOC http://www.internationaloliveoil.org/

Figure 2.13 Olive Oil Exports since 2000/2001, without intra-EU trade

Spain, Italy and Tunisia, the three main exporter countries, have a total share of around 75 % of the World export market, without intra EU trade (**Figure 2.13**).

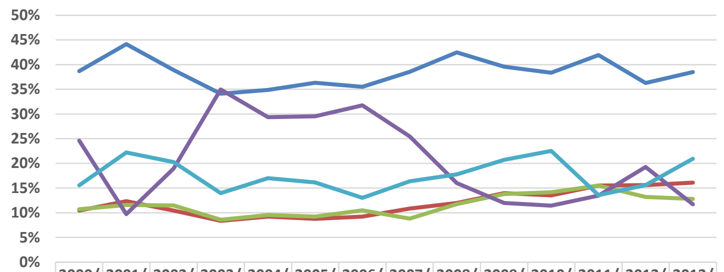


Source: Eurostat

Figure 2.14 Intra EU trade in 2012/13 as share of total volume

The Intra-EU trade volume has increased to around 800 thousand tons in 2012/13 from 600 thousand tons in 2000 (**Figure 2.14**). In intra-EU market, Spain and Greece are net sellers and Italy, Portugal and France are net buyers.

If we consider EU as one market and ignore intra-EU trade, USA has been the world's largest market for imports of olive oil (**Figure 2.15**)

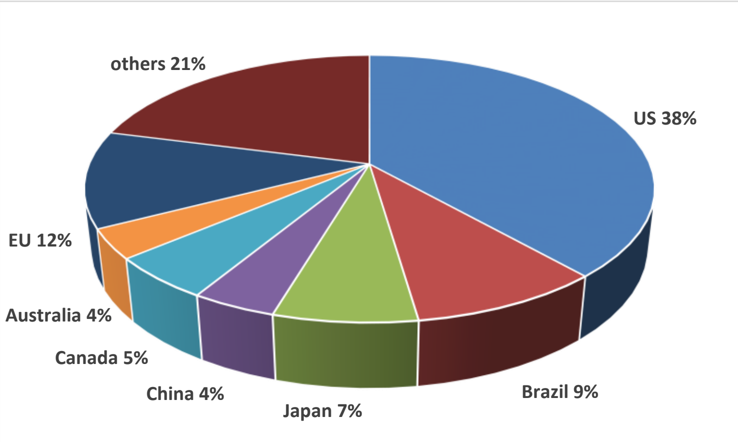


	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
USA	39%	44%	39%	34%	35%	36%	35%	39%	42%	40%	38%	42%	36%	38%
Brasil+Japan	10%	12%	10%	8%	9%	9%	9%	11%	12%	14%	14%	16%	16%	16%
China+Canada+Australia	11%	12%	11%	9%	10%	9%	11%	9%	12%	14%	14%	16%	13%	13%
EU	25%	10%	19%	35%	29%	30%	32%	25%	16%	12%	11%	13%	19%	12%
Others	16%	22%	20%	14%	17%	16%	13%	16%	18%	21%	23%	14%	16%	21%

Source: IOC http://www.internationaloliveoil.org/

Figure 2.15 Share of Olive oil Imports since 2000/01, without intra-EU trade

In 2013/14, the share of USA has been 38 %. Brazil, Japan, Canada, China and Australia are other significant consumers, which have a total share of 29 % in 2013/14 (**Figure 2.16**). In the World market, the share of olive oil categories according to product quality is changing as well. The share of higher quality virgin olive oil is becoming more significant.

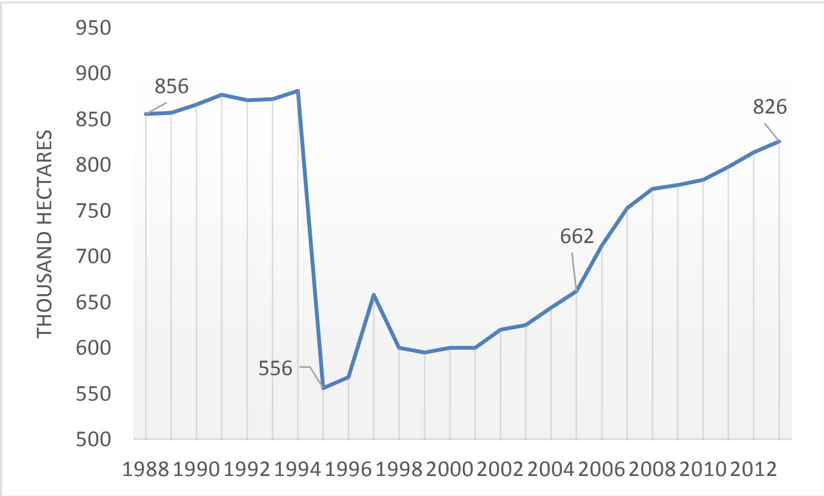


Source: IOC http://www.internationaloliveoil.org/

Figure 2.16 Share of Olive oil Imports in 2013/14, without intra-EU trade

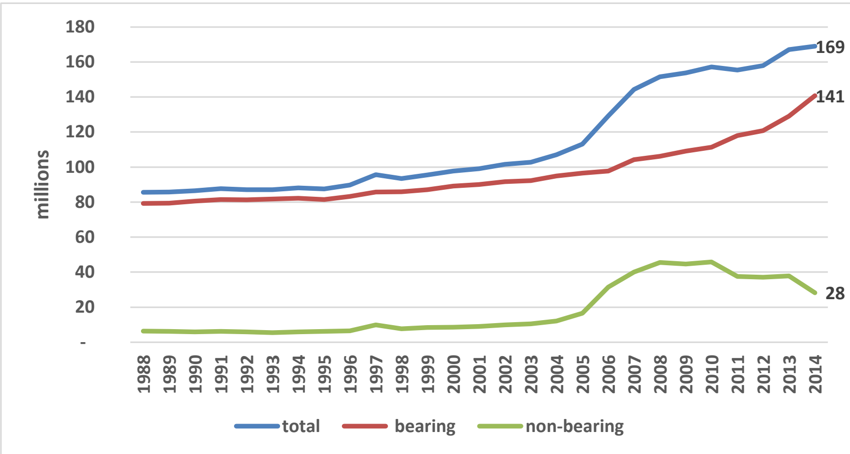
2.3 Current Situation of the Olive and Olive Oil Sector in Turkey

In Turkey, as of 2013, 826 hectars of land, which is around 2 % of the total agricultural land, is dedicated to olive production (**Figure 2.17**). At the beginning of 1990s, this area was around 870 hectars. Olive cultivation area has shrunk almost 40 % in 1990s, with rapid opening of olive orchards to urbanization. Starting from the beginning of 2000s, the area dedicated to olive orchards has extended to its former levels with support policies of the government. As of 2014, there are 169 million olive trees, of which 83 % is olive bearing (**Figure 2.18**).



Source: TÜİK www.tuik.gov.tr

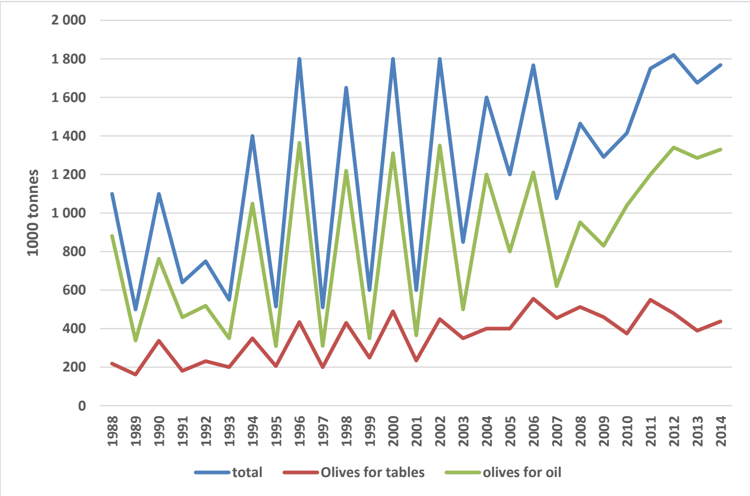
Figure 2.17 Area of Olive Cultivation in Turkey



Source: TÜİK www.tuik.gov.tr

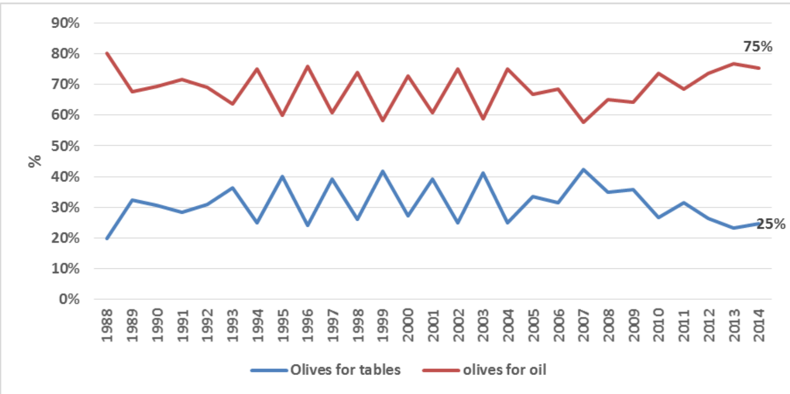
Figure 2.18 Number of Olive Trees in Turkey

Since 2004, the share of olive bearing trees fell from a level of 90 % because of the newly established orchards in the last decade. In 2014, around 1.8 million tons of olives are harvested, of which almost ¼ of it is used for table olive production and ¾ for olive oil production (**Figure 2.19, Figure 2.20**). When we look at the trend of olive production, we can easily see the high periodicity, which is one of the main problems in Turkey.



Source: TÜİK http://www.tuik.gov.tr/PreTabloArama.do

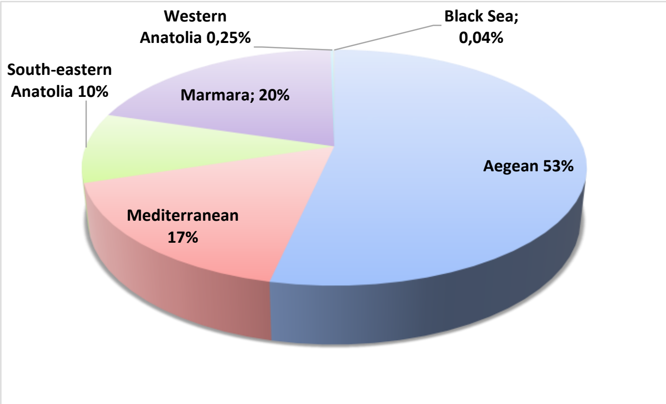
Figure 2.19 Olive production of Turkey, 1988-2014



Source: TÜİK http://www.tuik.gov.tr/PreTabloArama.do

Figure 2.20 Distribution of olives for table olives and olive oil, 1988-2014

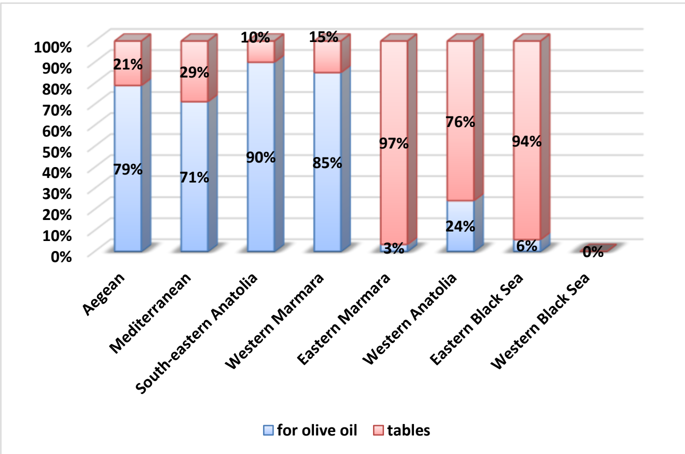
Olives are grown mainly in four regions of Turkey: Aegean, Marmara, Mediterranean and South-Eastern Anatolia regions. There is also some production in microclimates of Black Sea and Western Anatolia regions. The 53 % of olive plantation area is in the Aegean Region (**Figure 2.21**). Marmara (20 %), Mediterranean (17 %) and South Eastern Anatolia (10 %) are the consecutive regions those have the largest plantation areas.



Source: TÜİK http://www.tuik.gov.tr/PreTabloArama.do

Figure 2.21 Share of Regional Olive Plantation Area

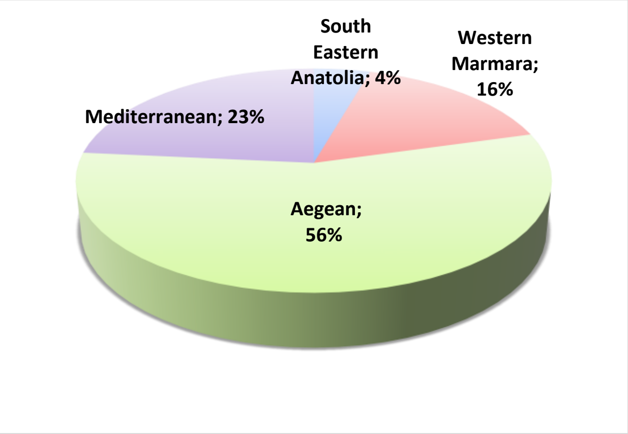
In Aegean Region 79 % of the olive production is used for olive oil and 21 % for table olives in 2014 (**Figure 2.22**).



Source: TÜİK http://www.tuik.gov.tr/PreTabloArama.do

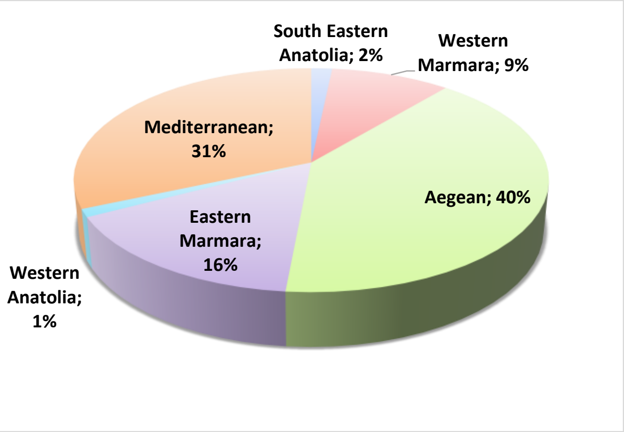
Figure 2.22 Regional Distribution of Olives for Table Olives and Olive Oil, 2014

The western and eastern parts of Marmara region have different specializations. In Western Marmara 85 % of olives are used for olive oil production whereas in Eastern Marmara region 97 % of olives are used for table olives in 2014. In Mediterranean and South Eastern regions, olive oil production is more dominant. As of 2014, Aegean region supplies 56 % of olives for olive oil production and 40 % of olives for table olives (**Figure 2.23, Figure 2.24**).



Source: TÜİK http://www.tuik.gov.tr/PreTabloArama.do

Figure 2.23 Regional Share of Olive Production for Olive Oil, 2014

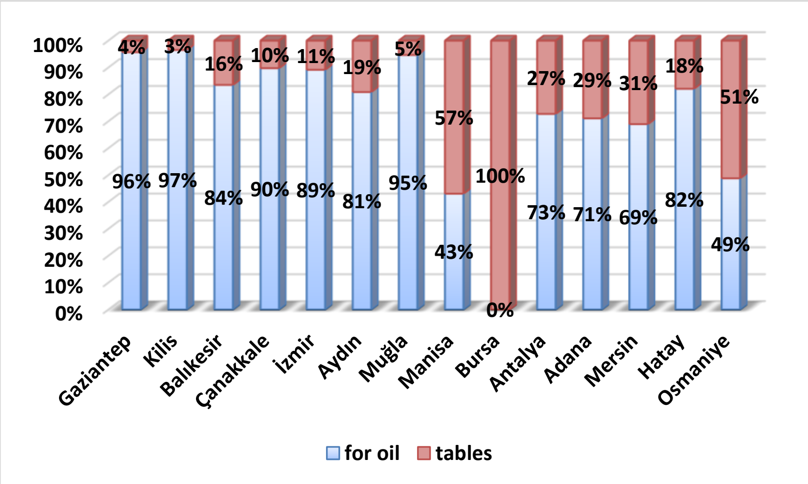


Source: TÜİK http://www.tuik.gov.tr/PreTabloArama.do

Figure 2.24 Regional Share of Olive Production for Table Olives, 2014

Mediterranean region comes second with 23% of olive production for olive oil and 31 % for table olives production. Western Marmara is third in olives for olive oil. In 2014 Eastern Marmara supplied 16 % of olives for table olives whereas Western Marmara 9 %.

In 2013, Aydın province in Aegean region is the leading producer of olives for olive oil with a share of 21 % of the total olives produced for olive oil **(Figure 2.25)**. İzmir (16 %) in Aegean region, Hatay (11 %) in Mediterranean region and Gaziantep (9 %) in Southeastern Anatolian region are the following largest producer provinces of olives for olive oil.

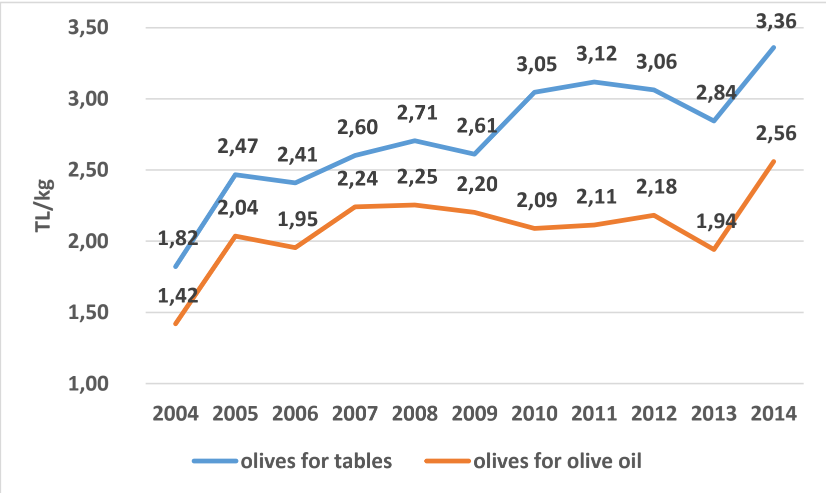


Source: TÜİK http://www.tuik.gov.tr/PreTabloArama.do

Figure 2.25 Distribution of Olive Production in Provinces, 2014

For table olives, Bursa province in Eastern Marmara region, leads with a share of 22 % total olive production for table olives. Aegean region provinces, Manisa (20 %) and Aydın (15 %) have the consequent largest shares. Mersin province in the Mediterranean region also has a significant share of 9 % of olives for table olive production.

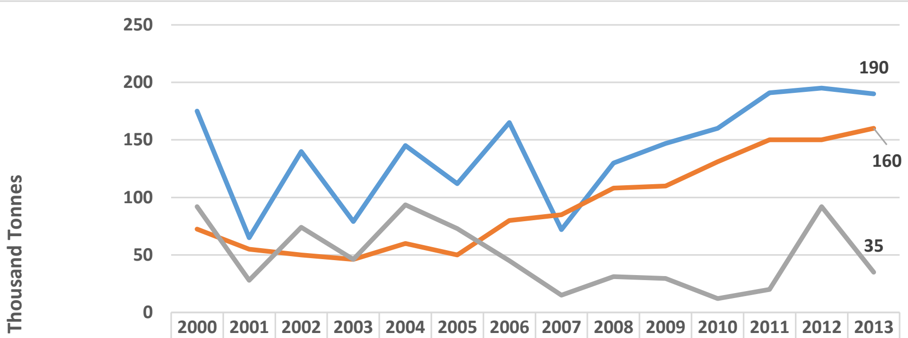
Average producer prices for olives for tables are higher than olives for olive oil (**Figure 2.26**). In fact, this reflects the higher harvesting costs of the previous one. Price gap has also increased to around one TL/kg since 2010.



Source TÜİK: http://tuikapp.tuik.gov.tr/tarimsalfiyatapp/tarimsalfiyat.zul

Figure 2.26 Average Producer Prices for Olives 2000-2014

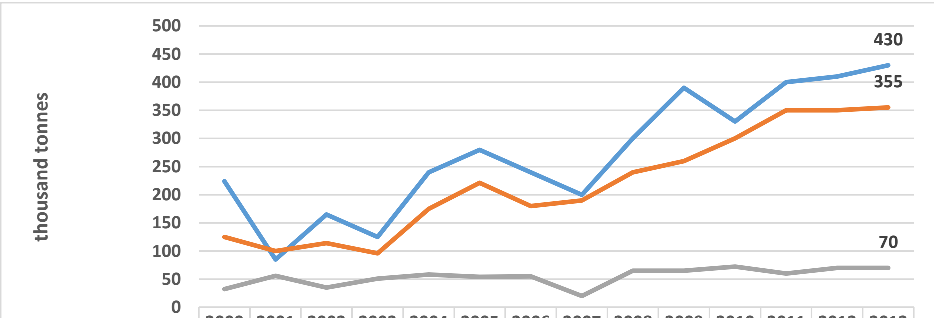
In Turkey both production and consumption levels of olive oil and table olives are increasing significantly. In the last years, on average, 80 % of olive oil production and around 90 % of table olives production are consumed domestically **(Figure 2.27, Figure 2.28)**.



	2000 /01	2001 /02	2002 /03	2003 /04	2004 /05	2005 /06	2006 /07	2007 /08	2008 /09	2009 /10	2010 /11	2011 /12	2012 /13	2013 /14
production	175	65	140	79	145	112	165	72	130	147	160	191	195	190
consumption	72,5	55	50	46	60	50	80	85	108	110	131	150	150	160
exports	92	28	74	46	93,5	73	45	15	31	29,5	12	20	92	35

Source: IOC http://www.internationaloliveoil.org/

Figure 2.27 Olive Oil Production, Consumption and Exports 2000/01-2013/14

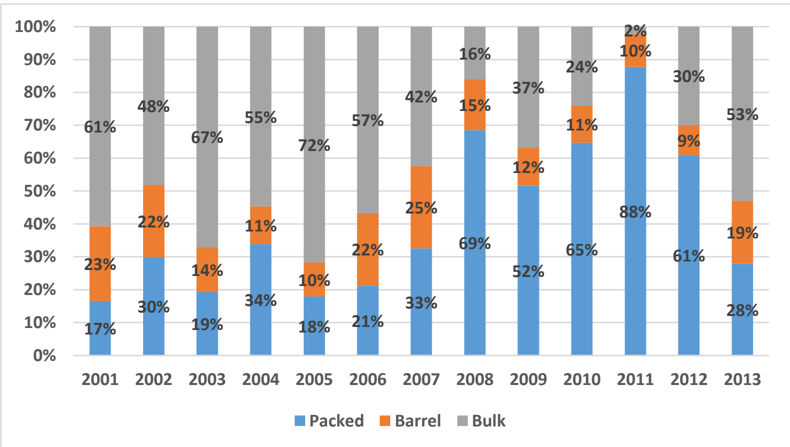


	2000 /01	2001 /02	2002 /03	2003 /04	2004 /05	2005 /06	2006 /07	2007 /08	2008 /09	2009 /10	2010 /11	2011 /12	2012 /13	2013 /14
production	224	85	165	125	240	280	240	200	300	390	330	400	410	430
consumption	125	100	114	96	175	221	180	190	240	260	300	350	350	355
exports	32	56	35	51	58	54	55	20	65	65	72	60	70	70

Source: IOC http://www.internationaloliveoil.org/

Figure 2.28 Table Olive Production, Consumption and Exports 2000/01-2013/14

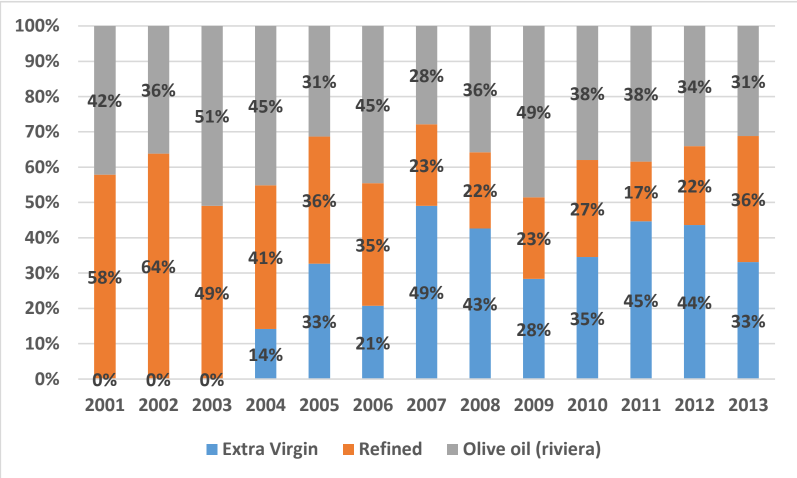
Olive oil consumption level shows a significant rise starting from 2006. It has doubled with from 80 thousand tons in 2006 to 160 thousand tons in 2013/14 season. Olive oil exports do not show the same increasing trend of production and consumption. The level of olive oil exports has fallen since 2006 below the level of first half of 2000s. The table olive exports trend is rather stable, as more or less the excess of consumption amount is exported.



Source: EİB http://www.egebirlik.org.tr/

Figure 2.29 Olive Oil Exports by Type of packing (January-December)

When we look at the trend of olive oil exports by type of packing, starting from 2005, we see a significant rise of packed olive oil exports against bulk olive oil exports (**Figure 2.29**). Same improvement can be seen in higher quality olive oil exports as well (**Figure 2.30**). Though fluctuating between virgin and Riviera olive oil, the total share of virgin and riviera olive oils in total olive oil exports has increased from 64 % in 2005 to 83 % in 2011.

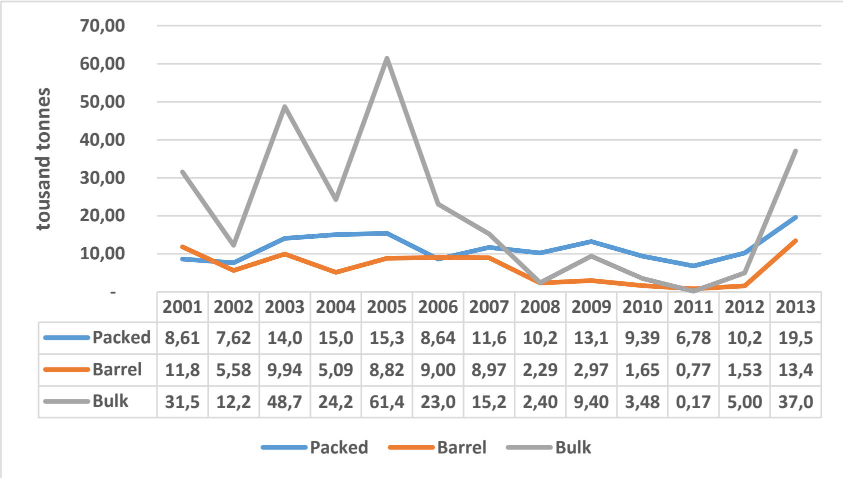


Source: EİB http://www.egebirlik.org.tr/

Figure 2.30 Olive Oil Exports by Quality (January-December)

The rising trend of high quality and packed olive oil exports has been reversed in 2011. The share of bulk olive oil has increased significantly, to 53 % in 2013. Moreover, the share of higher quality olive oils (extra virgin and Rivera) has dropped to 78 % in 2012 and to 64 % in 2013.

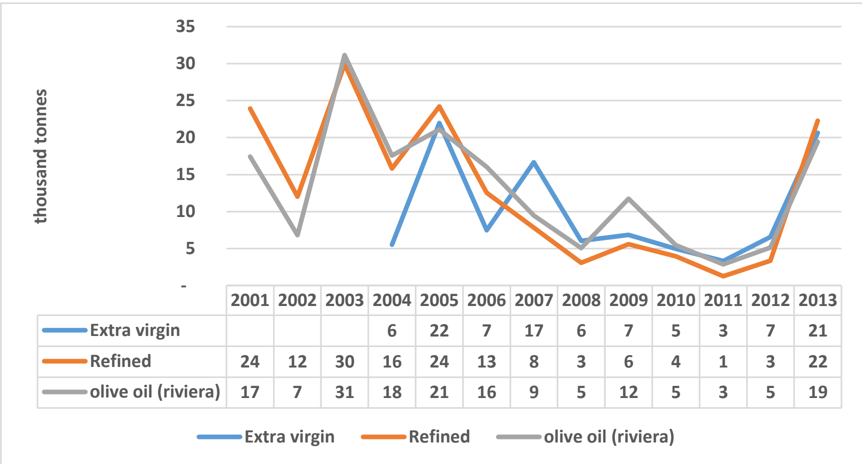
These changes are not due to a fall in the export amount of the smaller packed and higher quality olive oils, but rather very sharp increase in the export amount of bulk olive oil and sharper increase in the refined olive oil in the last years (**Figure 2.31, Figure 2.32**).



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Packed	8,61	7,62	14,0	15,0	15,3	8,64	11,6	10,2	13,1	9,39	6,78	10,2	19,5
Barrel	11,8	5,58	9,94	5,09	8,82	9,00	8,97	2,29	2,97	1,65	0,77	1,53	13,4
Bulk	31,5	12,2	48,7	24,2	61,4	23,0	15,2	2,40	9,40	3,48	0,17	5,00	37,0

Source: EİB http://www.egebirlik.org.tr/

Figure 2.31 Olive Oil Exports Volumes by Type of Packing (January-December) 2011-2013



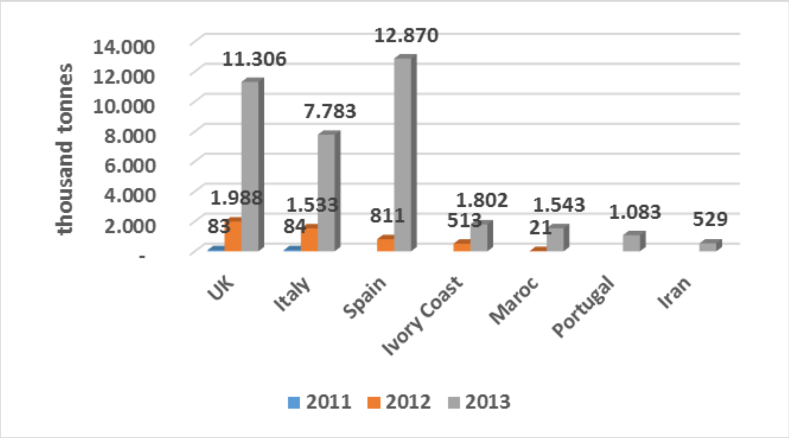
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Extra virgin				6	22	7	17	6	7	5	3	7	21
Refined	24	12	30	16	24	13	8	3	6	4	1	3	22
olive oil (riviera)	17	7	31	18	21	16	9	5	12	5	3	5	19

Source: EİB http://www.egebirlik.org.tr/

Figure 2.32 Olive Oil Export Volumes by Quality (January-December) 2011-2013

Bulk olive oil exports increased from around 170 tons in 2011 to 5 thousand tons in 2012 and 37 thousand tons in 2013. Main reason behind this increase is the significant rise of the EU demand. In 2013, the productivity of Spain fell down sharply because of drought.

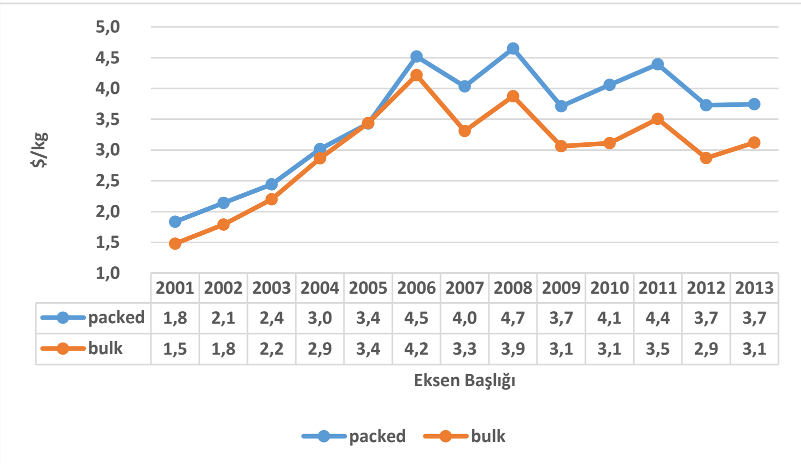
Regarding the change from 2011 to 2013, almost 89 % is coming from EU countries, mainly from Spain and 9 % is from Morocco, Ivory Coast and Iran (**Figure 2.33**).



Source: EİB http://www.egebirlik.org.tr/

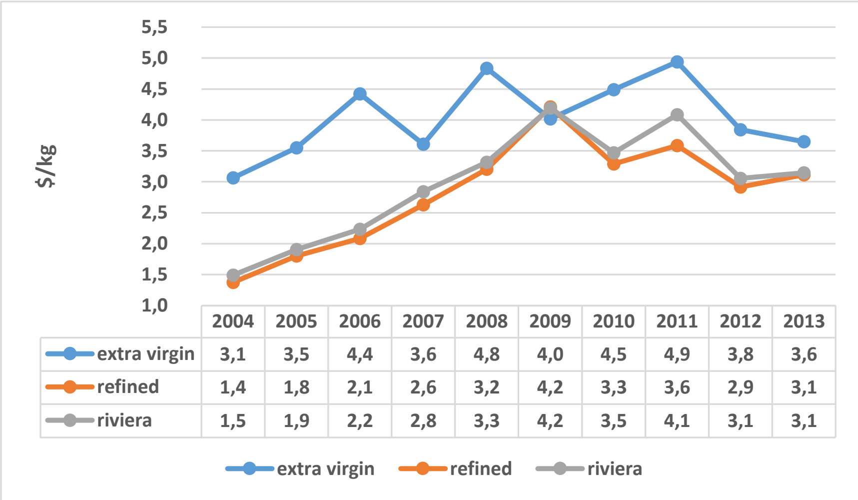
Figure 2.33 Bulk Olive Oil Exports by Country, 2011-2013

Export prices of the packed and extra virgin olive oil are higher than then other type of oils (**Figure 2.34, Figure 2.35**).



Source: EİB http://www.egebirlik.org.tr/

Figure 2.34 Olive Oil Average Export Prices by Type of Packing, 2011-2013



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
extra virgin	3,1	3,5	4,4	3,6	4,8	4,0	4,5	4,9	3,8	3,6
refined	1,4	1,8	2,1	2,6	3,2	4,2	3,3	3,6	2,9	3,1
riviera	1,5	1,9	2,2	2,8	3,3	4,2	3,5	4,1	3,1	3,1

Source: EİB http://www.egebirlik.org.tr/

Figure 2.35 Olive Oil Average Export Prices by Type of Quality, 2011-2013

2.4 Main Global Institutions

The regulatory environment of olive and olive oil sector is mainly framed by:

- International Olive Oil Agreement,
- EU regulations and policies,
- Food standards set by World Health Organization (WHO) and Food and Agricultural Organization (FAO),
- International trade agreements of World Trade Organization (WTO) and bilateral trade agreements

International Olive Oil Agreement and International Olive Oil Council (IOC): First International Olive Oil Agreement was adopted in 1956. The agreement was revised 5 times and the last version "International agreement on Olive Oil and Table Olives, 2005" is currently in practice[26].

IOC administers the agreement and it is the world's only international intergovernmental organization in the field of olive oil and table olives[27]. Main responsibilities of IOC[28] include international technical cooperation on R&D projects, training and the transfer of technology, promoting world consumption of olive oil and table olives via campaigns and action plans, dissemination of information and statistics, enabling members to meet regularly to discuss the sector and to set priorities for IOC action.

EU Regulations and Policies: In EU, in addition to general European legislation affecting food industry and European environmental legislation, there are specific legislations directly related to olive industry.

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[26] http://www.internationaloliveoil.org/estaticos/view/101-basic-texts

[27] Initially, International Olive Oil Council (IOOC) was established in Madrid under the auspices of United Nations (UN). The IOOC has been restructured into International Olive Council (IOC) in 2006.

[28] http://www.internationaloliveoil.org/estaticos/view/100-mission-statement

Common Market Organization (CMO) of Agricultural Markets[29] in EU governs 21 agricultural sectors including olive and olive oil since 2008. Within this framework, there is a special regulation on common organization of the market in olive oil and table olives[30]. The regulation on the CMO in olive oil and table olives regulates internal market as well as trade with third countries. Previously, regulation on olive oil sector was a part of the common organization of the market in oils and fats, which was into use since 1966[31].

Historical roots of the present European olive oil policy go back to significant deficit in fats and edible oils of EC-6 in early 60s (Drogué 2006 p.3). First CMO for fats and oils of 1966 was created in this context. Accession of main olive producers in EU (Greece in 1981, Spain and Portugal in 1986) affected the course of the EU regulations. EU was transformed from being a net importer to a net exporter and become the key player in the world trade of olive oil (EC 2002 p.2). The CMO has been amended in 1984, 1998, 2001, in accordance with the Common Agricultural Policy (CAP) reforms.

The CAP is the main EU policy instrument that has an impact on the agricultural sector and it represents the largest allocation of funds, around 40 %, transferred centrally through the EU budget. Since 1992, the CAP is shifting away from product-based support towards producer support with more considerations for the environment.

In 2003, the CAP was reformed aiming to make EU agriculture more market oriented and competitive. In this framework, most important change was the decoupling of subsidies from production. Single farm payment is introduced to ensure the stability of farmers'

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[29] Council Regulation (EC) No 1234/2007 of 22 October 2007 establishing a common organization of agricultural markets and on specific provisions for certain agricultural products. http://europa.eu/legislation_summaries/agriculture/agricultural_products_markets/l67001_en.htm

[30] http://europa.eu/legislation_summaries/agriculture/agricultural_products_markets/l11090_en.htm

[31] http://europa.eu/legislation_summaries/other/l11054_en.htm see European Commission (2002) "The Olive Oil Sector in the European Union" which gives an overview of EU olive oil policies until 2003 CAP reform http://ec.europa.eu/agriculture/publi/fact/oliveoil/2003_en.pdf and Drogué (2006) that analyses the evolution of the common olive oil CMO and policies of EU since the signature of the Uruguay Round Agreement on Agriculture (URAA) in 1994 till the CAP reform 2003.

incomes. The subsidy could remain linked to olive production (max 40 %) as olive grove payment so that olive farming is done in a socially and environmentally sustainable way. Thus, with the 2003 CAP the 'cross-compliance principle' became obligatory: the CAP payments are linked to the meeting of certain minimum requirements and standards related to the environment, animal welfare, agricultural and environmental condition of the land.

In 2013 CAP reform, policy changes continued along the 1992 - 2003 reform path that moves from product to producer support with stronger emphasis on environmental considerations[32]. Moreover, CAP 2013 reform has more territorial approach. In 2013 CAP reform, that is effective for 2014-2020 period, most part of the direct payments targets new entrant young farmers, small farmers, environment, areas with natural constraints. In addition, improved legal framework for producer cooperation and aid for setting up producer groups are among the new objectives.

Latest CAP reforms have a special focus on improving quality, specifically on the olive oil sector. In 2000, the EC published a communication called "the quality strategy for olive oil" and set out a plan for enhancing the quality of European olive oil. Also, the "Action Plan for the Olive Oil Sector" which was announced in 2012, during the discussions of 2013 Cap reform, targets the quality and its control in order to maintain product quality and positive image of the EU olive oil.[33] Some measures of CAP include the improvement of the intrinsic quality (organoleptic, sensorial parameters), combating fraudulent mixtures, and new rules on labelling in order to provide more information to customers. Many protected extra virgin olive oils (PDO, PGI)[34] are recognized by EU for this aim (Mili 2009 p.227).

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[32] See http://ec.europa.eu/agriculture/cap-post-2013/index_en.htm ; European Commission (2013) "Overview of CAP reform 2014-2020" http://ec.europa.eu/agriculture/policy-perspectives/policy-briefs/05_en.pdf

[33] See "The Action Plan for the EU Olive Oil Sector" http://ec.europa.eu/agriculture/olive-oil/action-plan_en.pdf

[34] Three EU schemes known as PDO (protected designation of origin), PGI (protected geographical indication) and TSG (traditional speciality guaranteed) promote and protect names of quality agricultural products and foodstuffs.
http://ec.europa.eu/agriculture/quality/schemes/index_en.htm

Food Quality Standards: The Codex Alimentarius Commission (CAC)[35] is an intergovernmental body established by FAO and WHO in 1963 to implement the Joint FAO/WHO Food Standards Program. The objective of CAC is to protect the health of consumers and to facilitate the trade of food by setting international standards on foods, i.e. Codex Standards[36].

Another mostly adopted and therefore binding international quality standard is the group of EN ISO 9000 standards developed by International Organization for Standardization (ISO)[37]. These standards deal with quality assurance by defining the principles of quality management systems of industries.

Hazard Analysis of Critical Control Points (HAACP) is another regulation related to food safety binding nations. HACCP deals with the prevention of food safety hazards (biological, chemical, physical) in production processes that can cause the finished product to be unsafe, rather than finished product inspection.

Regulations of the World Trade Organization (WTO): One of the main international agreements of the WTO is the Agreement on Agriculture (AoA) that binds national agricultural policies and international trade policies, therefore affect the competiveness of olive producer countries. The AoA has three pillars related to domestic support, market access and export subsidies.

The first pillar of the AoA, related to domestic supports, affects the national subsidy policies of its members. The AoA classifies subsidies into three boxes[38] depending on their effects on production and trade. This pillar has affected the course subsidy policy of EU, the main player in the olive and olive oil sector since 1980s. In the CAP reform 2003, EU agricultural subsidies are transferred to the "green box". Other pillars of AoA referring to the reduction

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[35] See http://www.codexalimentarius.org/

[36] http://www.codexalimentarius.org/codex-home/en/

[37] See http://www.iso.org/

[38] Amber (most directly linked to production levels), blue (production-limiting programs that still distort trade), and green (causing not more than minimal distortion of trade or production).

of tariff (or non-tariff) barriers to trade by WTO member-states affect the way tariffs applied to non-EU olive oil producers. Under WTO negotiations the EU agricultural export subsidies for olive oil has been eliminated since 1998.

Another WTO regulation that has influence on the olive sector is the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). According to TRIPS agreement, Geographical Indications (GIs) are indications, which identify a good as originating in the territory of a WTO member, or a region or locality in that territory, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin.

Bilateral Trade Agreements of non-EU Mediterranean Countries with EU: EU imports olive oil from non-EU Mediterranean countries under three regimes (Mili 2009, Mili and Mahlau 2005). These regimes make EU-Mediterranean trade more favorable for EU.

One of these regimes is the "Preferential Tariffs and Quotas Regime TQR" which defines quotas. As of 2014, Tunisia's quota is the most significant one with a quota of around 57000 ton whereas Turkey has a quota of 100 ton. Second regime is the "Inward Processing Regime IPR". From 60 % to 80 % of total EU imports under this regime is mainly from Tunisia and to a lesser extent from other countries such as Turkey, Morocco and Syria[39]. Usually quantities imported under this regime are high when EU production is low. Imports under IPR are mainly used for refining. Third regime is the "Most Favored Nation Regime MFN" in which ad-valorem equivalents are high (65 %-120 %) depending on the product category (Mili 2009).

2.5 Main Global Challenges to the World Olive and Olive Oil Sector

Most important trends which will influence olive and olive oil industry over the next decades should be known by sectoral actors in order to respond effectively at local and regional as well as international levels.

[39] Export tariff is around 1200 euro/tone. Tariff reduction for bulk oil is 10 % and packed oil is 5 % for Turkey.

Currently, there are some significant global trends, which shape the context and trajectory of world olive and olive oil sector. These trends are challenges to olive and olive oil sectoral actors as they may present both opportunities and threats. Moreover, these challenges present differing opportunities or threats for individual countries'. Hence, they should be considered while forming national policies and strategies. Most significant challenges are summarized as follows.

There are few nations, which are significant players in different segments of the world olive and olive oil market. As mentioned previously in figures, EU, mainly Spain and Italy, have leading position in the world production, consumption and international trade. Main producers of EU, Spain and Italy are also IOC member countries. The leading position of EU implies a determinant impact on the international olive oil pricing (Mili 2006 p.2). Besides, IOC non-member countries, the USA and other new-world countries, have an important share in the export markets.

Therefore, we may argue that the world market and the regulatory environment for the olive sector is shaped mainly by EU, Spain, Italy and some IOC non-member countries, mainly USA. As one of the significant producer countries, Turkey has a follower position in designing the international context.

Significant big industrial players are emerging in the global value chain as result of vertical and horizontal integration. Globalization and modernization of agro-food systems has been leading to the emergence of integrated food value chains and olive oil value chain is no exception to it (Mili 2013).

Some leading companies are strengthening their positions in the international markets by creating enterprises in different countries, by mergers and acquisitions[40]. Moreover, recent mergers and acquisitions of Spanish leading companies in 2013 created "a conglomerate with dominant positions in the entire process, from production to packaging and retail" in

[40] By this way, some EU companies have taken the advantages both in tangibles (technology, capital) and intangibles (brand, reputation, management) as well as the duty-free access possibility via enterprises in southern Mediterranean countries (Mili 2006 p.4).

the world market[41]. The production levels of many of the Mediterranean producer countries are not even comparable to their high volume of production and transaction. This creates challenges for the competitiveness of other producers in the international markets.

Furthermore, acquisition of Spain of brands associated with Italy is also an indicator of blurring of association of brands with particular producer countries and operation of large corporations without the constraints of national borders[42].

The bargaining power of the distribution sector is becoming stronger. The producer brands of extra virgin olive is proliferating, while large supermarket chains are introducing their brands and reducing the number of proprietary brands on their shelves (Field 2013). Stable collaborations between olive oil producing companies and large food distribution chains are increasing and the market share of distributor's brands is expanding at the expense producer brands (Mili 2006). This trend only favors large producers who can supply high volumes at low prices. This trend will further limit the proliferation of extra virgin olive oil brands, contribute to the concentration of power by the conglomerates, enhance market power of supermarkets to obtain olive oil at reduced prices and to control over the quality specifications of the oil bottled in their private labels products (Field 2013).

Specialization on specific, high- value market segments is becoming significant. Initiatives linking olive oil production to olive oil culture and tradition as well as regional aspects and tourism are taking more ground. Marketing of olive oil with geographical indications, supply

[41] For instance In March 2013, Spanish company Deoleo, formerly SOS group and the world's leading packed olive oil distributor, acquired the extra virgin olive oil brand and a bottling plant of the Hojiblanca Cooperative Group. In return, the Hojiblanca had an increased stake in Deoleo with two seats on its board. The Deoleo was already controlling the three of the world's top four olive oil labels- Bertolli, Carapelli and Carbonell. The Hojiblanca, the huge umbrella for 95 Spanish cooperatives mainly Andalusian, was already the world's biggest producer of extra virgin olive oil. See http://www.oliveoiltimes.com/olive-oil-business/deoleo-hojiblanca-merger-cleared/33641

Later on, in October 2013 Spain's giant Hojiblanca Cooperative Group has been renamed "Dcoop" after its merger with Tierras Altas, a Granada-based group of 15 olive oil mills. See http://www.dcoop.es/news/base-news/dcoop-the-new-name-of-hojiblanca-after-its-merger-with-tierras-altas/ Dcoop represents "de la cooperativa" which means in English "from the cooperative". Dcoop produces over 250,000 tons of olive oil and over 67,000 tons of table olives.

[42] http://www.oliveoiltimes.com/opinion/olive-oil-industry-megatrends/35603

of organic products, olive oil obtained with traditional milling systems are some examples for thee market segments (Mili 2006).

IOC and EU pay special attention to the promotion of Geographical Indications for olive oil and table olives. EU has a new regulation that is effective since 2003 which is part of a new set of policy initiatives embodied in “Europe 2020: A Strategy for smart, sustainable and inclusive growth”[43].

Different olive oil trade standards exist in the World, creating an ongoing debate over international standards[44]. There are international standards (Codex Alimentarius, IOC standards) as well as national standards (USA, Australia/NZ, Iran…). All of these standards contain definition of different categories of olive oils, purity criteria, quality criteria including organoleptic characteristics, method of analysis and sampling. Some of these standards cover olive oil standards on food additives, contaminants, hygiene, packing and labelling. For instance, IOC standards cover all whereas US standards cover only contaminants. Standards are needed to guarantee the olive oil quality, purity or authenticity. The challenge is that the standards should be broad enough to allow product diversification but narrow enough to protect against fraud and adulteration (USITC 2013). In the last decades, emergence of new-world producers such as USA, Australia, increase in olive oil consumption and the brands of extra virgin olive oil intensified the discussions on quality and certification.

Even though there are many standards for olive oils, frauds in the olive oil sector is still a major problem. Current international standards for extra virgin olive oil allow different olive oil qualities to be marketed as extra virgin. There are many olive oil grading standards at international and national levels, but only few governmental bodies enforce these standards along with sanctions for noncompliance (USITC 2013). Variety of global standards and weak enforcement mechanisms have been leading to fraudulent practices, adulteration

[43] http://ec.europa.eu/europe2020/index_en.htm

[44] See proceedings of the workshop of olive oil authentication of the European Commission in 2013 at http://ec.europa.eu/agriculture/events/2013/olive-oil-workshop/proceedings_en.pdf

and mislabeling in the olive oil sector[45]. The quality standards led to emergence of better methods of detection. Current detection methods can combat with common frauds, but their sufficiency is arguable as frauds are getting more complicated.

Australian Olive Oil Association already developed its own set of standards for domestic olive oil. These standards include new chemical tests in addition to stricter labeling requirements. There is an ongoing discussion of new grading and labelling standards in USA, the proposal of California region[46], which do not comply with IOC standards. The argument behind this standards change proposal was the weakening of the competitiveness of US produced olive oil in the US market. The broad and mostly unenforced standards lead to adulterated and mislabeled products, weakening the consumer trust in US olive oil.

In the last years, new world producers have also become very active in exposing non-compliance. These activities led main producers to take actions. Currently, IOC has primacy in setting of olive oil classification standards as well as controlling compliance. EU has taken an increasing role in assuring compliance. For instance, IOC has launched an international research project on olive oil authentication in 2013 with the aid of EU Horizon2020 funding.

Different product and quality categories are creating ambiguity in the international market statistics. According to IOC standards, there are 9 different grades for olive oils used by 17 member countries: 4 different grades for virgin olives, 2 different grades for olive oils, 3 different grades for pomace olive oils. CODEX, US, EU, AUST/NZ has 3 grades for virgin olives. CODEX ignores lampante virgin olive oil whereas US, EU, AUST/NZ ignore ordinary virgin olive oil.

Only harmonized statistics on olive oil can be produced by World Customs Organization under three different categories of olive oil: virgin olive oil, olive oil and olive pomace oil.

[45] http://www.oliveoiltimes.com/tag/olive-oil-fraud

[46] http://www.oliveoiltimes.com/olive-oil-business/north-america/testimony-proposed-california-olive-oil-standards/40583

Therefore, the share of virgin olive oils according to different grades (e.g. extra-virgin olive oil) cannot be traced[47].

Olive and Olive Oil Agreement of IOC, is on the international table for renewal. International Agreement on olive oil and table olives will be expiring on 31 December 2014. Debates within the IOC on the new agreement led to the prolongation of the agreement for one more year, with the proposal of EC[48]. The debate on standards, the inaccuracy of olive oil production and efficiency of trade statistics would probably be among main issues for discussion.

In the debate on standards of extra virgin olive oil, there are differences in the opinions between New World and Old World Mediterranean producers, as well as between premium and lower-quality olive oil producers (USITC 2013). Lobbying power of different groups among the IOC members on the defining of standards of IOC as well as the possible membership of USA or other significant non-IOC member consumer countries would shape the new IOC agreement.

The EU CAP reforms is incrementally changing the trajectory of the olive and olive sector in a radically different way. Currently EU olive producers are receiving significant financial support through a variety of CAP programs: decoupled direct income payments to farmers, subsidies for storage, support for rural development programs, quality improvement initiatives. Among these, direct payments are providing the most important part of the support.

Though the high dependency of EU producers on public subsidies still exists, the level and the direction of subsidies have changed along with the course of CAP reforms. Before 2003,

[47] IOC members are not required to notify more detail figures. Some detailed data is available for some countries. For instance, European Union distinguishes virgin lampante oil within its production and imports whereas USA and Canada distinguish their imports according to bulk and packed category.

[48] The IOC Council of Members can prolong the agreement “for not more than two periods of up to two years each”.

the subsidies enhanced mass production with negative environmental effects. Later on the direction of subsidies turned to quality improvements with environmental considerations.

The CAP reforms adopted by the EU in 1984 and 1998 encouraged unsustainable farming practices (EUROMED 2008). These CAP reforms were the main cause of the great expansion of olive oil production and technological changes in olive oil processing in Europe. Agricultural subsidies were directly coupled to the level of production. Aggressive production as result of these subsidies led to high density planting of olive trees, introduction of intensive farming practices and industrial-scale processing of the olive oil (EC 2010). Irrigation became vital, intensive irrigation practices aggravated water scarcity, caused soil erosion and desertification, combined with the intensive use of chemicals and pesticides polluted the ground and surface waters (Beaufoy 2001a, 2001b; EUROMED 2008; EC 2010). Though the negative effects of CAP subsidies outweighed benefits, the CAP of 1980s and 1990s were successful in the making of olive oil sector a significant economic activity in EU (EUROMED 2008).

Arguably, the trends in CAP reforms may affect Spain more significantly. The coupled payments of previous CAPs transformed Spain's traditional olive plantations into high density and super high-density plantation transforming poly-culture areas to monoculture olive plantations. Spain has been more locked into mass production farming practices and processing technologies. The benefits of this technological lock-in were high in the previous years, but current costs may be high. The striking fall in the production of Spain in 2013 can be interpreted as the result of this technological lock in which depends on high irrigation. Increasing environmental concerns and stringent payments of the CAP 2013 may make things harder. Therefore, current CAP reform may be an opportunity for traditional producers as it slows down the subsidies leading to aggressive intensive production.

2.5 Main Domestic Challenges to Turkish Olive and Olive Oil Sector

Facing global challenges similar to other olive producer countries, Turkish olive and olive oil sector has its own domestic problems inhibiting its product quality and productivity. Since the beginning of the 2000s, along with the efforts to improve olive sector in Turkey, many research studies evaluated the trends and problems in the olive and olive oil sector in Turkey.

A group of studies aimed to highlight main sector wide problems: TBMM (2008)[49] thoroughly analyze the problems related to knowledge infrastructure, olive and olive oil production as well as the regulatory environment and defines areas for policy action. Öztürk, Yalçın and Dıraman (2009) make an overall economic assessment of the Turkish olive oil sector, but more specifically assess and suggest solutions to the problems related to olive production, olive oil consumption and technical efficiency of olive processing. Tunalıoğlu (2010a) summarizes historical evolution of olive growing in the World since the ancient times and in Turkey mainly in the last two centuries; evaluates the economic situation and main policy improvements in Turkey, including support policies. Özkaya et al. (2010) make an overall assessment in many respects, the goals of olive sector and the problems those inhibit the productivity and quality in olive sector. Özışık and Öztürk (2011) make a comparative analysis of olive sector in Turkey and other main olive producer countries. They apply SWOT analysis to highlight necessary policy implications to improve the existing situation of olive sector in Turkey.

Some studies focused on the consumption patterns and evaluated possible reasons behind the low level of olive oil consumption: Tunalıoğlu et al. (2003) evaluate consumption patterns in the World and Turkey for the period of 1990-2002, the role of IOC and EU policies in the increasing trend of the World consumption. They assess the factors behind the low consumption levels in Turkey and suggest policies to improve it. Tiryaki ve Akbay (2005) assess consumption patterns of Turkish families, which belong to different socio-economic groups and find the differences significant. Tunalıoğlu (2006) evaluates consumption patterns in the World and Turkey, underlining the fact that traditional producer countries are also main consumers of olive oil, except Turkey. Tunalıoğlu (2009) evaluates the changes in olive sector marketing policies during the period 2000-2010. Though there are important supports via production, export and import policies, there has been no policy effort to increase domestic consumption and to overcome the structural problem of the sector. Polat (2011) analyze factors affecting the consumer behavior in the

[49] A research commission for the National Assembly was established to sort out the problems in the olive and olive oil sector and to propose on policy solutions. After 4 months of thorough analysis with related institutions as well as study visits to meet with the sector representatives, producers and farmers, the report was prepared and presented to General Assembly.

food oil industry in Turkey, including olive oil. The study indicates health concerns as the primary factor in Turkish consumers' food oil choice and the olive oil. Therefore, the emphasis on health would be a successful strategy for product development and marketing. Tunalıoğlu et al. (2012**)** analyze consumer behaviors on olive consumption in Aydın region with an aim to reveal the potential reasons behind the low level of olive oil consumption in Turkey.

The quality and capacity of olive sapling production, main upstream industry of olive sector, has been scrutinized: Özkaya (2003) discusses the role of the supply of high quality and certified olive sapling on olive quality and productivity. He points out problems and solutions related to the olive sapling production. Özışık et al. (2012) discuss the importance of certified sapling use in olive production as well as inefficiencies such as fluctuations in olive sapling production and number of producers along with frequent changes in the government support policies and regulations during the last decade.

The focus of some studies was the technical (in) efficiency of olive production and processing: Tunalıoğlu and Gökçe (2002) evaluate olive cultivation in Aegean region and problems inhibiting optimal spread of olive plantation area. In addition to the assessment of difficulties arisen from socio-economic, land ownership and geographical conditions, the problems that olive producers face during olive orchard formation, olive cultivation and marketing are identified. Gökçe (2003) assesses quality and productivity problems related to olive and olive processing sector arising from olive cultivation and production stages. One of the conclusions is that instead of extension of the olive plantation area, improving the productivity of existing olive orchards will be the rational solution for improving productivity and quality in olive processing sector. Işın and Koçak (2003) examine general characteristics of olive pressing plants for olive oil production located in İzmir province and compare different production techniques, continue, hydrolic and super pressing systems from the economic point of view. They conclude that continuous system is more profitable than other traditional systems for the sampled plants. Ergin (2006) evaluates quality problems related to olive production and processing, points out the weaknesses in marketing and in existing agricultural support mechanisms as the main factors behind the quality problems.

Tetik (2006) and Korukluoğlu (2006) assess the problems related to table olive production arising from olive production, processing and marketing. The technical inefficiency arising from small size of orchards, lack of qualified technicians in the processing stage, technological backwardness and high production costs preventing price competition are among their findings. Harp ve Keçeli (2008) study the effect of agricultural practices before, during and after harvesting, as well as the physical and knowledge infrastructure of table olive producers, on the quality of table olives.

Some studies indicated the role of cooperatives: Koç, Tunalıoğlu and Karahocagil (2004) point out the positive role of market share of cooperatives on olive producer prices and importance of long term, consistent policies for production to consumption of olive products. Anaç (2005) analyses olive production in the Edremit region and underlines the role of cooperatives as a solution for the existing problems that producers face collectively. Kendirlioğlu (2008) assesses producer satisfaction of the activities of TARİŞ Olive and Olive Oil Agricultural Sales Cooperatives and highlight differences between small and medium to large enterprises.

Policies of EU and Turkey on olive sector are assessed comparatively: Güldoğan (2006) assess the 2003 EU CAP reform, CMO of olive oil and changes in the Turkish regulations. Tunalıoğlu and Çobanoğlu (2012) evaluate the potential effects of recent EU policy changes and IOC policies, as well as recent improvements in the olive sector, on global competitiveness of Turkish olive oil sector. They suggest strategies to improve quality, productivity and competitiveness such as modernization of traditional olive production, increasing promotions, improving R&D activities. Toplu Yılmaz (2013) analyze agricultural support policies for olive sector in EU and in Turkey, and emphasize the important role of licensed storage system and production aid system for olive oil similar to that in EU to maintain price stability and income stability for farmers in Turkey.

Various aspects of domestic and international competitiveness of olive and olive oil sector are emphasized: Türkekul et al. (2007) analyze the competitiveness of Turkey in the markets of new world countries and underline the importance of production, organization and policies of foreign trade on competitiveness.

Tunalıoğlu and Özdoğan (2008) examine olive oil domestic and foreign market strategies, chain production, the significant role of quality and food safety system on olive marketing in Turkey. Olgun et al. (2008) analyze the factors affecting the tendency of shifting to organic production of the conventional farmers in the Aegean region. They find out that mostly small to medium size producers have this tendency and ready to shift if the marketing conditions are met. Taşkır ve Şimşek (2008) study factors that inhibit the institutionalization of the family establishments in Ayvalık region and conclude the problems related to branding and promotion are the most important factors in that process.

Tunalıoğlu (2010b) makes an evaluation of the implementation of food safety and quality regulations in Turkey and the role it plays in domestic and international markets of olive oil. The conclusion is that, although exports of the branded and packed olive oil are supported by government policies, Turkey is not competitive in international markets. This is mainly because of the lack of continuous production of high quality olive oil and the negative image of Turkish olive oil that has been established in the international markets due to adulteration of exports in the last decades. Günden et al. (2010) assess the role of brand, food quality and safety, price, incentives, productivity and efficiency as factors that are important for competitiveness both in the domestic and foreign markets. Türkekul et al. (2010a) assess the competitiveness of Turkey in comparison with main olive oil exporting countries over the 1990 and 2006 period. They cluster exporting countries into different groups according to their competitiveness levels. They indicate natural constraints like alternate bearing in olive, land fragmentation, high level of small producers, incapacity to invest in new technologies and marketing systems, high production costs as the main factors contributing to Turkey's competitiveness. Türkekul et al. (2010b) conduct a SWOT analysis on olive oil firms at national scale in order to understand those factors influencing olive oil industry in Turkey. They conclude that though improving, the industry is still confined by various constraints mostly based on a lack of commercialization and marketing skills. Türkekul, Gençler and Yıldız (2011) examine recent developments in international olive oil market and existing opportunities to increase Turkey's competitiveness. They underline the necessity of continuity in high quality olive oil production in order to increase the market share in international markets. Savran and Demirbaş (2011) discuss quality improvements in table olive production in recent years and policy implications, mainly policies to enhance research, to continue these improvements.

Some studies analyzed existing problems in the olive sector with the aim of regional policymaking: Seçer and Emeksiz (2012) assess existing problems in olive sector of the Eastern Mediterranean region by applying SWOT analysis. The study aims to outline a sectoral policy that will help to seize the future economic potential of olive sector in the region, of which production has increased as result of new plantations**.** Sayın et al. (2012) apply cluster analysis to olive and olive derivatives sector in Çanakkale region with an aim to design a strategic road map for cluster development as a part of regional development policies in the region.

Based on national studies and current trends in olive sector in Turkey, main domestic challenges to Turkish olive and olive oil sector can be broadly summarized as below.

Turkey is at the low end of olive oil global value chain. The share of high quality, branded and packed olive oil, which has higher premium in global markets, is very modest in Turkey. Compared to leading producer countries, the main part of Turkish olive oil exports is in bulk.

There are many reasons for this situation, such as significant fluctuations in olive oil productivity because of high alternate behavior of olive production, quality loss due to technical inefficiency in olive and olive oil production, lack of marketing strategies, high production costs , absence of horizontal and vertical integration … etc.

The impossibility to compete in the EU market as result of EU regulations is another factor. EU is the largest market for olive oil exports. The privileges presented to other Mediterranean countries by EU via bilateral agreement are affecting Turkey's competitiveness. In addition, the tax deduction on bulk export is higher than packaged product, thus encouraging bulk exporting and inhibiting packed and branded exports to EU.

Demand for olive oil in Turkey is very low compared to other traditional producer countries. Low domestic olive oil consumption has always been a problem in Turkey. Olive oil consumption level in Turkey is strikingly low compared to other Mediterranean producers. Olive oil consumption has recently increased to around 2 kg in Turkey whereas it is between 10 to 20 kg in Spain, Italy and Greece. Moreover, olive oil is mainly consumed in olive producing regions and not spread homogenously to whole regions in Turkey.

Main reasons behind the low level of consumption are lower income per capita, high olive oil prices and significantly cheaper vegetable oils. The parity between prices of vegetable and olive oil causes low to medium income consumers demand shift to vegetable oils. Other reasons are established palate and lack of knowledge on the benefits of olive oil.

In recent years, with the promotional campaigns, awareness of Turkish consumers has been improved and consumption has increased slightly. The challenge is to increase consumption to high levels of the other Mediterranean countries, but there is not a significant domestic marketing policy.

There is strong alternate bearing and quality loss in olive production arising from technical inefficiency in olive propagation, cultural practices and harvesting. Olive nurseries' infrastructure, both technical and human capital capacity, is still weak. Because of the problems related to root development, olive varieties, which can more easily develop roots are selected for nursery and are mostly found in markets. This leads to reproduction of only a couple of varieties though there are many varieties adapted to different regions. Some regional varieties are hard to find. There has been government indirect support for sapling production via subsidies aiming to encourage olive plantation but whether the positive effects of these policies outweigh the negative effects is strongly arguable.

There is significant quality loss due to cultivation, pruning and harvesting practices. Olive orchard formation is done without looking at technical issues such as variety selection, soil condition, topography, irrigation, drainage etc. Besides, the scale of orchards is very small as result of the heritage law[50] and this is an obstacle for mechanization. Agricultural practices such as fertilizer usage, pest and disease combat as well as olive cultivation, pruning and harvesting are done without sufficient knowledge or implemented carelessly.

There is technical inefficiency in postharvest handling and olive oil processing. In addition to olive quality losses resulting from upstream value chain activities such as olive cultivation,

[50] The heritage law has been recently improved to get over this problem, but the problem continues.

an important part of olive oil quality losses is arising from inefficient post harvesting activities. Lack of care for storage and transportation is significant.

Technological improvement in olive oil processing has been slow. Though improved in recent years, olive oil processing technologies are still backward compared to leading olive producers' technology.

A common consensus on a technology to tackle with wastewater problem is not reached yet. Furthermore, the need of capacity development and technological improvement in olive pomace industry is affecting olive oil industry.

There is still a significant knowledge gap on genetics and breeding of national olive varieties. There are 88 national olive varieties in the genetic bank of olive Research Institute and 29 of them has been formally registered. Though many steps have been taken in the last decades years (see Arsel and Sefer 2010, Telli Karaman et al. 2011) there is no thorough and substantially completed work on the definition of genetic properties and certification of olive varieties. The knowledge on how different varieties respond to and perform in different ecologies is weak and breeding activities based on national varieties are low.

Selection of the dominant technology in olive oil processing technology and its reflections on the olive sector is ambiguous. In Turkey mostly traditional technologies, discontinuous production with presses are used in olive oil industry, though the continuous systems, mainly three phase and occasionally two-phase, are increasingly wide spread. The two-phase system has introduced while the three-phase system has been on its way to be the dominant technology. Established olive oil refining industry is organized to treat the olive pomace of the three-phase system. As the two-phase pomace has higher water content and is more difficult to treat than traditional solid waste, different infrastructure and higher capital requirements are needed.

Inefficient treatment of the wastewater of currently used technologies are leading to stringent regulations forcing the sector to two-phase system without any thorough efficiency analysis of the applicability of it to olive oil sector in Turkey. Besides, even though it is widely used in EU, the efficiency of two-phase system is still discussed in EU in many respects, mainly the management of its environmental effects (EC 2010).

The strong lobbying power of the mine and energy sectors creates threat to viability of the olive sector. The law on olives that gives protection to the olive sector has been attempt to be changed a couple of times in the last years. In 2014, a proposal to change the law is submitted to the General Assembly, in order to favor the mining and energy sector.

The statistical information on olive and olive oil is scarce and not reliable. In addition to many missing statistics, which are vital for sectoral evaluation, different sectoral actors disseminate varying and partial statistics on olive and olive oil sector, which makes it hard to evaluate sectoral trends consistently.

Regulatory environment of the sector has to be further improved by taking the EU and IOC policies more into consideration.

- The regulatory and technical infrastructure related to Certification of Designation of Origin is still underdeveloped. There is a couple of nationally certified but not international certified olive and olive oil variety.
- The non-uniform control and supervision is another problem. The non-uniform infrastructure and equipment of the provincial control laboratories, infant application of sensory analyze and testing panels due to very recent regulation on sensory analysis of olive oil is not sufficient to overcome adulteration of olive oil.
- Licensed storehouse and specialized commodity exchange system has recently launched, but has to be developed. In addition to storage facility it provides, which is vital for quality improvement, this system is important for the financing of olive producers and smoothing out the effect of alternate in production.
- Current regulation on producer cooperatives and unions leads to weak organizational structure with insufficient human capital.
- The law on olives defines olive orchards out of forest areas and gives the identification and nursing responsibility to the Ministry of Agriculture. There is a similar article is in the Law on Forestry and this issue inhibits the proper nursery of the wild olive orchards.

To conclude briefly, there are a significant number of domestic challenges to olive and olive oil sector in Turkey, which have been very well underlined by various studies and which should be the target of policy design in Turkey.

CHAPTER 3

A RETROSPECTIVE ON INNOVATION SYSTEM APPROACH

3.1 Definition and Types of Innovation

The research on innovation initially attempts to define what innovation is. Usually the starting point is defining difference between invention and innovation: "Invention is the first occurrence of the idea for a new product or a process, while innovation is the first attempt to carry it out into practice" (Fagerberg 2005 p.5). In Oslo Manual, a joint publication of the Organisation for Economic Cooperation and Development (OECD) and Statistical Office of the European Communities (EUROSTAT), types of innovation and the degree of novelty they encompass are defined (**Table 3.1**). In Oslo Manual innovation is defined as "… the implementation of a new or significantly improved product (good or service) or process, a new marketing method or a new organisational method in business practices, workplace organisation or external relations" (OECD and Eurostat 2005 p.46)

Table 3.1 Types of Innovation and Degree of Novelty

TYPES OF INNOVATION	• **Product innovation**: The introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. • **Process innovation:** The implementation of a new or significantly improved, production/delivery method. • **Marketing innovation**: The implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. • **Organisational innovation:** The implementation of a new organisational method in the firm's business practices, workplace organisation or external relations.
DEGREE OF NOVELTY	• An innovation can consist of the implementation of a single significant change (**radical innovation**) or of a series of smaller incremental changes that together constitute a significant change (**incremental innovation**). • There are three types of novelty, **new to the firm**: the diffusion of an existing innovation to a firm :the innovation may have already been implemented by other firms, but it is new to the firm **new to the market**: when the firm is the first to introduce the innovation in its market **new to the World:** when the firm is the first to introduce the innovation for all markets and industries

Source: Oslo Manual, OECD and Eurostat (2005)

3.2 Evolution of Innovation System (IS) Approach

There is a continuous process of invention and innovation (Kline and Rosenberg 1986) sometimes with long lags, which makes it hard to distinguish one from the other. A supposedly single innovation may be a result of a process including many interrelated innovations. This is one of the reasons to apply IS approach rather than focusing on individual innovations (Fagerberg 2005 p.6).

Innovation concept has evolved over time along with the models that explain innovation processes. Innovation was initially treated as "manna from heaven" or as a residual for a long time. Since the World War II the generally accepted model was the linear model that considered innovation as the result of a linear process of different stages in a sequential order. In this perspective, scientific discovery is the only source of innovation. "Technology-push" and "Demand-pull" models followed the linear model based on same logic of sequential innovation process. The "technology-push model" assumes science and technology capacity whereas the "demand pull model" assumes market conditions (e.g. cost, profit, pricing) as the main determinants of innovation. The linear innovation model is based on the assumption that investments in R&D would have positive consequences of innovation, productivity and growth.

In time, the recognition of the complexity and uncertainty of the innovation process as well as interactions and interdependencies between the different components of it, made the linear model inadequate to explain the innovation process. Kline and Rosenberg (1986) criticized the linear model that assumes R&D as the only source of innovation. They argued that there are feedback loops among the stages of the innovation process. Innovation is considered by them as a complex process with interactions between firms and the scientific and technological system where innovative activities influence and are influenced by the market. Kline and Rosenberg (1986) put firms and the "design" at the center of the innovation process.

Nelson and Winter (1982)'s evolutionary economic approach to economic growth contributed significantly to the innovation research.

The initiation of the systemic approach to innovation process with the "chain-linked model" of Kline and Rosenberg (1986) was broadened and deepened by IS Approach.

IS approach appeared in the late 1980's in science, technology and innovation studies mainly with the work of researchers such as Freeman (1987), Lundvall (1992) and Nelson (1993). The IS approach is first coined by Freeman (1987) with formal use of the expression "National System Innovation (NSI)". According to Lunvall (2007), Christopher Freeman first used the term 'national system of innovation' in an unpublished paper of 1982 (Lundvall 2007 p.3). Lundvall (2007) gives an overview of historical background of emergence of IS research with a "focus on how different generations of economists have contributed to the modern understanding of innovation systems" (ibid pg.5).

Innovation concept goes back to classical economists. For instance in the "Wealth of Nations" Adam Smith distinguishes two different modes of innovation, of which Lundvall (2007) calls as DUI mode of learning (learning by Doing, Using and Interacting) and STI mode of learning. According to Lundvall (2007) "this distinction is fundamental" to analyze modern innovation systems and to design public policy.

The 1980s has been a period of significant contributions to innovation research. Nelson and Winter (1982) approached to economic growth with an evolutionary perspective. Moreover, Dosi (1984) established his hypothesis on shifts in technological paradigms; Kline and Rosenberg (1986) presented the chain-linked model; Freeman and Soete (1987) analyzed employment issues in relation to technical innovation, the seminal works of Dosi, Pavitt and Soete (1990) contributed to the role of innovation in relation to foreign trade.

In the late 1980's, the Directorate for Science Technology and Industry at the OECD contributed to IS studies significantly. The OECD (1992) report "integrated many of the most advanced ideas developed among innovation scholars in the 1980s and it gave innovation policy as well as innovation studies a new kind of legitimacy in all OECD-countries" (Lundvall 2007 p.14). In an attempt to overview the emergence of NIS approach in an historical perspective, Godin (2007) goes further back to show "what the system approach owes to the OECD and its very early works from 1960s" (Godin 2007 p.4).

He underlines that “the OECD has been a very early and systematic user of the system approach and an influential one among member countries in matters of policy” (Godin 2007 p.5).

When we overview IS literature, we find various definitions of IS. Freeman defines IS as “the network of institutions in the public and private sectors whose interactions initiate, import and diffuse new Technologies” (Freeman, 1987 p.1). Lundvall (1992) focuses more on interactive learning and user-producer interaction for theory development. He underlines “the structure of production” and “institutional set up” as the most important dimensions of IS. Nelson (1993) focuses on empirical case studies with less theory development whereas Nelson and Rosenberg (1993) emphasize the importance of “organizations that promote the creation and dissemination of knowledge” (Edquist 2005 p.183). Lundvall’s approach is much broader as these organizations are “embedded in a much wider socio-economic system in which political and cultural influences as well as economic policies help to determine the scale, direction and relative success of all innovative activities” (Freeman, 2002 pg.195 in Edquist 2005 p.183).

According to Edquist (2005) although both Nelson and Lundvall define IS in terms of factors influencing the innovation processes, they single out different determinants and propose different definitions of the concept using the same term. Therefore, in order to make a more general definition, Edquist (1997) defines IS as “…all important economic, social, political, organizational, institutional and other factors that influence the development, diffusion and use of innovation” (Edquist 1997 p.14).

Innovation is a complex process that involves not only the innovative firm but also interactions and interdependencies between firms, organizations and institutions. Firms do not innovate in isolation. They collaborate with other organizations such as other firms, universities, government organizations. Behaviors of organizations are shaped by laws, rules norms and routines, in other words, by “institutions”. These organizations and institutions are components of innovation systems for the creation and commercialization of knowledge where “innovations emerge in such systems of innovation” (Edquist 2005 p.182).

3.3 Types of Innovation Systems

According to Edquist (1997) all IS approaches complement rather than exclude each other and they are variants of IS approach. Conceptually all the various IS approaches defined as follows are comparable since the difference between them is mainly due to system boundaries.

3.3.1 National Innovation Systems

The first defined IS was National Innovation System (NIS). The notion of NIS places a major emphasis on the role of nation states, where the geographical boundaries of the IS are defined as national boundaries. In NIS approach, country specific factors influencing the innovative capabilities of national firms are studied where actors in a national boundary share a common culture, history, language, social and political institutions (Edquist 1997). Lundvall (1992) defines NIS as “the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge … and are either located within or rooted inside the borders of a nation state” (Lundvall 1992 p.2). This is the only definition to include a reference to the nation state as a system boundary (Suurs 2009 p.37).

During the late 1980’s, the NIS approach gained ground with the works of other researchers. Metcalf (1995) defines NIS as:

> …set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process. As such, it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts, which define new technologies (Metcalfe 1995 p.38 in Edquist 1997 p.289).

However, with globalization and internalization, the existence of national boundaries for innovation processes and whether firms being as nationals has been questioned. Moreover, the NIS approach did not allow analyses of the differences in different industrial sectors and technological trajectories. Depending on the purpose of the inquiry, the most convenient definition of IS may differ. Therefore, regional, sectoral and technological innovation systems approaches have arisen in addition to NIS approach.

3.3.2 Regional Innovation Systems

The literature on Regional Innovation System (RIS) evolved since the middle of the 1990s and during 2000s with contributions of for instance Cooke 1992, Saxenian 1994, Cooke and Morgan 1994,1998 Cooke 1996, Cooke et al. 1997, Cooke 1998, Cooke et al. 1998, Maskell and Malmberg 1997, Asheim and Isaksen 1997, Storper 1997, Braczyk et. al. 1998, De la Mothe and Paquet 1998, Doloreux 2002, Asheim et al. 2003.

The RIS approach considers innovative activities within regional boundaries. These boundaries may be within a country or parts of countries. In the RIS approach, innovation is seen as a locally embedded process and therefore RIS is seen as a good analytical framework to understand innovation processes in the regional economy.

According to Doloreux and Parto (2004), the origin of the RIS concept lies in two main bodies of theory and research: systems of innovation system literature and regional science literature "which focus on explaining the socio-institutional environment where innovation emerges" (Doloreux and Parto 2004 p.9).

Therefore a RIS is:

> …characterized by co-operation in innovation activity between firms and knowledge creating and diffusing organizations, such as universities, training organizations, R&D institutes, technology transfer agencies, and so forth, and the innovation supportive culture that enables both firms and systems to evolve over time (Doloreux and Parto 2004 p.10).

Asheim and Gertler (2005) ask the question of why location matters when it comes to innovation activity. They underline the role of knowledge type (e.g. tacit, codified) and geography of knowledge base types (e.g. synthetic, scientific) as well as the local knowledge circulation on innovation process (Asheim and Gertler 2005 p.291-298). The distance matters and geographical distance between actors has a significant effect on the innovative performance of the region. Asheim and Gertler (2005) define RIS as "the institutional structure supporting innovation within the production structure of a region" (Asheim and Gertler, 2005 p.299).

Asheim (1998) distinguishes among three types of RIS: Territorially embedded RIS, Regionally Networked IS and Regionalized NIS (Asheim and Gertler 2005 p.300-303). These definitions correspond to Cooke's (1998) definitions of Grassroote RIS, Network RIS and Dirigiste RIS.

One of the weaknesses of the RIS approach is that it does not have a common definition for its boundaries as "the regional innovation system approach embraces numerous scales and utilizes an array of units of analysis" (Doloreux and Parto, 2004 p.14).

3.3.3 Technological Innovation Systems

The NIS and RIS approaches do not take into account a detailed analysis of technological innovation processes (Suurs 2009). Researchers from Sweden developed the concept Technological Innovation Systems (TIS) in the beginning of the 1990s (see Carlsson and Stankiewitz 1991, Carlsson and Jacobsson 1994; Carlsson 1995, Carlsson and Jacobsson 1997). The aim of TIS studies is "to analyse and evaluate the development of a particular technological innovation in terms of the structures and processes that support (or hamper) it" (Suurs 2009 p.38).

Carlsson and Stankiewitz (1991) define TIS as "a network or networks of agents interacting in a specific technology area under a particular institutional infrastructure to generate, diffuse, and utilise technology" (Carlsson and Stanckiewicz 1991 p.94).

TIS can be national, regional, and international "…where the boundaries are drawn depends on the circumstances, e.g. the technological and market requirements, the capabilities of various agents, the degree of interdependence among agents" (Carlsson and Stankiewicz 1991 p.111). The TIS approach cuts through both the geographical and the sectoral dimensions. Therefore TIS may overlap with parts of various NISs and Sectoral Innovation Systems (SIS)s (Hekkert et al. 2007 p.417).

Different from other IS approaches, TIS approach is most often used for analyzing an emerging system rather than a mature system (Carlsson 1997, Negro 2007 p.27). In an emerging system, the characteristics are different from those of mature systems.

While the system develops over time the configuration of actors and institutions change (Carlsson 1997).TIS is more specific and better suits for a dynamic analysis (Negro 2007 p.28).

The TIS approach "emphasizes the role of economic competence" and "stresses the importance of individuals as sources of innovation, something which has been lost in the more macro oriented IS approaches"; and TIS "is a more serious focus on system dynamics" (Suurs 2009 p.38-39)

In order to make changes in a system, it is important to understand what happens in the system, i.e. factors that influence system dynamics. These factors, which determine the development, diffusion, and implementation of a technology, are important. Hence, an IS approach based on functions of IS has been developed to understand TIS dynamics (see Johnson 1998, Jacobsson and Johnson 2000, Liu and White 2001, Rickne 2001, Hekkert et al. 2007).

3.3.4 Sectoral Innovation Systems

Franco Malerba and his colleagues developed the concept of Sectoral Innovation System (SIS) (Breschi and Malerba 1997). According to Malerba (2005) "innovation greatly differs across sectors in terms of characteristics, sources, actors involved, the boundaries of the process, and the organization of innovative activities" and "a comparison of actors, sources, institutions, and policies for innovation in different sectors shows striking differences" (Malerba, 2005 p.380).

The sources of innovation and appropriability mechanisms are key differences among sectors (Malerba 2005 p.384). Sector specific factors that generate structural competitive advantages and asymmetries such as technological opportunities, cumulativeness (learning process) and appropriability (profitability) characterize its technological trajectory and market opportunities (Dosi 1984).

A SIS is defined as "a set of new and established products for specific uses and the set of agents carrying out market and non-market interactions for the creation, production and sale of those products"(Malerba 2002a p.250).

Where, “(a) sector is a set of activities that are unified by some linked product groups for a given or an emerging demand and which share some common knowledge” (Malerba 2005 p. 385). A SIS may have local, national, global dimensions and “often these three dimensions coexist in a sector” (Malerba 2005 pg.386).

Depending on the specific research goal, the appropriate level of analysis of SIS may differ in terms of agents, functions, products and agents:

> Sectoral systems may be examined broadly or narrowly (…) where a broad definition allows us to capture all the interdependencies and linkages in the transformation of the sectors, while a narrow definition identifies more clearly specific relationships Malerba 2005.386).

Sectoral systems may be examined according to different levels of aggregation of products. Therefore, they “may be very broad, such as computer hardware and software, or … narrow, such as computer software” (Malerba, 2002a p.251).

SIS is not similar to the traditional concept of sector used in industrial economics as

> … it examines other agents in addition to firms, it places a lot of emphasis on non-market as well as on market interactions, and focuses on the processes of transformation of the system it does not consider sectoral boundaries as given and static (Malerba, 2002a p.250).

Malerba (2005) defines three main dimensions of a sector: knowledge and technological domain, actors and network, institutions. The knowledge and technology domain relates to accessibility, opportunity and cumulativeness of knowledge. Knowledge plays a central role in innovation and it differs across sectors in terms of domain (Malerba 2005 p.387). Knowledge has different degrees of accessibility i.e. opportunities external to firms, maybe internal or external to sector (Malerba 2005 p.388). Greater accessibility internal to the sector implies lower appropriability. Knowledge may be more, or less, cumulative i.e. the degree by which the generation of new knowledge builds upon current knowledge.

According to Malerba (2005), high cumulativeness implies an implicit mechanism leading to high appropriability of innovations where the boundary of a SIS is affected by the knowledge base and technologies. A SIS may also be seen as a bundle of inter-related and partially overlapping TISs, each involving another set of core technologies (Hekkert et. al.2007, Negro 2007, Suurs 2009).

A multidisciplinary and multisource knowledge base as well as rapid technological change implies a great heterogeneity of actors in most sectors (Malerba 2005 pg.390). Within sectoral systems, heterogeneous agents are connected in various ways through market and non-market relationships. The types and structures of relationships and networks differ greatly from sectoral system to sectoral system due to differences in the knowledge base, learning processes, basic technologies, demand characteristics, key links and the dynamic complementeries (Malerba 2005 p. 392).

Malerba (2005) underlines the significant role of evolutionary process in the dynamics of a sectoral system. He refers to the work of Nelson (1995) and Metcalfe (1998) by underlining that "at the base of the dynamics and transformation of sectoral systems lies the interplay among evolutionary processes (such as variety creation, replication and selection) that differ from sector to sector" (Malerba 2005 p.395). According to Malerba (2005) "changes in sectoral systems are the result of co-evolutionary processes of their various elements, involving knowledge, technology, actors, and institutions" which are "sector specific and path dependent":

> Local learning, interaction among agents, and networks may generate increasing returns and irreversibilities that may lock sectoral systems into inferior technologies. In addition, the interaction between knowledge, technology firms, and institutions are also shaped by country-specific factors (Malerba 2005 p.396).

Hence, the concept of sectoral systems is proposed as a useful tool

> for a descriptive analysis of the differences and similarities in the structure, organisation and boundaries of sectors; for a full understanding of the differences and similarities in the working, dynamics and transformation of sectors; for the identification of the factors affecting innovation, commercial performance and international competitiveness of firms and countries in the different sectors; and for the development of new public policy indications (Malerba 2002b p.3).

3.4 Strengths and Weaknesses of IS Approach

There are strengths as well as weaknesses of IS approach as a framework of analysis (Edquist 2005 p.184-187). Edquist (2005) defines six characteristics of IS approach as it strengths:

- IS approach puts "learning" at the center of focus as innovation is "a matter of producing new knowledge and combining existing (sometimes new) elements of knowledge in new ways".

- IS approach is "holistic". It tries to cover "a wide array of the important determinants of innovation and allows for the inclusion of organizational, social, and political factors, as well as economic ones."
- IS approach is "interdisciplinary" as it absorbs perspectives from different (social) science disciplines.
- IS approach employs evolutionary and historical perspectives.
- In IS approach there is emphasize on non-linearity and interdependence. The notion of optimality is assessed to be irrelevant. Innovation develops over time with feedback and loop processes (Kline and Rosenberg 1986), in a path dependent way, with influence of many factors. Therefore, the comparisons between any two systems could be made between different real systems over time and space, or between a real system and a target system but not with an optimal one.
- IS approach emphasizes the role of "institutions" on innovation processes.
- IS approach suit well to all types of innovation as it encompass different of innovations.

Besides its strengths, Edquist (2005) underlines weaknesses of IS approach:

- There is conceptual diffuseness of the terms used (e.g. institutions or organizations)
- What exactly should be included in an IS are not defined, which is its main weakness.
- IS approach is not a formal theory. There is not "well-established empirical regularities" and IS could be defined as "an approach or a conceptual framework rather than a theory".
- There is also varying views in the literature on the seriousness of the weaknesses of IS and how to treat them.

Suurs (2009) propose that although there is variety and ambiguity in the definitions used in IS studies they share a common ground:

- There is an emphasis on innovation as a learning process as Lundvall (1992) proposed,
- There is an emphasis on the role of institutions,

- There is the notion of a system stressing the relations between actors and institutions,
- IS concept is widely used as an intervention model to support innovation policies and strategies.

3.5 IS Approach as a Framework of Analysis

In an attempt to develop IS approach and make it more theory like Edquist (1997, 2005) relates IS approach to "general system theory". In order to be a system, there has to be components of a system and relations among them as well as an overall function of a system. In addition, a system has to be excluded from the rest of the world.

Edquist (2005) proposes that one does not need to define all the components of a system to make it theory like. His aim is not to transform IS approach into a "general theory of innovation" but rather "… make it clearer and more consistent so it can better serve as a basis for generating hypothesis about relations between specific variables within IS (which may be rejected or supported through empirical work" (Edquist 2005 p.187).

IS approach is "about the determinants of innovation, not about their consequences" (Edquist 2001 p.2). He defines IS as "all important economic, social, political, organizational, institutional and other factors that influence the development, diffusion and use of innovation" (Edquist 1997 p.14, Edquist 2001 p.2 Edquist 2005 p.182).

Edquist (1997, 2001, 2005) defines "constituents of innovation system" as its "components" and "relationship between these components". The main function of an IS "is to pursue innovation processes" i.e. "to develop, diffuse and use of innovations". Activities are defined all those "factors that influence the development, diffusion and use of innovation". Specific activities are the determinants of the main function (Edquist 2005 p.182).

3.5.1 Constituents (Structure) of Innovation Systems

Edquist (1997, 2001, 2005) defines "organisations" and "institutions" as the main components of IS. "Organisations" are defined as "consciously created formal structures with an explicit purpose" (Edquist, 2005 p.188).

They are “players or actors” such as firms, schools, universities, public agencies etc. “Institutions” are “sets of common habits, routines, established practices, rules, or laws that regulate the relations and interactions between individuals, groups and organisations” (Edquist, 2005 p.188). Institutions are the “rules of the game”. Institutions can be delineated as soft institutions (common habits, routines) and hard institutions (rules, laws, strategies) (Klein-Woolthuis et al. 2005). The structure of organizations and institutions may vary among ISs (Edquist 2005 p.189).

In IS literature, there is general agreement that “organisations” and “institutions” are the main components of ISs, but there is no agreement on their definition. Especially, the conceptual ambiguity surrounding the term “institution” has not been sorted out (Edquist 1997 p.24-26, 2001 p.5, 2005 p.188-189).

Some studies categorize actors in broad domains from the perspective of the role they play in the innovation process. Such as users, producers, intermediary and supportive organizations (Smits and Kuhlman 2004) or as research and education, intermediary/bridging institutions, business, supporting institutions, demand domains (Arnold and Bell 2001). As the difference between users and producers is blurred in an IS, the categorization of actors according to their role in economic activity may be more useful, as one actor may play varying roles in innovation processes (Wieczoreck and Hekkert 2012).

Interactions among organizations are also form the structure of an IS. Interactions among organizations may be “market or non-market type” such as competition, collaboration, transaction and networking, user-producer interaction…etc. (Edquist 2005 p.196-197). They can be analyzed at the level of networks, a higher form of actors’ organization, and of individual contacts (Wieczoreck and Hekkert 2012). Interactive learning among organizations is crucial for innovation processes (Edquist 2005). Relations between organizations and institutions are important for innovations as well as the operation of IS:

> Organisations are strongly influenced and shaped by institutions. Organisations can be said to be ‘embedded’ in an institutional environment or set of rules like the legal system, norms, standards, habits, but institutions are also ‘embedded’ in organizations (Edquist 2005 p.197).

In other words "there is a complicated mutual embeddedness between institutions and organizations" (Edquist and Johnson 1997 p.59-60, Edquist 2005 p.197) that influence innovation processes as well as the performance of IS. Some organizations create institutions, e.g. organizations that create standards formulate and implement rules. Institutions may also be the basis for the creation of organizations, such as a government law that creates an organization. Institutions also affect each other, may be related to each other, they may support and reinforce or contradict and conflict with each other (Edquist 2005). Organizations and institutions should be conceptually distinguished from each other in order to analyze their complex relations between each other. It is therefore important to specify the concepts and to make a clear distinction between organizations and institutions in order to be able to address the relations between them (Edquist 2001).

3.5.2 Functions (Activities) of Innovation Systems

Edquist (1997, 2001, 2005) proposes that it is not sufficient to identify the main components of IS and the relations between them only. Identifying all of the important factors influencing the development, diffusion and use of these innovations is crucial. Therefore, "(w)e must also explicitly address what happens in the systems" (Edquist, 2001 p.8). A way to do so is to deal with what could be called the "*activities*" in the systems or the "*functions*" of the systems. The "*specific functions*" of the systems are the determinants of innovation processes or factors influencing them (Edquist 1997, 2001,2005). Focusing on "*activities*" within IS emphasizes what happens in the systems.

Similarly, Jacobsson and Johnson (2000) have suggested that a sectoral system of innovation or a technological system may be described and analyzed in terms of its functional pattern, i.e. in terms of how these functions are served. The character of as we as interaction between components of an innovation system i.e. actors, networks and institutions, shapes functional pattern. According to Bergek (2002), system performance may be evaluated by looking at how well the functions are served within the system:

> The external dynamics of an innovation may be studied by drawing maps of functional patterns over time. The internal dynamics are created by the interaction of functions, which make it possible for cumulative and circular causation to appear. By studying feedback loops between functions, it is, thus, possible to get a picture of the internal dynamics of the system (Bergek 2002 p.24)

Negro (2007) proposes three reasons for adopting the functions approach: first, this perspective allows us to make comparison of the performance of IS with different institutional setups. Second, it permits a more systematic method of mapping determinants of innovation, increasing the analytical power of the IS approach; third, this perspective has the potential to deliver a clear set of policy targets as well as instruments to meet these targets (Negro 2007 pg.30-31).

This approach provides a more dynamic perspective and useful to analyze why a certain IS performs bad or well. Thus, functions of IS approach is more useful for policy purposes. Organizations perform the activities and institutions provide incentive frameworks for these activities. One needs to focus on activities and components in order to understand and explain innovation processes. Therefore, we need to address the relations between components and functions (Edquist 2001).

Main functions or activities of the systems are more or less similar in all systems, but they may be performed by different organizations within a context of different institutions. There is not one to one correspondance between functions and organizations: various organizations can fulfill each function or can perform more than one function (Edquist 2001).

Though Edquist uses the term “activity” to describe the determinants of innovation processes Hekkert et.al. (2007) uses the term “function” and defines the activities that contribute to the goal of the IS as “functions of IS or system Functions”.

Starting from the late 1990s, various system activities/functions have been proposed in the literature. These activities/functions differ mainly due to the way of grouping and in fact, they usually overlap (**Table 3.2**).

Initially, Lundvall (1992) proposed the activity of ‘learning’ or ‘interactive learning’ as the core of the IS approach.

Edquist and Johnson (1997) mentions three functions: reducing uncertainty by providing information, managing conflicts and cooperation, and providing incentives for innovation.

McKelvey (1997) discusses three functions based on evolutionary theory: retention and transmission of information, generation of novelty leading to diversity, and selection among alternatives, that correspond with the main principles of evolutionary economics - variety, selection and retention.

Galli and Teubal (1997) discuss hard and soft functions: Hard functions are R&D activities, the supply of scientific and technical services whereas soft functions include diffusion of information, knowledge, and technology, policy making, design and implementation of institutions concerning standards, laws, patents…etc. Hard functions require hard organizations, which perform R&D and soft functions may be operated by soft institutions such as regulatory entities.

According Liu and White (2001) "the lack of system-level explanatory factors" is a fundamental weakness of NIS research (Liu and White 2001 p.1092). They focus upon the activities in the systems. These activities are related to "the creation, diffusion and exploitation of technological innovation within a system" (Liu and White 2001 p.1093). They propose five activities fundamental to IS, research (basic, development, engineering), implementation (manufacturing), end-use (customers of the product or process output), linkage (bringing together complementary knowledge) and education.

Jacobsson et al. (2004) described five functions: create new knowledge, guide the direction of search processes, supply resources, facilitate the creation of positive external economies (in the form of an exchange of information, knowledge, and visions) and facilitate the formation of markets.

Hekkert et al. (2007) propose seven system functions: knowledge development, knowledge diffusion, entrepreneurial experimentation, guidance of search, market formation, creation of legitimation and resource mobilization.

Edquist (2008) introduces ten activities as discussed in Edquist (2005) and structures them into four thematic categories: the provision of knowledge inputs to the innovation process, demand side activities, the provision of constituents of SIs and support services for innovating firms.

Table 3.2 Activities / Functions of Innovation Systems in the Literature

Hekkert et al. (2007)	Bergek et. al. (2008)	Johnson (1998) Johnson (2001) Bergek (2002)	Rickne (2000)	Bergek and Jacobsson (various)	Carlsson et al. (2005)	Edquist (2004)	Galli and Teubal (1997)
Knowledge development Knowledge Diffusion	Knowledge development and diffusion	Create knowledge, facilitate information and knowledge exchange	Create human capital	Create new knowledge	Creating a knowledge base	Provision of R&D, competence building	R&D diffusion of information, knowledge technology
Entrepreneurial activities	Entrepreneurial experimentation	Create knowledge		Create knowledge	Promoting entrepreneurial experiments	Creating, changing organizations needed(e.g. enhancing entrepreneurship)	
Guidance of the search	Influence on the direction of search	Identify problems, Guide the direction of search. Provide incentives for entry. Recognize the potential for growth	Direct technology, market and partner search. Create and diffuse technological opportunities	Guide the direction of the search process	Creating incentives	Articulation of quality requirements (demand side).Creating/changing institutions that provide incentives or obstacles to innovation	
Market formation	Market formation	Stimulate market formation	Create market/diffuse market knowledge. Facilitate regulation (enlarge market, enhance market access)	Facilitate the formation of markets	Creating markets or appropriate market conditions	Formation of new product markets. Articulation of quality requirements (demand side)	
	Development of positive external economies	Facilitate information and knowledge exchange	Enhance networking	Facilitate the creation of positive external economies	Promoting positive externalities, or 'free utilities	Networking	Diffusion of information, knowledge and technology, Professional coordination
Creation of Legitimation Lobbying Activities	Legitimation	Counteract resistance to change	Legitimize technology and firms			Creating/changing institutions that provide incentives or obstacles to innovation	Design and implementation of institutions, Diffusion of scientific culture
Resource mobilization	Resource mobilization	Supply resources	Facilitate financing, create a labour market. Incubate to provide facilities, etc.	Supply resources	Creating resources (financial and human capital)	Financing of innovation processes etc. Provision of consultancy services, Incubation activities	Supply of scientific and technical services

Source: Based on Bergek et al. 2008 pg. 426

3.5.3. Systemic Problems and Systemic Instruments in IS Framework

There are two other groups of studies in IS literature that contributes development of IS perspective as a framework of analysis (Wieczoreck et al. 2012). One group is on systemic problems (Smith 2000, Jacobsson and Johnson 2000, Klein-Woolthuis et al. 2005, Chaminade and Edquist 2010, Edquist 2011, Weber and Rohracher 2012). The other group is on systemic instruments (Smits and Kuhlmann 2004, Wieczorek et al. 2009, van Mierlo et al. 2010).

Problems that hinder the functioning of IS are defined as systemic problems (or blocking factors, failures or weaknesses) in the IS literature **(Table 3.3).**These problems negatively influence the speed and direction of innovation processes. These system level failures replace the neoclassical market failure (Edquist 1997).

Table 3.3 Systemic Problems in the Literature

Smith (2000)	Failures in infrastructural provision and investment, transition failures, lock-in failures, and institutional failures.
Jacobsson and Johnson (2000)	blocking factors on actors' and markets' side (poorly articulated demand or market control by incumbents), on the network side (poor connectivity or wrong guidance with respect to future markets), on institutions (legislative failures or failures in the educational system)
Klein-Woolthuis et al. (2005)	infrastructural (concerning physical infrastructure), institutional (hard: laws, regulation, soft: norms, values) interaction (too strong or too weak networks) and capability failures (entrepreneurship, skills, adequate labor qualifications)
Chaminade and Edquist (2010)	infrastructure provision and investment problems, transition problems, institutional problems (hard and soft), lock-in problems, capability and learning problems, network problems, unbalanced exploration– exploitation mechanisms and complementary problems
Weber and Rohracher (2012)	complement the list of Klein-Woolthuis et al. (2005)'s system failures by the "transformational failures": Directionality failure, demand articulation failure, policy coordination failure and reflexivity failure

Source: Klein-Woolthuis et al. (2005), Weber and Rohracher (2012), Wieczoreck et al. (2012)

The strategies and tools that target systemic problems and which influence the overall functioning of the innovation system are called the systemic instruments (Smits and Kuhlman 2004). Systemic instruments are methods and mechanisms used by government or other political parties, business or individuals to organize, coordinate and direct innovation systems (Wieczoreck and Hekkert 2012). Systemic instruments considered to be novel means that support processes at the level of IS rather than targeting specific parts of IS (Smits and Kuhlman 2004).

Smits and Kuhlman (2004) suggest five systemic instruments that systemic policies should aim to achieve: Building and organizing innovation systems, providing a platform for learning and experimenting, providing an infrastructure for strategic intelligence and stimulating demand articulation, managing interfaces, developing strategy and vision.

There are some studies attempting to combine systemic problems with systemic policy instruments or with actors.

For instance, Borras and Edquist (2013) study systemic problems and the design of the proper policy instruments. They look at the IS policy instruments in a slightly different way than Smits and Kuhlman (2004). They argue that not the policy instruments but the way in which they are "combined and customized into mixes that aim at addressing the concrete problems identified in an IS" makes them systemic:

> It is not the instruments alone that make an innovation policy systemic. It is the instrument mixes that make it systemic - if they are designed and implemented in a way that addresses the complex and multiple natures of the causes of the problems (Borras and Edquist 2013 p.24).

Furthermore, Borras and Edquist (2013) underline the "specific and unique nature" of each innovation system and remind that there is no "one-size-fits-all" policy attempt to analyze IS (Borras and Edquist 2013 p.25).

It is important to know not only the systemic problems, but the most important causes of systemic problems should be identified. These causes are related to the activities or determinants of the development and diffusion of innovations:

> Hence, the identification of the problems and their activity-related causes should be the basis for the selection of policy instruments. The combination of instruments

is a crucial part of the innovation policy: "innovation policy is what its instruments are" (Borras and Edquist 2013 p.29).

Moreover, Klein-Woolthuis et al. (2005), van Mierlo et al. (2010) and Weber and Rohracher (2012) propose an innovation system failures matrix, which maps different actors against systemic failure categories. Van Mierlo et al (2010) links IS actors, systemic problems and systemic instruments' in their study. They create an IS framework that combine systemic failures defined by Klein-Woolthuis et al. (2005) with Smits and Kuhlman (2004)'s systemic instruments in relation to actors/components of the system.

In combining structures, functions, systemic problems and policy instruments, Wieczorek and Hekkert (2012) go a step further and link the four innovation policy approaches: functional analysis, structural analysis, systemic problems and systemic instruments.

Briefly, since 1980s, mainstream IS literature has evolved significantly on the development of IS perspective as a framework of analysis, by studying different aspects of it e.g. structures, functions, systemic instruments and systemic problems.

3.6 Agricultural Innovation System (AIS)

3.6.1 The Evolution of AIS approach

One of the reasons that IS approach is convenient for agricultural sectoral policymaking is that technological dynamics in the agricultural sector is much more complex and multidisciplinary than usually assumed.

In order to evaluate the technological dynamics of a sector, one commonly used classification is by looking at its R&D intensity in production (Fagerberg 2005 p.16). By this criterion, high R&D industries (e.g. aerospace, computers, telecommunications, pharmaceuticals) sectors are classified as "high-tech", medium level R&D industries (e.g. machinery, chemical industry) are classified as "medium-tech". In this type of classification, as their R&D levels is assessed to be low, food and agriculture industries are classified as "low-tech" similar to sectors such as textiles and furniture.

The classification based on R&D level ignores innovation activities based on skills and learning by doing, using and interacting. Pavitt's (1984) taxonomy takes into account of these other factors and proposes four types of sectoral pattern for innovative activities: supplier dominated, scale intensive, specialized suppliers and science-based sectors.

Based on Pavitt's (1984) taxonomy, Possas et al. (1994) evaluates the classification of technological dynamics of the agricultural sector. According to Possas et al. (1994) even though agriculture is considered as a "supplier dominated" sector, this does not mean that to analyze agricultural sector as a "supplier dominated" one is enough (Possas 1994 p.13). Because there is not one specific general technological trajectory in agriculture but a set of different trajectories, which should be taken into account.

Therefore, within agriculture-related industries one can find all types described in Pavitt's taxonomy:

> There are typical 'science based' industries, such as pesticides (Achilladelis et al., 1986) and seeds (Joly and Ducos, 1993); there is a 'scale intensive' branch, as chemical fertilizers; one 'specialized supplier' such as farm machinery (Sahal, 1981; Fonseca, 1990) and finally a 'supplier dominated' (Fanfani et al., 1992), as food industry. If we include the 'information intensive' type as in the latest taxonomy version (Bell and Pavitt, 1993), a services group could also be classified (Possas et al. 1994 p.19).

Moreover, technological trajectories related to agriculture-related industries have distinct dynamics of innovation and different historical paths, which may not always related to agriculture (Possas et al. 1994).

Possas et al. (1994) underline the multidisciplinary nature of agricultural sector:

> …it involves at the same time the management of physical conditions, as some soil properties and changes in temperature, insolation and moisture; chemical ones, as the availability of essential elements in specific molecular forms; biological ones, which are more complex in so far as they concern not only the functioning of individual organisms (plants, animals and micro-organisms) but also the effects of their interactions with one another and with the environment (Possas et al. 1994 pg.20).

According to Possas et al. (1994) agricultural technological basis is transforming and the present agricultural technological regime is exhausting. A new phase of product innovation in agriculture is beginning; the search for increasing yields is still an objective but losing its significance as compared with other goals, especially those related to quality (Possas et al. 1994 p.23-28).

The technological dynamics of an agricultural sector is embedded in a social, cultural, economic, environmental and institutional context that has been transforming significantly in the last decades. A rising global population, rising incomes and changes in diets led to increase and change in food demand. Inter-sectoral competition for water and land is higher. There is degradation of water, land and the environment. Energy demand forces conversion of land for bio-fuel plantations. Climate change and the volatility of weather conditions threaten sustainable production. New controls on pesticides lead to the need for new solutions to fight diseases. Food security is becoming more important with globalization of food value chain, affecting each step of the chain.

"Agriculture's physical, social, and economic environment changes continually" and "some changes occur with unpredictable force and suddenness" (World Bank 2012 p.1). Agricultural social and economic landscape has been changing over the past few decades and "if farmers, agribusinesses, and even nations are to cope, compete, and thrive in the midst of changes of this magnitude, they must innovate continuously" (World Bank 2012 p. 3).

These changes and challenges related to the agricultural sector lead to IS thinking to establish:

> For major societal challenges like the lack of food security, the increasing impoverishment of small farmers, the effects of global warming, animal diseases, depletion and pollution of natural resources, the increase in the level of systemic thinking can be considered a necessity (Klerkx et al. 2012 p.464)

The IS perspective gained more and more ground in agricultural studies during the last couple of decades. The global crisis since 2008 has fastened this inclination further. Policy papers and reports of multinational and supranational institutions such as the OECD, FAO, World Bank as well as well as the European Commission and G20 propose the IS perspective.

The G20 governments committed to take comprehensive action to strengthen the longer-term productivity, sustainability and resilience of the food and agriculture system

Worldwide. For this aim, G20 policy report[51], prepared with the coordination of FAO and OECD, recommends to:

> Improve food and agriculture innovation systems, encompassing public and private investments in scientific research and development, technology transfer, and education, training and advisory services and ensure that successful practices are scaled up (G20 2011 pg.18).

As mentioned before, OECD was the pioneering international organizations on IS studies in the last decades and recently it started to focus on the application of systems perspective for the agricultural sector[52]. The OECD (2011) admits that "while formal R&D is central to innovation, it is increasingly recognized that it is not the only source of discovering new technologies for farmers and others" therefore "a more comprehensive analytical framework going beyond the linear relationship between R&D expenditure and productivity growth would need to be adopted in future work to analyze "innovation systems" in agriculture" (OECD 2011 p.12, 80). World Bank (2006a) started to use AIS concept "… to develop a framework for guiding diagnosis of innovation capacity and for planning interventions"[53].

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[51] G20 report on "Price volatility in food and Agricultural markets: Policy responses" prepared in collaboration with FAO, IFAD, IMF, OECD, UNCTAD,WFP the World Bank, the WTO, IFPRI and the UN HLTF. http://www.oecd.org/dataoecd/40/34/48152638.pdf

[52] The Conference on Agricultural Knowledge System (AKS), organized by the OECD and took place in June 2011, looked at developments in AKS institutions and the relationship between the different components at the national and international levels, and discussed whether these are functioning well and responsive to emerging issues. The suggestions for further work include how to deepen the debate on the various concepts of knowledge/innovation systems, shifting paradigms in agricultural research and in AKS…etc.

[53] World Bank (2006) defines six changes in the context for agricultural development that leads to need to examine how innovation occurs in the agricultural sector: 1. Markets, not production, increasingly drive agricultural development. 2. The production, trade, and consumption environment for agriculture and agricultural products is growing more dynamic and evolving in unpredictable ways. 3. Knowledge, information, and technology increasingly are generated, diffused, and applied through the private sector. 4. Exponential growth in information and communications technology has transformed the ability to take advantage of knowledge developed in other places or for other purposes. 5. The knowledge structure of the information and communications technology has transformed the ability to take advantage of knowledge developed in other places or for other purposes. 5. The knowledge structure of the agricultural sector in many countries is changing markedly. 6. Agricultural development increasingly takes place in a globalized setting.

Agricultural innovation is increasingly seen as a co-evolutionary process of technological, social and economic change where agricultural innovation is not just about adopting new technologies:

> Agricultural innovation arises through dynamic interaction among the multitude of actors involved in growing, processing, packaging, distributing, and consuming or otherwise using agricultural products. These actors represent quite disparate perspectives and skills, such as metrology, safety standards, molecular genetics, intellectual property, food chemistry, resource economics, logistics, slash-and-burn farming, land rights… (World Bank 2012 p.3)

Before application of AIS concept, World Bank developed other frameworks **(Table 3.4).** In the 1980s, World Bank initially developed the concept of "National Agricultural Research System" (NARS). Development activities based on the NARS concept generally focused on strengthening research supply by providing infrastructure, capacity, management, and policy support at the national level. NARS has a linear approach with a view that agricultural research, through technology transfer, leads to technology adoption and growth in productivity. Therefore, in order to achieve this goal the assumption was to improve agricultural research, training, and extension organizations of the public sector.

Table 3.4 Main Characteristics of the Frameworks of the World Bank

Defining Feature	**NARS National Agricultural Research System**	**AKIS Agricultural Knowledge Information Systems**	**AIS Agricultural Innovation System**
Actors	Research Organizations	Farmers, research, extension and education	Wide spectrum of actors
Outcome	Technology invention and technology transfer	Technology adoption and innovation	Different Types of Innovation
Organizing Principle	Using science to create new technologies	Accessing agricultural knowledge	New uses of knowledge for economic and social change
Mechanism for Innovation	Technology transfers	Knowledge and information exchanges	Interaction and innovation among stakeholders
Role of Policy	Resource allocation and priority setting	Linking research, extension and education	Enabling innovation
Nature of Capacity Strengthening	Strengthening infrastructure and human resources	Strengthening communication between actors in rural areas	Strengthening interactions between all actors, creating an enabling environment

Source: World Bank (2006a) p.23

The NARS framework has been effective in creating capacity in agricultural science, but as it is not explicitly linked to technology users and other actors, this framework is poorly suited for responding to rapidly changing market conditions and providing technologies for producers to supply emerging, high-value niche markets (World Bank 2006a p.24).

The Agricultural Knowledge Information Systems (AKIS) approach of 1990s has been improved by the guiding principles developed by FAO and World Bank. The AKIS framework was promoted by FAO and it tackles many of the shortcomings of conventional agricultural research and extension systems, particularly their limited opportunities for interaction between the users and producers of knowledge (World Bank 2006a p.24).

Röling (1990) defines AKIS as:

> … a set of agricultural organizations and/or persons, and the links and interactions between them, engaged in such processes as the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilization of knowledge and information, with the purpose of working synergistically to support decision making, problem solving and innovation in a given country's agriculture or domain thereof (Röling 1990 p.1).

The AKIS concept recognizes that research is not the only means of generating or gaining access to knowledge. It focuses on research supply, but it gives more attention to the links between research, education and extension as well as the identification of farmers' demand for new technologies. Farmers are at the heart of the knowledge triangle formed by education, research and extension (FAO and World Bank 2000).

In AKIS, there is emphasis on innovation as a social process of learning. This view broadens the scope of agricultural research and extension to include developing local capacities, which is the strength of AKIS. AKIS still tends to suggest that most technologies will be transferred from researchers down to farmers, which may be regarded a weakness of the framework (World Bank 2006a p.25).

In 2000s, FAO and World Bank's approach has moved towards the concept of AIS. The AIS concept places greater emphasis on the interaction between actors and encompasses a broader range in comparison to AKIS.

The IS concept could be used as a framework "for embedding innovation capacities in the rapidly changing market, technological, social, and political environment of contemporary agriculture" (World Bank 2006a p.26).

According to the World Bank (2006a), in comparison to AKIS approach, AIS focus on the role of institutions and infrastructures on learning and innovation more explicitly. AIS include all relevant organizations beyond agricultural research and extension systems and it is defined as:

> A network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect the way different agents interact, share, access, exchange and use knowledge (World Bank 2006a pg. vi–vii).

Klerkx et al. (2012) remind the wide range of approaches to agricultural innovation over the last decades. For instance, the Transfer of Technology approach (1985), Induced Innovation (Ruttan and Hayami 1984), Training and Visit System (Hulme 1992), Participatory Research and Participatory Technology Development (Farrington and Martin 1988, Neef and Neubert 2011), Farmer First (Chambers et al. 1989) and Agricultural Knowledge and Information Systems (AKIS) (Röling 2009).

Table 3.5: Shifts in Theoretical Perspectives on Agricultural Innovation

	Type of Perspective			
Characteristics of the perspective	**Diffusion of Innovations / Transfer of Technology**	**Early Farming Systems Research**	**Agricultural knowledge and information systems (AKIS)**	**Agricultural Innovation systems (AIS)**
	Central since 1960s	**Starting in 1970s,1980s**	**From 1990s**	**2000s**
Mental model and activities	Supply technologies through pipeline	Learn farmers' constraints through surveys	Collaborate in Research (participatory research) and extension	Co-develop innovation involving multi-actor processes and partnerships
Knowledge and disciplines	Single disciple driven (breeding)	Multidisciplinary (agronomy plus agricultural economics)	Interdisciplinary (plus sociology and farmer experts)	Transdisciplinary , holistic systems perspective
Scope	Productivity increase	Efficiency gains (input-output relationships)	Farm-based livelihoods	Value chains, institutional change
Core elements	Technology packages	Modified packages to overcome constraints	Joint production of knowledge and technologies	Shared learning and change, politics of demand, social networks of innovators
Drivers	Supply-push from research	Diagnose farmers' constraints and needs	Demand-pull from farmers	Responsiveness to changing contexts, patterns of interaction
Relation with policy and institutional environment	Science and technology are relatively independent of political and other social partners – institutional factors as external conditioners of the adoption process.	Science and technology are relatively independent of political and other social Partners – institutional factors as external conditioners of the adoption process. Agro-ecological and farm-economic context is considered in İntegrated way	Science and technology develop and are embedded within a historically defined social, political, economic and agro-ecological context	Science and technology develop and they are embedded within a historically defined social, political, economic and agro-climatic context. Institutional change is considered a 'sine-qua-non' for innovation
Innovators	Scientists	Scientists and extensionist	Farmers, scientists and extensionists	Multiple actors, innovation platforms
Role of farmers	Adopters or laggards	Sources of information	Experimenters	Partners, entrepreneurs, innovators exerting demands
Role of Scientists	Innovators	Experts	Collaborators	Partners, one of many responding to demands
Key changes sought	Farmer's behaviour change	Removing farmers' constraints	Empowering farmers	Institutional change, innovation capacity
Intended outcomes	Technology adoption and uptake	Farming system fit	Co-evolved Technologies better fit to livelihood systems	Capacities to innovate, learn and change

Source: Klerkx et al. 2012 p.460-461

Klerkx et al. (2012) distinguishes "four main theoretical traditions with a cumulative degree of systemic thinking" (**Table 3.5).** These approaches "are not necessarily mutually exclusive", some of them "consecutively fed into each other" some "emerged in parallel" such as AKIS and AIS (Klerkx et al. 2012 p.459). These four concepts mainly differ on "how they consider the broader institutional and policy environment, and changes in these, as relevant to agricultural innovation, i.e. where they draw the system boundaries" (Klerkx et al. 2012 p.462). The AIS approach emerged in parallel with AKIS approach as a critique towards linear models of innovation and were influenced by the NIS perspective of Lundvall (1992) (Klerkx et al. 2012).

On the comparison of AKIS and AIS perspectives, also Rivera et al. (2006) reminds that:

> AIS did not evolve as a further development of the AKIS framework, but rather as a parallel development, which did not build upon the insights of the AKIS literature and the practical experience in applying this framework. One reason for this parallel rather than consecutive development may be due to the fact that, considering the background of the leading authors, AKIS evolved from the extension perspective, while AIS was developed from a research perspective (Rivera et al. 2006 p.587).

The World Bank (2006a) defines the narrow focus and top down technology transfer as limitations of AKIS approach:

> The focus is restricted to actors and processes in the rural environment and the framework pays limited attention to the role of markets (…) the private sector, the enabling policy environment, and other disciplines and sectors. The AKIS framework recognizes the importance of transferring information from farmers to research systems, but tends to suggest that most technologies will be transferred from researchers down to farmers. (World Bank 2006a p.25-26)

According to Klerkx et al. (2012), AIS approach overcomes these limitations:

> The main achievement of the AIS approach thus appears to be that it has further broadened the scope of analysts and interventionists on the complex interactions between a multitude of players and sub-systems that characterize innovation (Klerkx et al. 2012 p.464).

Many agricultural research institutes are using AIS framework for agriculture and development related studies. For instance, the LINK (Learning, Innovation and Knowledge) project initiative of UNU-MERIT[54] uses AIS concept as a framework for its studies related to its "Research into use - RIU" project. The key research question for RIU is not just about finding the best way of putting research into use, but it is to understand which sorts of configurations are relevant under which circumstances and at which stages in different innovation trajectories. Based on AIS perspective, RIU forms six innovation narratives to organize its research.[55]

International Food Policy Research institute (IFPRI) of the Consultative Group on International Agricultural Research (CGIAR) has studies on AIS perspective and have significant contributions to AIS literature. A good literature review on AIS perspective can be found in Spielman (2005), an IFPRI discussion paper. In another study of IFPRI, Spielman and Kelemework (2009) argues that without adequate measures of the properties and performance of the AIS, it is difficult to promote policies and investments that foster greater innovativeness in agriculture. They review and validate several hundred indicators and aggregate them into a unique Agriculture, Development, and Innovation Index (ADII). Their study provides a toolkit for collecting and analyzing "systems-oriented" indicators. In ISNAR/IFPRI country report on AIS in Azerbaijan, Temel, Janssen and Karimov (2002) analyze the functioning of AIS, pinpointing its weaknesses and identifying areas that need to be strengthened.

The Standing Committee for Agricultural Research (SCAR)[56] of EU advises member states as well as the European Commission in the field of the coordination of research in agriculture. The Collaborative Working Group on Agricultural on Knowledge and Innovation Systems (WP1) of SCAR was established to analyze the current state of agricultural knowledge and information systems (AKIS) in Europe. In this context, the two concepts of AKIS and AIS have

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[54] United Nations University Maastricht Economic and Social Research Institute on Innovation and Technology,

LİNK initiative. http://www.merit.unu.edu/research/websites.php

[55] http://www.innovationstudies.org/index.php?option=com_content&task=view&id=269

[56] http://ec.europa.eu/research/agriculture/scar/index_en.htmlTurkey has observer status as a candidate country and the Ministry of Agriculture, General Directorate of research (TAGEM) is the representative.

been merged as the acronym AKIS has been reinterpreted as "Agricultural Knowledge and Innovation Systems". The report of WP1 elaborates the contribution of AKIS on agricultural and rural innovation. The WP1 report argues "the case for stimulating a transition towards AKIS that can more effectively support innovation and change in the farming, agri-food and rural domains" (Dockès, Tisenkopfs and Bock, 2011 p.3).

The Technical Centre for Agricultural and Rural Cooperation (CTA)[57] launched its competence-building program in Africa, the Caribbean and Pacific (ACP) to build capacity to understand and apply the innovation systems framework for analyzing agricultural science, technology and innovation (ASTI) systems (CTA 2009).

3.6.2 Perspectives and Methodology for the Analysis of AIS

OECD (2013) underlines that innovation in the agricultural sector may take place at various levels (OECD 2013 p.11):

- At the farm level, there are "process innovations" related to production techniques: i.e. the adoption of improved seeds, irrigation and waste management technologies, farmers' practices to adapt etc.
- Some process innovations for farmers (i.e. improved seeds and animal breeds, agricultural machines, irrigation systems) are "product innovations" for the upstream industry.
- The downstream industry has product innovation, such as functional food with new health attributes, or non-food products from agriculture for the chemical or pharmaceutical industry (bio- economy).
- All along the supply chain, there are marketing and organizational innovations that are becoming increasingly important.

As innovation is the main driver of productivity growth, at the national level, innovation helps create higher value added and improve competitiveness and economic growth

[57] African, Caribbean and Pacific (ACP) and EU institution http://www.cta.int/

whereas at the farm level, it lead to a better allocation of resources, higher productivity and income OECD (OECD 2013 p.12).

Different problems and varying innovation activities at different levels of agricultural sector lead to various perspectives and use of methodology for its analysis. Even though there is a common general understanding on the constituents of AIS, there has evolved varying approaches to AIS concept. There are different academic strands of thinking about AIS regarding the boundaries and structure of the system as well as approaches to analyze these systems.

Klerkx et al. (2012) groups these differing views under three groups: An infrastructural view of AIS, A process view of AIS and A functionalist view of AIS (Klerkx et al. 2012 p.464-467).

Under infrastructural view of AIS, there are studies which tend to approach AIS as an "innovation support infrastructure" and studies "that make a predominantly static analysis" of actors, their interactions and infrastructures. In these studies, the main question is "to what extent this system supports, or does not support and even constrain, agricultural innovation": for example, Sorensen (2011) explores how cutting-edge R&D and rapid innovation contribute to maintaining the global competitiveness in Australia's agricultural sector; Temel (2004), Leitgeb et al. (2011), Sorensen (2011) interpret AIS both as a national innovation system where as Blay-Palmer (2005), Gildemacher et al. (2009) converge AIS a sub-sectoral innovation system (Klerkx et al. 2012 p.464).

These studies with infrastructural view of AIS "see innovation systems in terms of creating 'fertile soil' for innovation to grow" and "with its emphasis on clear boundaries and pre-assumed goals (…) infrastructural view still has affinity with hard systems thinking":

> This perspective on AIS correlates with a fairly static view on networks, in which embeddedness of an actor in the structure of a network, the existence of structural holes and weak ties in networks, co-determine the potential for innovation, as they give information on the available resource configurations (knowledge, finance, materials) and the potential for creative recombination of knowledge, technologies and practices (Klerx et al. 2012 p.464-465).

The studies grouped under the process view of AIS include Ekboir (2003), Hall and Clark (2010), Klerkx et al. (2010), Leeuwis and Aarts (2011). These studies look more at the process side of AIS and make "a more dynamic analysis to assess the co-evolutionary process of interactive development of technology, practices, markets and institutions" (Klerx et al. 2012 pg.465).

In this group of studies, AIS is seen as "systems in the making" and approached as "self-organizing growing networks of actors connected to the development of a certain novelty, emerging from a dominant incumbent production system (...) or value chain configuration and moving towards an alternative to the incumbent system…" (ibid). In these studies, the central focus is on "how an agency of innovators is embedded within and supported by a broader socio-institutional and technological environment, or conversely, the efforts of innovators to change their socio-institutional and technological environment" (ibid).

Among these studies, such as Roep et al. (2003), Knickel et al. (2009), Elzen et al. (2011), Lamine (2011), Brunori et al. (2008), Elzen et al. (2012) do not explicitly use IS approach but use "system innovation approach" to study radical innovation in agricultural sector and focus on niche dynamics. (ibid).

In their report on EU funded IN-SIGHT research program, Brunori et al. (2008) review the evolution of innovation studies in agriculture, showing the progressive shift from the linear approach to the system approach for agricultural innovation. They offer a new conceptual framework where "second order innovation" at micro, meso and macro levels is discussed. Knickel et al. (2009) further builds on the conceptual level work carried out in Brunori et al. (2008).

Knickel et al. (2009) discuss a conceptual framework related to innovation processes as the outcome of collaborative networks. They argue that technical and economic factors used to analyze drivers and barriers alone are not sufficient to understand innovation processes. Therefore, the related social and institutional aspects of cross sector as well as within sector processes are explored. According to Knickel et al. (2009), "innovation functions as a process where farmers' and rural entrepreneurs' knowledge, motivations and values play an important role" and "institutions, administrations and extension services, whose mission is to support changes, can become barriers to innovation, if they do not acknowledge that the needs of farmers and of society have changed" (Knickel et al. 2009 p.883).

Further development of novelties is limited by their compatibility with external constraints, i.e. actors, rules and artefacts. As long as niches develop and consolidate, they modify the networks within they operate, and challenge dominant rules, actors, and artefacts.

Wiskerke (2003) focus on the prevailing sociotechnical regime constraining the growth of new promising sustainable food supply chains and networks by using the example of Dutch wheat and bread. According to Wiskerke (2003), “constraints are both of a technical and an institutional nature” and he proposes strategic niche management “as a promising design tool to overcome some of the encountered constraints, with the aim of contributing to a transition towards a more sustainable sociotechnical regime”. Thompson and Scoones (2009), Vanloqueren and Baret (2009) focus on the socio-political and political economy of this kind of agricultural innovation processes.

Researchers like Markard and Truffer (2008) and van Mierlo et al. (2010) link niche approach and IS approach (Klerx et al., 2012 p.466). Here, niches are rather like TIS. They are specific projects or as sets of projects connected to a similar novel technology or practice. In agricultural innovation studies, such as in Hall and Clark (2010) and Brooks and Loevinsohn (2011), the AIS concept instead of TIS concept is actually used but this type of niche focus has been applied (Klerx et al., 2012 p.466).

According to Klerx et al. (2012) a third strand, under which agricultural innovation studies may be grouped, is the functionalist view of AIS**.** This approach has rarely been applied to the analysis of AIS, but has been mentioned as an interesting avenue for exploration (World Bank 2008, 2012).

World Bank (2012) underlines that conducting a functional analysis is a way of getting a better overview of the innovation landscape:

> A functional analysis is useful to rapidly assess a national or sectoral innovation system. It can help to identify the principal actors within an innovation system and the linkages and interactions between them. Weaknesses identified in such an analysis can form a good starting point for formulating specific innovation policy interventions (World Bank 2012 p.466)

In recent years, the World Bank contributed significantly to the development of the AIS approach both conceptually and empirically. There are quite examples of the AIS approach applications to the sub-sectors of agriculture (see World Bank 2006a, 2008, 2012).

Moreover, Spielman et al. (2009) makes a review of development of AIS approach in various studies of developing-country agriculture. They reference the studies of Biggs and Clay (1981) and Biggs (1989) as an early foray of AIS approach who introduced several key concepts that become central to later IS studies on developing-country agriculture (Spielman et al. 2009 p.4). They indicate that studies of Hall and Clark (1995), Hall et al. (1998, 2002, 2003), Johnson and Segura-Bonilla (2001), Clark (2002), and Arocena and Sutz (2002) introduce the IS approach to the study of developing-country agriculture. Regional and national applications of IS approach include Sumberg (2005), Roseboom (2004), Chema, Gilbert, and Roseboom (2003), Peterson, Gijsbers, and Wilks (2003), and Hall and Yoganand (2004) for Sub-Saharan Africa; Vieira and Hartwich (2002) for Latin America; and Hall et al. (1998) for India. There are several studies focusing on the institutional arrangements in research and innovation: for instance, Hall et al.(2002) on public-private interactions in agricultural research in India; Porter and Phillips-Howard (1997) on contract farming in South Africa; or Hall et al. (1998), Allegri (2002), and Kangasniemi (2002) on producers' associations in South Asia and Sub-Saharan Africa. Other studies focus on technological opportunities, such as Ekboir and Parellada (2002) on zero-tillage cultivation. According to Spielman et al. (2009), these studies are distinguished from many other works on agricultural research and development as they "embed analyses of innovation within the wider context of organizational and institutional change processes" and "they offer some answers to certain research questions that the conventional literature is often unable to address."

Depending on the perspective of the AIS analyses, static or process view, what is needed to enhance IS performance differs, hence there are various methodological applications used for the analysis of AIS (Klerkx et al. 2012 p.470). Spielman et al. (2009) make an overview of current methodological applications of AIS approach and propose additional methods of analyses to improve AIS. According to Spielman et al. (2009) while a diversity of methods used by the conventional IS approach in studies of industrialized countries, the methods employed in the study of developing-country agriculture remains fairly limited.

Spielman et al. (2009) argues that no single method can be used to analyze the complex innovation processes and systems. Currently, the favored methodology is the descriptive case study and there are some methods of analysis that can be used to support this descriptive work (Spielman et al., 2009 p.4-6) such as:

- in-depth social and economic histories, innovation histories,
- policy benchmarking
- cross-country comparisons and best practices
- statistical and econometric analysis
- systems and network analysis (e.g. using social network analysis)
- game-theory modeling in the tradition of evolutionary economics and empirical applications

By taking into account of the study of Spielman et al., (2009), Klerx et al. (2012) makes a review of IS analysis methods those have been applied and proposed. They group and describe these methods as follows (Klerx et al. 2012 p.470-471):

- *Institutional analysis* looks at "the influence of institutional enablers and constraints in relation to innovation systems performance or of parts of it" such as the studies of Hall et al. (2001), Clark et al. (2003), Klerkx and Leeuwis (2008), Spielman et al. (2008). This kind of analysis can be approached from both an infrastructural and a process perspective.
- *Social network analysis* is used "to map institutional linkages visualizing relationships between actors, and assessing the position of actors within the system-in terms of centrality, number of ties, strengths of ties". Studies of Temel (2004) and Spielman et al. (2011) are in this group. This type of research is generally used in a more infrastructural and static perspective.
- *Innovation histories* or *innovation journeys* is "a way of recording innovation processes by means of timelines, focusing on important events and the relationships and activities which defined those events and influenced the outcome of the innovation process". This type of research is used in the process view of AIS. Some related studies are Douthwaite and Ashby (2005), Spielman et al. (2009), Klerkx et al. (2010).

- The use of *game-theory modelling* is proposed by Spielman et al. (2009). This method is based on evolutionary economics, illustrates “the spontaneous processes of social self-organization and the ways in which public policy and organizational structures can affect these processes”. This method can be used in the process view of AIS.
- *Benchmark analysis*, which is also proposed by Spielman et al. (2009) is based on indicators such as patents, R&D expenditures, numbers of researchers, and input-output/spill-over analysis on R&D investment, returns on risk capital, etc. This type of research is convenient for infrastructural and static perspective.
- *Innovation system analysis* uses the different categories of system failures cross-tabulated against actor groups to identify failures. This method is useful for infrastructural and static view as well as for the process view of AIS. For instance, Gildemacher et al. (2009) use a “system failure framework” to identify the shortcomings of the potato innovation system. Klein-Woolthuis et al. (2005) reframe the “system failure framework” by distinguishing between actors and rules, design a IS policy framework that enables policy makers to address systemic failures, illustrate the functioning of framework on two cluster initiatives in the Netherlands. Van Mierlo et al. (2010) develop an analytical framework that integrates elements from the IS approach with a social learning perspective.
- *Functions of innovation systems approach* looks whether all functions properly performed (Hekkert et al. 2007). This type of analysis may be use for process-oriented AIS approach.

Briefly, since 1980s the application of AIS concept as a framework of analysis has been developed and enriched with many theoretical and empirical contributions of the literature. With an (A)IS perspective, international and supranational organizations such as the World Bank, OECD, FAO as well as EC has been developing various indicators and toolkits based on good country practices for government policy making to overcome global and domestic challenges for agricultural development. The AIS perspective has become the mainstream perspective for government policy design.

CHAPTER 4

ANALYTIC FRAMEWORK AND RESEARCH METHODOLOGY

4.1 Introduction

The main research method of this study is an analytical framework based on IS approach. This analytical framework is the coupled functional-structural analysis framework developed by Wieczorek and Hekkert (2012). This framework is summarized in the next section.

The application of functional-structural analysis framework to olive and olive oil sectoral innovation system is based on different methods and data sources. These methods and data sources are explained in the third section.

In the fourth section, functions of agricultural sub-sector innovation system are broadly defined. The functional-structural analysis framework is based on these functions.

4.2 Functional-Structural Analysis Framework

Wieczorek and Hekkert (2012) argue that four approaches to IS analysis - structural analysis, functional analysis, systemic problems and systemic Instruments - have been developed rather separately from each other. For instance, functional analysis emerged as a criticism to the insufficiency of structural analysis in the IS literature.

Furthermore, Wieczorek and Hekkert (2012) argue that although there is a significant amount of literature study on the categorization of systemic problems, there is not much work on the systematical identification of them, nor on the type of the tools to address them.

Thus, different classifications of systemic problems are difficult to compare. They also argue that the literature on systemic instruments is poorly linked to the literature on systemic problems.

In order to overcome this gap, Wieczorek and Hekkert (2012) developed the so-called "Systemic Innovation Policy Framework". They link four innovation policy approaches – functional analysis, structural analysis, systemic problems and systemic instruments - in their framework. They combine structural and functional analyses of IS. This new framework may be used to identify the systemic problems and to suggest the systemic instruments that would address these problems (Wieczorek and Hekkert 2012 p.75).

The rationale behind this approach is that functions cannot be influenced without altering a structural element. According to Wieczorek and Hekkert (2012), functional analysis is not sufficient to develop successful systemic innovation policies for two reasons:

> First, functions cannot be influenced without altering a structural element....Secondly, if the functions are used as the sole basis for policy, then uncertainty emerges with regard to the completeness of the identified list of blocking mechanisms and thus, of the policy issues (Wieczorek and Hekkert 2012 p: 78).

Structural components of IS includes actors, institutions (hard, soft), interactions (networks, individual contacts) and infrastructure (physical, knowledge, financial) (**Table 4.1**).

Table 4.1 Structural Dimension of IS

Actors	• **Civil society** • **Companies**: start-ups, SMEs, large firms, multinational companies • **Knowledge institutes:** universities, technology institutes, research centers, schools • **Government** • **NGOs** • **Other parties:** legal organizations, financial organizations/banks, intermediaries, knowledge brokers, consultants
Institutions	• Hard: rules, laws, regulations, instructions • Soft: customs, common habits, routines, established practices, traditions, ways of conduct, norms, expectation
Interactions	• At level of networks • At level of individual contacts
Infrastructure	• **Physical:** artefacts, instruments, machines, roads, buildings, networks, bridges, harbors • **Knowledge:** knowledge, expertise, know-how, strategic information • **Financial:** subsidies, fin programs, grants etc.

Source: Wieczorek and Hekkert 2012 p.77

Wieczorek and Hekkert (2012) group and map type of systemic problems mentioned in the previous IS literature with structural dimension of IS (Table 4.2).

Table 4.2 Structural Dimensions of Systemic Problems

Structural Dimensions	Systemic Problems
Actors	• **Presence Problem**: relevant actors may be absent • **Capacity Problem**: lack of competence, capacity to learn or utilise available resources; to identify and articulate their needs; and to develop visions and strategies (*transition problems* by Smith 2000; Chaminade and Edquist 2010)

Institutions	• **Presence problem:** specific institutions maybe absent**.**
	• **Capacity problem**:
	    ○ **Stringent institutional problems** may result in the so called appropriability trap and favor incumbents.
	    ○ **Weak institutional problems** may hinder innovation, for instance by insufficiently supporting new technologies or developments.

Interactions	• **Presence problem**: missing interactions because of cognitive distance between actors, differing objectives, assumptions, capacities, or lack of trust.
	• **Quality problem:**
	    ○ **strong network problems** : actors are wrongly guided by stronger actors and fail to supply each other with the required knowledge
	        ▪ **myopia*:*** internal orientation favoring the incumbent set-up and relationships
	        ▪ Over **strong involvement of incumbent actors**
	        ▪ **Lack of weak ties**
	        ▪ Dependence on dominating partners due to **assets specificity**.
	    ○ **Weak network problems:** weak connectivity between actors which hinders interactive learning and innovation (complimentarity problems: Chaminade and Edquist 2010)

Infrastructure	• Presence problem: specific type of infrastructure is absent. • Quality problem: infrastructure is inadequate or malfunctioning.

Source: Wieczoreck et al. 2012 p: 79

The rationale of Wieczoreck and Hekkert (2012) behind coupling of functions with structures is that systemic problems are the barriers hindering development and functioning of innovation systems, hence innovation processes.

Therefore identification of the type of systemic problems should be a precondition for selecting policy tools that would target them and thus, to influence the overall functioning of the innovation system. For this aim type of systemic problems that inhibit each function (Table 4.3) are analyzed.

Table 4.3 Systemic Problems Based on Functional–Structural Analysis of an IS

System functions	Structural Element	Systemic Problem	Type of Systemic Problem
Knowledge development **Knowledge diffusion** **Guidance of search** **Entrepreneurial activities** **Market formation** **Legitimization/lobbying activities** **Mobilization of resources**	Actors Interactions Institutions Infrastructure	Actors Problem Interactions Problem Institutions Problem Infrastructure Problem	Presence? Capabilities? Presence? Intensity/quality? Presence? Capacity/quality? Presence? Capacity/quality?

Source: Wieczoreck et al. 2012 p: 82

Each function is analyzed through the perspective of the four structural elements: actors, interactions, institutions and infrastructure. The aim is to identify which structural element causes the weakness or absence of the function. Functional-Structural analysis is based on a set of diagnostic questions (Table 4.4).

Table 4.4 Diagnostic Questions for Functional-Structural Analysis

Knowledge Development	What is the knowledge base in terms of quality and quantity? Is the knowledge basic or applied? Are there many projects, research, patents and articles? Which actors are particularly active? Who finances the knowledge development?
Knowledge Diffusion	Are there strong partnerships? Between whom? Is the knowledge development demand-driven? Is there space for knowledge dissemination? Does the knowledge correspond with the needs of the innovation system?
(Other functions)	(other diagnostic questions)

Source: Wieczorek and Hekkert 2012 pg: 84

Functions are evaluated based on responses to these diagnostic questions and scoring of functions according to scale of their functioning.

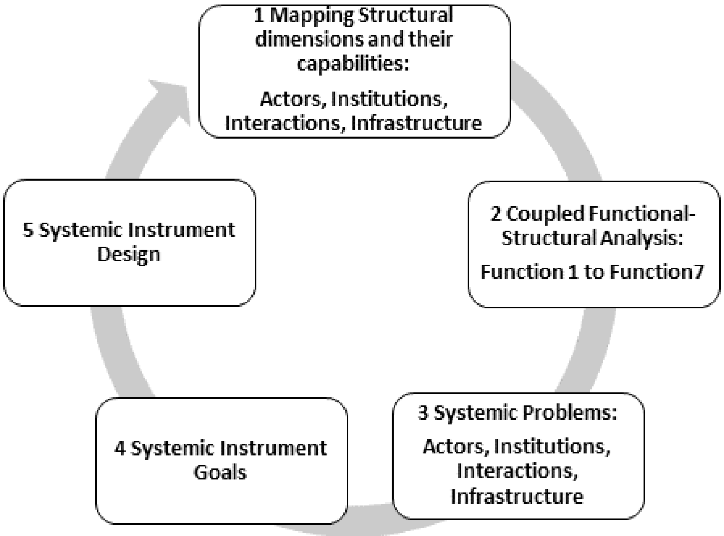
Moreover, Wieczoreck and Hekkert (2012) couples type of systemic problems with systemic instrument goals as shown in **Table 3.2.5** for which a rich set of individual policy tools are recommended (Wieczoreck and Hekkert 2012 p.85)

Table 4.5 Systemic problems vs Systemic Instruments Goals

<table>
<tr><th>System Functions</th><th>Type of Systemic Problem</th><th>Systemic Instrument Goals</th></tr>
<tr><td rowspan="4">Knowledge Development
Knowledge diffusion
Guidance of search
Entrepreneurial Activities
Market formation
Lobbying activities
Mobilization of Resources</td><td>Actors Presence?
Capabilities?</td><td>Stimulate and organise participation of relevant actors
Create space for actors capability development</td></tr>
<tr><td>Interactions Presence?
Intensity/quality?</td><td>Stimulate occurrence of interactions
Prevent too strong and too weak ties</td></tr>
<tr><td>Institutions Presence?
Capacity/quality?</td><td>Secure presence of hard and soft institutions
Prevent too weak and too stringent institutions</td></tr>
<tr><td>Infrastructure Presence?
Capacity/quality?</td><td>Stimulate physical, financial and knowledge infrastructure
Ensure adequate quality of infrastructure</td></tr>
</table>

Source: Wieczorek and Hekkert (2012)

In Figure 4.1 five stages of application of “systemic innovation policy framework” of Wieczorek and Hekkert (2012) is presented.



Source: Wieczorek and Hekkert 2012 p.84

Figure 4.1 A Systemic Innovation Policy Framework

4.3 Framework Application and Research Methodology

4.3.1 Selection and Definition of Functions

For the application of analytical framework Wieczorek and Hekkert (2012), among various definitions of IS functions in the literature, the list of functions proposed by Hekkert et al. (2007) is used. Hekkert et al. (2007) propose seven functions: entrepreneurial activities, knowledge development, knowledge diffusion, guidance of search, market formation, legitimization/ lobbying activities and mobilisation of resources. Hekkert et al. (2007) discuss these functions in relation to the analysis of technological innovation systems to understand technological change in the developed countries' case studies.

One of the reasons that these functions are selected in this study is that they are the core functions of an IS and clearly defined. They also are the main subset of functions proposed in other studies and they do not contrast with them.

More importantly, regarding the recent developments in olive sector in Turkey and the main problems that the sector is facing (see chapter 4) these functions seems appropriate ones to be analyzed to answer the research question of this study.

Agricultural sector as well as the developing country context has its own specificities. Therefore, content of these functions have to be adopted according to the agricultural sector and developing country context. In addition, if the level of analysis is at agricultural sub-sector level, functions should capture specificities in functional dynamics arising from being at sub-sector level. Innovation system may seem to function at general agricultural level, but may not function well at sub-sector level. For instance, olive sector is an agricultural sub-sector of horticulture. It is also a sub-sector in the whole of agricultural sector encompasses horticulture, plant production and animal husbandry. Functional-structural analysis of an agricultural sector IS should be done by taking these facts in consideration. For this aim, functions proposed by Hekkert et al. (2007) are modified and explained in the next section.

Based on the survey of relevant literature, general set of diagnostic questions and possible AIS indicators for each function are prepared (**Appendix A**). These matrices of diagnostic questions and indicators form the analytical infrastructure of the functional-structural analysis framework.

4.3.2 Stages for the Application of Analysis Framework

The stages for the functional-structural analysis of the olive and olive oil sectoral innovation system are as follows:

- Define delineation of the sector
- Map structure and define actors of the olive and olive oil innovation system
- Identify systemic problems within each function
- Discuss policy implications to further improve functioning of IS

In this study, the sectoral boundary of olive and olive oil sectoral innovation system is delimited to olive production i.e. olive sub-sector, table olives sub-sector and extra-virgin olive oil sub-sector.

The refined olive oil sub-sector is not included within the boundaries as main problem in olive oil sector in Turkey is the low productivity in high quality extra-virgin olive oil. Regarding the need to focus on problems of virgin olive oil sector, the different technological infrastructure of refined olive oil production, its activities and the type of actors differing from virgin olive oil sector, combined with already large scope of the study, this part of the olive oil industry is left out.

Olive and olive oil sector is strongly related to territorial dynamics. This is a fact not only because of the specificity of being an agricultural sub-sector dependent upon natural resources, territorial knowledge and capacities, but also because of the behavior of olive tree itself varying with different territorial conditions. An olive tree variety can easily adapt to different territorial conditions and markedly differentiates itself from the olive trees of the same variety planted in other regions. It reflects its territorial specificities in the olive yields, quality or taste. Sector dynamics in different regions based on different olive tree varieties is important for the success of the sector as a whole.

Therefore, region specific evaluation of the sector is also needed to answer research question of this study. The analysis of all olive producing regions is out of the reach of this study because of time and physical constraints. Therefore, two regions are selected to make territorial delineation and select regional actors: Gemlik District of Bursa Province and Ayvalık District of Balıkesir Province.

Based on statistical database of TÜİK, in total olive production of the years 2013 and 2014, almost 20 % of a total of 133.4 thousand tons of production in Bursa belongs to Gemlik, with a production of 26.5 thousand tons. Ayvalık produced a total of 84 thousand tons with a share of 35 % of a total production of around 240 tons in Balıkesir. Volume of production in Gemlik has almost halved when we compare the total production in 2000 and 2001. In Ayvalık, total production has increased, around 10 %, but it is still modest when government supports for extension of olive production area is taken into account.

Though they have a modest share in the total olive production in Turkey, these two traditionally olive producing regions are themselves a brand in the domestic market due to the quality of their products.

Hence, both of these districts are good cases to focus in this research due to reasons as underlined below:

- Both districts have its own specific variety of olive tree adapted to the region that requires different agricultural and processing practices. Gemlik region is a significant producer in black table olives market with Gemlik cultivar olives and Ayvalık is well known for its extra-virgin olive oil produced from Ayvalık cultivar olives.
- Both districts recently got the "geographical indication" to compete with other regions. Both regions have to tackle with region specific and food product specific sectoral challenges, table olive for Gemlik, olive oil for Ayvalık.
- Though their product specialization is different, both of these districts are part of Marmara region. They are very close to big cities that have a number of supporting knowledge and bridging institutions. The existence of these regional actors allows assessing the regional interactions of actors.
- Both of these districts are under threat of competition with newly established olive plantations favorable for mechanization, composed of younger olive trees with higher productivity. As traditional olive producing regions, both Gemlik and Ayvalık districts are more sensitive to challenges in the olive sector, therefore they are good cases for regions that have to face and tackle the problems in the sector more intensely.

In order to identify key actor groups of the olive and olive oil innovation system both Spielman and Birner's (2008) framework which was based on Arnold and Bell (2001) and the World Bank (2012) modified from Rivera et al. (2006) are used (**Figure 4.2, Figure 4.3**). These frameworks are very useful to understand the AIS components. In addition, the list of actors in the structural dimensions of an IS defined by Wieczorek and Hekkert (2012) are also used for the definition of IS key actors.

According to Spielman and Birner (2008) essential elements of an innovation system consist of knowledge and education domain, business and enterprise domain, and bridging institutions that link the two domains.

Knowledge and education domain is composed of agricultural research and education systems whereas business and enterprise domain comprises value chain actors who use outputs of the knowledge and education domain. Bridging institutions facilitate transfer of knowledge and information between these domains. Farmers are "implicit" throughout the system "both as consumers and producers of knowledge and information, as producers and consumers of agricultural goods and services, as bridging institutions between various components, and as value chain actors" (Spielman and Birner 2008, p.7).

In the World Bank's (2012) conceptual framework, research, education, extension and farmers form the agricultural knowledge and information systems that is an important subset of AIS.

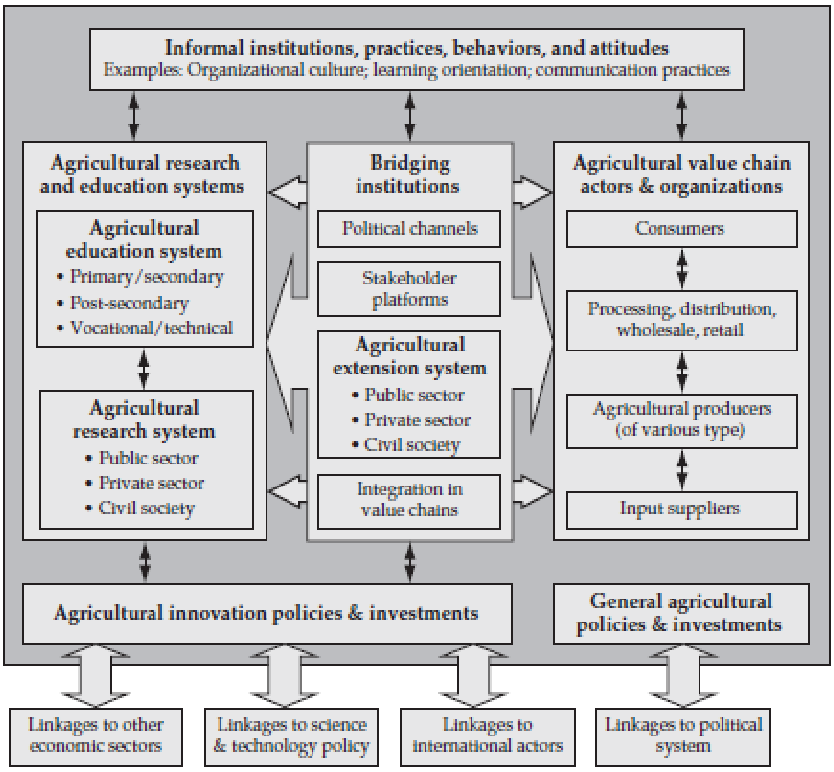


Figure 4.2: Spielman and Birner's (2008) Conceptual Diagram of AIS

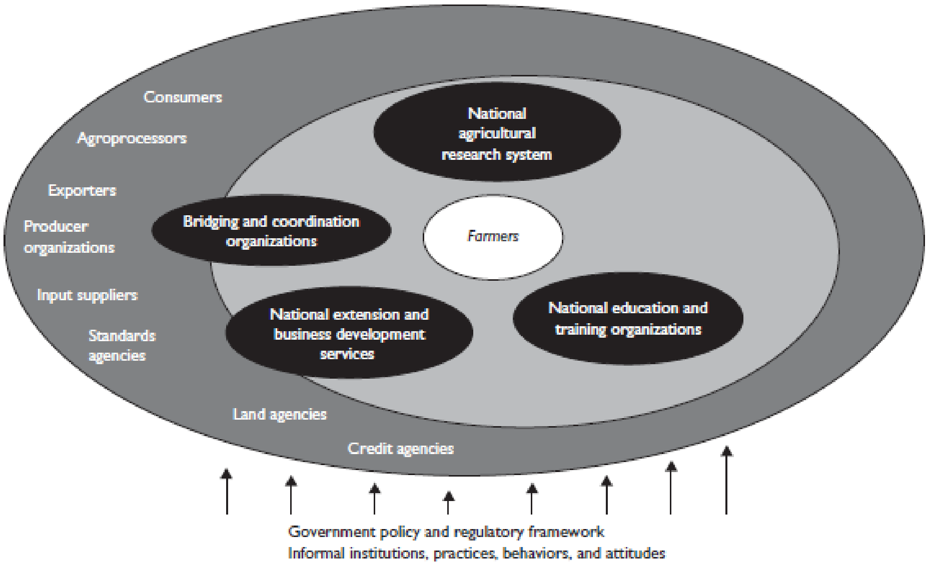


Figure 4.3: World Bank (2012) Conceptual Diagram of AIS

4.3.3 Methodology for the Application of Analysis Framework

In this study various methodological tools are combined to answer the research question, like various IS studies which do similar type of research[58].

As one of the methodological tools on-line internet search is used to collect information on publications, official documents, secondary data sources, news related to olive and olive oil sector. This method was very useful to define the actors, organizations, institutions and major events affecting the functioning of the sector. The literature survey of books, research articles and thesis is done by the use keywords through the web sites of journals, university

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[58] As examples of empirical studies using functional and/or structural Analysis of IS to legitimize analysis framework in this research study, see Lizuka and Gebreeyesus (2012), Lamprinopoulou et al. (2012, 2014), Gildermacher et al. (2009), Bleeker (2013), Gabaldon- Estevan and Hekkert (2013), Van der Hilst (2012),Islam et al (2012), Nilsson and Moddysson (2011) and Sanchez and Bisang (2011)

libraries and research platforms. In addition, interview recordings of key actors and information flows on social media platforms of the olive sector[59] were very useful to track key events, actors and their attitudes. Finally, attending the key congress[60] and workshops that took place during the research period was another very useful method to acknowledge about the active actors and organizations in the sector. Information from these sources helped to understand activities in the sectors, answered some of the diagnostic questions, and helped triangulation of the information got from interviews.

As the main methodological tool, semi-structured and face-to-face interviews with different sector actors and experts are used to collect primary data related to the sector, based on diagnostic questions prepared for Functional-Structural Analysis (**Appendix A**). Not all of these questions are asked to all of the interviewees, but regarding the role of the actor in the sector and the direction of the interviews as many of these questions as possible are used.

Semi-structured face to face interviews is selected as a methodological tool as it would be very useful given the research question of this study and the analysis framework[61]. Research methods should be appropriate to research questions (Bryman 2008 p.395). Analyzing an agricultural sector in an innovation system perspective requests exploration of the context; social realities embedded in a regional context such as the interactions of regional actors; soft institutions like trust, values, belief, expectations and attitudes of actors; processes of learning …etc. Analysis of these issues request deeper and richer data that could be produced by qualitative research methods. In this respect, face-to-face semi-structured interviews are useful tools as they allow flexibility for the interviewer and interviewee to discuss and elaborate more on interesting comments, therefore to conduct more in-depth

[59] https://groups.yahoo.com/neo/groups/UZZK-TURK/info , facebook groups such as Zeytindostu, zeytinciler, zeytin-olive academy

[60] For instance IV National Olive Congress of May 2014

[61] See Corbin, J. and Strauss, A. (2008). *Basics of qualitative research* (3rd. ed.). California: Sage, McCracken, G., (1998). *The long interview*. California: Sage, and Patton, M.Q., (2002). *Qualitative research & evaluation methods*. (3rd. ed.). California: Sage.

interviews. Particularly, interviews with sector experts allow draw on the comprehensive knowledge of experts who have long experience in the sector (World Bank 2012, p.556).

The *snowball method* was used to identify relevant actors of the system, by asking the interviewees about the other actors that play role in the sector. The importance of the role of these actors is also verified by the internet search, if possible.

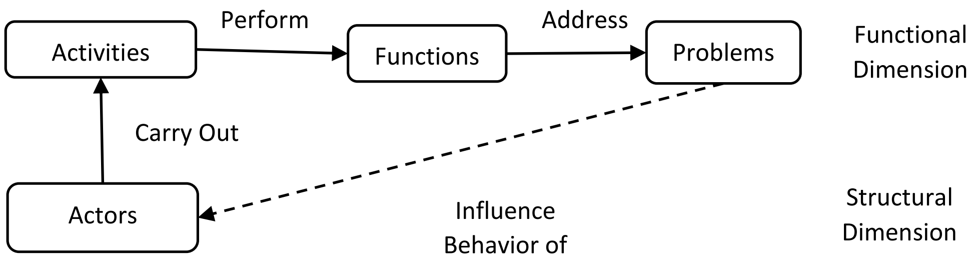
In addition, some criteria are defined to form a broad sample of actors. The value chain actors who are active in the market, the members of (regional) producer cooperatives and organizations, the quality award-winning producers are surveyed to form the list of potential interviewees. Behind these criteria, the assumption was that producers who were the members of groups and unions were the producers who aim to be active in the value chain and the market. Quality award winning small producers were assumed as entrepreneurs who overcome and who know the sectoral challenges more. Accordingly, a list of value chain actors has been developed. Among this list, value chain actors who are in the production chain and the value chain and who make a living only from olive and olive oil sector are selected. From this list, because of time constraints, most appropriate and available actors were interviewed.

Semi-structured interviews are also used to understand relational structure of the sector. These interviews allowed collect information on both the main types of linkages between key system actors as well as the importance of these linkages. The diagnostic questions of the semi-structured interviews are designed to generate basic information that is useful for assessing relational elements. In addition to the primary data collected from the semi-structured interviews, available secondary data sources (such as multi actor R&D projects, public-private partnership) are used to drive on the network structure of within and between different actor groups.

Different actors may play different roles in an innovation system as they may perform different activities that affect, directly or indirectly, performance of functions positively or negatively [62](**Figure 4.4**). For instance, even though a research institute is a primary actor of

[62] See (Nilsson and Moodyson 2011) for the relationship of actors, activities and functions.

knowledge development function, it may also be an actor of knowledge diffusion function if it has activities of agricultural extension and education. Activities, therefore actor(s) who carry out them, may contribute to performance of different functions. Based on the data produced from different methodological sources, main activities of the actors and their role in a function are defined.



Source: Adopted from Nilsson and Moodyson 2011 p.5

Figure 4.4 Scheme of the Structural and Functional Dimensions of IS

The statistical analysis of olive and olive oil Sector is done for a period of 15 years from 2000 to 2014. It is a long enough time to understand the direction of olive and olive oil sector based on statistics. Moreover, Turkey has been a candidate country for EU in 2000. Since then there has been significant institutional reforms i.e. changes in laws and regulations, and changes in organizational structure for EU accession purposes, in many areas including agricultural sector. The EU financial tools have been a significant source for financial infrastructure development since then. Furthermore, in this period there have been other significant institutional changes in olive and olive oil sector. Turkey exit International Olive Council in 1998 and rejoin it 2010. A National Olive and Olive Council (UZZK) established in 2007. These are significant changes in the sector. Regarding all these changes, the period between the years 2000-2014 is an appropriate selection for analysis.

Face-to-face interviews have been completed from March 2014 to December 2014, of which most of them are recorded. Each interview lasted minimum an hour or more. The list of 65 sector representatives interviewed is in **Appendix B.** These interviews are fully transcribed to written documents for analysis.

4.4 Functions of (Agricultural Sub-Sector) Innovation System

The seven functions of IS proposed by Hekkert et al. (2007) are adopted to agricultural and developing country context for the convenience of this research study as below.

Function 1: Knowledge Development

Knowledge development function is related to the breadth and depth of the scientific and technical knowledge base of the IS and how well the IS performs in terms of its knowledge base (Bergek et al. 2008, 2010).

Lundvall stresses the importance of knowledge development, by underlining "the most fundamental resource in the modern economy is knowledge and, accordingly, the most important process is learning" (Lundvall 1992 p.1). Learning, therefore knowledge development, is at the heart of any innovation process (Lundvall 1992, Hekkert et al. 2007).

Knowledge development function encompasses "learning by searching" and "learning by doing" (Hekkert et al. 2007 p: 422). Knowledge development and learning happen at different levels of IS such as the level of the firm, within industry or sector (Bergek et al. 2010 p.122).

In AIS, the knowledge base may encompass different disciplines. As agriculture is a technology user sector, it involves a set of different technological trajectories along the entire value chain. Each subsector AIS may require different combinations of scientific and technological knowledge. Input suppliers, farmers and agricultural producers, food processor firms, i.e. knowledge user actors require and feed in different types of knowledge.

The actors of the research and education domain of AIS are the primary actors who perform knowledge development function (Spielman and Birner 2008, Worldbank 2012, EU SCAR 2012). As research and development in an agricultural sector have long-term goals, it requires high capital investment. Hence, scientific and technological research is mainly the task of the public sector research institutes in developing countries where capacity of private sector is weak.

The capacity, organization structure and governance of public agricultural research system affect the agricultural knowledge development processes. The knowledge base of an agricultural sub-sector is embedded in the general agricultural sector knowledge base. How the sub-sectoral knowledge development processes take place within the public agricultural research system, its capacity and quality, is an important determinant of knowledge development function in that sub-sector. Therefore, a good functioning of public agricultural research system is a primary condition for good functioning of sub-sectoral knowledge development in developing countries. The research and education structure of AIS may look good on the paper, but they may be understaffed or under resourced and may contribute little to the sector.

The capacity of knowledge users and the quality of demand for agricultural research and development are important determinants of the good functioning of the knowledge development function of AIS in a developing county context. Farmers, small producers and firms, which form significant part of the knowledge user domain in the agricultural sector of developing countries, may lack the capacity to configure their needs and demand. Knowledge development may not function not because of the capacity and quality of the knowledge producer domain only, e.g. public research and education system, but because of the capacity and quality of the knowledge user domain.

As the agricultural landscape is changing, agricultural research and education systems are forced to produce knowledge on issues such processing, distribution, packaging, marketing and consumption to enhance agricultural productivity (Spielman and Birner 2008 p.24). The challenge is to make public research organizations more responsive, dynamic, and competitive within the new agricultural landscape (World Bank 2012 p.477).

Function 2: Knowledge Diffusion

Knowledge that has been developed creates a value when it diffuses from producers of knowledge to users of knowledge.

Knowledge diffusion function captures how the scientific and technical knowledge is diffused and combined in the system (Bergek et al 2010 p.121). Knowledge diffusion is related to “learning by interacting” and “learning by using” when user producer networks are concerned (Hekkert et al. 2007 p.423). Lundvall (1992) states the essence of interactive learning for the functioning of an IS.

The actors of an IS interact, collaborate or cooperate for innovation. They rarely innovate based on their own knowledge bases for reasons such as technological complexity and technological dynamics (Bergek et al 2010 p.122). Hence, how the scientific and sector specific knowledge diffuse through networks is a major concern for the good functioning of an AIS.

In an agricultural sector, extension systems form the major part of bridging institutions that link knowledge produced by the research domain to agricultural knowledge users, mainly farmers. The actors of agricultural extension systems[63] include public sector, private sector and non-governmental organizations and producer organizations. In developing countries, mainly public institutions assume this role.

The capacity building of extension and advisory services with an AIS perspective is needed for good functioning of AIS (World Bank 2012; EU SCAR 2013). Traditionally, extension activities were focused on increase in agricultural productivity, farmer training and technology transfer (Spielman and Birner 2008, World Bank 2012). In an AIS perspective, agricultural extension has "a vital role to play in helping to strengthen capacities to innovate and broker linkages" (World Bank, 2012 p.180).

Farmer organizations have an important role in knowledge diffusion. Therefore, better inclusion of them via capacity building programs is important for the system (World Bank 2012). Research, extension and farmer cooperatives must cooperate and ensure that farmers receive relevant information to increase agricultural productivity and quality (Swanson and Rajalahti 2010).

[63] The World bank (2012) defines extension and advisory services as "systems that facilitate the access of farmers, their organizations, and other value chain and market actors to knowledge, information, and technologies; facilitate their interaction with partners in research, education, agribusiness, and other relevant institutions; and assist them to develop their own technical, organizational, and management skills and practices as well as to improve the management of their agricultural activities" (Worldbank 2012 p.180).

Not only the capacity of individual extension agents and organizations but also the extension administration should be upgraded with an AIS perspective (Worlbank 2012) so that the extension system could cope up with evolving demands and new roles for advisory services in AIS.

Function 3: Guidance of Search

In an IS, where knowledge development function is related to variety creation, guidance of search function deals with the process of selection (Hekkert et al. 2007 pg. 423).

The guidance of search function covers the activities within an IS "that shape the needs, requirements and expectations of actors" (Suurs 2009 p.55) giving a sense of direction in relation to sectoral changes. "Without a concrete sense of direction, the activities of Knowledge Development, Knowledge Diffusion and Entrepreneurial Activities are bound to lead nowhere" (ibid pg.56). Guidance of search covers both hard institutions (e.g. policy targets) and soft institutions (e.g. promises and expectations).

The perception and trial of the new opportunities by the actors of the IS are important for the development of IS (Bergek et al 2010 p.122). Opportunities are rarely visible in a clear way and the actors of IS may interpret the same information in very different ways (ibid p.122). Guidance of search function covers the mechanisms influencing the direction of search within the IS in terms of different competing technologies, applications, markets, business models (ibid pg.123). The technical bottlenecks, changing factor and product prices, landscape changes (e.g. climate change, green growth, agricultural sustainability influence direction of search.

Guidance of the search is often an interactive and cumulative process of exchanging ideas between knowledge producers, users and other actors of IS. Expectations are important phenomenon in this interactive process (Hekkert et al 2007 p.423) and "wording used by scientists and policy makers is often a good indication for these expectations" (ibid pg.424).

Guidance of the search can be positive or negative (Suurs 2009 p.55-56): Expectations, promises, policy directives may converge positively in a particular direction of sectoral development or vice versa. The convergence is important, as a focus is needed given the limited resources in an IS.

The variety must not be lost as the result of too much focus, as the balance between creating and reducing variety is important for the good functioning of an IS.

Function 4: Entrepreneurial Activity

Entrepreneurs are vital to AIS as they turn knowledge into action and innovation. Entrepreneurial activity can be seen the result of the other functions and is the prime indication of the system performance (Hekkert et al. 2007 p.422).

Entrepreneurship can be defined as the processes of identification, evaluation and exploitation of opportunities (Shane and Venkataraman 2000 p.218). The rapidly changing conditions in the context of agriculture increasingly require a higher level of farmer entrepreneurship (Beldman et al. 2014, Lans et al. 2013). The globalization and diversification of agricultural markets, changing consumer habits, the requirements for food quality, safety and certification, as well as the concerns and regulations about environment and natural resources, are some of the external conditions that challenge farmers and agro-food producers. These external conditions also pave the path for entrepreneurship (Lans et al 2013 p.1) as they create entrepreneurial opportunities. Entrepreneurs can be new entrants who recognize opportunities in the sector or they can be incumbents who diversify their activities to take advantage of these opportunities.

The changing conditions force farmers to shift from subsistence farming to farming suitable for marketing (Kahan 2013 p. 16). In order to turn inventions into economic outcomes, business development is crucial which involves a range of complementary assets such as skills and capabilities (Bergek et al. 2010 p.124). Therefore, in addition to sound management and craftsmanship, "farmers need to become more flexible and develop strategies to pro-actively adapt their farm, product portfolio, networks, partnerships, knowledge systems, personal skills and competences to the changing external conditions" (Smit A.B. 2004).

Besides certain elements of entrepreneurship that are universal to all sectors, some other elements are dependent on the context. The characteristics of agricultural sector, the culture of family farms and firms, the environment that these firms and farms is embedded have to be taken into account while analyzing agricultural entrepreneurship (Lans et al. 2013 p.2).

Agro-food systems have more diverse production structure (EU SCAR 2013 p. 24). Besides large industrial farms and processing firms, family farms and smallholder producers have an important share in agro-food value chain. Even the large farms are SMEs with relatively few workers (EU SCAR 2013 p.24). Family farms and small producers are predominant in agricultural sector both in developing and developed countries (Lowder et al. 2014).

In an agricultural sector, value chains provide farmers and small producers an opportunity to access new markets and to add value to their products. Bu it is essential that farmers and small producers are included and upgraded in the value chains so that they can cope up with sectoral challenges (Laven 2009).

In comparison to other entrepreneurs, family farms are less driven by the aim of profit maximization but rather give priority to survival (Lans et al. 2013 p.2). Family farms and smallholder producers usually have little access to adequate knowledge, skills, finance and infrastructure.

Producer organizations, such as agricultural cooperatives, can play an important role in supporting and enabling smallholder farmers to take advantage of market opportunities. The empowerment of small producers is existence reason of a cooperative. Current context of the agro-food sector require different means to achieve that goal. Instead of playing a defensive role, they now have to be more pro-active role in marketing, updating their organizational structure and engaging in value chain integration (Muradian and Mangnus 2009). Therefore, producer organizations have to develop their managerial capacities and entrepreneurial skills.

By mediating important services such as education, credit, technical knowledge and infrastructure agricultural cooperatives have the potential to enhance smallholder farmers' entrepreneurship skills and enable them integrate themselves into the value chain. In addition to single entrepreneurial activities of the farmers and SMEs "Collective entrepreneurship" (Cook and Plunkett 2006 p.426) through producer organizations is an important way of upgrading entrepreneurial activity of family farms and smallholder producers.

Function 5: Market Formation

Market formation function consists of activities related to the creation of demand for a product. It is about to create spaces so that new products can be introduced and reach economies of scale.

In an agricultural sector, farmers and small producers have to compete with scale economies that their larger competitors are able to reach more easily. Therefore, niche markets are an opportunity for them to stay in the sector. In an agricultural sector, organic, local, heritage products are some examples of niche market products sought by specific consumer segments.

Uncertainties may exist in many dimensions for a niche agricultural product. Markets may not exist or may be underdeveloped, potential customers may not exist or their demand may not be articulated yet, quality of the niche product may be low or standards may not exist.

Food and safety regulations are big challenges for the farmers and small producers to be successful in a niche market. The compliance of standards is important in gaining access to high-end markets as well as differentiating product to create value by reflecting consumer demand (Lizuka 2009). The challenge of uncertainty related to the consumer demand can be overcome by consumer education and by linking farmers, chefs and consumers to promote niche product.

In addition to niche products, general compliance level of the traditional products to the international quality standards are vital for international market access and being in the high-end of the value chain. National rules, regulations, quality control standards and procedures are some of the important institutions for both national and international market formation.

Function 6: Lobbying Activities

This function is related to interest groups and their lobby actions. When something new in the sector challenges the incumbents, there can be resistance to this "creative destruction" from parties that have vested interests (Hekkert et al. 2007 p.425). Advocacy coalitions can lobby to take away the resistance and legitimize to invest resources into the new technology or niche product. The success of advocacy coalitions depends on available resources and future expectations (Hekkert et al. 2007, Bergek et al. 2010).

In AIS, one of the reasons of lobbying activities is natural resources. Agriculture depends on limited natural resources such as land and water. Agriculture is multifunctional and agricultural products are used for food, feed and fuel. Therefore, within general agriculture sector, there is competition between different levels of agricultural sub-sectors for natural resources. Within agriculture sector, plant production, animal husbandry and horticulture lobby for the legitimacy of themselves. At lower levels of sub-sectors, for instance within horticulture, different fruit tree sub-sectors may lobby within a region. Within lower levels of agricultural subsectors, there may be different competing technologies or niche markets, which are trying to be the dominant technology or incumbent in the sub-sector. Moreover, an agricultural sub-sector faces challenges from different sectors other than agriculture as well. Sectors such as mining and energy, which are dependent on natural resources, may have strong lobbying power.

In AIS, lobby groups of small producers and farmers as well as the emerging niche markets are usually weak or their influence may be limited. Their inclusion by forming cooperatives or unions and by building capacity is important for viability of an agricultural sub-sector.

Function 7: Resource Mobilization

Resource mobilization relates to the building and allocation of financial, human and material resources relevant to the innovation system (Hekkert et al 2007, Suurs 2009, Bergek et al. 2010). Subsidies, investments, funds allocated by the government and the private sector on generic infrastructure, large and long-term R&D projects to develop specific technological knowledge and skills are some of the activities in this function (Hekkert et al 2007, Suurs 2009, Bergek et al. 2010). This function is difficult to map over time by using indicators and the best method is to use interviews with core actors asking their view on sufficiency of the resources (Hekkert et al. 2007).

In developing countries, relevant institutions may lack, governance mechanisms may be weaker or funds may not be available to allocate according to needs. This may be especially the case for the developing country private sector when it comes to agricultural sector that consists of small-scale producers and farmers.

In a developing country, with limited resources to be allocated to different economic activities, strong and long-term commitment of the government and public sector in building financial, human and material resources is vital for sectoral development.

The stability of government and its effectiveness in enforcing rules is one of the “social capabilities” that explains differences in countries’ abilities to exploit the potential to catch up (Abramovitz 1986, 1994a, 1994b, in Fagerberg et al. 2010). Social capabilities condition the growth of technological capability (Fagerberg et al. 2011).

In a developing country context, commitment, long-term stability and consistency of the acts of public sector in mobilizing resources to agricultural sector are important issues that should be taken into consideration to assess the resource mobilization function of AIS.

CHAPTER 5

THE FUNCTIONAL-STRUCTURAL ANALYSIS OF OLIVE AND OLIVE OIL SECTORAL INNOVATION SYSTEM

In this chapter, initially actors of the olive and olive oil sectoral innovation system (SIS) are defined. Later on, structural causes, i.e. systemic problems that lead functional weaknesses are analyzed. Function by function, the barriers leading to systemic problems are discussed according to actors' presence or capabilities, institutional presence or the quality of the institutional set up, the presence or quality of interactions and the presence or quality of the infrastructure as suggested in Wieczoreck and Hekkert (2012).

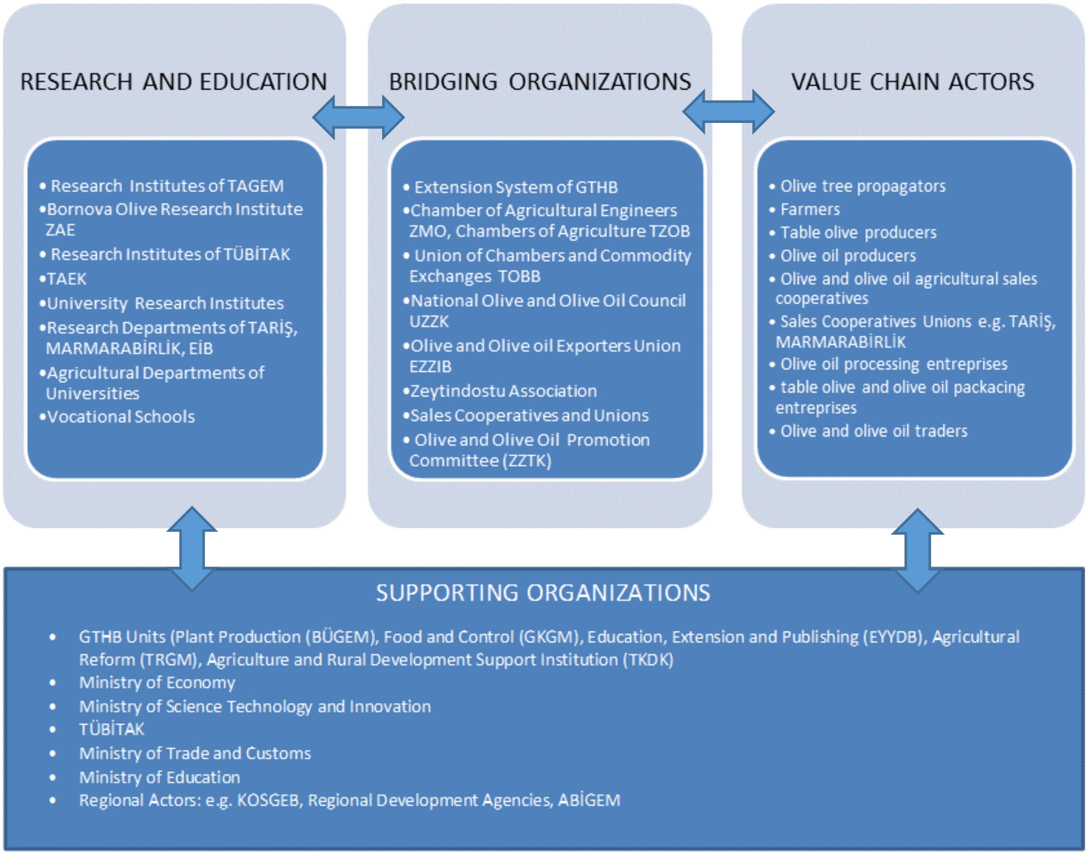
5.1 Actors of Olive and Olive Oil Innovation System

An actor can assume in the innovation system more than one role. For instance, a research institute primarily responsible for research may play the role of bridging and assume training activities as well.

For the sake of simplicity, actors of olive and olive SIS (**Figure 5.1.1**) are grouped into components according to their primary roles as follows:

- Research and education system
- Bridging organizations
- Value chain actors
- Regulatory and supporting organizations

Furthermore, as the delineation of SIS in this study is limited to olives, table olives and virgin olive oil sub-sectors, the actors such as refinery plants etc. are not included in the system though they of course play role in the innovation system dynamics.



Source: Author's compilation

Figure 5.1 Actors of the Olive and Olive Oil Sectoral Innovation System in Turkey

Research and Education System

Research and Development (R&D) as well as education system of olive and Olive oil sector is embedded in the food and agricultural R&D and education system. Currently, there are three main components of food and agricultural research and education in Turkey:

- Public R&D organizations,
- The faculties of agricultural sciences and university research institutes,
- Private sector and Non-Governmental Organizations (NGOs)

Main public organizations involved in agricultural research are as follows:

- The research institutes of Ministry of Food, Agriculture and Livestock (GTHB)

- The research institutes of Marmara Research Center (MAM) and the laboratories of the Scientific and Technological Research Council of Turkey (TÜBİTAK) related to Ministry of Science, Industry and Technology **(**BSTB**)**
- The Sarayköy Nuclear Research and Education Center (SANAEM) of Turkish Atomic Energy Authority (TAEK)

Currently, there are 47 agricultural research institutes (11 central, 10 regional and 26 subject-oriented) governed by General Directorate of Agricultural Research and Policies (TAGEM) of GTHB. All research institutes may be grouped under one of the following subjects: plant breeding and agro-technology, plant health, animal breeding and husbandry, aquaculture, animal health, soil-fertilizer research. There are also food control laboratories of GTHB that the Ministry entitled for research activities. Among the institutes of TAGEM, 23 of them make research on horticulture and two of the subject-oriented institutes are solely responsible for olive research. Among these institutes, Bornova Olive Research Institute[64] (ZAE) is the only one that is active in olive research. Hatay Olive Research Institute is recently established.

In addition to their undergraduate and graduate teaching mandate, currently there are around 30 agricultural faculties and 38 food-engineering departments that can carry out basic and applied research on olive sector related subjects. Though there are occasional studies on olive sector carried in many of these departments, mainly universities that are located in the olive producing regions are the most active ones. Furthermore, there are around 26 university research centers that are related to food and agriculture sector that have research potential on the olive and olive oil studies (DPT 2010, TÜBİTAK 2010).

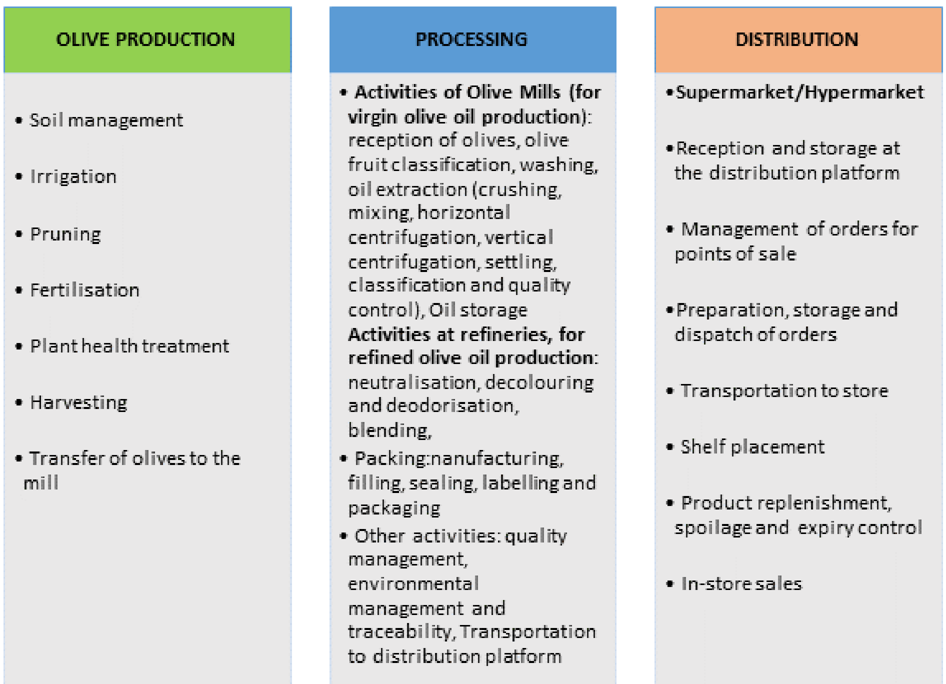
There are educational programs for horticulture, food processing and olive processing technology offered by vocational schools of universities and technical high schools. As of 2014, there are almost 30 university vocational schools in olive producing regions those offer these programs. Among them, three university vocational schools offer olive

[64] As of 2011, ZAE's title transformed to "Station" from "Institute". Its responsibilities and functions stay the same. In the rest of this study, the word "Institute" will be used for the sake practicality as in many statistical sources they are still referred as institute.

processing technology program: Çine vocational school in Aydın, Akhisar vocational school Manisa and Edremit vocational school in Balıkesir. At the secondary education level, there are industrial vocational high schools, which have departments related to agriculture and agricultural vocational high schools. Among these schools in olive producing regions, around 50 of them have food technology program with different sub branches. Out of them, 17 schools have olive processing sub branch. Moreover, as a part of "lifelong learning program" of the Ministry of Education (MEB), there are education programs of olive storage and processing.

Value Chain Actors and Organizations

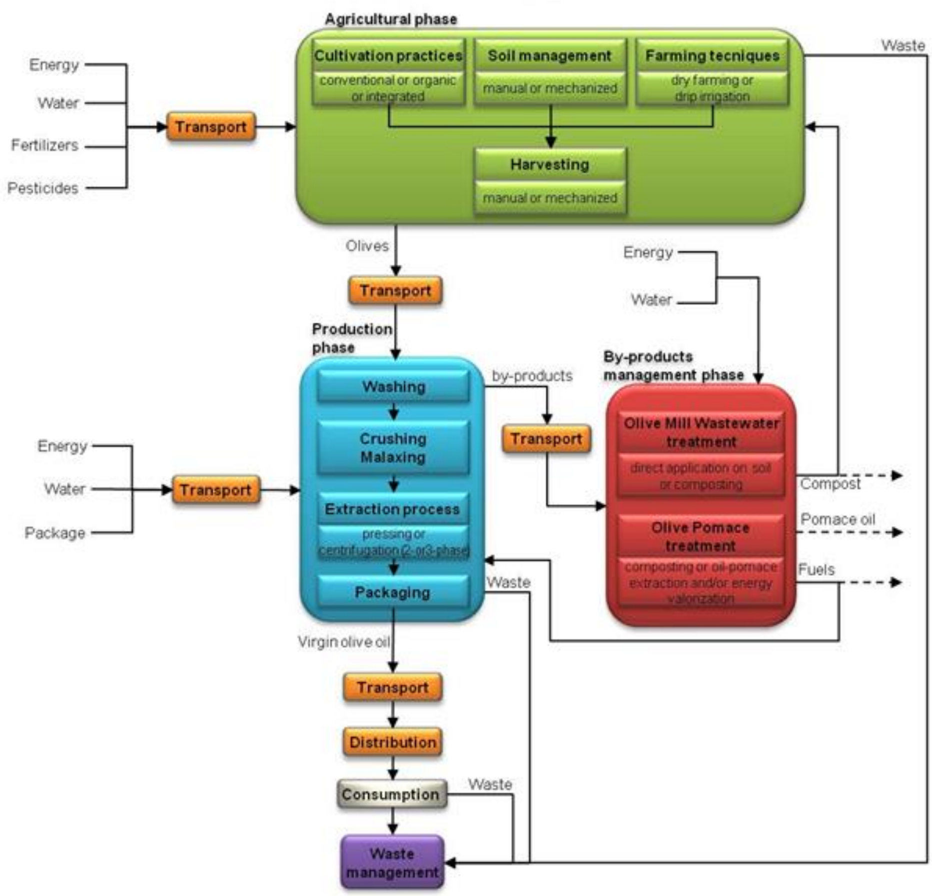
Table olives and olive oil value chains have three distinct stages: production, processing and distribution. Main activities of olive oil value chain, of which most of them are similar for table olives except type of processing activities, as it requires different technology, are listed in **Figure 5.2**.



Source: http://www.internationaloliveoil.org/

Figure 5.2 Main Activities in Olive Oil Value Chain

Storage and transportation are also very important stages in this sector. Thus, it is crucial to evaluate olive oil value chain by integrating this stage in between production and processing as well as processing and distribution. In the olive and olive oil Sector, by-product management and waste management are significant supply chain activities (**Figure 5.3**). In this study, only actors of agricultural production and olive processing for virgin olive oil are included.



Source: http://ww2.unime.it/emaf/

Figure 5.3 Main Activities in Olive Oil Supply Chain

Olive quality and the production capacity are strongly related to plantation of the proper olive tree variety most compatible with its soil, geography and the climate. The selection of the most suitable olive variety for olive grove formation is the initial important step at the production stage. Therefore, among input suppliers of olive production, olive sapling nurseries are an important upstream industry for olive and olive sector. In Turkey, olive tree propagation is done by both public and certified private institutions. Main public olive sapling nursery is the Edremit Production Station attached to GTHB. It provides olive saplings to farmers via GTHB's District and Province Agricultural Directorates. **Private olive sapling nurseries** in Turkey are small enterprises with a limited production capacity (Özkaya et. al 2010). The bulk of their production is bought by GTHB's Province and District Agricultural Directorates.

Farmers are the main actors in the olive production stage. In Turkey, olive producers are mainly comprised of small-scale producers and family enterprises. There are around 400.000 families working in olive and olive oil production[65].

There are 481 certified **olive processing and packaging enterprises** and 1794 certified **olive oil producers** (TBMM 2008 p.104, Tunalıoğlu 2010a p.20). There are also integrated plants, in which there exist processing sub-plants for both table olive and olive oil with packaging and bottling functions.

There are 1,005 olive oil mills (515 continuous, 102 super press and 580 hydraulic press systems), 100 olive oil bottling/canning and 478 table olives facilities (ABGS 2006). There are 15 olive oil refineries (ABGS 2006) and 20 pomace extraction plants of which 14 use classical methods and 6 centrifuge technique (TBMM 2008 p:143). Even though they do not have a direct role in virgin olive oil production chain, olive oil refineries and pomace extraction plants play an important role in the olive oil sector in Turkey.

Olive and olive oil agricultural sales cooperatives and unions are important players in the value chain. Sales cooperatives and their unions gained their autonomy in the last decade

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[65] source: http://www.zztk.com.tr/yeni/sektorel.html

with the law “4572 Sayılı Tarım Satış Kooperatif ve Birlikleri Hakkında Kanun” and they have been developing capacity since 2000.

Agricultural sales cooperatives unions purchase, process, stock and sell the olive and olive oil of their members. These organizations are able to purchase and process approximately 16 % of total production (ABGS 2006). In Turkey, there are three sales cooperatives unions of olive and olive oil sector: Tariş, Marmarabirlik and Güneydoğubirlik.

These unions, especially Marmarabirlik and Tariş, have important weight in the sector and they are multifunctional. They make direct purchases from producers and they are themselves in the value chain via processing, packaging and storage functions. They provide in-kind supports (such as fertilizers, pesticides) as well as cash support. Besides, they provide education and extension services.

Tariş was established in 1949, currently serves for 33 cooperatives of provinces of Aydın, Balıkesir, Çanakkale, İzmir, Manisa, Muğla, with around 25.000 members. TARİŞ is a major player in the market with a share of 16 % in total olive oil production of the region, 13 % of the total production in Turkey and 18 % olive oil exports (TBMM 2008 p.165).

Marmarabirlik was established in 1954 and currently serves for eight cooperatives of provinces of Bursa, Balıkesir, Tekirdağ with around 29.000 members. This union focuses mainly on table olive production but it has also olive oil production facilities. Marmarabirlik purchases almost one third of olives of the region and has a powerful lobby role on behalf of table olive producers. It has storage capacity of 70.400 tons, daily 150 tons table olive packaging capacity and 220 tons olive oil processing capacity. It has also pioneered in investing in licensed storage, which is crucial for quality production.

Güneydoğubirlik was established in 1940 only for pistachio, then in 1989 it included four other product unions (chili pepper, raisins, olive oil and beans) into its context. It has 9 cooperatives and 17.000 producer members.

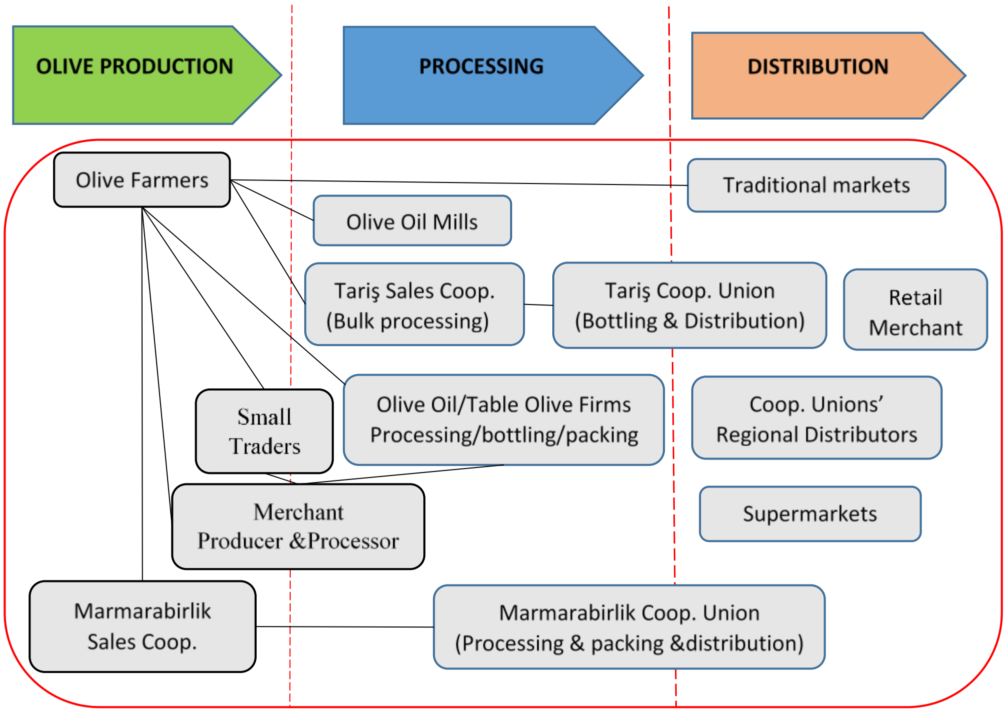
There is also Eastern Mediterranean Olive Union, Akdenizbirlik, which is not organized as sales cooperatives union but as product union in 2001. It covers the region consisting of Adana, Mersin, Osmaniye, Kahramanmaraş, Hatay, Gaziantep and Kilis, with 600 members.

Currently its main functions are supplying young olive trees for producers and organizations, providing extension services and technical support for pest control as well as inventory collection and reporting. It also aims to establish industrial plants for olive processing, storage and packaging; improve olive sector in the region via collaboration with the province administrations as well as the other stakeholders such as research institutes, universities and public institutions.

In Turkey, an actor can be active in various stages in table olives and olive oil value chains. Many actors assume more than one function in the value chain. Therefore, roles of actors in table olive and olive oil value chains are not very clear, as broadly depicted in **Figure 5.4**.

Some actors are only olive producers, processor of table olives and olive oil, trader or exporter. Some actors possess some or all of these roles. For instance, farmers are not only producing olives but also processing (via cooperatives and olive oil mills for producing olive oil or pickling olives at home for table olives production) and marketing them (mostly informally) to traders or directly in traditional markets.

Moreover, there are merchant producer and processors who produce olives and process them for olive oil; collect olive oil from small traders and blend olive oil for bottling with their own brands; or supply the olive oil they have collected to bottling and packing firms that market under their own olive oil brands.



Source: Author's compilation

Figure 5.4 Main Actors of Table Olives and Olive Oil Value Chains

Bridging Organizations

Extension system as a part of the provincial organization of the GTHB is the most important bridging organization in charge to link research and education domain with farmers.

Union of Turkish Chambers of Agriculture (TZOB) is the biggest farmers' association in Turkey, with more than two million members. Its effectiveness is limited to advocating farmers' rights and providing services to its members. The Government gives financial support to TZOB budget and it is administratively dependent. Farmers have to be members in order to get credit from Ziraat Bank and credit cooperatives. Thus, membership tends to be perceived as obligatory.

Olive and Olive oil Producer Unions have been established since 2004 with the enactment of the law permitting the establishment of producers' unions. These unions are usually very small scale. There is also one official producers' union of tree nurseries (Fidan Üreticileri Altbirliği, FÜAB).

Agricultural Development Cooperatives in the olive producing regions are also bridging actors of the value chain. There are 7500 development cooperatives and the ones established in olive producing regions cover olive producers as well.

Both these bridging actors, i.e. olive oil producers unions and development cooperatives, are also actors in the value chain.

National Olive and Olive Oil Council (UZZK) is one of the main organizations in the sector and a formal platform that brings public, private institutions and NGOs together to improve olive and olive oil sector. After Turkey exited International Olive Council (IOC) in 1998, UZZK was established as a reflection of a strong civil society initiative due to needs of the sector. First meeting of the industry representatives was in 2002 year, later on an executive committee has been formed and finally, in 2007 UZZK was formally established as a legal entity. It is the first established product council in Turkey.

There are five subgroups of the council and for of them are clearly defined by the regulation on the establishment of UZZK[66]. UZZK targets development and strengthening of the structure of olive industry; the improvement of olive and olive oil production, consumption and trade; to support brand creation and product marketing; improving the harmony with European Union olive and olive oil common market formation; increasing competitiveness; preparing sectoral plans and common strategies and implementing them according to

[66] See Official gazette no: 26484, April 5th 2007. Agriculture group is composed of chambers of agriculture, farmers' organizations, agricultural producer unions, sales cooperatives and unions, agricultural credit cooperatives, olive nursery firms' representatives. Trade group consists of representatives of chambers of commerce, chambers of industry and commerce, agricultural sales cooperatives and unions, License storage companies, olive and olive oil export unions. Industry group includes chambers of industry, chambers of industry and commerce, sales cooperatives and unions, olive and olive oil by-products industry representatives, Union of Chambers and commodity exchanges of Turkey (TOBB). Finally, research and education group consists of Ministry of Science, Industry and Technology, Ministry of food, agriculture and livestock (GTHB), Ministry of economy, Ministry of development, Turkish Statistical Institute (TÜİK), Turkish Standardization Institute (TSE) , Small and Medium Enterprises Development Organization (KOSGEB), Research Institutes (related to olive and olive oil sector and by-products), universities, and Non-governmental Organizations (NGO)s.

domestic market conditions and international developments. UZZK reports to Agricultural Support and Orientation Board, at least once a year. It also represents Turkey in IOC, since the membership of Turkey in 2010.

Zeytindostu Association is the only nationwide NGO established by civil initiative in 2006. Zeytindostu aims to establish “a common wisdom and power solidarity” in the sector.

Chambers of Commerce, industry and commodity exchanges are organizations established in provinces and the districts linking the representatives of the private sector. **Union of Chambers and Commodity Exchanges of Turkey (TOBB)** is the highest legal entity of the private sector. The Sector groups of these chambers include olive and olive oil sector groups in the olive producing regions.

Under the auspices of **Turkish Exporters Assembly (TIM) and the Aegean Exporters Union (EIB)**, **Olive and Olive oil Exporters Union (EZZIB)** is one of the main bridging organization playing an important role in the sector. Each of the exporter firms should be a member to a union. There are of course other exporter unions related to other olive producing regions, but EZZIB is the only union specific to olive and olive oil exporters.

Olive and Olive Oil Promotion Committee (ZZTK) established in 2007. The communique of the Ministry of Economy lays down the rules of its functioning. EZZIB is leading ZZTK. The objective of ZZTK is defined as “ to increase the efforts directed to the foreign markets and to diversify our export markets as well as implement promotional campaigns for the establishment of the Turkish Olive and Olive Oil brand and image”. ZZTK also intends to carry out promotional activities to improve the consciousness of consumers in the domestic market, in order to develop market and increase consumption. ZZTK aims to ensure the product diversity in accordance with the demands from the world markets and to enhance market channels, thus applying a sustainable pricing policy.

Regulatory and Supporting Organizations

Various units of GTHB play significant role in one or more of the functions of the olive and olive oil innovation sectoral system. These units are General Directorate of Plant Production (BÜGEM), General Directorate of Food and Control (GKGM), Department of Training, Extension and Publications (EYYDB), General Directorate of Agricultural Reform (TRGM), Agriculture and Rural Development Support Institution (TKDK).

Other organizations, which play significant roles related to olive and olive oil sector include Ministry of Economy (EB), Ministry of Development (KB) Ministry of Customs and Trade (GTB), Ministry of Science, Industry and Technology (BSTB), Small and Medium Enterprises Development Organization (KOSGEB), Turkish Standards Institution (TSE), Turkish Patent Institute (TPE), The Scientific and Technological Research Council of Turkey (TÜBİTAK).

Main regional actors, those support regional knowledge, finance or human capital infrastructure of the olive sector are the Regional Development Agencies, Rural Development Agencies of TKDK, regional offices of KOSGEB, Turkish Agricultural Credit Cooperatives (TTKK) and the European-Turkish Business Centers (ABİGEM) established by TOBB.

5.2 Knowledge Development Function

5.2.1 Knowledge Base of Olive and Olive Oil Sectoral IS

The type of knowledge base of olive and olive oil sector is important for the assessment of knowledge development function as well as knowledge diffusion function. The level of codification or the tacit knowledge base of a sector may determine the role of proximity of the actors in the innovation activities of the sector (Martin and Moodysson 2011).

Olive and olive oil sector is based on a “synthetic knowledge base”. First, along the olive and olive oil production and value chain various types of scientific knowledge are used from genetics, biotechnology to chemistry. The tacit part of the knowledge base is significant as the olive tree is a “culture” based on “learning by doing”. Furthermore, the process technology and the quality of olive products, the table olives and olive oil, are not only based on pure scientific knowledge based on “learning by searching” but based also on the five senses such learning by tasting, smelling, seeing and touching i.e. “learning by doing”. As mentioned by one of the producers (int#45): *“*When you enter the table olive processing enterprise you should understand whether the things are going better or worse from the smell of the place”.

Because of the significant tacit component of the knowledge base, the applied research part of the scientific knowledge of the olive and olive oil innovation system is important to transform knowledge into application and innovation.

5.2.2 Actors of Knowledge Development Function

Actors of the R&D and education system have broadly defined in the previous part of this chapter. Whether and how these actors contribute to the knowledge development function and their capacity is the subject of this part.

The analysis of i) basic research ii) applied research and iii) patenting activities iv) breeding and registration activities related to olive cultivars will reveal the role of the actors.

In order to identify the main active actors of the research domain and asses their knowledge production capacity the below databases are surveyed for analysis:

i) the Institute for Scientific Information (ISI) web of science (WoS) Science Citation Index (SCI)-Expanded database
ii) TÜBİTAK ULAKBİM national database
iii) The Council of Higher Education (YÖK) thesis database
iv) Turkish Patent Institute (TPE) database
v) European Patent Office (EPO) patent database, Espacenet
vi) European Commission Community Research and Development Information Service (CORDIS)
vii) Olive Germplasm Database of the OLEA database

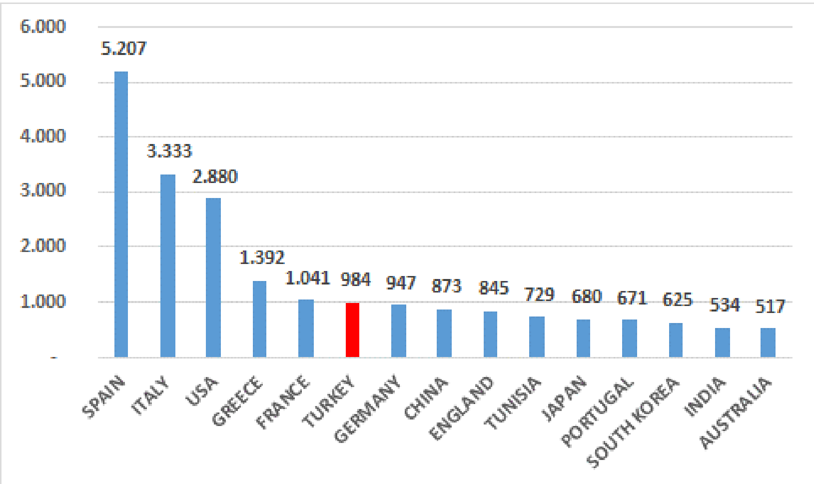
Bibliometric Analysis of Publications

Bibliometric analysis based on the data retrieved from ISI WoS SCI- Expanded is used to see the publication performance of the Turkish researchers in comparison to their foreign colleagues.

The publications those include “olive” in their topic are retrieved from ISI WoS SCI-Expanded as of 31 January 2015 for a fifteen years of period, from 2000 to the end of 2014.

As the aim of this analysis is to see the relative performance of actors, the search of publications is not delineated to some specific technology of olive processing or to olive production practices etc. Besides, such kind of delineation of publications according to some specific keywords would complicate the search process, as it is not so straight forward to justify the non-inclusion of excluded publications. Therefore, all the publications those are related to "olive" are retrieved for the sake of consistency of the data and reliability of the analysis.

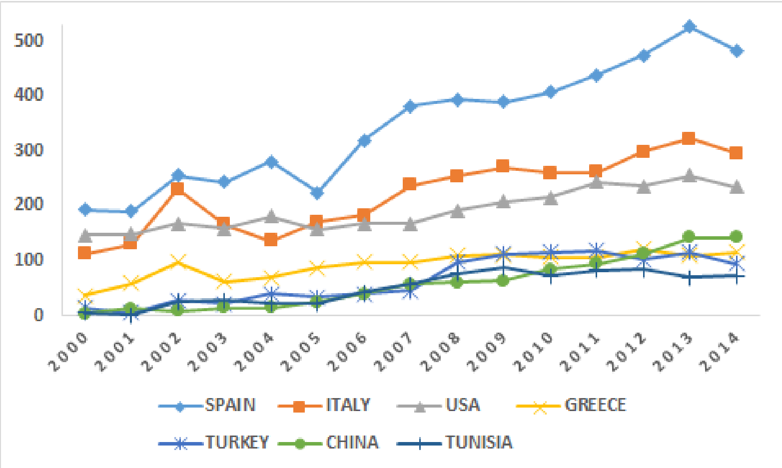
The results indicate that, during the last 15 years, the total number of yearly publications that have olive in its topic has significantly increased all over the world. The number of publications in 2000 was 828 whereas it has reached a level of more than 2 thousand publications in 2014, with a two and a half fold increase. During this period, there were total of 23.047 publications and 984 of them belong to Turkish scholars, as of 31 January 2015 (**Figure 5.5**). Spain is at the first rank with 5207 publications in 2000-2014 period with a 23% share of the total.



Source: ISI WoS SCI-EXPANDED, 31 January 2015

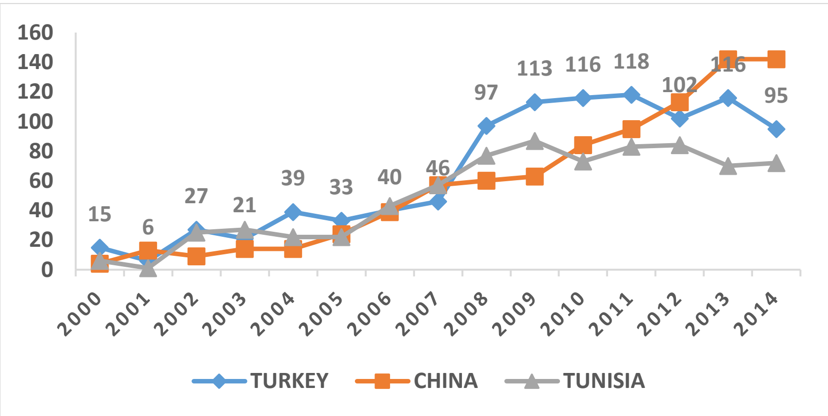
Figure 5.5 Numbers of Total Publications by country, 2000-2014

It is important to note that, the publication performance of Germany, as a non- olive producer, and China, as a new producer with very low olive production levels, are significant and very close to Turkish publication performance. Since 2000, the number of publications of the main olive producer countries, including Turkey, has increased in time (**Figure 5.6, 5.7**). The publication level of Turkey has catch up the level of Greece in 2009 and better performing than Tunisia since 2007.



Source: ISI WoS SCI-EXPANDED, 31 January 2015

Figure 5.6 Numbers of Yearly Publications, 2000-2014



Source: ISI WoS SCI-EXPANDED, 31 January 2015

Figure 5.7 Numbers of Yearly Publications, 2000-2014

The improvement in the publication performance of Turkish scholars in comparison to their foreign colleagues is more significant when we compare the publications in five years periods of time (**Table 5.1**). During the period of 2010-2014, Turkey has risen to sixth rank with a share of 5.3 % of the total whereas during 2000-2004, Turkey was at the 13th rank with a share of 2.2 %.

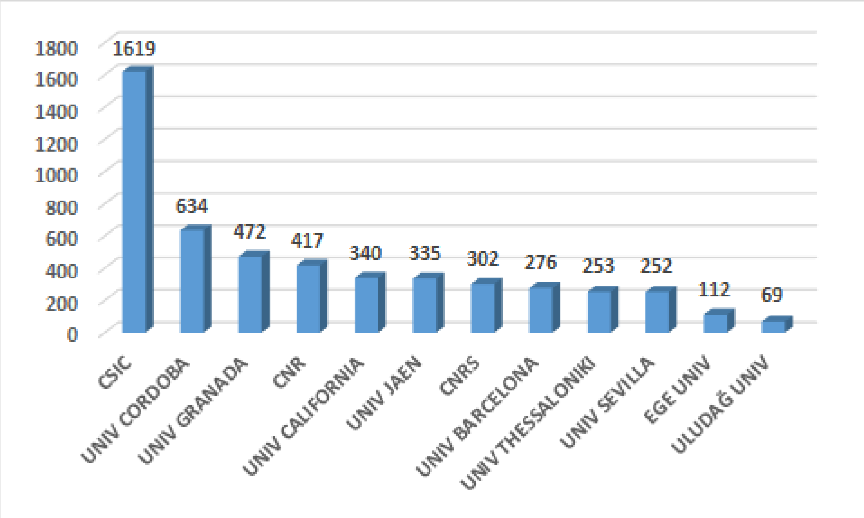
Table 5.1 Percentage Shares of Publications by Country, 2000-2014

2000-2004		2005-2009		2010-2014		2014	
SPAIN	23,3%	SPAIN	22,4%	SPAIN	22,4%	SPAIN	23,3%
USA	16,1%	ITALY	14,6%	ITALY	13,8%	ITALY	14,3%
ITALY	15,5%	USA	11,7%	USA	11,4%	USA	11,3%
GREECE	6,5%	GREECE	6,6%	GREECE	5,4%	CHINA	6,8%
GERMANY	5,1%	FRANCE	4,9%	CHINA	5,3%	GREECE	5,5%
ENGLAND	5,0%	**TURKEY**	**4,3%**	**TURKEY**	**5,3%**	**TURKEY**	**4,6%**
FRANCE	4,6%	GERMANY	4,2%	FRANCE	4,2%	FRANCE	3,8%
JAPAN	3,9%	ENGLAND	3,8%	TUNISIA	3,7%	S.KOREA	3,5%
PORTUGAL	2,5%	TUNISIA	3,7%	GERMANY	3,6%	BRAZIL	3,5%
AUSTRALIA	2,4%	CHINA	3,5%	S.KOREA	3,5%	ENGLAND	3,5%
NETHERLANDS	2,4%	PORTUGAL	3,4%	ENGLAND	2,9%	GERMANY	3,5%
CANADA	2,3%	JAPAN	3,0%	BRAZIL	2,9%	TUNISIA	3,5%
TURKEY	**2,2%**	S.KOREA	2,4%	INDIA	2,8%	INDIA	2,8%
S.KOREA	1,5%	INDIA	2,4%	PORTUGAL	2,8%	IRAN	2,6%
ISRAEL	1,5%	AUSTRALIA	2,4%	IRAN	2,8%	PORTUGAL	2,6%
TOTAL	**4995**	**TOTAL**	**7639**	**TOTAL**	**10413**	**TOTAL**	**2073**

Source: ISI WoS SCI-EXPANDED, 31 January 2015

The ISI WoS SCI- Expanded database results further analyzed according to the organizations-enhanced category. In the web page, the "organizations-enhanced" search option used instead of "organizations" as the publications could be registered under different names of the same organization in the latter option. The results indicate that, though there is a significant improvement in the total number of publications, among the top 100 organizations according to their SCI publication performance, the performance of the Turkish research organizations is weaker than other olive producer countries.Among the top 100 organization, there are only two Turkish universities. In the total of publications between 2000 and 2014, Ege University is at the 40th rank with 112 publications (0.5 % of the total) and Uludağ University is at the 93rd rank with 69 publications (0.2 % of the total).

The leader organization is the Spanish National Research Council with a 7 % of the total publications. In fact, 6 of the top 10 organizations are Spanish, which have a share around 16 % of the total publications produced in the period 2000-2014 (**Figure 5.8**).



Source: ISI WoS SCI-EXPANDED, 31 January 2015

Figure 5.8 Numbers of Total Publications of Selected Organizations, 2000-2014

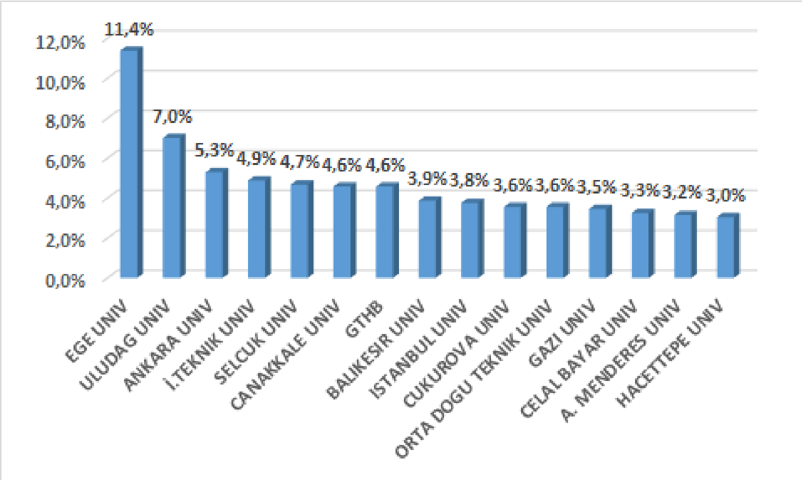
The search results are further refined to country level of Turkey to see the national organizational performances. When we look at the publications of Turkey according to organizations-enhanced category, we see that around 95 % of publications belong to Universities (**Table 5.2**).

Table 5.2 Publications of Turkish Organizations, 2000-2014

Organization	Publication #	Share %
GTHB	45	4,6%
o.w. ZAE	17	1,7%
TÜBİTAK	9	0,9%
Universities	930	94,5%
TOTAL	984	

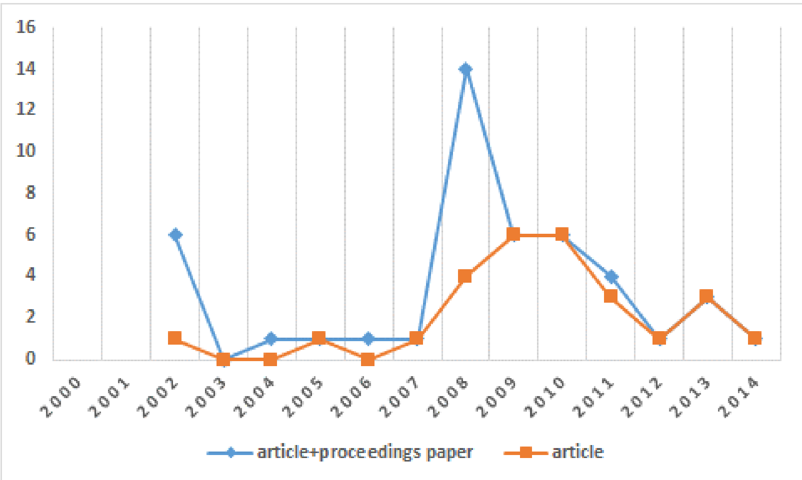
Source: ISI WoS SCI-EXPANDED, 31 January 2015

The research institutes of GTHB have a share of 4.6 % of the total Turkish publications. Olive Research Institute ZAE has 17 publications. TÜBİTAK research institutes' share is very low, which is around 1 % of the total Turkish publications. The 70 % of Turkish publications belongs to top 15 organizations (**Figure.5.9**).



Source: ISI WoS SCI-EXPANDED, 31 January 2015

Figure 5.9 Publications of the First 15 Turkish University, 2000-2014

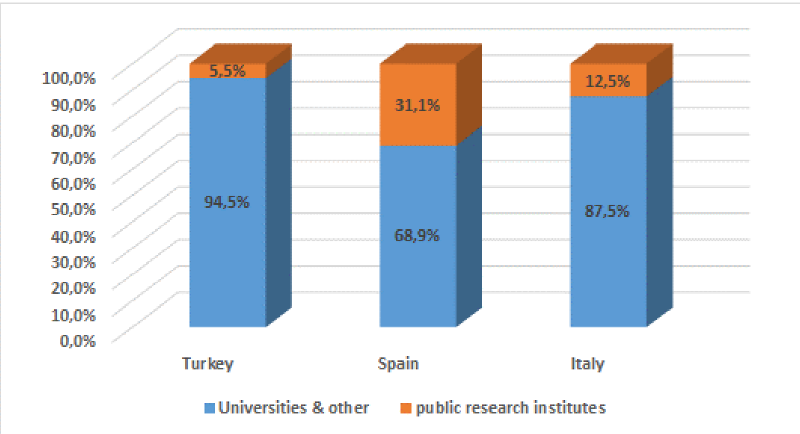


Source: ISI WoS SCI-EXPANDED, 31 January 2015

Figure 5.10 Yearly Publications of GTHB Research Institutes, 2000-2014

Among them, 14 are public universities and the research Institutes of GTHB is at the seventh rank. In the publications of the research institutes of GTHB, 27 of them are articles and 18 of them are proceedings papers. However, the number of publications of MFAL research institutes does not show a yearly increasing trend and yearly number of publications are rather random (**Figure 5.10**).

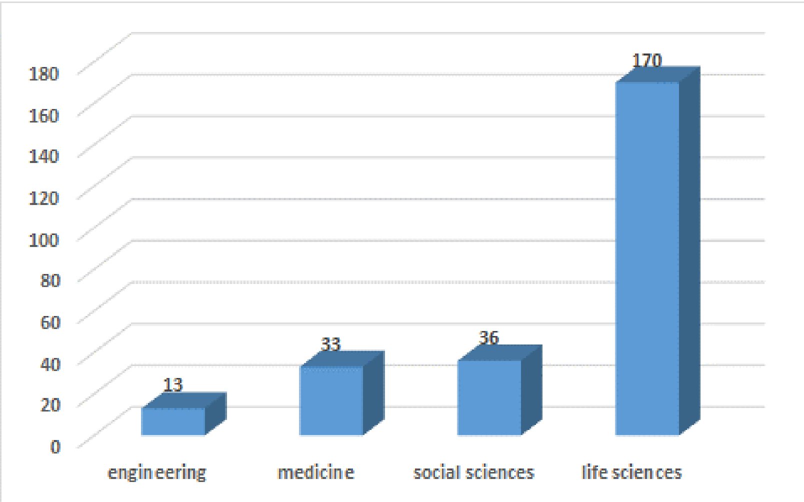
Furthermore, when compared internationally, the publication performance of public research institutes in Turkey, i.e. the institutes of GTHB and TÜBİTAK, is lower than the Spanish National Research Council (CSIC) and the Italian National Research Council (CNR) that represent their public research institutes (**Figure 5.11**). In Turkey 5.5 % of publications belongs to public research institutes where as in Spain it is around 31 %.



Source: ISI WoS SCI-EXPANDED, 31 January 2015

Figure 5.11 Shares of Publications of Spain, Italy and Turkey According to Organization Type, 2000-2014

In order to further evaluate the publication performance of the Turkish scholars, the national databases in TÜBİTAK ULAKBİM related to four research subject, i.e. life sciences, social sciences, engineering and medicine, are surveyed. In these databases of TÜBİTAK, there are more than 400 Turkish journals indexed. Publications that have the key word “zeytin (olive)” in their abstract are retrieved. Between years of 2000 and 2014 there have been 239 publications and around 71 % of them belongs to life sciences (**Figure 5.12**).

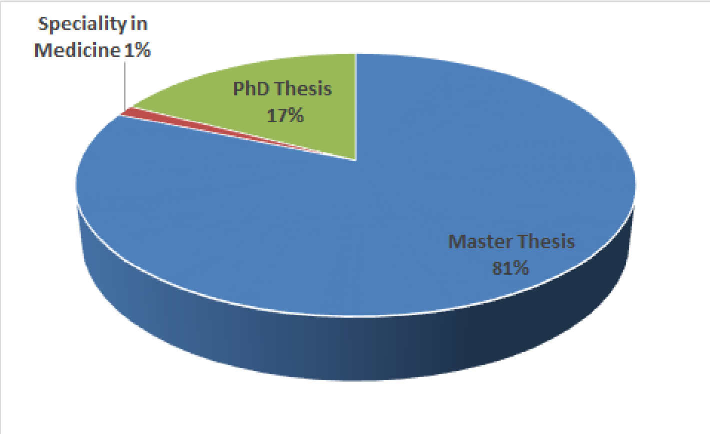


Source: ULAKBİM national databases, 31 January 2015

Figure 5.12 Numbers of Publications in Turkish Journals, 2000-2014

The share of publications related to other research areas look rather low, especially in engineering. The share of publications on social sciences and medicine are around 15 %. In fifteen years, there have been only 13 publications (5 % of total) in the Turkish journals related to engineering.

The analysis of the quantity of the thesis research is another indicator of the research capacity of the universities. All the published thesis from database of national thesis center of YÖK (https://tez.yok.gov.tr/UlusalTezMerkezi/giris.jsp) which have the keywords "zeytin/olive" and "zeytinyağı/olive oil" are retrieved. With a review of the titles, the thesis those are no relation to olive are eliminated. (For instance, in the retrieved data, there were some thesis related to a region in Turkey named "Zeytinburnu" or the results included a couple of thesis that in fact does not have the keywords). After the elimination of the not relevant data, as a result, there were 460 thesis of which 374 master thesis, 80 PhD thesis and 6 speciality in medicine **(Figure 5.13).**



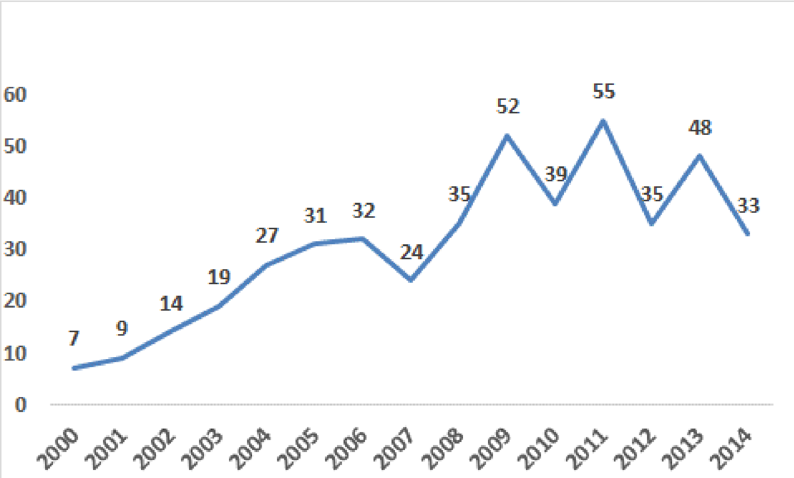
Source: YÖK https://tez.yok.gov.tr/UlusalTezMerkezi/giris.jsp 31 January 2015

Figure 5.13 Type of Thesis, 2000-2014

The number of PhD thesis compared to Master thesis indicate that the specialization of the researchers who make an academic career in the olive related subjects is less than one fifth of the total researchers. The number of specialization in medicine is very low when compared to the whole of the thesis published between 2000 and 2014. In the total number of published thesis since 2000, the share of specialization in medicine is around 10 percent but the olive related ones it is around 1 percent.

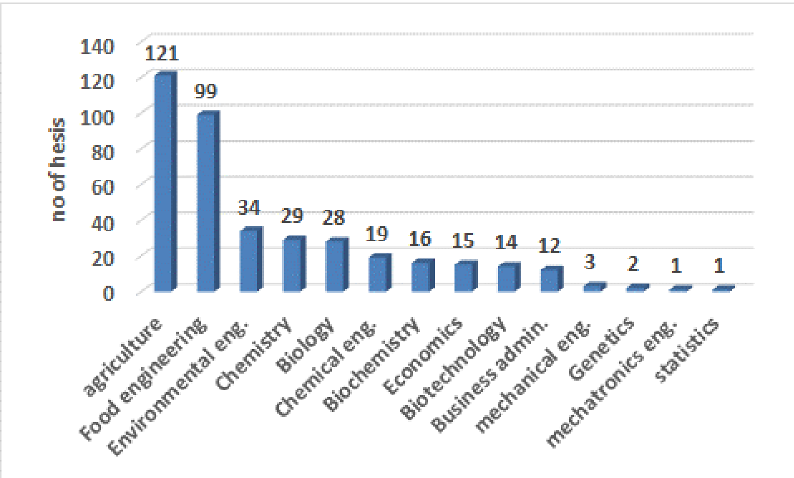
Since 2000, the number of thesis published shows a significant increasing trend **(Figure 5.14**). In the year of 2000, there was only seven thesis published related to olive but in the last decade, the average number of thesis published was 39. This also indicates increasing focus of olive search in the universities.

When we analyze the subject of thesis published related to olive, we see that almost half of them, around 48 percent, is related to agriculture and food engineering (**Figure 5.15**). This result verifies that the research in olive is mostly done in the agricultural faculties of universities in Turkey.



Source: YÖK https://tez.yok.gov.tr/UlusalTezMerkezi/giris.jsp 31 January 2015

Figure 5.14 Yearly Number of Thesis, 2000-2014



Source: YÖK [https://tez.yok.gov.tr/UlusalTezMerkezi/giris.jsp 31 January 2015](https://tez.yok.gov.tr/UlusalTezMerkezi/giris.jsp)

Figure 5.15 Subject of Thesis Published, 2000-2014

Analysis of R&D Activities

Analysis of the R&D activities related to olive sector funded by different government organizations would give a broad profile of the main active actors dealing with R&D activities in the olive sector. Besides TÜBİTAK and GTHB, the primary supporters of agricultural and technological research in Turkey, BSTB, MF and TTGV are the other main R&D supporting organizations, directly or indirectly. The R&D supports of these organizations are summarized in **Table 5.3**.

Table 5.3 Supports for R&D as of 2014

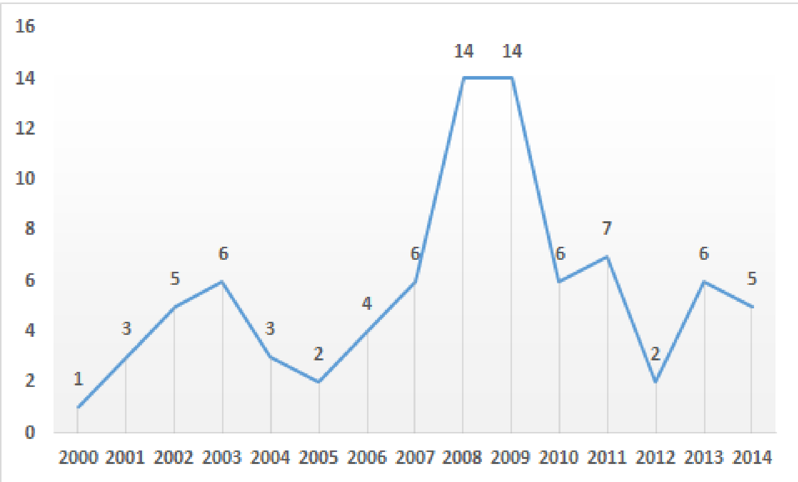
Agricultural R&D Supports	
Ministry of Food, Agriculture and Livestock (GTHB)	In -kind support for Public-Private Partnership: since the year 2007, MFAL has opened up research institutes' infrastructure to private sector and NGOs. Cash grants for agricultural R&D projects of universities/NGOs/Firms: Since 2006, MFAL funds up to 300 thousand TLs for short term, result oriented projects. Financial supports for GTHB Institutes' R&D Projects.
General R&D Supports	
The Scientific and Technological Research Council of Turkey (TÜBİTAK)	Various national supports for academic, business & industry R&D via Research Support program (ARDEB), Technology and Innovation Support Program (TEYDEB).
Ministry of Science, Industry and Technology (BSTB)	SANTEZ program: cash grant for the 65-85% of the expenditures of university-private sector partnership projects for three years. This support exists since 2006. Cash in kind support is higher for SMEs. In this support, Universities give in-kind support with their research infrastructure.
Ministry of Finance (MF)	R&D allowance, income tax withholding and insurance premium supports that cover technology centers, R&D centers, pre-competition cooperation project…etc. since 2008.
Technology Development Foundation (TTGV)	The Advanced Technology Projects Support Program: 50 % cash support for the projects including food technologies, production of bio-products from agricultural waste since 2010.

Source: Web pages of organizations mentioned in the table

TÜBİTAK funded R&D projects related to olive sector are retrieved from TÜBİTAK's databases. There are two search engines for TÜBİTAK funded R&D project database. One of them is TÜBİTAK ULAKBİM (http://uvt.ulakbim.gov.tr/proje/), where you can search completed R&D projects and reach their reports.

The other one is TÜBİTAK project search engine (http://mistug.tubitak.gov.tr/proje/). By using the latter one, you can reach basic information related to all projects, both completed and ongoing. By using both search engines the projects, which have the keyword “olive” in their title or abstract are retrieved for the period 2000-2014.

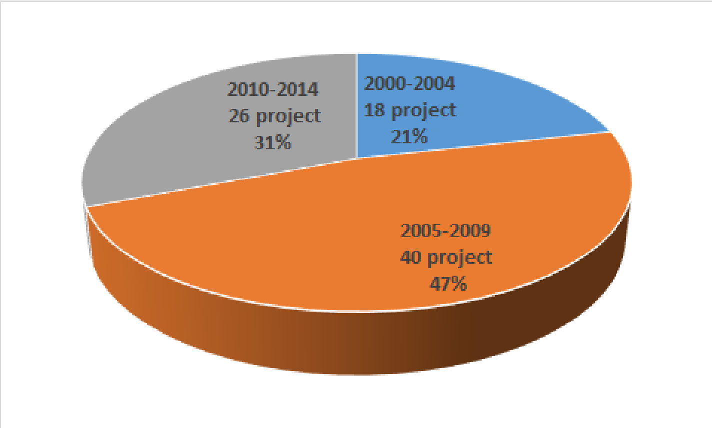
The data related to the completed projects retrieved from each search engine were not consistent with each other, as some projects were missing in both. Therefore, both results were combined to get a more complete list of projects. The results indicate that there are 84 completed and 17 ongoing projects related to olive. When looked on a yearly basis, the number of completed projects do not show an increasing trend, but looks rather random since 2000 (**Figure 5.16**).



Source: TÜBİTAK http://uvt.ulakbim.gov.tr/proje/ http://mistug.tubitak.gov.tr/proje/

Figure 5.16 TÜBİTAK Funded R&D Projects Completed, Yearly 2000-2014

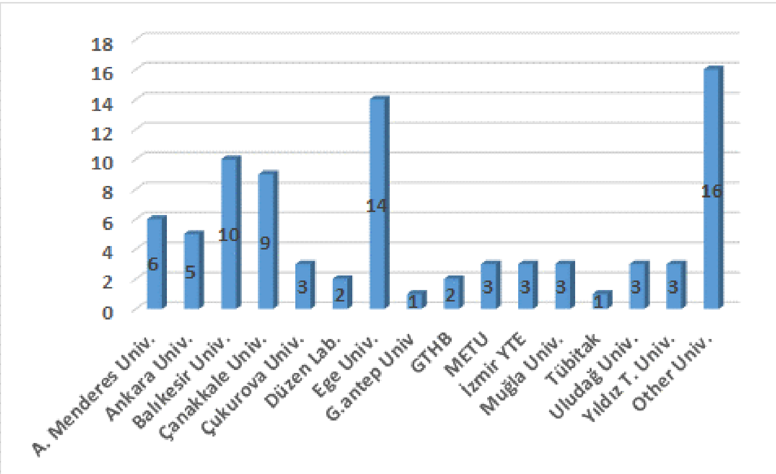
When we look at five years periods, though the number of completed projects is decreasing from 40 in 2005-2009 period to 26 in 2010-2014 period but higher than number of projects of the 2000-2004 period, we can argue that the number of completed R&D projects is increasing through time (**Figure 5.17**).



Source: TÜBİTAK http://uvt.ulakbim.gov.tr/proje/ http://mistug.tubitak.gov.tr/proje/

Figure 5.17 TÜBİTAK Funded R&D Projects Completed, Total 2000-2014

When we analyze the project leaders of the TÜBİTAK funded completed R&D projects, we see that mainly universities are assuming this role (**Figure 5.18**).

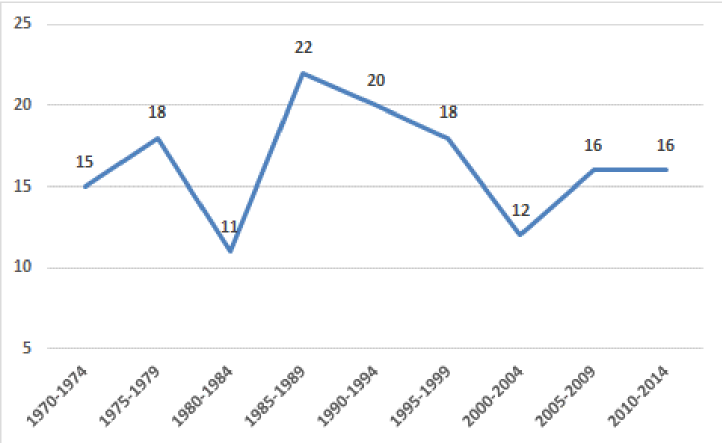


Source: TÜBİTAK http://uvt.ulakbim.gov.tr/proje/ http://mistug.tubitak.gov.tr/proje/

Figure 5.18 Leaders of TÜBİTAK Funded R&D Projects Completed 2000-2014

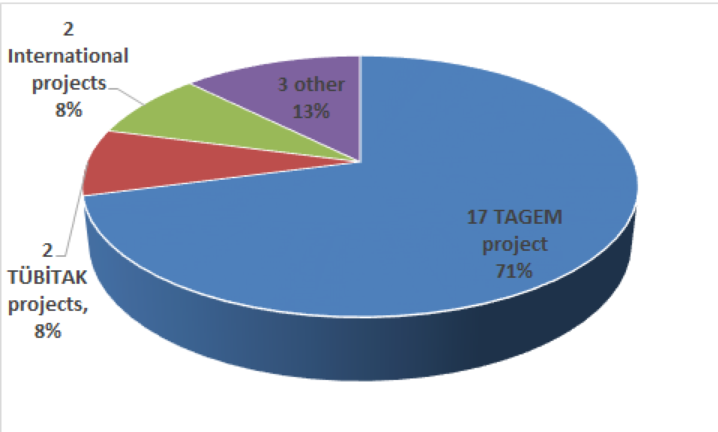
As Olive Research Institute ZAE is dealing with olive research only, it is important to see its R&D research capacity in time. The completed and ongoing projects are listed on the web site of the ZAE.

Based on this data after some updates, ZAE has 148 completed R&D project since 1970 and 24 on-going projects as of 31 December 2014. When we look at the completed projects for 5 years periods, ZAE completed 16 projects on average (**Figure 5.19**). Among the ongoing projects, two projects are TÜBİTAK financed and two projects are international financed whereas most part of it is MFAL TAGEM financed (**Figure 5.20**).



Source: ZAE http://arastirma.tarim.gov.tr/izmirzae as of December 2014

Figure 5.19 Completed Projects of Olive Research Institute ZAE, 1970-2014



Source: ZAE http://arastirma.tarim.gov.tr/izmirzae as of December 2014

Figure 5.20 Ongoing Projects of Olive Research Institute ZAE, 2014

It is commonly argued by the GTHB authorities that the share of the public sector in agricultural research is around 90 percent and private sector 10 percent. In other words, regarding the whole of agricultural sector R&D in Turkey, they see GTHB as the main actor. Besides, it is also argued by the TAGEM authorities that that the share of private sector has reached its current level with the supports of MFAL for public-private sector partnership in agricultural research.

As it can be seen in Table 5.4, GTHB supports private sector agricultural support in two ways: one support is via cash grant and the other one is in-kind support via its research institutes. In order to enhance the private sector research in agriculture, MFAL has opened its research institutes' infrastructure to private sector research since 2007. The private sector is solely expected to supply the funding for the projects. Within this R&D support framework, there are 96 completed and 31 on-going projects as of 2014.

Table 5.4 GTHB Supports for Private Sector R&D

	cash grant	in-kind support
total	**215**	**127**
o.w. olive sector	**5**	**0**
completed	**86**	**96**
o.w. olive sector	3	0
ongoing	**129**	**31**
o.w. olive sector	2	0

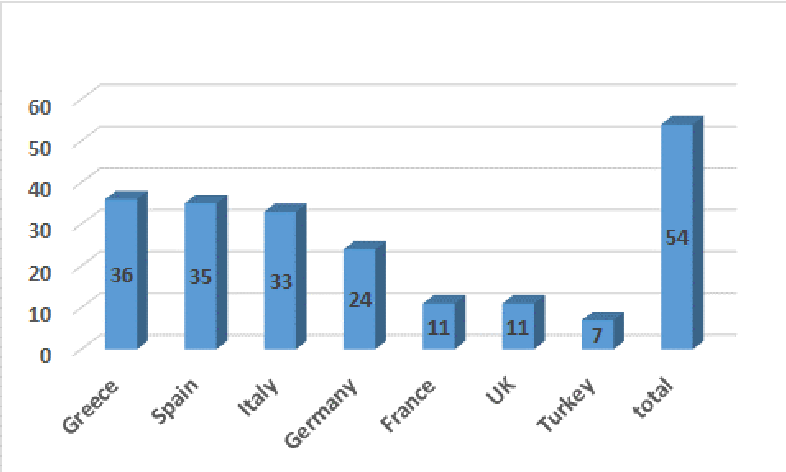
Source: GTHB web page, as of 31 December 2014

Though there is significant demand for this R&D support framework, it is remarkable that there is no project related to olive sector either in the completed or on-going projects. There may be two reasons of this: either the accepted projects are related to the sectors having higher priority for GTHB or there is no demand from the private sector of the olive sector for research within this R&D support program.

Since 2007, there is another GTHB R&D support program, which aims to enhance agricultural R&D activities of private sector, universities, cooperatives and NGOs. Each year, the GTHB calls for the projects and supports these projects in cash, up to 300 thousand TL.

These projects are evaluated based on the R&D research subject priorities of MFAL, which are also announced yearly. Within this R&D support program, there are 86 completed and 129 ongoing projects. Out of these 215 projects, only 5 of them, i.e. 2.3 %, are related to olive sector: three completed, two ongoing projects (**Table 5.4**).

The European Commission Community Research and Development Information Service (CORDIS) surveyed to see the relative performance of Turkish applicants for EU-funded research projects. The R&D projects which has the keyword "olive" in their title and of which the project start date is between 1st of January 2000 and 31st of December 2014 are retrieved from CORDIS. During this period, there were 54 EU financed R&D projects related to olive and Turkey have participated seven of them (**Figure 5.21**).



Source: http://cordis.europa.eu/projects/home_en.html

Figure 5.21 EU Financed R&D Projects by Country, Total 2000-2014

Out of the seven projects, the two of them were funded by sixth Framework and five of them were funded by seventh framework (**Table 5.5**). Among these projects, the two of them belong to Universities, four of them belong to firms and one of them belongs to EZZİB, the union of olive and olive oil exporters. There are no EU framework projects which have the keyword "olive" in its title that belong to GTHB Research institutes, including ZAE.

Table 5.5 EU Funded R&D Projects, 2000-2014

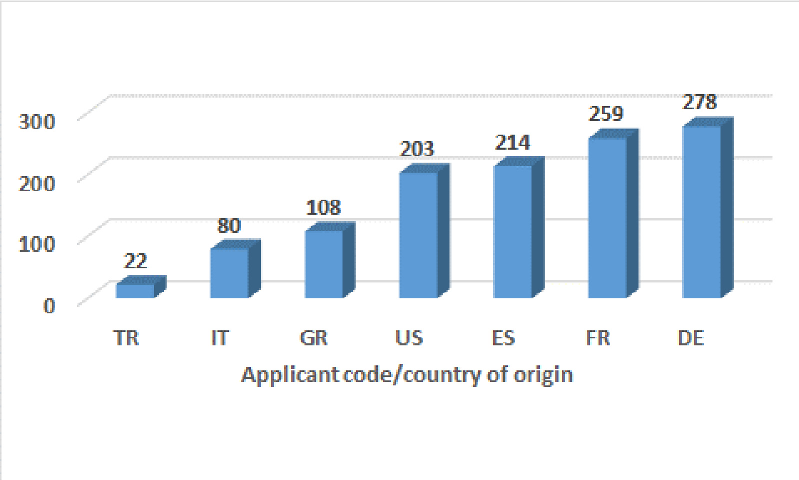
Program	start date	end date	Participating Institution
FP6-POLICIES	2004	2007	Ege Univ. S&T Center
FP6-MOBILITY	2006	2007	İzmir Institute of Tech.
FP7-SME	2008	2011	Uygun Rafine Ltd.
FP7-SME	2008	2011	TARKİM
FP7-SME	2010	2013	HAUS
FP7-SME	2013	2016	HAUS
FP7-SME	2014	2017	EZZİB

Source: http://cordis.europa.eu/projects/home_en.html

The Analysis of Patenting Activity

One other indicator of research and development activities related to olive sector is the number of patents registered to Turkish olive producers and firms. In order to assess the research capacity of the private sector in time the patent registration performance can be used as an indicator. For this aim, European Patent Office (EPO) and Turkish Patent Office (TPO) databases are searched for the key word "olive".

In the worldwide database of EPO Espacenet, the keyword "olive" is searched in the title or abstract of the patent application according to the applicants' country code, for the years 2000-2014. By searching the keyword "olive" not only the patents related to the olive production and value chain, but also the ones related to olive and olive by products used as an input in other sectors are included as well. According to the results, the patent performances of Turkish applicants are rather low compared to other country applicants (**Figure. 5.22**).

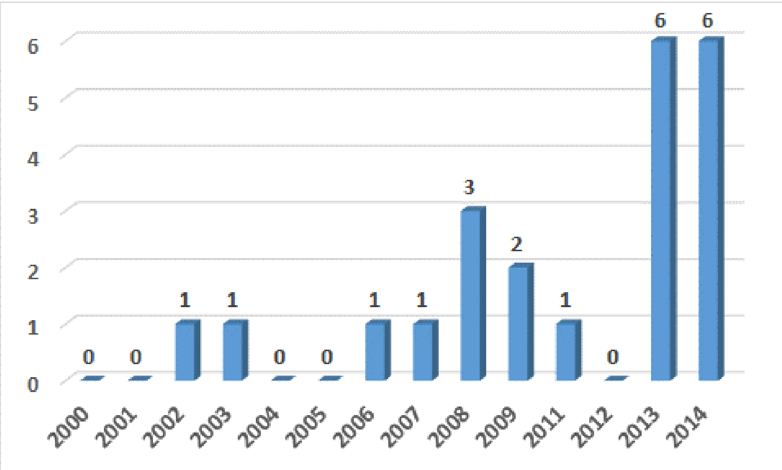


Source: EPO Espacenet http://worldwide.espacenet.com/

Figure 5.22 Patents According to Applicant Code, 2000-2014

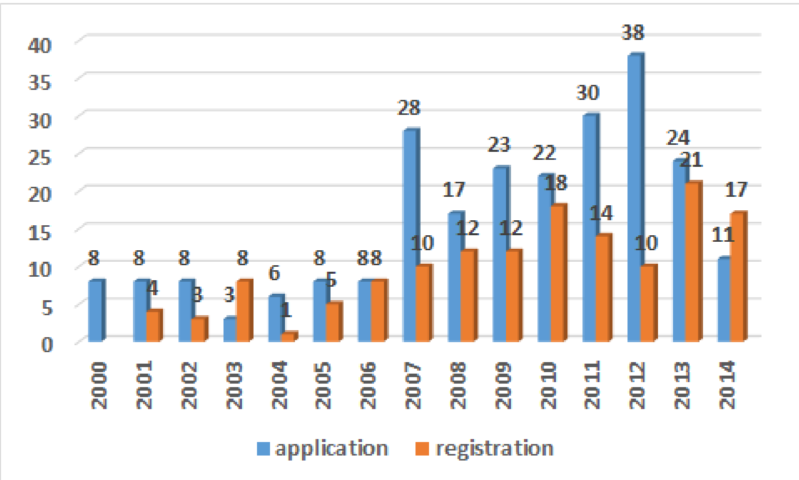
Between years of 2000 and 2014 there have been 22 patent applications with TR applicant code where as other olive producer country origin applicants' total patent number is significantly higher. Besides the olive producer countries, the performance of applicants' from consumer countries are also significant. For instance, the number of applicants from Germany, one of the main consumer countries in Europe, is very significant to mention.

Out of these 22 international patent applications, three of them are assigned to TÜBİTAK, three of them are assigned to private firms and 16 of them are assigned to individual applicants. Among the individual applicants, two of the patent applications belong to researchers from Universities: Gaziantep University and Celal Bayar University. Though low cumulatively in number of applications, the international patenting activity of the Turkish applicants is increasing in time (**Figure 5.23**).



Source: Turkish Patent Institute TPE http://www.tpe.gov.tr/ , 31 December 2014

Figure 5.23 Numbers of Patents with TR Applicant Code, 2000-2014



Source: Turkish Patent Institute TPE http://www.tpe.gov.tr/ , 31 December 2014

Figure 5.24 Numbers of TPE Patent Applications and Registrations, 2000-2014

When we survey the Turkish Patent Institute TPE database, we see significant improvement in the patent application activity in Turkey. The number of patents applied by and registered in the TPE database is increasing in time (**Figure 5.24**).

The number of patents, which has the keyword “olive” in the title or abstract of the patent application, is 242 between the years 2000-2014. Among them, 143 are registered by TPE (**Table 5.6**).

Table 5.6 Number of TPE Patent Applications, 2000-2004

Total	**242**
International	**48**
National	**194**
Firms	70
Individuals	117
*o.w. University Researchers**	6
University	1
Agr. Cooperative	2
TÜBİTAK	4
Registered	**143**
International	36
National	107
Ongoing	**59**
International	9
National	50
Rejected	**40**
International	3
National	37

Source: TPE patent search database, as of 31.12.2014

*whose registered address is the university

Almost 80 percent of the applications and 75 percent of the registered patents are national. In order to understand the public and private sector composition of the national patent applications, the TPE database is searched with 11 Turkish keywords (üniversite, enstitü, istasyon, araştırma, Tübitak, Tariş, Marmarabirlik, kooperatif, şirket, A.Ş., Şti.) part of the applicant name together with the keyword “zeytin (olive)” in the title or abstract. TÜBİTAK has four national patent applications, three of them exactly same as the EPO applications. There is only one patent assigned to a university: Uludağ University. There are two patent applications, one registered and one ongoing, belonging to cooperatives of Marmarabirlik.

Other than those, there is no institutional patent registration related to the research institutes, universities or the cooperative unions. The firms have 70 patents and the rest, i.e. 168 of them are individual applicants. Among the individual applicants, six of them are detected as university scholars as their registration address was their university. Some of the remaining private applications, who have indicated personal address, could also belong to researchers from universities or research institutes. The TPO database does not have registration data on the organizational association of individual applicants, if any. If this information could have been retrieved, better profile of the patenting activities of the universities and research institutes could have been drawn.

When we compare the national and international patenting activities of the Turkish applicants, we can conclude that the patenting activities in Turkey are much higher. The low level of international patent registration of the private firms may be arising for the need for the capacity building in international application.

Analysis of Olive Cultivars Breeding and Registration Activities

Besides the patenting activities of the olive and olive oil processing technologies, the DNA markers, breeding and registration of olive tree cultivars are important outputs of agricultural R&D activities. The olive germplasm collections are the resources for further assessment of olive cultivars in a common environment, a reliable genetic material. Furthermore, the DNA markers of olive cultivars, as result of R&D activities related to breeding will also provide quality assurance in the markets. Therefore, the olive cultivar collection and the capacity of the registered cultivars may be indicators of the R&D capacity of the research component of the olive sector in Turkey.

The world's olive germplasm contains more than 2.600 varieties, with many local varieties and ecotypes (Muzzolupo 2012). According to the 2008 web edition of the FAO (1998) "Olive Germplasm: Cultivars and World-Wide Collections" cited at http://www.oleadb.it/ there are 1,250 cultivars in 54 countries and conserved in over 100 collections. This database looks like to be updated in 2008, but the retrieved data gives an idea of relative performance of different countries.

Based on the data retrieved from olea olive germ plasm database, the largest olive collection is held by olive growing and oil industry research center (CRA-OLI) of Agricultural Research Council (CRA) in Rende, Italy (**Table 5.7**).

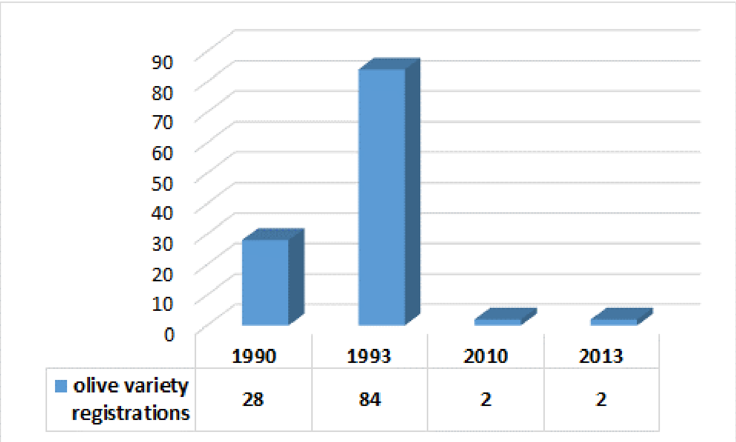
Table 5.7 Olive Cultivars in Selected Collections

Australia-National Collection	99
China- Olive garden Chaanxi	103
USA -national clonal germplas repository	121
Turkey-Olive Research Institute	127
Tunusia- Institute d'olivier	144
France- INRA	145
Argentine- Ministry of Agriculture	200
Spain- IFAPA	444
Italy- CRA OLI (Rende)	470

Source: http://www.oleadb.it/, as of 2008

There are 470 olive cultivars in CRA-OLI in Rende and the collections of the CRA-OLI in two other locations, the number of olive cultivars of CRA_OLI goes up to 682. In fact, there are 26 different collections in Italy with a total of 1925 cultivars. According to olea database, the second largest collection is the olive world collection of the Andalusian Institute of Agricultural Research and Training (IFAPA) in Cordoba, Spain, with 444 olive varieties. There are three collections in Spain with a total of 604 olive cultivars.

In the olive germplasm database of olea database, the only registered collection in Turkey belongs to Olive Research Institute ZAE, with 127 olive cultivars. As Table 5.7 indicates, the olive cultivar collection of olive research institute of Turkey is very modest compared to traditional olive producers. In Turkey, there are 116 nationally registered olive cultivars, based on the data published by GTHB (**Figure 5.25**).



Source: http://www.tarim.gov.tr/BUGEM/TTSM/ as of December 2014

Figure 5.25 Olive Variety Registrations in Turkey

Most of the registrations were in 1990 and 1993. In addition, all of the registrations belong to research institutes of GTHB. Among the registered olive cultivars, based on GTHB data, the 112 of them belong to olive research institute ZAE, 2 belong to Atatürk Horticultural Central Research Institute in Yalova, 1 belong to Pistachio Research Station in Antep and 1 belong to western Anatolia research institute in Antalya. It is very striking that there have been only four registrations after 1993. In other words, in the last two decades there has been almost no olive cultivar registration, implying the low capacity of breeding activities of the research institutes. In addition, regarding plant breeders' right (PVR) activities, there is no PVR presented to any Turkish applicant for an olive variety, based on the data published by GTHB.

However, the stagnation of breeding activities of the research institutes, primarily the olive research institute ZAE, may be mainly attributed to the cease of Turkey from the membership of IOC in 1998. This led to the exit of ZAE from the ongoing IOC projects, most importantly the RESGEN project. The IOC RESGEN project aims the genetic improvement of olive by forming the world olive cultivar's collection. The IOC projects were an important external knowledge source for building the knowledge development capacity of ZAE to carry out national breeding R&D projects.

With the re-participation of Turkey to IOC in 2010 as a member state, this knowledge gap of more than a decade will be closed with the initiatives of ZAE to participate in RESGEN project of IOC. Besides, ZAE applied IOC in 2010 for the formation of third olive collection in İzmir and it has been accepted in 2011. This project, which is held between 2012 and 2015, in addition to the RESGEN project is seen by the ZAE researchers as a great opportunity for capacity building.

In summary, all of the above analysis related to the knowledge base, indicate that in the knowledge development function of the olive and olive oil sector Innovation System:

- The dominant actors are the public research institutes of TAGEM and the public universities. Universities seem to do basic research more than public research institutes.
- The role of TÜBİTAK's Research Institutes and other public organizations such as TAEK in scientific knowledge development related to olive sector is minor. TAEK have project partnership with GTHB on mutation breeding of plants and National Boron Research Institute on plant nutrition, but none of them is related to olives.
- The role of value chain actors in scientific knowledge development is weak. This weakness mostly arises from the small size of the olive producers and the processors. The Agricultural Cooperatives Unions capacity is minor in terms of scientific knowledge development. They have incremental olive process innovations a result of "learning by doing". Yet, most of these innovations are not patented.
- Though the knowledge development capacity of actors is improving in time, their performance is significantly lower compared to other countries.

5.2.3 Barriers in the Research System

Based on the interviews, the institutions (i.e. the rules, regulations, custom, tradition etc.) that create barriers/blocking mechanisms leading to systemic problems and the inducement mechanisms to the functioning of knowledge development can be grouped under certain headings for the sake of clarity:

i) Functioning of Research Organization of TAGEM

ii) Functioning of Olive Research Institute ZAE

iii) Management of the Agricultural R&D Programs of TAGEM

iv) Functioning of the University Research System

Functioning of the Research Organization of TAGEM

The current research organization as a part of GTHB of has a history of more than 85 years. The first seed breeding practices started with the initial years of Turkish Republic and the research institutes related to plants of which Turkey has a comparative advantage were already established as 1930's. Therefore, there is an important bulk of knowledge accumulation in the research system of TAGEM in time, which is an *inducement mechanism* for agricultural research in general.

Though the establishment of public research institute's history goes back to 1920s 1930's, the public research organization evolved through time with the reorganization of the related ministries. They were rather scattered among different public organizations or different units within the ministry responsible for agriculture. In 1984, the public research institutes were gathered and divided under the 5 General Directorates of the Ministry of Agriculture, Forestry and Rural Affairs (TOKB).

In 1991, with the establishment of a separate Ministry of Forestry (MOF), the remaining part of TOKB was reorganized as Ministry of Agriculture and Rural Affairs (TKB). The TAGEM was established in 1991 as a new General Directorate during this reorganization of TKB and all the research institutes were consolidated under the responsibility of TAGEM. Therefore, the current research system of TAGEM is rather new and has an organizational history of almost 25 years. This restructuring process went along with the "Turkey Agricultural Research Project" with the World Bank. As a product of this project, an additional research institute, Agricultural Economic and Policy Development Institute (TEPGE) was established in 1994. The aim of the establishment of TEPGE was to make the economic and marketing research. In the World Bank project report, this need was underlined as:

> Surprisingly, for a country as developed as Turkey, MARA (TKB) has no macro or micro-economic research unit or institute to conduct economic research… Such a unit or institute will be essential for MARA (TKB) and () decision makers to develop sound policies affecting the agricultural sector (World Bank 1992 p.14-15)

The current research organization of TAGEM is a classical public organization based on top down management. As TAGEM is a part of a ministry, this organization system gives power to the government to intervene. Therefore, this bureaucratic organization structure itself is a main blocking mechanism to the functioning of knowledge development, creating barriers in many systemic dimensions. Another main blocking mechanism is the recruitment of the staff based on Civil Servants' Law.

In TAGEM, there are currently seven departments: horticulture, crop, plant health, soil and water resources, livestock and aquaculture, agricultural economic and policy research departments. These departments have split the research institutes among themselves according to their research area. For instance, the olive research institute ZAE functions as administratively responsible to horticulture department. In each department, there is a coordinator providing the administrative link between the department head and the research institute.

The coordination of research on olive is held by a coordinator who is responsible for the coordination of research on all the sub-tropic fruits, including citrus fruits, bananas, figs etc. As Turkey is a Mediterranean country, the research on all the sub-tropic fruits has some kind of priority. Hence, the coordination of olive research with other fruits may be *a barrier* for the effectiveness of the organization of the olive research system. As the coordinator's role is expected to be "the interface" between the units of GTHB and the research institutes, the coordination of olive research with other sub-tropic fruits is *not seen as a barrier* to the functioning of the coordination of olive research. The representative of TAGEM (int#4) admits that, "*If you go into the details of projects only one person for coordination would not be enough*".

TAGEM's organization and process management system is codified as a detailed manual and can be reached easily from their web site. This manual includes the master plan revision process, project management processes of DPT, TÜBİTAK, TAGEM funded projects as well as the management and support system processes.

The codification of all these organizational processes is an *inducement mechanism* to the effective functioning of the Research System of TAGEM.

Given the large spectrum responsibilities, the *human capital infrastructure* of TAGEM is assessed to be insufficient by most of the interviewees. The reason behind this insufficiency is not primarily due to the low number of staff recruited in the directorate, but the significant share of staff those are "dormant", in other words, the existence of researchers who choose to be inactive or kept redundant by the directorate. As the researcher staff of TAGEM are also civil servants, there is no way to impose any sanction or dispose of them when they do not work effectively as long as they do not break the rules of civil servants' law. One of the representatives from TAGEM (int#13) underlined that "*the one who is waiting for his retirement can never be a researcher*".

Furthermore, there is considerable mobility of the TAGEM's research staff, which is *a barrier* to "*learning by researching*". Due to frequent appointments to different positions within TAGEM's research system or transfers to universities to get some academic positions, the stability of the staff is rather limited. All of the researchers interviewed mentioned the main reasons i.e. *barriers* leading to mobility as follows:

i) the low motivation as a result of the bureaucratic organization that allow mobilization and appointment of staff based on ideological purposes
ii) the lack of reward and promotion mechanisms for researchers according to their performance, skills or merits
iii) the significantly lower payments compared to university research system

Besides, current research organization of TAGEM, as a classical public organization, gives the opportunity to the researchers as civil servants to ask for a change in their position within the research system without even consulting the Director or informing their coworkers.This is also arising from the *weak culture of doing research* in Turkey as indicated by one of the interviewees (int#13) – which may vice versa be a result of the research system:

> There is no loyalty. They use the facilities of Ministry. When they reach a certain experience level, they quit the system even if they are in the middle of a research

> project. They do not consider leaving after finishing the project or raising another researcher to complete it. This is a mentality, a culture. Without responsibility and patience, wealth and status become their objective instead of instrument of doing research"

It is also mentioned by him that, "t*here is a significant share of researchers, who really are eager to the research, but current rules of the organization allow them to a certain point and after some point time they get exhausted*".

In order to improve the quality of research activities, the ministry started performance evaluation of the researcher based on their productivity. All of the interviewed researchers mentioned this as an improvement in the system but the problem is that there is no reward of getting high performance evaluation. It seems that it is *personal ethical values, which* define the upper limit of the researcher capabilities. One of the interviewed researchers (int#59) conducting R&D projects olive processing, who seems to be hardworking and ambitious, told that;

> The performance evaluation does not transform into any economic return. I am currently leading four projects and I still get the same payment with the one who has no project in his hand. Why do bother, struggle and get tired? It only brings personal contentment.

In 2011, the TKB and therefore as a part of it, TAGEM has been restructured. The Ministry of Food, Agriculture and Livestock (GTHB) has been established. During the restructuring process, most of the department heads of TAGEM have changed and selected researchers are attended to active positions. All the staff those were seen as *a barrier* to the functioning of TAGEM was excluded.

The construction of a better functioning management research system of TAGEM is an *inducement* for knowledge development. This restructuring is found to be very appropriate by the managers and the staff interviewed as "*the directorate got the chance to construct its team that would work*". One of the interviewees (int#22) said that, "we *are lucky that the Director has approved his team, but the other Directorates of the Ministry may not be as lucky as we are*".

However, one of the interviewee (int#11), who in fact look eager to work more actively in the system, perceive this re-structuring imposed by the government differently, indicating the existence of *the weak trust* in the research system. This researcher confessed that, "*the merits or competence is not taken into consideration any more therefore the motivation of the staff is very low in general*".

A senior researcher (int#13), assessed the situation as follows:

> In the past they were calling it re-organization now they call it re-structuring. On the paper, you write ideal things, but in the back stage, it is a tool of disposing of things. When you re-structure you can waive one's rights. Re-structuring became the tool of doing it. Externally, it is for the sake of efficiency and productivity. But without being respectful to human factor and accumulated human capital, how will there be efficiency or productivity?

All the current managers of TAGEM, the department heads, deputy directors and the Director, have PhD degree in subjects related to agriculture. All of them are researchers who have always been working for TAGEM and have developed skills in the research system bottom up. This fact has been mentioned as a great luck, an *inducement mechanism*, for the system by all of the researchers interviewed in the research system of TAGEM. The managers of TAGEM have the "know-how" of agricultural research. Besides, most of them have the experience of working in the provincial research institutes. This is also mentioned as a great advantage, an *inducement mechanism*, for the Research Institutes in general, Olive Research Institute ZAE in particular, by the representative of Olive Research Institute ZAE (int#44):

> They know the context that we are operating very well. They know the province, the Ministry and the problems we could face. They work with us cooperatively. They can understand our problems even from the way we use the words and propose solutions immediately

Though current team in TAGEM is an *inducement* to the functioning of the research system, it is still a second best situation, as the whole of the current staff is not working effectively.

The staff seems to be divided into three groups: an actively working group who are in the system, a voluntary dormant group and an involuntary dormant group who are excluded from the system by the government or the management. Arguably, this situation affects the synergy between the researchers negatively and impedes the collaborative working of the staff, implicitly creating another *barrier* to the functioning of the research system of TAGEM.

Furthermore, the current strong management of TAGEM is a great “chance” for the functioning of the research system, but the rules and laws that set up the research organization of TAGEM does not guarantee the continuity of it. During another restructuring of the Ministries - the next one may take place after the general elections of June 2015- the things may change. It is up to the government.

Functioning of Olive Research Institute (ZAE)

The history Olive Research Institute ZAE goes back to 1937. It reached a capacity to operate as a research institute and got the name of “Olive Research Institute” as of 1971.

It is already mentioned that the current research organization of TAGEM is a classical hierarchical public organization and the researchers are civil servants. When we look at the history of the public agricultural research organization, we see that in the 1960s, 1907s and 1980s the researchers in the public research institutes had privileged employee rights. Their position as researchers degraded in time and in the 1990s they were “civil servantized” literally.

There are reflections of this transformation and the current research system of TAGEM on the Olive Research Institute’s functioning and its performance via adverse effects on the human capital infrastructure. According to the representative of Olive Research Institute ZAE (int#44), “c*urrently there is no physical or financial problem for doing R&D, but the problem is the serious lack of qualified human capital*”.

The “synthetic knowledge base” of the olive sector and the necessity of doing applied research in agricultural research highlights the significance of the “tacit knowledge” component of “learning by practicing” and “learning by doing” research.

The importance of learning from a senior, experienced and skillful researcher is mentioned by all of interviewed researchers either directly or indirectly. Hence, the continuity of the culture of “craftsman and apprentice” relationship between a mentor senior researcher and a junior researcher seems very important for ensuring the skills development and human capital accumulation in the agricultural research institutes in general.

For instance, an interviewed researcher of Yalova Horticulture Research Institute (int#59), who does research on olive processing, referenced to one of the senior researchers of the institution with admiration telling that "*He is very valuable and bottom up raised in this institute. He is the one who led me to do research on olives*".

Arguably, with the degradation of public research institutes with 1990s, early retirement scheme facilitating the exit of experienced researchers from the system, the poor appointment of new researchers because of economic concerns at that epoch and with some other reasons, there is a lost generation of senior researchers in the Olive Research Institute ZAE. One of the interviewees from ZAE, who have experienced personally the discontinuity in the "craftsman and apprentice" relationship as *a barrier* to his skills development, summarized the situation as follow (int#44):

> In the previous generations there were internationally known researchers of the Olive Research Institute. For instance, one of them was an internationally accepted and awarded olive oil degustation panelist. Another one, currently retired, trained at least ten researcher to take after him. When I have started working in ZAE as a researcher, there was not the knowledge of degustation at all. The generation belong to the age group of 35s-40s were missing. There were only the researchers belonging to the age group of 55s-60s, who have already drew back themselves with full of disappointment

The lack of the guidance of a senior researcher on developing skills "*to do a publication and present it*" combined with the weak language skills of researchers is seen as the *barrier* for the researchers in ZAE to do internationally accepted high quality publications and to establish networks with their foreign colleagues. In fact *"the researchers in ZAE have completed projects with significant outputs, but nobody knows them".*

Currently, another *barrier* related to the human capital quality and capacity of ZAE is the diminishing supply of high quality graduates from agricultural faculties who would replace the current staff and maintain the continuity of institutional skills development. The representative of ZAE (int#44) mentioned that:

> There is a general trend of degeneration and olive research is not an exception. Now there is an active and productive researcher group in the institute. I frequently suggest the olive sector representatives to use this group for R&D as much as possible. They will stay in the research system for 10 or 15 years, not anymore.

As the research system is hierarchical, the head of the Olive Research Institute ZAE is not free to recruit staff by himself. The organizational flexibility is very low. This low organizational flexibility is *a barrier* to knowledge development capacity as it slows down the transformation of the institute's knowledge base according to the evolving needs of the olive sector. The low capacity of the breeding activities of ZAE in the last decades can be related to slowness of the system, as mentioned by one of the researchers (int#43):

> The projects on olive culture have longevity. You cannot get a result in 2-3 years but you need at least 10 years. A researcher almost reaches his retirement when he completes a project on olive breeding. The longevity of the project combined with a ponderous system delays the results.

There is number of permanent staff (norm kadro) that is fixed by GTHB for each of the research institute. Every year TAGEM formally asks whether they need staff and the head of institutes demand staff according to their current needs. If TAGEM approves they get new staff. The Ministry usually looks at the total number of permanent staff recruited instead of deficiency or surplus of recruited professions. If the total staff is already at the limits they have fixed, they may not approve the new staff demand. The fact that almost half of the ZAE staff is not working actively is exacerbating the situation. The system does not allow fill in the staff needs, as on the paper the institute looks full of staff.

There is not a uniquely defined "researcher post" for the staff recruited in the research institutes but posts are defined according to "professions" such as agricultural engineer, food engineer, chemist. Therefore, if the post for a profession is not defined by GTHB, it is impossible to recruit staff from that profession. Currently defined professions by the Ministry are not adequate to recruit researchers from new disciplines. This is creating another *barrier* for the Olive Research Institute's functioning, therefore knowledge development capacity.

For instance, a new department in ZAE related to "plant breeding and genetics" was established in 2011 and but for the time being they cannot recruit genetic engineers. One of the interviewees from ZAE (int#43) told an instance that underlines the problem:

> The project related to the establishment of second international olive germplasm in İzmir was on the newspapers as a great success. A newly graduated genetic engineer called us asking what he should do to work in ZAE, as his dream was to

> take part of such kind of agricultural projects. He called the ministry, but he could not be recruited as there was not officially defined post suitable for him.

Another *barrier* that adversely affects the motivation of the staff is that, besides the general problem of significant lower payments compared to the academia, the researchers from some professions are not paid equally. Same interviewed researcher confessed that: "t*his is demoralizing me. I get lower payment compared to agricultural engineers working in this institute, even the inactive ones. I am an idealist person. Otherwise one can easily convince himself not to work hard*".

The existence of active and inactive groups of researchers in ZAE is *a barrier* to the effective allocation of projects among the staff. The active group is overloaded and gets exhausted. Furthermore, the inefficient allocation of the project becomes *a barrier* to development of expertise in different disciplines, mentioned by an interviewed researcher (int#42): "*Everybody is everywhere. One has to develop expertise on one subject and contribute to the group work accordingly. If everybody becomes an expert on everything, then we know nothing.* "

The inefficient allocation of projects among the staff is blurring the separation of the responsibilities of different units between each other. Based on the interviews, this blurring of responsibilities seems not only impeding efficient multidisciplinary work but also weakening the trust within staff and creating *a barrier* on collaborative working in the research institute.

The staff regulations that allow mobility of researchers between research institutes is also affecting negatively the skills accumulation of the Olive Research Institute as "*it gets at least two years to adopt and learn the new plant before developing research on it*".

Besides, as result of this mobility, though few, there are some staff in ZAE whose expertise is not relevant to olive research, such as crop production or zoo-technique. Furthermore, the perception of the incumbent staff of the newcomer is negative "*especially if he comes upon reference of someone*", as mentioned by int#41. The staff mobility, which is arbitrary, seems to create prejudice, *a barrier* on building trust and collaborative working; at least for some time.

Management of Agricultural R&D Programs of TAGEM

Research institutes can conduct research by using their i) budget allocation from the budget of GTHB ii) The R&D program budget of TAGEM.

As mentioned by one of the interviewed managers of TAGEM, research institutes are expected to do basic search or trial R&D projects by using their own budgets and holistic R&D projects are funded by the R&D program budget of TAGEM.

Under the coordination of TAGEM, the R&D project proposals of researchers of the Research Institutes of TAGEM are evaluated in four discussion platforms:

- Institute Research Committee (EAK)
- Program Evaluation Groups (PDG)
- Research Advisory Committees (ATK)
- The Agricultural Research Council (TADAK)

Research proposals are initially discussed in EAKs. All the researchers are he member of the EaK and head of the institute leads the discussions. The decisions of the Committee are sent to TAGEM in January. PDGs mainly consist of researchers of TAGEM, other GDs of the GTHB, representatives of Ministries, the Academia, representatives of District Agricultural Directorates, private sector, producers, NGOs. The PEGs meet once a year meet by the end of February and beginning of March. Their decisions have the advisory guidance role for ATK. ATK consist of six Science Committees: Field Crops, Horticulture, Animal Husbandry, Aqua Culture, Food and Natural Resources Science Committee. These Committees evaluate the R&D projects based on the priorities of the "Research Master Plan" of GTHB and propose the accepted projects to TADAK. The procedures related to the R&D programs are well defined and codified in by a manual, therefore there is no ambiguity for the researchers related to the process.

Table 5.8 Approval process of R&D projects of Research Institutes of TAGEM

January 2015	Feb-Mar 2015	May-June 2015	July-Sept 2015	Dec 2015	2016-2017	2018
• Transmission of project proposal accepted by EAKs	• Programme the Evaluation Groups Discussion	• Discussions in ATK	• Approval process in TAGEM	• Notification of the Institutes of the supported R&D projects	• Start of the Project and Evaluation process	• Project Approval and Publication

Source: Authors compilation, based on TAGEM's manual

The timetable of this procedure is shown in **Table 5.8** for an R&D project of two years of time. As can be seen from the table, the proposal of an R&D project, its approval and launch of takes minimum one year. The evaluation and project approval takes quite a time. The evaluation period before the approval and after the end of the project is underlined as *a barrier* to the system (in#60):

> Not all but for some of the R&D projects this lag of time is more important. The disadvantages are that the subject may lose its priority or the data become outdated. Especially, if you do field search using face to face interviews, as in the agricultural economics. The social agenda and the problems change or a new regulation may come into effect during this time. It would be much better if we could start in the year we propose the R&D project and if the approval process were shorter after the completion of the project.

Another *barrier* to the effectiveness of the management R&D programs is that the R&D proposals of different Research Institutes may coincide. When this issue is asked to the interviewed researchers, all of them indicated that it is the PDGs meetings functioning as control mechanism. The interesting thing is that it seems natural for the researchers that the resolution for the coincidences is at the PDGs level, not beforehand. If two of the R&D proposals coincide, during the PDG they either merge both of them by transforming the proposals to a higher framework R&D program or reject one of them.

Both of the cases bring burden on the researchers and lengthen the evaluation process of the project proposals. Therefore, whether this happens or not depends on *the quality of researcher's search process* during the decision making on the subject of his R&D project.

One of interviewed researchers (int#59), though they experienced this problem before, thinks the probability is low:

> Before the institute's evaluation meeting, we discuss the R&D proposal in our division. For sure all of us in the division have an idea of other potential researchers who can do research on similar subjects. We give a call to that person to consult if there is the probability.

The evaluation criteria of the ATKs are defined clearly, which gives highest attributes to the compliance with the master plan priorities, collaborative research, the applicability and innovativeness of the research proposals. The criteria, is an *inducement* as it supports innovative and collaborative R&D.

In general, the selection of R&D project subjects is prone to *top down rather than bottom up*. Currently, the master plan of GTHB (2011-2015) sets the main priorities of agricultural research, therefore the research on olive and olive oil (**Table 5.9**).

Table 5.9 Master Plan Research Priorities (2011-2015) related to olive and olive oil supply and value chain

Research Opportunity Area	Program	Priority
Biologic variety and Genetic Resources	Plant Genetic Resources	High
	Biosafety and Biotechnology	Medium
	Genetic Resource Database	Medium
Fruits and vineyard	Olive	Medium
	Socio-economic research	low
	Organic fruits and vineyard	low
	Integrated combat techniques	low
Food and Fodder	Food safety and quality	High
	Modernization of food processing technologies	Medium
	New techniques in food analysis	Low
	New technique in food preservation and packaging	Low
	Treatment of food waste	Low
Soil and Water, Environment	All of the programs under this research opportunity areas are related to the olive sector	

Source: http://www.tarim.gov.tr/TAGEM/Belgeler/master_plan.pdf

There are 14 opportunity areas of research (AFA) defined in the Master Plan (2011-2015). There is no prioritization of AFAs, but the programs under an AFA are prioritized. For instance within the fruits and vineyard AFA, stone fruits and citrus fruits have higher priority than olives. Besides, though the olive waste treatment may be a higher priority for the olive sector compared to treatment other food wastes, as it has low priority in general, the researchers may be sceptic about choosing it.

The existence of a medium term master plan for agricultural research is *an inducement* mechanism for knowledge development and the guidance of search, but it may create *a barrier* to bottom up knowledge development as it has a determining power on research areas. Therefore, the methodology used in prioritization practices of the master plan is an important institution that can be *both an inducement and a barrier*.

Regarding the R&D supports programs of TAGEM for the universities, private sector and NGOs R&D priorities are announced during the project call period at the beginning of each year. The R&D priorities are defined within the framework of master plan.

Each department in TAGEM prepares its draft priorities based on the feedback from the related Research Institutes. The final R&D priority list is prepared with a meeting between departments. For instance, the Olive Research Institute ZAE feeds its priorities in the horticulture department in TAGEM via the responsible coordinator. This priority list usually reflects the needs of research institutes, "*the research areas that they could not focus because of budget, human capital or time limitations*". It was also mentioned by an interviewee *(int#4)* that "*initially the private sector was not interested and only the universities benefited. When TAGEM increased the support amount, the private sector stepped in."*

Functioning of University Research System

Universities are responsible for both research and education. Interviewees from universities underlined this as one of *the barriers* in efficient allocation of time, resources and human capital for conducting research in general. Besides, the more applied nature of agricultural research is more demanding in terms of allocation of time as "*the experimentation period is long*".

Furthermore, most of the interviewed researchers underlined that applied research on olive tree "*requires more patience as it takes significantly longer time to get results compared to other plants*" and "*more complex as it is bears oil which distinguishes it from other fruit trees*".

Therefore, the freedom of allocation of the needed research time by the researcher is important for conducting applied research on olives. In this respect, the human capital infrastructure of the university department of the researcher can be *an inducement or a barrier* depending on the situation to conduct applied research on olives efficiently. This is a barrier case for one of the interviewees, a research assistant (int#10) conducting research on olive flavor:

> We have deficiency in faculty members. There are two research assistants. One looks for vegetables, the other (me) for fruits. All workload is on us. There are many analysis of flavor that I have to read. In addition to my project on olives, there are others, the strawberry, citrus fruits, pecan nut etc. Besides, sometimes you have to stop in the middle of your experiment unwillingly and deal with administrative issues. When you return to it, you ask your-self: where was I to start again?

Currently, in the agricultural faculties of universities there is not a department, or a branch of a department, solely responsible for research on olive. The research on olive culture is conducted under horticulture department with other fruit trees and vegetables whereas research on olive processing is mainly under food engineering departments. A researcher from horticulture who does research on olives also do research on peach and apples, or another researcher doing research on table olives processing do research on chestnut or milk processing. This seems to be *a barrier* in cumulative knowledge, developing skills and expertise in the universities on olive related issues.

One of the interviewees (int#44) told that: "today *olive tree is a lonely tree in Turkey. There is not a person from the faculty staff of the universities in the olive producing regions that I can say that he is really the expert on olive*".

The criteria of faculty promotion and tenure system in the universities seem to c*reate barriers* for specialization in olive research in the universities. First, specialization on one subject is usually seen as a flaw instead of a virtue for promotion. Researchers prefer to diversify their research subject.

Secondly, faculty promotion is based on quantitative criteria, such as the number of publications in high quality journals. Therefore, the university researchers are reluctant to study subjects that take time to get results. This is the case for olive research as "*you wait for years and yet you do not know what the results would be at the end*".

The quantitative criteria for publication are argued as *a barrier* by all of the interviewed researchers for selecting olive culture as area of research. One of the interviewees (int#10) told: "*If you study peach you get the results sooner. One has to wait 4-5 years in the case of olives. That does not make him assistant professor*" and another (int#59) told: "*you have to make SCI publications. Nobody cares whether the publications are on olives or regional products".*

The domination of academic career as the primary concern for doing research in the universities is also implicitly creating *a barrier* on bottom up knowledge development in the olive sector. In other words, the aim of doing R&D for finding out solution for the problems of the olive sector, by keeping in touch with the sector representatives, may be the secondary objective.

Senior academic people are usually guiding the research assistants for the specialization of their projects; therefore, the focus of their research area is effective on the new researchers' expertise. The "craftsman and apprentice" relationship seems to exist in the agricultural research in universities as well.

Universities have Scientific Research Projects (BAP) commissions and university researchers apply for funding for their projects. The BAP funding of universities for agricultural projects is insufficient and covers only a small part of agricultural research projects, which require costly analysis methodologies. The limited funding of BAP system is defined as *a barrier* for agricultural research in universities by an interviewee (int#10): "*You work with organic material. The shortest the time between picking up the fruit and the analysis, the better it is as the fruit may decay. But it depends on your financial resources.*"

Another *barrier* related to the functioning of BAP funding of the universities is that the commission may favor some groups according to their ideologies, which in fact is a major problem in most of the public organizations in Turkey. This is argued by the same interviewee as one of the main *barriers* for doing research: "*The support of the professors and the department is up to some point. We cannot get over the barrier of university management. The difficulty is in the procedures of the university*."

The grouping of researchers in the universities according to ideologies is also a *barrier* for collaborative research, which inhibit multidisciplinary studies as well. The trust in the university research system is low "*as some groups of researchers are getting more finance*". The interviewees argued that the rather limited BAP funding is leading university researchers to compete for TÜBİTAK funds for R&D projects, as they would get better funds for agricultural research.

5.2.4 Interactions within the Research and Education System

The yearly meetings of PDGs, organized by TAGEM to evaluate the ongoing project and to discuss the new project proposal, are the main platform for knowledge development on the olive and olive oil sector.

All of the interviewed researchers of TAGEM attributed importance to these meetings as PDGS are supposed to gather all the related actors of the research institutes and the university with other sector representatives.

During the PDG meetings, there are different evaluation groups. There is no single group responsible for evaluation of olive related project proposals. For instance if it is related to olive culture it is evaluated under the working group of "citrus, subtropical plants and olive", if it is related to organic olive production it is discussed under organics group and if the project is related to olive processing, i.e. table olives and olive oil, these projects are discussed under food processing working group. All the meetings of PDGs are held on the almost the same time-period which facilitates the interaction of the researchers with each other. The evaluation of olive related projects in different evaluation groups can be assessed as *a barrier* to the researchers who study olive related issues to learn from each other. One of the researchers (int#5) reminded that was once there was a separate subgroup and that the "*things are continuously changed*".

Another important platform that brings researchers on olive related issues is the congress of olive students, which is held every two years. The third of the congress is held on 2014 and this congress is rather a new platform for researchers. The congress seems to bring together mostly the university researchers and the vocational school students, as the participation of public research institutes to this congress, including ZAE, is very low.

It looks like that, other than the PDGs and the olive student congress, there is no regular platforms that the olive related research could be discussed in all its respects. Of course, there are national congresses related to horticulture, food engineering, agricultural economics etc. that research on olive related issues are presented and discussed; but these congresses get together the researchers mostly from that particular discipline or the research on particular that issue.

The collaboration between research institutes of TAGEM within the same region seems comparatively stronger. They use and share their facilities for R&D and support each other when needed. Regarding the research institutes in different regions, the interactions are rather weaker on collaborative R&D.

Based on the interviews, the research institutes in different regions seem to decide on and develop their R&D projects separately and rarely interact with each other.

The collaboration between research institutes and university looks stronger than the collaboration between public institutes. As the researchers of TAGEM do their master and PhD degrees in universities, the social network of the researchers of TAGEM and the university staff, is strong. The researchers of TAGEM are prone to collaborate with the colleagues from the universities they are affiliated for education. The existence of a social network of the public researchers and university staff is *an inducement* for researchers' learning by interacting. Regarding the type of research, the formal collaboration between for instance the olive research institute and the university is "*mostly on basic research rather than applied R&D projects*" (int#44).

In the collaborative R&D projects of the research institutes and the universities, the division of responsibilities between the institute and the university is defined as *a barrier* to "collaboration" by a researcher (int#41):

> The university faculty sees us as their rear garden. They want to lead the projects, to decide on methodology and program everything as they wish. They leave us the management of the technical issues and supply of infrastructure as we can afford better budget from the R&D programs of TAGEM.

As partly elaborated in the previous part, the rules regulating the university research system is creating a competitive environment rather than a creative environment for doing research. Therefore, the university research system does not induce interaction and collaboration in agricultural research as desirable as it could be (int#10): "*As the career in the universities is based on quantity of research, nobody wants to share anything. Why share? You do whatever you can do by yourself or collaborate with people in other departments of whom you think that he will not use your ideas*"

5.2.5 Infrastructure for Knowledge Development

Starting with 9th development plan (2007-2013) and with the law # 5746 on Research and Development enacted in 2008, many steps have taken for the improvement of the physical, financial and human capital infrastructure of R&D.

The aim is to increase R&D expenditure levels significantly (Table 5.10). Furthermore, with the National Science, Technology and Innovation Strategy (NIS) (2011-2016) of The Supreme Council for Science and Technology (BTYK) the food sector is determined as one of the priority areas that the R&D and innovations have to gain pace. These improvements have been a significant *inducement mechanism* for the R&D in general.

Table 5.10 The R&D Expenditure goals vs realization

	2023 goals	**2013 realization**
R&D expenditure/GDP	3 %	0,95 %
Private Sector R&D expenditure/GDP	2 %	0,45 %
Share of Private Sector in total R&D expenditure	66,9 %	47,5 %

Source: TÜBİTAK, TÜİK, as of December 2014

Physical Infrastructure

One of the primary goals of the NIS is to increase the GDP share of R&D in general and private sector in particular via supporting R&D infrastructure capacity development. With this aim, the establishment of the private R&D centers is subsidized since 2008. This initiative has been successful, as a considerable number of private R&D centers are certified. As can be seen from Table 5.11 the food sector has a minor share. One of the main reason for his the low level is that the very small scale of the firms in agriculture and food sector which is creating *a barrier* to benefit from the subsidies of the government, as private R&D centers above a certain scale are subsidized.

Table 5.11 Private Sector R&D Centers Certified

Private Sector R&D Centers	October 2014
Applied	209
Certified	186
Currently Active	165
of which food Sector	**4**

Source: BSTG, www.biltek.gov.tr

Within the programs of Turkish Research Area (TARAL) launched in 2004 for the development of NIS (2011-2016) and the framework of the 9th development plan (2007-2013), the establishment of public R&D centers and University R&D centers foreseen as well. As result of the proactive initiatives of the government, 74 thematic and advanced R&D centers of the public sector and universities are established since 2003 (See DPT 2010).

Though not all of these R&D centers are related directly to food and agricultural sector, more than half of them can feed in multidisciplinary research related to food and agricultural sector, therefore olive sector. Though there is not a new R&D center among them solely responsible for research on the olive sector, the improvements in the food and agricultural R&D infrastructure is *an inducement* for knowledge development function of the olive and olive oil innovation system.

In addition to these developments, the physical infrastructure of the research institutes of TAGEM in general has been significantly improved by the GTHB in the last few years. This improvement in the physical infrastructure is mentioned by all the interviewed representatives from TAGEM and the researchers of the Olive Research Institute as an enormous step "*as it was almost like in the 1970s a couple of years ago*". One of the researchers from ZAE (int#43) indicated that:

> It was affecting the image of the institution negatively. Previously, laboratories were in a miserable state. We were dependent on universities for analysis. The institute is like a construction yard for the last two years. It is beautiful to be organized. Naturally, the head of the Institute is expecting more project proposals from us.

Besides, the establishment of a second Olive Research Institute, though not completed yet, is another significant improvement for research on olive.

Financial Infrastructure

The share of total of R&D expenditure in GDP has increased from 0.48 percent to around 0.95 percent in Turkey. Especially with the launch of TARAL, the funding for R&D has been significantly increased since 2005. All of the interviewed researchers agree on the significant improvements in the TÜBİTAK and GTHB R&D supports for agricultural research, as an *inducement*.

The researchers of TAGEM currently feel the financial support of the TAGEM, as indicated by one of the researchers (int#59): "*The Ministry and TAGEM value Olive culture. I do not believe that a good project proposal on olive that is consistently prepared could be rejected by them. And I never saw a project on olive which has been rejected before*"

One of the main *barriers* mentioned by the interviewees is the rather short time-period of R&D supports. As mentioned before, doing research on olive culture demand much longer time compared to other plants. The time limit for the R&D programs of TAGEM is 5 years and at the 4th year a new proposal has to be given to justify the extend of time. The TÜBİTAK R&D funding period is much shorter and favors project proposals that could be transformed to application soon.

Therefore, TÜBİTAK's R&D project financing strategy looks not very convenient for research on plants like olive that demand longer time-periods for project results.

Based on the interviews, The TÜBİTAK R&D project evaluation procedure is also seen as a *barrier* to the R&D support system. The *trust* to the capability of the panel of experts those evaluate the projects seems to be very low. The justification of the project refusals are not convincing according to the interviewees. Besides, as the panel consists of representatives from the university staff only, the researchers from public research institutes feel that they are competing under unequal terms as the panelists favor mostly university projects. There is the belief that there are groupings within university panelists as well, favoring the proposals from certain university faculty more than others. Furthermore, the evaluation system favors the researchers who have projects approved for TÜBİTAK funding and who have SCI publications more. This is mentioned as a disadvantage by one of the interviewees. This criteria, creates a *barrier* for knowledge development capacity of young and new researchers.

In order to apply for TÜBİTAK funding, there should not be an application for any other source of funding for that particular project. If the project proposal is rejected by TÜBİTAK, the different timing and frequency of project calls of TÜBİTAK and GTHB is leading to significant delays in the launch of the desired projects.

This is creating *a barrier* to the productivity in research and knowledge development capacity of the actors according to an interviewee (int#59):

> While you wait for the approval of TÜBİTAK, you miss other project calls. I had a project rejected by TÜBİTAK. For me, it was very innovative and rejected based on weak arguments. We represented it after revising according to their expectations. It was rejected for the second time with some other arguments. We lost a significant time, as we missed GTHB call as well.

In terms of financial supports for the researchers to attend national and international research platforms such as congress, according to the interviewees the support of TAGEM has significantly improved compared to previous years. The management of TAGEM supports any researchers *"who will make an oral presentation and who certifies medium level of English*" to attend international congress.

In the universities, the situation is worse as the researchers compete for limited budgets. This situation creates *a barrier* for capacity development and networking among researchers. An interviewee (int#10), a university researcher who had a presentation in the olive student congress, confessed that:

> I used my own finances to attend the congress. I wanted to present my research. University did not cover the costs of congress if it is not the fifth congress consecutive or more. This one is the fourth consecutive one. Some researchers did not come to present their study in this congress. Most probably, they could not get financing. You cannot expect them to act like me. We all have families to run.

Knowledge Infrastructure

The barriers related to the knowledge infrastructure of olive and olive oil sector can be grouped as follows:

i) human capital infrastructure
   a. education at the university, supporting the codified part of knowledge base
   b. education in vocational schools, supporting the tacit part of knowledge base
ii) Database infrastructure: R&D databases, assessment reports, statistics database

Regarding ***human capital infrastructure***, one of the main barriers indicated by all of the interviewees is the weak language skills of the researchers. This is seen a result of the current education system. This situation leads to low productivity of publications in foreign languages and weak capacity of handling the international R&D projects. The weak language skills of researchers are leading to low self-confidence creating *a barrier* to present themselves in the international platforms. A senior researcher in TAGEM (int#13) summarized the problem as follows:

> There is International Horticulture Conference in August 2014 in Australia. The next will be held in İstanbul in 2018. We say that Turkey is a heaven for horticulture plants. You expect a significant number of applications for publications from Turkey, but the current total of both the universities and TAGEM researchers do not exceed a modest number.

The barrier of weak language skills is felt more in the TAGEM research institutes. The research master plan of TAGEM foresees the researchers of TAGEM to get 50 % of their R&D project financing from external resources other than the budget of GTHB. Weak language skill is *a barrier* to seize the international R&D funding opportunity at the maximum level, mainly the current R&D funding of EU. The management of TAGEM is aware of this problem of the need for high quality human capital with better language skills, "*as without relevant human capital the improvement in the physical infrastructure means nothing*" and took significant steps to improve the situation. They set the criteria of medium level English proficiency and having MA degree to be accepted for the research institutes. One of the managers in TAGEM (int#22) confessed that:

> Even though they have MA degree, we accept them at zero level. They see applied research in our institutes, as they do not experience it in their faculties. Initially we do not give any projects under their responsibility. They progress quickly as they have agricultural education background.

TAGEM also supports the higher education of the agricultural faculty students those will in turn work for the ministry. These efforts are not as effective as they wish to improve the human capital infrastructure of TAGEM research institutes. Because "*the number of relevant university graduate applicants is not sufficient*" and "*the ones those whom they support to develop skills leave the research system for academic career*".

The supply of low skilled graduates from the agricultural faculties is *a barrier* for knowledge development function. One of the reasons of the low quality graduates is indicated as the increase of the number of universities and agricultural faculties in the last decades without sufficient infrastructure. Another reason mentioned by the interviewees for the low quality of the agricultural faculty graduates is the already very low quality of the high school students who prefer agricultural faculties.

In Turkey, a university applicant's primary aim is to select a discipline that will help to earn their life after their graduation. They see no future in the agricultural sector and therefore the successful students primarily select other disciplines. The students with low performance of university entrance exam (ÖSS), with no other choice, select agricultural faculties. Not the demand for undergraduate programs is low, but *"also the demand for the graduate programs in agricultural faculties".*

In addition to this situation, another reason for the deteriorating quality of graduates is mentioned as the frequently changing and inefficient agricultural faculty curriculum management. Agricultural engineering has sub branches. During the education period, students select one of the sub branches for expertise. The management of this process has been changed a couple of times in the last decades. One of the researchers interviewed (int#10) summarized the problem as below:

> When I was a student, we were selecting sub branches in the third year. It was not very efficient as well as there was not enough time to develop expertise on the selected branch. Now, the students select the sub branches at the very start. They can graduate with an agricultural engineer title without having idea on horticulture. We call them ÖSS veterans.

The student quality problem is deepening when it comes to Higher Vocational Education Schools (MYO). The interviewed faculty staff of the Olive processing departments of these schools mentioned that the students who are not qualified enough to go any faculty come to these schools. Most of the students have no self-esteem and even do not know why they are there when asked. They "*are not there to devote themselves to olive sector*" but to get a diploma.

There are technical high schools, which have olive departments, but not all the students of MYO's are the graduates of the technical schools. Even so, the student quality of the technical schools is also questionable as the good one are in the other high schools.

The *barrier* for the MYO students who are eager to work in the olive and olive oil sector is the lack of practical knowledge. Though currently there are efforts in Edremit MYO olive department, as result of the weak physical infrastructure up to now in most of the MYO olive departments, the students lack practical knowledge. They only have an internship period of 15 days, which does not help any skills development via "learning by doing".

In addition to these, the budget share of MYOs in general, and olive departments in particular, are low and the faculty staff is limited. The faculty staff has to undertake the burden of extra courses that are outside the area of their expertise. For instance, a faculty staff with an expertise on plant nutrition has to deal with courses such as math, English or communication. Besides, as mentioned by the interviewed MYÖ faculty staff (int#34) "*in addition to the work overload, the academic environment is not convenient for doing research as MYÖs are almost like high schools*."

Regarding ***knowledge database infrastructure*****,** the main barrier that is mentioned by most of the interviewees is that there is no reliable and extensive national and regional statistical database on the number and type of the olive trees as well as on olive, table olive and olive oil production. Currently produced official statistics of the olive and olive oil sector assessed to be not trust worthy by many of the actors in the system. Based on the interviews, this seems to be an important barrier not only to the knowledge development capacity of the researchers but also to other functions such as guidance of search, market formation and entrepreneurial activities. As the size and the capacity of the sector are not known by the actors of the system, everybody is acting based on his own interpretations and intuition.

Another barrier leading to the weakness in the statistical database of the olive and olive oil sector is that the informal and unregistered part of the sector is very significant. For reasons such as the very small size of the producers and production for self-consumption, as well as the rules and regulations leading to informality in the sector, the informal part is significant. Therefore, the current statistics produced are only estimations based on regionally sampled questionnaires pf the formal and registered sector.

Another reason for *the low trust* on the statistical database is that there is no single officially responsible actor to release statistics. For instance, the TÜİK, GTHB, UZZK and the Chambers of Commerce in the olive producing regions are announcing various statistics those are not consistent with each other. The situation was worse in the last decades as there was no intention of coordination between the bridging actors. The announcement of statistics was creating a frustration among the sector actors. By the year 2014, the congruity on the announcement of statistics among the bridging actors seems to be settled down. The UZZK is officially announcing statistics on behalf of the sector representatives that is *an inducement* to the system.

In order to improve the statistical data base, the Geographical Information System (GIS) and Remote Sensing (RS) Research Department was established in TAGEM in 1997 with the project on the conservation of genetic variability supported by the World Bank. With GIS, a project on determining the olive growing areas and establishing olive database was conducted in 2006 for Burhaniye region in Balıkesir. Although this department was initially envisaged as a separate research institute, in 2000 it is transformed as a department under the Fields Crop Central Research Institute in Ankara. In 2011, with the restructuring of GTHB, Geographical Information System (GIS) department as a part of Agricultural GD has been established responsible for development of statistical database by using GIS and RS. The current infrastructure of GIS units seems to be *an inducement* not only for the capacity development in the knowledge infrastructure of the olive and olive oil sectoral innovation system, but also to other agricultural products. Yet, this unit has not a project on nationwide inventory of olive trees yet.

Regarding the R&D projects database there is no single nationwide database on the total of R&D projects conducted by the research institutes and universities that will allow the researchers to reach all the previously conducted R&D projects on olive and olive oil related issues. The lack of such kind of a database is *a barrier* for the capacity development of researchers.

TÜBİTAK has its database only for the R&D projects funded by itself. TAGEM has a digital library, which has been established with the World Bank project. The purpose of the digital library was to establish the knowledge database by including all the publications and the R&D projects conducted by the research institutes of TAGEM. It is not update and the researchers confess that they are not able to reach R&D project reports via this database. Finally, there is not a university wide database for a researcher to find out the R&D projects of universities financed by BAP. Some universities have its own database open to public search and some do not.

Other than the database infrastructure, *a barrier* to the knowledge development function is that, there are no regular assessment reports on the olive and olive oil sectorial trends produced by specific institutions. Time to time, here and there some reports are produced on olive and olive oil sector by different actors.

Currently, the capacity of the Olive Research Institute is weak in this sense, as there is only two researchers recruited dealing with R&D on agricultural economics. The Agricultural Economic and Policy Development Institute TEPGE and the State Planning Organization (currently Development Ministry) have been publishing reports on olive and olive oil sector. In the last decades the capabilities of the organizations' reporting on olive sector evaluation reports has been lost in time due to different reasons.

The Ministry of Development is producing sectorial assessment reports on more general levels, such as plant production, food, animal husbandry, fisheries etc. For instance, the special commission report of the 10th Development Plan (2014-2018) on plant production includes a broad evaluation on the present situation of crops and horticulture plants and strategic targets to overcome existing problems. The report on food sector is also so broad that there is not a single sentence including olive oil in it.

In fact, TEPGE has been playing an important role both the statistical database formation and sector evaluation reports on agricultural and food products, including of the olive and olive oil, in the first half of 2000s. It seems that being directly affiliated to the Ministry instead of being part of the research system of TAGEM until 2011 has been *a barrier* to perform its capacity as a research institute.

In time, with the demand of the management the TEPGE was transformed to a unit producing ad hoc reports for the higher management of the Ministry and lost its research and sectorial expertise capabilities. As mentioned by the researcher interviewed from TEPGE (int#35):

> While we were preparing the assessment reports, we were coming together with all the sector representatives. We were discussing with them the current situation and the future projections. These reports were a real stock of knowledge and statistics. Along with the launch of the report, we were conducting a symposium. It was like a celebration. The researcher responsible for the report of a specific product was a respected expert on that product. .. Currently it is not as before.

The affiliation of TEPGE to TAGEM in 2011 is an *inducement* to the public research system, as it started to establish its research capabilities on agricultural economics and policy development. Furthermore, before 2011 there was not a funding of the R&D projects on agricultural economy and policy development. This lack of TAGEM funding was *a barrier* to the knowledge development capacity on issues related to agricultural economics. Based on the interviews, the recent inclusion in 2011 is a significant improvement.

The Ministry is currently demanding extensive projects, especially on the economic effects of the current subsidy policies from TEPGE, but human capital infrastructure is *a barrier* as mentioned by the interviewed researcher:

> We do not have the capacity to construct an economic model and analyze the results of extensive projects. There is not a statistician or an econometrician in TEPGE or in any of the research institutes of TAGEM. Because there is no available post defined by the Ministry to recruit them. The Ministry has education programs and we have accumulated some skills but it is not sufficient.

Briefly, social science research capacity of GTHB is weak, due to above reasons.

5.3 Knowledge Diffusion Function

Knowledge diffusion function is about "learning by interacting" (Hekkert et al. 2007).

The barriers creating systemic problems in the knowledge diffusion function of Olive and Olive Oil Innovation System can be mainly assessed by the analysis of interactions between:

i) TAGEM research institutes and other units of GTHB responsible for policy
ii) TAGEM research institutes, extension agents and the farmers
iii) Research and education actors e.g. universities, bridging organizations and the value chain actors

Regarding the financial infrastructure for knowledge diffusion function, government supports are main *inducements* for developing partnerships between different components of olive and olive oil sectoral innovation system.

In this respect, in addition to R&D supports for public-private partnership mentioned in Table 5..3 in the knowledge development function section, there are additional supports of Ministry of Economy, TÜBİTAK, and Ministry of Science, Industry and Technology summarized in **Table 5.12** for developing partnerships.

Table 5.12 Main Supports for Partnerships as of 2014

Ministry of Science, Industry and Technology	**Clustering Support**: Since 2011, clustering project partnership between various regional actors, inclusion of at least one Industry/and Trade Chamber and one university is mandatory. **Technology Development Zone (TDZ) Support**: since 2004, with the Law No. 4691 enacted in 2001, there are tax exemptions for enterprises in these zones.
Ministry of Economy	**SME Clustering Support Program (URGE)**: since 2010, with project coordination of bridging institutes (NGOs, cooperatives, trade chambers etc.) cluster partnership mainly for export markets development
TÜBİTAK	**Technology Transfer Offices (TTO) Grant Program:** since 2011, to improve university-industry partnership and commercialization of R&D by developing TTOs as interface

Source: Author's compilation

Especially clustering supports are important for agricultural sectors where SMEs are dominant. These supports are important for not only capacity building for SMEs, but also bringing different sectoral actors together. For instance, as result of clustering supports, two significant clustering projects in olive and olive oil sector have been launched in 2014.

One of them is nationwide olive and olive oil clustering project of GTHB coordinated by TÜSSİDE Research Institute and the other one is the clustering project of boutique olive oil producers coordinated by Zeytindostu Association financed by URGE support.

5.3.1 Knowledge Diffusion between TAGEM Research Institutes and GTHB Units

The GTHB has a significant role as a regulatory and supporting institution in the Olive and Olive Oil Innovation System. Whether the scientific knowledge developed by the TAGEM research institutes transform into effective policy tools designed by the GTHB units depends on the quality of interaction between TAGEM and these units. In addition to collaboration between TAGEM and GTHB units i) the interaction within GTHB units ii) the physical and human capital infrastructure of the GTHB units are important factors to transform knowledge for policy implementation.

Most of the agricultural supports for agricultural production are managed by different departments of the General Directorate of the Vegetative Production (BÜGEM). In BÜGEM the field crops and horticulture department deals with premium support for olive production; seed department deals with seed and sapling supports including olive sapling support; Plant Nutrition Department deals with fuel, fertilizer and soil analysis supports; Good Agricultural Practice (GAP) and Organics Department deals with GAP and organics production supports, Agricultural Zones department deals with the prioritization of agricultural products according to zones etc. Though these departments are part of the same directorate, they act rather separately, their interactions are bureaucratic and knowledge flows are hierarchical. Besides BÜGEM, Food Control General Directorate deals with table olives and olive oil codex standard as well as the food control standards. Same pattern of organization exist there as well.

Based on the interviews, a formal horizontal network organization or a strong informal social network between departments for sector specific issues are lacking because of the bureaucratic organization. This is *a barrier* for knowledge diffusion between these departments for the design of effective sector specific supports. The relevant knowledge on sectorial issues feed into higher-level management: general director and upper levels.

Every year, each department prepares its proposal on supports separately and BÜGEM presents them via the coordinator unit of GTHB to the Agricultural Support and Guidance Council. The role of TAGEM directorate in this process is that it *"formally presents the technical views to BÜGEM but what happens in the ultimate policy formulation politically is another subject"* according to a representative from TAGEM (int#22).

Based on the interviews, collaboration between TAGEM research institutes and GTHB units, including BÜGEM, is assessed as weak. This is *a barrier* for knowledge diffusion function in a couple of respects.

First, the scientific knowledge developed by TAGEM Research Institutes does not transform into policy formulation bottom up. For instance, BÜGEM staff is hardly aware of the knowledge developed by TAGEM Research Institutes and "*was not aware even the existence of Olive Research Institute until recently* "as mentioned by one of the interviewed researchers in ZAE (int#44).

These *weak ties* have significant consequences. The high generic sapling support of BÜGEM in mid 2000s that aimed expansion of olive production areas is an example. Though the knowledge of regionally relevant olive types existed in Olive Research Institute ZAE, the sapling support was not designed based on this knowledge. This support led to the dispersion of Gemlik type olive sapling, which in turn has negative consequences on market formation and entrepreneurial activities functions of the Olive and Olive Oil Innovation System.

Secondly, weak ties of BÜGEM with TAGEM, and with Olive Research Institute ZAE in particular, create a barrier to tap into the *regional social networks*, therefore the regional knowledge. This is *a barrier* to *the reach capacity* of BÜGEM, therefore GTHB, to relevant regional knowledge i.e. *the local buzz* when needed. The nationwide cluster project of the olive and olive oil sector launched by GTHB in 2014 is a significant example. TAGEM research institutes, which do research on olives, mainly Olive Research Institute ZAE and Yalova Horticulture Research Institute, were not asked for collaboration in the design of the Cluster Project. The interviewee from ZAE (int#44) summarized this situation as follows:

> Our problem is lack of collaboration…They did not visit or contact us to assess our capacity to see what we can contribute. We know the sector they do not. They may visit wrong people. The producers and processors in the olive and olive oil sector do not easily open their doors and give information to others.

The researchers of the Yalova Horticulture Research Institute did not have the chance to participate the cluster project meeting in Bursa after the launch of the project and "*informed about the cluster project meeting indirectly by a colleague from private sector*"(int#59).

Finally, though GTHB has an external relations unit, TAGEM taps into external agricultural knowledge networks of international platforms such as OECD, CGIAR and FAO. In other words, TAGEM is *the global knowledge pipeline* of the GTHB, therefore the agricultural sector. The existence of such a pipeline is *an inducement* for knowledge diffusion function of the Olive and Olive Oil Innovation System. Taking into consideration of the very weak language skills of BÜGEM staff and rare participation of them to international meetings, the quality of interaction with TAGEM is utmost importance to follow up the global developments in agricultural sector, new technologies and policy developments. Therefore, weak interaction between TAGEM and GTHB units is *a barrier* for the diffusion of this external knowledge to keep up with the global changes.

5.3.2 Knowledge Diffusion between TAGEM Research Institutes, Extension Agents and Farmers

Almost all of the interviewees underlined the *weak faculty of collaboration* in our society, regardless of education level or role of the person, creating *a barrier* to knowledge diffusion. As mentioned by one of the interviewees (int#13) "*We do not have the enthusiasm of developed countries that respect and appreciate even the smallest novelty. We do not have that culture.*"

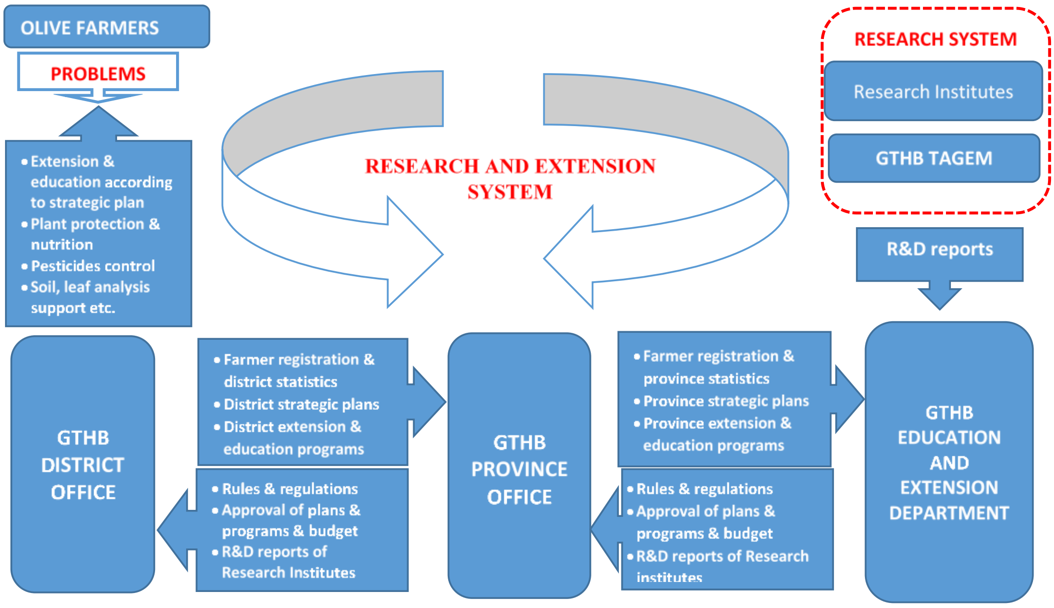
Another *barrier* to knowledge diffusion, also to knowledge development as well, is the low demand by the value chain actors for knowledge, including R&D. The main reason behind this low demand is that olive and olive oil sector consists of small producers and farmers with low level of literacy. Therefore, *"they even do not have the capability to articulate their problems and ask for a solution*".

In fact, this *barrier* is not specific to the olive and olive sector but general to whole of agricultural sector, especially in developing countries like Turkey where low literacy is more significant.

Considering this context, the governments established various "research and extension systems" to reach farmer and enhance diffusion of relevant knowledge to improve agricultural productivity and quality.

Currently GTHB has a "Research and Extension System" which is based on "Training and Visit (T&V) approach". This system is centralized and it aims to bring researchers, public extension agents and farmers together. Extension agents of GTHB are responsible for bridging researchers and farmers for diffusion of knowledge. The T&V system has *a top-down approach*, from research institutes to extension agents to farmers that delivers specific recommendations to farmers about the practices they should adopt based on existing R&D results (**Figure 5.26**). It also aims to diffuse knowledge from farmers to researchers via extension agents for R&D development to solve existing problems.

In order to manage the regional activities, The GTHB has provincial offices at levels of provinces and districts. The district offices are bureaucratically responsible to the province offices and province offices are responsible to GTHB. The extension system of GTHB is not a separate entity and embedded in this provincial organization. The rules and regulations governing the extension system are defined by the Extension and Education Department (EYYDB) of GTHB.



Source: Author's Compilation

Figure 5.26 Research and Extension System of GTHB

The embedded nature of the extension system in provincial setting of GTHB is creating *barriers* to its functioning. Similar to the bureaucratic organization of TAGEM's research system that creates barriers to knowledge development function, the bureaucratic organization of the provincial organization and recruitment of the staff based on Civil Servants' Law are the *main blocking mechanism* to the extension system, therefore functioning of knowledge diffusion function. Besides, as result of the restructuring of GTHB in 2011, organization of provincial offices was also restructured and they assumed food control activities.

These changes led *additional barriers* to the functioning of the provincial offices of GTHB and therefore the extension system. Based on the interviews, *barriers* to effective functioning of the extension system are as follows:

- Recruitment of staff based on Civil Servants' Law is inefficient in many respects. Particularly extension activity in office hours is *a barrier* to knowledge diffusion as during that time farmers are in the field. Farmers can be reached after the office hours but the staff is paid only for office hours.
- The mobility of staff is not only *a barrier* to development of expertise but also for trust building with the farmer. Both learning a plant, especially olive culture, and building trust take significant time. As mentioned by interviewees, the trust of a farmer depends on his persuasion on the level of expertise of staff as "*farmers are always sceptic about the expertise of the Ministry staff and they are famous for quizzing them by asking questions to understand what they know or not*". Therefore, in order to gain respect and trust of farmers, the durability of the staff in a district for a significant time is needed.
- The district staffs of GTHB, who will perform extension activities, get instruction and education. These education programs are short and generic. For instance, before a staff is recruited in an olive producing region, he does not get any specific education program related to olive production. He rather improves his skills on the job by "learning by doing" through time.
- The new organization structure of the district offices does not have a separate extension division. The extension activities are handled by the staff responsible for other activities such as food control, management and registration of the subsidies. These activities take significant time of staff. According to interviewees, the organization of district offices before the restructuring of GTHB was better as there was a separate unit for extension.
- Collaboration between research institutes and extension agents is weak. The results of the R&D projects are transmitted to district offices formally through TAGEM directorate.

Since 1990s, in order to establish an effective extension system and to improve it, many projects have been initiated:

- 1990 to 1995, Agricultural Extension and Applied Research Project (II. TYUAP)
- 1991 to 1995, 2000 onwards, Extensive Farmer Education (YAYÇEP)
- 2006 to 2007 Village Centered Agricultural Production Support Project (KÖYMER)
- 2007 to 2010 Improvement of Agricultural Extension Project (TARGEL)
- 2012 onwards Extension of Agricultural Innovations project

The framework of current research and extension system with T&V approach has been established nationwide with II. TYUAP project. With the two latest projects, rules and regulations that mold existing research and extension system have been modified significantly.

Therefore, in order to assess the barriers impeding knowledge diffusion via functioning of the current extension system, it is important to go over briefly TARGEL system and "Agricultural Innovation and Knowledge Sharing System" established in the framework of Agricultural Innovations project.

The aim of TARGEL project was to assign an agricultural engineer as extension agent to each village that will function as agricultural advisor and enhance knowledge diffusion. TARGEL project is the nationwide extension of the KÖYMER project. There are around 10 thousand TARGEL extension agents, recruited nationwide according to GTHB figures.

TARGEL system could not fully reached its goals as result of the *barriers* arising from rules and regulations defining the system as well as lack of infrastructure. Based on interviewed representatives from district offices of GTHB, *main barriers* that initially impede functioning of TARGEL system are as follows:

- The assignment of TARGEL extension agents was arbitrary. TARGEL extension agent and the village were not matched by regarding needs of the village and expertise of the staff. For instance, for a village, which deals with olive growing, a food engineer was assigned instead of an agricultural engineer who knows olive culture.

- The job description of TARGEL staff was not clearly defined and performance of the staff depends on his personal enthusiasm, ethical values etc.
- Though TARGEL staffs are foreseen to reside in the villages, the needed physical infrastructure (transportation, residence, office etc.) was not provided by GTHB.
- TARGEL advisors are bureaucratically attached to district offices. Impossibility of residing TARGEL staff in villages combined with the work burden of the incumbent staff of district offices, led to assignment of TARGEL staff as the backup of the incumbent staff in GTHB district offices.
- The initial recruitment of TARGEL staff with unequal terms in employee rights and wages compared to incumbent staff of district offices created discomfort as both groups belong to same professions i.e. agricultural engineers or food engineers. Unequal conditions negatively affected the performance of the TARGEL staff and impeded *trust and collaboration* between two groups.

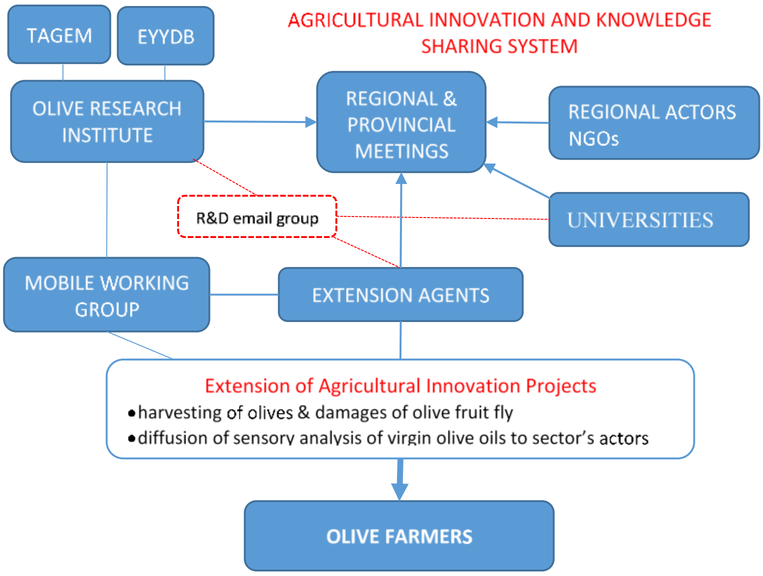
TAGEM as well as EYYDB are aware of the malfunctioning of the interactions within Research and Extension System. This awareness is *an inducement* for overcoming barriers in the extension system.

In line with the gaining ground of innovation system perspective in agricultural policy making globally, the perspective of GTHB has been modified in that direction. The FAO - Turkey Partnership program on “Capacity Development for Analysis and Strengthening of Agricultural Innovation Systems (AIS) in Central Asia and Turkey” was implemented between 2010 and 2012. The drafted report on Turkey is a guideline for developing agricultural knowledge and extension system in Turkey. Furthermore, TAGEM is joining Agricultural Knowledge and Innovation System (AKIS) work of Scientific Committee on Agricultural Research (SCAR) of EU. As result of change of perspective of GTHB, the AKIS perspective is occasionally applied to improve the agricultural extension system in Turkey. This is an *inducement* to knowledge diffusion function.

In order to improve the extension system, GTHB launched the “Extension of Agricultural Innovations Project”. This project aims, *first*, to strengthen the interaction between research institutes, extension agents and farmers; *secondly*, diffuse agricultural innovations. For this aim, there are two axis within the project:

- **“*Agricultural Innovation and Knowledge Sharing System*”** formally systemizes the regional and provincial meetings to get together TAGEM researchers, universities, extension agents and the regional actors for knowledge diffusion (F**igure 5.27**). The system also foresees i) establishment of a database of R&D projects completed by the Research Institutes open to public via internet site of EYYDB ii) a formal email network among researchers and extension agents that will diffuse the reports on R&D projects when completed.
- **“*Extension of Agricultural Innovation Projects*”** aims to diffuse the results of R&D projects of the TAGEM research Institutes to farmers. For this aim, *“initially the extension agents should be informed so that they can reach farmers.”* EYYDB has a budget allocation and calls TAGEM research Institutes to propose R&D projects that they give priority for extension to farmers. The results of selected R&D projects are diffused by collaboration of research institutes, district offices and extension agents to farmers by organizing farmer meetings, field days, demonstrations, technical education as well as distribution of documents such as leaflets, brochures etc. There is a mobile working group composed of researchers related to R&D projects and extension agents of that region to diffuse innovations.

The collaboration of research institutes, district offices and extension agents during the extension of selected R&D projects enhances skills development by “learning by interacting” and “learning by doing”.



Source: Author, based on information from EYYDB

Figure 5.27 Extension of Olive and Olive Oil R&D Projects in Agricultural Innovation and Knowledge Sharing System

Within the context of this system, based on EYYDB data sources, 33 innovation projects of 21 research institutes are promoted in 55 province in 2014[67]. Within these projects Olive Research Institute have two projects: extension of the best harvesting time of olive fruit tree by instructing damages of olive fruit fly and the diffusion of sensory analysis of virgin olive oils to sector's actors.

The interviewees assessed these developments in the extension system as *an inducement* to collaboration. Currently the participation of the regional actors seems to be weak and EYYDB representative (int#29) interviewed underlines this fact as follows:

> We are not as successful in including the regional sector representatives as we wish. It is natural, as we have recently established the system. As long as we make an effort to interact with them, they will for sure present the problems of the sector and solutions will be developed.

[67] EYYDB is sharing all the information on its web site. Fort he detalis of all projects see http://www.tarim.gov.tr/EYYDB/Link/6/Tarimsal-Yenilik-Ve-Bilgi-Sistemi

These are very significant improvements in the organization of research and extension system for collaboration. Although the system enhances knowledge diffusion, it seems that *knowledge still flows top down* as currently R&D projects that are decided by GTHB are diffused. If in time the system supports the *knowledge diffusion bottom up*, from farmers to researchers and extension agents on the decision of the projects, then R&D projects will be more in line with needs of the farmers, therefore the olive and olive oil sector. In addition, the budget of EYYDB is modest; therefore, it can support diffusion of some of the R&D projects, which have highest priority according to research institutes.

The main bridging organization, that facilitate knowledge flows between researchers and farmers are supposed to be extension agents. In order to improve extension activities GTHB is also supporting development of the private extension activities in addition to the public extension system. For this aim, EYYDB is regularly organizing exams for certification of agricultural engineers as private agricultural advisors. After accomplishment 3 years of extension services the private advisor can establish his own advisory firm. This is *an inducement* to knowledge diffusion function as it strengthens the private sector capacity. Regarding functioning of this system, interviewed private advisor (int#30) dealing with olive producing farmers summarized the *barriers* to functioning of this system follows:

> This system is launched to create job opportunity for agricultural engineers. The system is new and not settled yet. In fact, it may end before it settles down. We have to report everything to GTHB so that they can assess our performance. The bureaucracy of reports is so much. We are using the time that we should be in field for preparing reports. Besides, we have the problem of introducing ourselves to producers. Therefore, it is better to work in chambers or unions of agriculture instead of establishing our proper firms.

5.3.3 Knowledge Diffusion between Research and Education Actors, Bridging Organizations and Value Chain Actors

Olive oil Research Institute ZAE has not only a primary role in knowledge development function but also in knowledge diffusion function. As mentioned by the representative from of ZAE (int#44) "*Education and extension activities of ZAE are significant and the Institute tries to reach every region as long as the staff capacity allows. But of course our reach capacity diminishes with distance.*"

Arguably, weak capacity in the extension system is in a way leading the research institutes to fill the gap by acting as bridging institutions as possible as they can. Regarding extension and education activities of the provincial offices in the region, same interviewee from ZAE underlined that:

> Provincial offices are drown in paper work and the knowledge capacity of the staff in district offices is weak. They do not know olive culture. People from districts call us for information. They have no idea about the role of provincial offices. We recommend them to go to these offices. We assume their role, but we cannot reach everywhere. It is their job.

Olive Research Institute has regular education programs of olive growing with sales cooperatives unions MARMARABİRLİK and TARİŞ. The Institute trains staff in Unions and the Unions train members of their cooperatives. Though the Institute and the Unions are doing their best to diffuse knowledge, their extension and education activities are not fully efficient.

In general, the demand of farmers is very weak and breaking their established traditional practices is hard. These are mentioned as significant *barriers* for knowledge diffusion via extension and education activities. The interviewed TARİŞ representative (int#50) underlined the problem as follows:

> Every year a group of expert comes from İzmir to train our members on trimming, fertilization and pesticide control. We invite our member farmers. Most of them do not come. Last time we visited villages. The expert made a presentation in the village coffee house. Nobody listen to him, but watched a popular soap opera on TV … They do not want to change what they have learnt from their father.

He also underlines that the language that researchers and extension agents use may be *a barrier* to learn from them. For instance, once the researchers from Olive Research Institute informed TARİŞ representative about wastewater treatment. He confessed that he hardly remembers the details: *"I could not understand as I do not have chemistry education. They told about phenols etc. but I forgot all. If he were able to tell things in a way that I could understand… He was very technical."*

The district office staffs interviewed are aware of the importance of their way of approach to farmers. As their target group consist of primarily "peasants" not educated farmers, "*they have to translate the language of R&D to the language of peasant. This requires dedication* *and patience*" according to the representative from Ayvalık district office (int#46). Educated farmers, also the wealthier ones, seem to reach knowledge in a way or another by their own search processes i.e. by asking extension agents, research institutes or private advisors.

Also, a couple of interviewees mentioned about the ineffectiveness of the extension activities by distribution of reading materials such as brochures, leaflets etc. One of them (int#29) underlined the *role of our culture* as follows: "*The problem in our country is that we do not read. For sure, some of the documents prepared are reaching some farmers. However, these people have limited literacy. In fact, how much do we (the educated) read?"*

Based on interviews with farmers, in general they *perceive* both research institutes and district offices as "*formal institutions*" and "*they choose to keep their distance with formal institutions as formal institutions keep their distance with them*".

Furthermore, low level of applied R&D in collaboration with farmers seems to enhance the distance between researchers, extension agents and farmers. This distance weakens the *trust* to knowledge and skills of researchers. As one of the olive farmers (int#56) underlined "T*hey should get acquainted with olive tree on place. They should know the type of olive tree by picking olives by themselves not by looking at pictures of olives.*"

The lack of proper dialogue is *a barrier* for knowledge diffusion. Research institutes and district offices are seen as part of a government that does not talk "same language" with them, as mentioned by the olive farmer:

> They (government officials) tell us things that are like fairy tales to us. In addition, the things that we tell are like fairy tales to them. We cannot succeed in telling our system. They always tell and tell. We can only say two words. We say, "We cannot do the things you ask. Could you do the things we ask?" The answer is no.

In this respect, assessment of the capacity of bridging organizations and platforms other than the extension system in linking government, research and education component with small producers and farmers is important. Main *barriers* in functioning of bridging organizations that impede effective knowledge diffusion are summarized in the following paragraphs.

Agricultural Chambers are important bridging organizations for linking farmers to other actors. Especially, district level Agricultural Chambers is important for linking farmers with regional organizations and with others outside the region. However, in Turkey their weak human capital seems to be *a barrier* in their functioning. In their management, there are mostly farmers, which come with elections. Low literacy levels of farmers are leading *to weak capability* of these organizations*.*

The representative of Gemlik Agricultural Chamber (int#31), who is an agricultural engineer and a rare exception to generality, underlined that *human capital barrier* of Agricultural Chambers will continue as long as there is a transformation in the bottom:

> Their literacy and education level is low. Therefore, their comment capacity is weak. When we gather with board members of the Chamber, I would like to discuss problems and reach a consensus on solutions. However, it does not happen. They approve what I say… I wish that agricultural engineers actively took part in the management of agricultural chambers. However, they are not eager to do. They only look for the privileges of that position.

From farmers' perspective, the *trust* of farmers to agricultural chambers capacity is low as all of the interviewed olive farmers mentioned, *"Chambers are useless but always ask money from farmers"*. A significant part of farmers does not go and register in these chambers. In fact, farmers have to be registered to farmer system of GTHB via Agricultural Chambers to get subsidy. Interviewed olive farmers confessed, "*olive oil subsidy levels are so low they do not bother to register in agricultural Chambers as significant part of the subsidy will be the payment to chamber*".

As the financial infrastructures of Agricultural Chambers are based on membership payments, weak participation is creating weakness in their financial infrastructure. This in turn creates a kind of vicious circle in capacity building of these organizations. Briefly, Agricultural Chambers does not seem to assume a strong bridging role as they could. In addition, their extension and education activities are modest because of limited financial infrastructure.

Zeytindostu Association has been assuming an active role since its establishment in 2006 as a bridging organization. Between 2006 and 2009, it has organized fourteen "olive and olive oil common sense and power solidarity" meetings in different olive producing regions.

These meetings have been good platforms to get together the various sector representatives. The representative from Zeytindostu Association (int#39) underlined that *"We combined East and West. If today the olive oils of Nizip in South Eastern Anatolia region and Mut in Mediterranean region are well known, it is by the help of contributions and efforts of Zeytindostu*." Zeytindostu not only aim to bring actors of the sector together for consensus building but also have other activities such as:

i) Olive oil degustation trainings via an olive oil panel group that has internationally valid certificates on sensory analysis
ii) The training of producers on processing, quality improvement etc.
iii) Quality awards for extra virgin olive oils to promote higher quality and build consumer consciousness on quality
iv) Quarterly published, "Olive and Olive oil Mediterranean Culture" Periodical (Z&Z Akdeniz Kültür Dergisi) since 2006. This is the only periodical dedicated to olive and olive oil sector, which currently has been transformed to a scientific publication since 2013.

These activities are *inducement* to both scientific and tacit knowledge diffusion. As Zeytindostu is in İzmir province, they have collaborations with Olive Research Institute ZAE for training activities of producers and consumers. This collaboration was rather weak previously. However, with a change of management of Zeytindostu in 2014, interactions between Zeytindostu and ZAE are improving.

The willingness of government to interact with Zeytindostu Association is assessed as weak. This weakness is seen *a barrier* for diffusion of relevant knowledge to government to formulate efficient policies in line with needs of the olive sector. The government does not look for knowledge feedback from Zeytindostu related to olive and olive oil sector, although Zeytindostu is one of the few actors with significant knowledge accumulation of the sector. As mentioned by the representative of Zeytindostu Association (int#39):

> We are in the field. Public sector needs to learn the field through NGOs. The government does not benefit the knowledge we have accumulated. We are not over government to impose him to approach us. He is the one to change attitude and treat us as a counterparty.

Another *barrier* for knowledge diffusion activities of Zeytindostu Association is the modest financial infrastructure mainly composed of membership fees and therefore as a result, its limited staff. Therefore, *"the association is struggling to survive as public sector does not have significant direct or indirect supports for NGOs in general."* Weak institutionalization of NGOS in Turkey is *a barrier* to the role of agricultural sector NGOs not only in knowledge diffusion function but also in lobbying activities as well.

National Olive and Olive Oil Council (UZZK) have a significant bridging role in linking:

i) Various actors of olive and olive oil sector within its sub-committee framework
ii) Olive and olive oil value chain actors with related Ministries (mainly GTHB) for relevant policy formulation
iii) Olive and olive oil actors to International Olive council (UZK) via the national coordinator, Ministry of Customs and Trade.

The capacity of UZZK in interacting with these various actors is determining factor for its performance as a bridging actor in olive and olive oil sector, therefore the functioning of knowledge diffusion. Based on the interviews with head of UZZK and others, *main barrier* for capacity building and functioning of UZZK is lack of financial infrastructure and as a result, inability to employ technical staff. Representative of UZZK (int#40) confessed that:

> UZZK needs a regular income to support its activities. Otherwise, you cannot do much for the sake of institutionalization. We are trying to perform our activities with small budgets. The financial infrastructure of UZZK is not constituted formally when it was established. There is a board of directors to take decisions but there is no staff to execute them. I cannot keep up with things alone for most of the time.

Similar to Zeytindostu UZZK have training activities, mainly olive oil degustation trainings for (tacit) knowledge diffusion of organoleptic analysis of olive oil. Current head of UZZK is a Chemist and internationally accepted olive oil panelist by IOC. This is *an inducement* for knowledge diffusion function as head of UZZK has relevant skills for institutionalizing the role of UZZK in scientific and tacit knowledge diffusion. The trainings are given by head of UZZK personally as lead degustation panelist. However, there is not a formal panel group of UZZK yet because of limited financial resources. Thus, the reach capacity of UZZK seems to be limited to mainly Aegean Region as UZZK resides in İzmir province in that region. In order to fill the gap of human capital, UZZK interacts with other organizations or olive oil firms.

In this respect, there is significant informal interaction between UZZK and Olive Research Institute ZAE. Researchers of the Institute support UZZK for its training activities or when needed. One of the researchers (int#43) verified this situation as follows:

> The head of UZZK usually ask our opinion on planning of its activities. A group of researchers always takes place in these activities. We also assist for project writing process, especially for IOC projects… UZZK needs a core group. There is not an institutional functioning in UZZK yet. It needs to be a real organization with its staff.

As mentioned in previous part related to actors of innovation system, there are sub-committees of UZZK composed of various actors of olive and olive oil sector. The delegates of these sub-committees select members of UZZK board for representation. According to representative of UZZK, "*there is no representation problem of different segments of olive and olive oil sector in UZZK management*."

Other than these sub-committees, there is a research and advisory group, composed of experts from ministries, universities, NGOs etc., that meets twice yearly. Currently, research groups (such as economics, chemistry, promotion etc.) have been established in 2014 to build consensus on problems in the sector as well as on national view for IOC meetings. For economics research group, the coordinator is head of Olive and Olive Oil Research Institute. These committee formations are *inducement* to knowledge diffusion, but it results will be obtained in coming years. As they are newly established, strengthening of ties between group members and knowledge accumulation will take some time.

Since its establishment, UZZK is institutionally supporting i) formation of olive harvest festivals in olive producing regions ii) "Olivetech" Olive, Olive Oil and Technologies Fair held in İzmir yearly. Both olive harvest festivals and Olivtech Fair are significant knowledge platforms that gather various actors of the sector. Therefore, support of UZZK for their institutionalization is *an inducement* for knowledge diffusion function. In 2015, the fifth Olivetech Fair will take place with coordination of regional actors of İzmir province.

Regarding the role of olive harvest festivals as a knowledge diffusion platform, researcher from Yalova Horticulture Research Institute (int#59) mentioned its significant role on formation of regional networks as follows:

> In fact, being very close to each other physically is not so determinant for interaction. Regional Olive harvest festivals as well as congress, symposiums, workshops are important platforms. They bring people who are interested in same subject. Voluntarily or involuntarily, you exchange knowledge there.… We have warmer interactions with organizations of Orhangazi district then Gemlik district. Because they have olive harvest festival.

As a part of **Aegean Exporters Union (EİB), EZZİB** is playing a bridging role between i) public organizations and exporters of olive and olive oil ii) external partners and exporters of olive and olive oil. EZZİB has around 500 members from olive and olive oil sector. The knowledge exchange between public organizations is mainly on problems faced in foreign markets rather than problems in national markets. Regarding collaborative research and training activities, EİB's perform activities such as,

i) generic and short term training seminars for capacity building of exporter firms related to external trade, standards set by the government, marketing, management etc. in collaboration with a pool of trainers,
ii) more comprehensive training programs for SMEs in collaboration with private sector firms, such as the training program called "innovation academy" for firm capacity building,
iii) ad-hoc R&D research projects in collaboration with sector representatives, (Currently, there is one R&D project of EİB research department in collaboration with private sector and EU partners to address the olive fruit fly problems of olive producing SMEs.)
iv) "Food R&D Project Market" to exhibit innovative projects on food sector, including olive and olive oil sector.

The third of "Food R&D Project Market" will be held in İzmir in 2015. This initiative aims *first*, to strengthen interaction between research and industry, *secondly*, to transform R&D projects to application i.e. innovation, by creating a knowledge platform to enhance initiatives of food industry firms to get intellectual property rights of these R&D projects.

Furthermore, it promotes participation of researchers with R&D projects by nomination of prizes to best R&D project selected. This platform not only brings researchers and firms together but also enhances knowledge diffusion between researchers who produce R&D projects on olive and olive oil sector. These activities of EİB are significant *inducement*s to scientific knowledge diffusion in olive and olive oil sector.

Chambers of Trade at district levels have training activities for its members. One of the organizations they interact regularly for organizing trainings is KOSGEB. In fact, Chambers have to perform at least five training in a year according to rules. Usually scope of these training activities is decided according to needs of the region. Again low level of demand from producers is *a barrier* for effectiveness of these training activities in knowledge diffusion. The representative of Ayvalık Chamber of Trade (int#48) summarized this problem as follows:

> The head of Olive Saplings Production Station in Edremit was eager to train olive producers on new pruning techniques, plant protection etc. He came after office hours voluntarily. No fee was asked from producers. It lasted for a month only because of low demand. Besides, people in Ayvalık gain their living from tourism. We decided to perform language courses free. We announced everywhere. We could not gather a significant group in 5 months… Nobody comes to trainings.

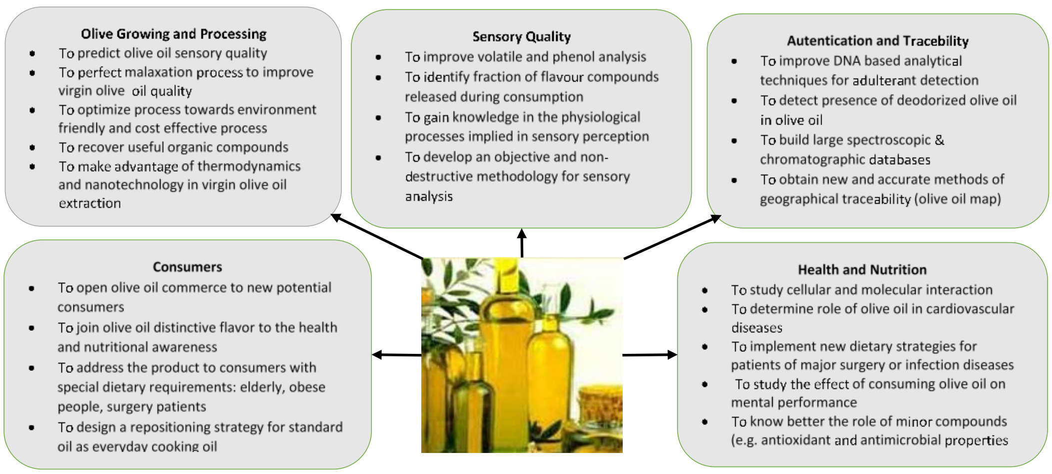
As mentioned before, due to reasons such as low literacy levels among farmers, low trust to representatives of research, education, extension etc., low demand for training is not specific to olive production but a common cultural state in agricultural sector, which is *a barrier* to knowledge diffusion in whole agricultural sector.

5.4 Guidance of Search Function

Guidance of search function can be briefly defined as activities that affect direction of search (e.g. for knowledge, markets, technology) in olive and olive oil sector. These activities include policy goals set by government, specific targets set by industry, converging expectations of sector actors that lead to a specific direction, R&D priority setting and therefore direction of technological change etc. Whereas knowledge development and diffusion functions are related to mechanisms of learning, guidance of search function is about the direction of learning process (Hekkert et al. 2007). If guidance of search functions well, search processes (of technology, market, business etc.) in the sector visibly evolves to a certain direction in congruence with the demands and needs of value chain actors. This, in turn, facilitates establishment of expectations and selection (of technology, market, business etc.) processes.

Regarding the direction of R&D priority setting, inevitably the direction of search processes in the global olive and olive oil sector has a significant role on it. Turkey has been a follower country in olive production and processing technologies. Leader producer countries, Spain and Italy, have a leading role in in olive production and processing technologies as well. As main producers and technology leaders are members of IOC and EU, the direction of R&D priorities of IOC and EU related to olive and olive oil are shaped by the main olive producers. In this regard, main challenges to global olive and oil sector that affect global priorities are summarized in Chapter 3.

As mentioned in section on knowledge development function, GTHB targets to get 50 % of agricultural R&D financing from external sources, mainly from EU in addition to IOC and others. Therefore, one can argue that the global trends in olive and olive oil R&D have a significant determining role in direction of R&D in Turkey. In this respect, main research challenges to global olive oil sector that also affects direction of research, i.e. guidance of search function, in olive oil sector in Turkey is summarized by F**igure 5.28**.



Source**:** Garcia Gonzales D.L. and Aparicio R. (2010)

Figure 5.28: Main challenges for scientific research on olive oil

By taking into account of external developments, i.e. landscape changes, actors of olive and olive oil innovation system in Turkey should mold their expectations and direction of search processes based on the current situation and needs of the sector. The efficient synchronization of internal dynamics with external developments i.e. existence of a deliberate direction of sector in line with landscape changes will help to catch up with leader countries.

Currently there is no clearly articulated shared goal and direction of the olive and olive oil sector. Almost all of the interviewed value chain actors and NGOs mentioned this fact as *a main barrier* to sectorial development. This is an indicator of the malfunctioning of the guidance of search function.

In order to understand the barriers to guidance of search function, for the sake of simplicity, analysis can be structured as:

i) The role of government

ii) The role of other actors

5.4.1 The Role of Government

The role of government in guidance of search function is considerable as it is the main regulating and standard setting authority. Based on the interviews, the olive and olive oil sector actors *do not sense government policy guidance* in the sector to predict even the short term sectorial developments. The lack of visible direction of government policies and existence of rather arbitrary developments, sometimes contradicting with each other, create diverging expectations in the sector that is a barrier to search and selection processes.

In fact, the government has many plans and programs i.e. various *hard institutions* that set priorities for different sectors, including agricultural and food sectors. Main plans and programs that affect food and agricultural sectors are shown in **Table 5.13**. These plans and programs broadly define the role of government in guidance of search function.

Table 5.13 Government Plans and Programs related to Food and Agriculture Sector

Program *	Years	Coordinator
Medium Term Program	2011-2014	Ministry of Development
Industry Strategy Document	2011-2014	Ministry of Science, Industry and Technology
Agricultural Research Master Plan	2011-2015	GTHB
Rural Development Support Program	2011-2015	GTHB
National Food R&D and Innovation Strategy	2011-2016	TÜBİTAK
Organic Agriculture Strategic Plan	2012-2016	GTHB
Input Supply Strategy (GİTES) Agricultural Action Plan	2013-2015	Ministry of Economy
GTHB Strategic Plan	2013-2017	GTHB
UGTP Strategic Research and Innovation Agenda "Vision 2023"	2013-2023	National Food Technology Platform (UGTP)
YOIKK Intellectual and Industry Property Rights and R&D Technical Committee Action Plan	2014-2015	the Coordination Council for the Improvement of Investment Environment (YOIKK)
Pre-Accession Economic Program	2014-2016	Ministry for EU Affairs
10^{th} Development Plan	2014-2018	Ministry of Development
National Strategy for Regional Development	2014-2023	Ministry of Development
National Basin Management Strategy	2014-2023	Ministry of Forest and Water Affairs

*Author's compilation, as of December 2014

Though there are so many plans and programs, the lack of visible direction of government policies from the point of view of the value chain actors may be arising from the following reasons:

- Many government actors are playing role in guidance of search function. The interaction and collaboration of these governmental actors is important for formation of consistent policies and a visible direction of these policies. Therefore one reason is, arguably, the weak governance capacity of the government.
- All these plans and programs are on general sector levels such as agricultural and food sector. There is not a clearly articulated vision of government policies for sub-sector levels: olive sub-sector as a part of agricultural sector, table olives and olive oil sub-sectors as a part of food sector.
- As mentioned in the previous part related to knowledge diffusion, interaction of government organizations with other olive and olive oil sectoral actors is weak. The

weak ties are leading to formulation of policies and plans a bit detached from the needs and wants of the sector. Therefore, the sector actors are not feeling the congruence of government policies with their current realities.

These are significant *barriers* to the efficiency of the role of government. A significant indicator for inefficiency of the role of government in guidance of search function is the realization performance of targets set in 2004 by GTHB for the year 2014 **(Table 5.14**).

Table 5.14 Realization of 2014 targets of GTHB set in 2004 for Olive and Olive Oil Sector

Indicator	**2014 Targets**	**2003/2004**	**2013/2014**
Olive area	1 million hectares	644.000	826.000
Number of olive trees	180 million tons	107.100.000 (89 % olive bearing)	168.997.130 (83 % olive bearing)
Production of table olives	650.000 tons	375.000	430.000
Production of olives	2.5 - 3 million tons	1.600.000	1.768.000
Production of olive oil	650.000 tons	79.000	190.000
Export of olive oil	200.000 tons	46.000	35.000
Export of table olives	150.000 tons	51.000	70.000
Yield per tree	25 kg	Table olives 13 kg Olive oil 13 kg	Table olives 10 kg Olive oil 14 kg
Consumption of olive oil per capita	5 kg	1,5 kg	2 kg

Source: TÜİK www.tuik.gov.tr , IOC www.internationaloliveoil.org, for 2014 targets see country profile of Turkey at http://www.internationaloliveoil.org/estaticos/view/136-country-profiles

In order to reach these targets the main goal of GTHB has been to extend olive production area and the main policy instrument has been to enhance formation of new olive orchards by giving significant supports to olive saplings per area.

As can be seen from realizations, most of the targets undershoot significantly. The *barrier*s behind the under realization of these targets was that:

- targets were not realistic as there was not a thorough technical study in collaboration with other sector actors
- targets were not produced with the coordination of related government organizations in order to enable coherency in convenient policy instruments

Briefly summarized above, the role of government in guidance of search function is significant as it is the main agriculture and food policymaking institution. Therefore, the *barriers* related to role of government in guidance of search function of olive and olive oil innovation system can be further elaborated in two broad dimensions:

i) Agricultural dimension: policies and subsidies that affect the area, volume and productivity of olive production
ii) Food dimension: policies and subsidies that shape the selection of olive processing technologies

Regarding the agricultural dimension, in olive and olive oil sector, to envisage olive production area and to predict production levels consistently is important to perform search processes and establish expectations related to the sector. According to interviewees, the government policy guidance lacks not only in olive and olive oil sector but in the whole agricultural sector. Most of the interviewees mentioned the weak capability in planning of agricultural land as a significant *barrier* to efficiency in agricultural policies and goals. According to one of the interviewees (int#53), "*there is not an agricultural policy because initially the government has to know for what the land will be used for.*"

Another interviewee (int#57) summarized the lack of regional agricultural planning as follows:

> We always come to same point: there is not land planning, production planning or product planning in Turkey. We still do not know how many olive trees exist in this information age. Today a farmer can plant anything anywhere in Turkey. Is it the same in Europe? Agriculture is planned regionally based on plant productivity.

There are various government subsidies for agricultural production. However, inefficient planning of agricultural land regionally is seen as *a barrier* to efficiency of current government subsidies. As underlined by an interviewee (int#53):

> Developed countries initially identify what to cultivate in which region based on productivity. They subsidize accordingly… In our country, one year everybody plants potato, but not onions. That year value of onions goes up potato falls down. In turn, next year everybody plants onions instead of potato. Neither the farmer nor the national economy gets value added (with current subsidies). This is a vicious circle.

As mentioned before, the government has been subsidizing to extend olive plantation areas since mid of 2000s. These subsidies combined with lack of an agricultural subsidy policy based on regional productivity and lack of efficient agricultural land planning*, i.e. weak guidance of search role of government,* created counteracting results for the development of olive sector:

One result is that there has been significant increase in olive plantation areas in the fertile plains of southern and southeastern regions. This also has various consequences. *First*, olive plantations replaced plantations of other fruit trees and vegetables that may bring more value added in these regions. This development is evaluated as a negative result for the agricultural sector in Turkey in general by most of the interviewees. *Second*, these olive plantations are more suitable for intensive and mechanized olive farming. Formation of large olive plantation areas turned naturally the focus of government subsidies to mechanized olive harvesting technologies. These subsidies were to the benefit of new plantations but not to traditional regions as their territories are not suitable for mechanization.

Another result is that though creation of olive plantation areas suitable for mechanization with higher olive productivity has been good for reaching 2014 targets of GTHB, its negative consequences led to move away from targets. *First*, giving a generic subsidy for olive saplings without taking into account of conditions in traditional olive producing regions. S*econd,* creation of low cost olive plantations with mechanized harvesting has aggravated competitiveness of traditional producers. These producers were already struggling with high costs of production.

In traditional regions such as Gemlik and Ayvalık districts, government subsidy levels do not help to cope up with high production costs. This in turn leads even uprooting of olive trees in these regions. An olive producer in Gemlik (int#56) underlined the situation as follows:

> In the old days, we had apple orchards, vineyards. None of them rested. We uprooted them all and planted olive trees. At that epoch, we were uprooting walnut trees and planting olive trees. However, nowadays we uproot olive trees and plant walnut trees. Why? It makes more money…

In fact, government has been implementing "agricultural basin support program" since 2010. This program is identifying agricultural products that will be supported according to basins. The launch of this program is evaluated as an inducement as government started to consider agricultural product differences in basins. But most of the interviewees argued and GTHB officials admitted that the program is not functioning efficiently because i) delimitation of basins and selection of agricultural products for support is questionable ii) an agricultural product, for instance olives, gets the same level of support in all basins. The basin system does not really take into account of differences in regions.

Though policy tools aimed extension of olive plantation area and in net total, there is an increase in olive plantation area; this could not be seen as a success as this extension has been realized in an unplanned manner. In terms of olive productivity and volume of production, there are not significant improvements in the last decade because agricultural policies were mainly composed of generic subsidies that are not designed by taking into account differences in territories effectively. Briefly, these counteracting situations in agricultural dimension create diverging expectations of actors in different regions and blurs direction of change in the sector as a whole.

Regarding the food dimension, there is significant role of government in selection of olive oil extraction and table olives processing technologies by setting standards, enforcing rules and regulations, giving supports to infrastructure etc.

In olive oil supply chain, in the olive oil production phase, extraction of vegetable oil from olives is conducted in olive oil mills that use traditional pressing or continuous centrifugation technologies. Currently the dominant technology in leading olive producer countries for olive oil extraction is continuous centrifugation system.

This technological system has different types: three-phase, two-phase and lately, two-and a half systems. The differences between these technological types are water usage, energy consumption and different byproducts of olive waste. In three phase and two-phase technologies different olive waste byproducts demand for different types of olive-waste management infrastructures. Therefore, selection and use of these technologies by olive producer countries depends on not only the efficiency and cost of that particular olive oil extraction technology, but also the established technologies in olive oil byproduct treatment sectors. Besides, stringency of environmental policies is a determining factor in selection of these technologies.

In olive oil sector in Turkey, though the use of continuous processing technologies has increased in the last decade, use of batch production technologies based on traditional pressing is still significant. As mentioned before, in line with the targets set for increasing olive oil production, the government has been supporting mechanization in the sector. Supports for the use of better technologies are *an inducement* to development and productivity of the sector. Again there were inefficiencies in the formulation and implementation of these supports i.e. guidance of search function of government. These inefficiencies have created *barriers* to the selection process of technologies in olive oil sector in an efficient manner.

One inefficiency of government in guidance of search function is that in designing supports to improve olive oil technological infrastructure regional olive production capacity and regional firm structure of olive oil industry are not taken into consideration. Supports for olive oil extraction infrastructure are an inducement to the sector but anyone who fulfills requirements can establish an olive oil factory. Therefore, government supports led to increase in the number of olive oil factories and mills over the needs of regions. As a result, many olive oil mills are forced to function with minimum scales. Furthermore, increase in the number of these mills aggravated olive wastewater problem.

Because of the use of inferior olive processing technologies and lack of infrastructure of mills for olive wastewater treatment, management of olive wastewater is a significant problem in Turkey. This problem is one of the determinants in guidance of search in the sector.

Although there are various projects of R&D on the treatment of wastewater, these projects are not turning into application because of the small scale of olive oil producers. Increase in the number of olive oil mills over than needed is creating *a barrier* also for collaboration and building regional consensus on technological choices because of small scales. One of the interviewed value chain actors (int#50) underlined this problem as follows:

> Government subsidies should consider all respects. The number of mills with continuous technology has increased over needs of our region as result of supports. Eventually our processing capacity has decreased significantly. Nobody gains much. If it were the vice versa, we could have more budgets for R&D and come together for solutions on olive oil wastewater.

Another inefficiency of government in guidance of search function, which created *a significant barrier* to technological selection process of value chain actors, has been related to three-phase and two-phase olive oil processing technologies. Starting from 2008 till around 2010, the government, without regarding the technological infrastructure of olive oil sector and high costs that olive oil producers will assume with this transformation, has forced them to change technology from three phase system to two phase system in a very short period of time by enforcing high environmental penalties.

The aim of government was to solve olive wastewater problem rather than improving quality of olive oil production with this technological transformation. As the main byproduct processors in olive oil sector, olive oil bagasse (pirina) producers, also had to transform their technologies to two-phase system, this attempt of government created significant discomfort in that sector as well. Therefore, the government had to step back.

This rather harsh enforcement of government *"has been daunting for value chain actors and established a negative prejudice for two phase system among them "(int#39)* As mentioned by one of the interviewees, in fact two phase system is "i*nnocent*" as higher quality olive oils with higher phenolic content can be produced. Therefore, "*technological change should have been based on the quality criteria not on environmental concerns*" (*int#39)*.

Same interviewee underlined the problem of government enforcement as follows:

> If the policy maker could have started with a soft transformation. For instance, there could have been credit supports for two-phase olive oil factories initially. With this harsh transformation, two-phase olive oil technology supplier firms also adapt their behavior accordingly. They would not be eager to support technological transformation in the sector by easing prices. They think that eventually olive oil firms will have to buy the technology.

Leaving aside the support for two-phase technology, at least the government could have stop giving permission to establishment of factories with three-phase technologies to guide this transformation since then "*but they even could not manage to take that decision*".

Actually, not all these barriers to olive oil technological change would have been created if the collaboration of government with value chain actors and NGOs of olive oil sector were stronger. Arguably, another reason for inefficiency of government's role in guidance of search function is that governmental ministries are structured at least once in a decade in Turkey. This is *a barrier* to knowledge accumulation in ministries, affecting their governance capability and efficiency in policy design. For instance in 2010 Ministry of Environment and Forestry was in charge of olive oil wastewater issue, but after the restructuring of ministries in 2011, this is the duty of Ministry of Environment and Urbanization.

By the end of 2014, "Olive sector waste water management project" has been launched by Ministry of Environment and Urbanization in collaboration with TÜBİTAK MAM Research Institute. The goal of this project is to design government supports including olive oil extraction technologies in a collaborative way based on sectoral needs. This is *a significant inducement* to the role of government in guidance of search function.

5.4.2 The Role of Other Actors

<u>Regarding input suppliers in agricultural dimension of olive and olive oil sector</u>, a couple of interviewed farmers believe that *"today multinational seed companies are guiding search in agricultural sectors in the world*." According to them, these companies are using the argument of "too much population to feed" as an instrument to monopolize food by patenting plants and seeds with biotechnology, by making producers dependent on their fertilizer, pesticide and herbicide sales.

One of the farmers from Ayvalık region (int#27) underlined its probable effect on olive sector in Turkey as follows:

> Farmers in traditional olive producing regions could not be clients of them continuously. Our olive trees are old and adapted to our region. However, new plantations are obliged to be. There, olive trees are planted and raised in a territory, which is not their natural environment. They are more open to diseases. Besides, in new plantations all the eggs are in one basket. When one of them sneezes, all of them get sick.

Concerning input suppliers of pesticide and fertilizers, farmers "*know what not to do initially*" but "*knowing what to do*" is a problem related to agricultural practices as the of guidance of extension agents lacks according to the same farmer:

> Every other day, a representative of agricultural firms comes with an argument of this or that is the latest technology and will be a solution to all our problems. You find what you want, but you lack guidance. The related knowledge also comes from

> the salesperson himself. Do the extension agents know these developments? I am not sure.

Regarding technology supplier firms, the role of olive processing technology firms in guidance of search function looks significant. Though there are number of olive oil extraction technology firms, based on the interviews, some of them have a leading role: Polat Makina and HAUS firms, which reside in Aydın Province as well as Kahyaoğlu firm in Ayvalık district. Especially, first two firms have a very significant share in the sector. Therefore, activities of these firms are a good indicator for the assessment of the role of olive processing technology firms in guidance of search function.

Both Polat Makina and HAUS completed their technology transfer olive oil extraction in 1980s. HAUS has manufactured its first continuous system olive oil plant in Turkey in 1989 and Polat Makina in 1994. Since the second half of 1990s, both firms have been exporting their technologies mainly to North African Countries, but also to Greece and Spain as well. These firms develop and market technology not only on olive oil but also on decanter centrifuges and separators for wastewater and potable water treatment facilities, oil fields, drilling industry, beverage industry etc. As both firms broke the domination of foreign firms, this has been *an inducement* to olive oil sector because they have strong ties to keep up with the sector needs and develop technology accordingly.

For instance, currently, in addition to two phase and three phase olive oil extraction systems, they produce "*boutique continuous system olive oil extraction plants*" for small-scale producers. This is a significant development for olive an olive oil sector as most of the producers have very small scales. The wide spectrum of technology options that these domestic firms present to olive and olive oil sector is *an inducement* to the guidance of search function as they facilitate the technology selection process of value chain actors according to their needs.

Regarding value chain actors, the Sales Cooperative Unions Marmarabirlik and Tariş are both main big players in the sector. They have a significant role in guidance of search function. Especially after gaining their autonomy from government in 2000, these Unions have developed their capabilities for technological search and selection processes.

The latest R&D projects of these Unions listed in **Table 5.15** are good indicators for direction of search processes of cooperatives as part of value chain actors.

Table 5.15: Main projects of Cooperatives and Unions as of 2014

Union/Cooperative	Supporter	Project
Marmarabirlik	TÜBİTAK TEYDEB	Process development for olive by-product management and energy production using by-products
Marmarabirlik/ iznik Coop.	BEBKA Development Agency	Sustainable clean production in olive sector
Marmarabirlik/ Orhangazi Coop.	BEBKA Development Agency	Table olive production with environment friendly clean technologies
Marmarabirlik/ Orhangazi Coop.	GMKA Development Agency	Application of clean production technologies in pickled olive production
Tariş/ Ayvalık Coop.	GMKA Development Agency	Treatment of olive oil bagasse with minimization of environmental impacts

Source: Authors compilation

As can be seen from the table, sales cooperatives unions are leading the sector to more environment friendly olive and olive oil production with clean technologies. This can be interpreted also vice versa: the direction of government subsidies is guiding the selection process of value chain actors to more environment friendly production technologies.

In addition, both cooperatives entered in the organic olive and olive oil market. Tariş has already been producing organic virgin olive oil and Marmarabirlik is planning to introduce organic table olives in the market starting from 2015.

Regarding bridging actors, contradicting views of them and their incapability to collaborate with each other has been *a barrier* to articulate an inclusive sector wide target. There have been attempts of Zeytindostu such as “ortak akıl” meetings or UZZK in the last decade to get together the sector representatives to discuss problems. For instance UZZK has a significant leading and bridging role in guiding discussions with government on two phase and three phase olive oil extraction technologies. However, there has been no consensus on the targets of the sector that will feed into government policies. The reasons of this lack of collaboration will be discussed more thoroughly in the section related to lobbying activities function.

By the end of 2013, so to be 2023 targets of the sector is formed by a group of sector representatives coordinated by the olive oil exporters' group. Non-inclusion of all sector representatives in the design of these targets has been *a barrier* to set realistic targets, as they do not consider the facts of the sector as a whole. These targets were mainly on olive oil export volumes assuming that production will increase significantly because of increased area of olive plantations. The current composition of the sector is composed of traditional regions with high costs and newly established nontraditional regions with low costs. The effect of differing productivities of different territories seems to be not taken into consideration while forming the targets, which in fact is *a barrier* to guidance of search function.

As a result, current 2023 targets of the sector are top down rather than bottom up. The small size producers and processors is again *a barrier* for articulating and reflecting their needs. They can articulate their needs and shape sectoral goals via UZZK, Zeytindostu and TZOB etc. But the bridging institutions have various weaknesses due to lack of financing, asset specificity, lack of human capital problems etc., of which some of them have been summarized in the previous section on knowledge diffusion, create *a barrier* in their role in guidance of search function as well.

5.5 Market Formation Function

Olive and Olive Oil Innovation System defined in this study compose of three sub-sectors: olive production (agricultural), table olives (food) and olive oil (food) subsectors. Olive fruit cannot be consumed directly without being processed as table olives or olive oil. Moreover, without olive fruit, table olives and olive oil sectors cannot exist. Therefore, market formation in olive sector is in directly related with market formation in table olives and olive and olive oil sub-sectors or vice versa. Besides, the delineation of table olives and olive oil subsectors is not clear-cut. Market boundaries of these subsectors are not mutually exclusive as depending on the season and quality, olives can be processed as one of them or both.

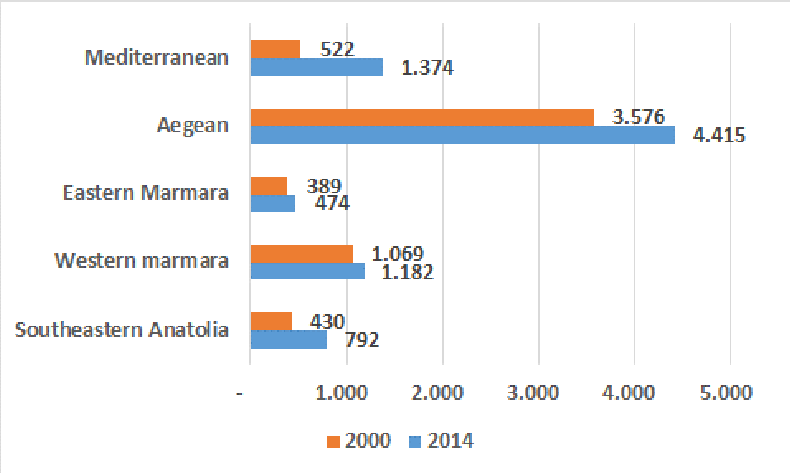
Analyzing the barriers that impede functioning of market formation according to each sub-sectors will be more practical to understand their policy implications. However, feedbacks between these three subsectors should kept in mind, as a barrier in one of them has an implication in another.

Barriers for market formation arising from structural problems are elaborated according to each subsector in what follows. Nevertheless, based on the analysis *main barriers* can be summarized as follows:

- Significant informal part in olive, table olives and olive oil markets, without any registration for olive production or processing
- Recent extension of production areas based on a single olive type instead of regionally adopted olive types
- Inefficient supply of standardized products (olive, table olives, olive oil)continuously for the whole year
- Adulteration
- Low demand for packed, branded table olives and olive oil
- Low consumption of olive oil in Turkey, whether branded or not, compared to vegetable oils consumption
- Small size of producers
- The value chain actors playing multi-role along the value chain
- Existence and domination of traders along the value chain
- Stringent standards of food sector those not keep up with sector infrastructure or vice versa.
- Inefficient government supports
- Lack of regional physical and knowledge infrastructure

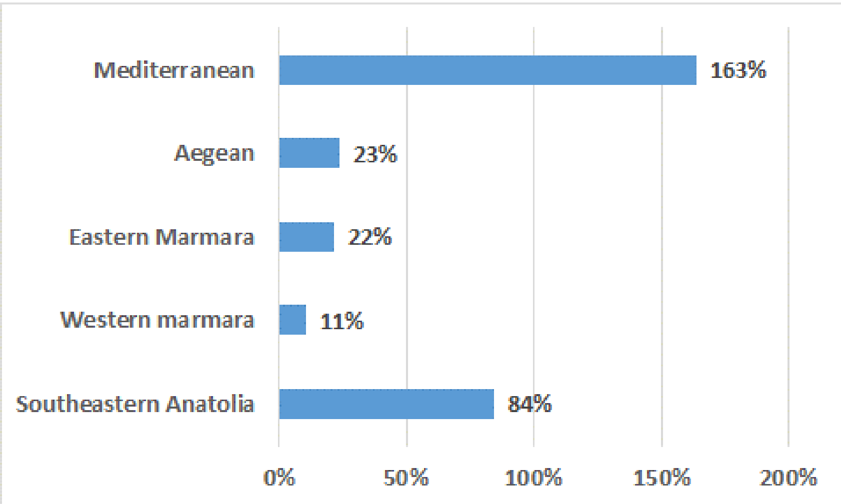
5.5.1 Olive Subsector

The change in the size of market is one of the indicators to understand whether market formation functions in olive and olive oil sectoral innovation system. In this regard, for olive and olive oil sector, olive production area is the main indicator that shows whether the market size is extending or not. This is an indicator for not only olive sector as an agricultural sector but for table olives and olive oil food sectors as olives are the main inputs for these sectors. As mentioned briefly in the previous sections, the government has been supporting extension of olive production area by giving significant supports to olive saplings since mid of 2000s. As a result, olive production area has extended significantly. This change in the olive plantation area has been rather uneven when we look at regional figures (**Figure 5.29, Figure 5.30).**



Source: TÜİK database at www.tuik.gov.tr

Figure 5.29 Change in Regional Olive Plantation Area, thousand Decars



Source: TÜİK database at www.tuik.gov.tr

Figure 5.30 Percentage Change in Regional Olive Plantation Area 2000-2014

This extension in olive plantation area is an inducement for olive and olive oil production, if our benchmark is quantity. However, uneven increases in regions, especially with different technological infrastructures and productivities have adverse effects on market formation function, as well as for entrepreneurial activities function, nationwide and regionally.

<u>One important factor</u> that has adverse effects on competiveness of olive producing regions is the type of olive cultivar planted in these new plantations. As mentioned before in guidance of search function, extension of olive production areas were mainly based on "Gemlik cultivar" because of generic government supports that does not take into account of regional differences and capabilities of olive sapling producers.

As type of Gemlik olive sapling is easier to produce and more adaptive, the demand and supply of it has been more than other cultivars. In fact, olive cultivar itself is a technology. However, productivity of this "technology" depends on its adaptation to its territory. Therefore, not only technological infrastructure but also geography and climate are defining factors for olive productivity given the olive cultivar.

<u>Another factor</u> is that, extension of olive plantations in regions that have less territorially favorable conditions with hilly areas, such as in Eastern and Western Marmara, has been low. In contrast, in Southeastern Anatolia region and especially Mediterranean regions olive plantations have significantly increased in plains. In Aegean Region, main increase has also been in plains and mainly in plains of Akhisar district[68].

Briefly, as of 2014, we can broadly delineate olive producing regions according to their technology, productivity and costs of production into three groups:

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[68] At this point, it is important to mention the role of Akhisar district in olive and olive oil sector. Akhisar has been once the main tobacco-producing region of Turkey. In 1990s, they started to transform their agricultural production from tobacco to olive production voluntarily in search of better lives as tobacco was not bringing value added. With direct agricultural supports in 2000s and later on olive sapling supports, they have become one of the leading olive producer regions. Emergence of Akhisar as a significant olive producer region has challenged traditional producers in Marmara region especially Gemlik and in Aegean Region such as Ayvalık. Later on, in addition to Akhisar, as result of government's support policies, new producers with big plantations emerged in Mediterranean and Southeastern regions starting from mid 2000s. These new olive plantations are now challenging competitiveness of traditional producers of Aegean and Marmara regions.

- *First*, traditional olive producing regions existing since ancient times (such as Gemlik in Marmara region and Ayvalık in Aegean region) using mainly traditional methods: non-mechanized production in hilly areas based on manual labor work in very small sized orchards. Their strength is that they have olive cultivars already adopted to their territory. However, trees are old age and needs rejuvenation to increase their productivity.
- *Second*, olive plantations in the plains of Aegean Region (such as in Akhisar) from medium to large plantations which are convenient for mechanized olive harvesting. As most of these plantations have been existing since the beginning of 2000s, they have already adopted their region and most part of trees is at their most productive ages.
- *Third*, very new and large olive plantations in the plains of Mediterranean and Southeastern Regions, (e.g. Adana, Hatay, Gaziantep provinces), which are convenient for intensive production. These plantations have geographical advantage for agricultural mechanization. Their current disadvantage is that they are mainly composed of "Gemlik olive cultivar". As they have been harvesting olives for the last couple of years, they do not yet know what challenges they face arising from olive cultivar type.

While assessing market formation function, these territorial differences should be kept in mind principally[69].

Related to facts about traditional olive producing regions given above, one of the olive producers of Gemlik (int#56) summarized the situation in their region as follows:

> We have been accustomed to better prices compared to costs. Now trees are older. The productivity of trees decreased. The price of olives stays stable. One year there

[69] This territorial diversity in olive production, i.e. diversity in supply, combined with diversity in established regional palate for table olives and olive oil, i.e. diversity in demand, is necessitating taking into account of product differentiation and market segmentation in table olives and olive oil marketing strategies. For definition of and differences between product differentiation and market segmentation see Smith, W. (1956), "Product differentiation and market segmentation as alternative marketing strategies" Journal of Marketing, 21, 3–8, Johnson, R. M. (1971), "Market Segmentation: A Strategic Management Tool," Journal of Marketing Research, 8 (February), 13–18

> is an increase, in the other it falls. Olive producer peasants cannot afford to look after olive trees because of high input prices. The thing is that when you do three of what you have to do for care but skip one of them you do not get better yield. You have to do all or none.

Same producer underlined the differences between traditional regions and new plantations:

> Regional differences in productivity and costs are significant. They gain almost hundred percent (in Amik plain of Hatay province). The soil is fertile. A fifteen years old tree yields 60 to 70 kilos of olives. In this region, it is around 15 kilos. Here, trees are 2-3 meters. There, it is almost a man's height. It is easier to collect olives. Cost of labor is cheaper. We pay 60 liras for daily labor here. They pay half of it. Besides, they learnt trimming from us and now they trim better than us."

According to interviewees, in traditional regions revenues do not cover cost of production. In fact, they know agricultural practices to improve yields very well but they do not have money to accomplish them properly. As a result, they cannot compete with other producer regions by increasing their productivity and quality of production.

Briefly, one of the *main barriers* for market formation function in olive sub-sector is the *weak financial infrastructure* of traditional regions. Most of the interviewees mentioned, "*It is the result of wrong government agricultural support policies*".

Agricultural supports as of 2014 are depicted in **Table 5.16.** In addition to agricultural input supports, the government gives a generic support for olive oil production by giving premium payments to olive producers who sell their olives to olive oil producers.

Table: 5.16 Agricultural Supports for Olive Sector in 2014

Support Type	Amount
Fertilizer Support for vegetable and fruit areas	4,6 TL/decar
Fuel Support for vegetable and fruit areas	6 TL/ decar
Basin support for olive oil	0,70 TL/kg
Olive Sapling Support for cultivars for olive oil Standard Certified	 50 TL/decar 100 TL/decar
Organic Production support for vegetable and fruit areas	70 TL/decar
Good Agricultural Practice Support for vegetable and fruit areas	50 TL/decar

Source: GTHB http://www.tarim.gov.tr/Konular/Tarimsal-Destekler

According to interviewees, the weaknesses in government's financial supports are as follows:

- Input supports are very low and do not cover costs of production, especially very high costs in traditional regions.
- The supports are given to farmers who are registered in Farmer Registration System (ÇKS). However, as supports do not cover costs, most of the farmers do not register in ÇKS system. Therefore, these supports are not used effectively and do not turn into value added.
- Olive producers do not benefit from Basin Support program for olive oil production. *First*, olive producers for table olives cannot benefit from the support as the support is given for olive oil production.

  Secondly, the basin support given for olive oil is very low when the oil ratio of olives is taken into consideration. For instance, if ratio is 1/5, this means that the producer is getting 0.70 TL for 5 kg of olives. This makes a 0.14 TL/kg support for olive production.

In fact, other agricultural products are getting supports for themselves, not based on their processed outputs as in the case of olives. For instance, in 2014, support per kg of sunflower is 0.30 TL and per kg of Canola is 0.40 TL. Thus, when we compare 2014 seed supports with implicit support for olives, as mentioned by most of the interviewees, current support system is significantly favoring seeds used for vegetable oils.

This support system is not only *a barrier* for olive sector because of its low level, but also *a barrier* for market formation function of olive oil sector, as it gives competitive advantage to vegetable oil sector by supporting with relatively higher supports to seeds.

Another *barrier* for effective use of government supports for market formation in traditional regions is the small size of olive orchards. They could not benefit scale economies. One of the producers (int#32) underlined the barrier of small size as follows:

> I do not get fuel support for years. If I wished to, I would get 70-80 liras. Then I have to pay 50 liras to Chamber of Agriculture for farmer registration. Then, 10-15 liras to Province office. There remains nothing to me. It does not worth bothering yourself. We are not producers with thousands of hectares of plantations.

All of the interviewed value chain actors, including olive oil producers, underlined the support for olive oil instead of olives as wrong government policy creating *a barrier* for the sector. They also mentioned that they have already expressed this issue to government many times but "*bureaucrats up there are preparing legislations as they wish*".

This is again the result of *weak interactions of government with sector actors*, as mentioned in guidance of search function, creating *a barrier* to design government policies in line with sector needs. As mentioned by one of the olive producers (int#57):

> We even submitted to National Assembly research commission in a written way. However, they do not care. We told them not to give supports based on agricultural areas. They support spare lands in vain. Give the support for what the olive producer produces. Then informal olive production will be under registration as well. The government will know what we produce. The producer will be eager to produce and the government himself will profit (from a more formal sector).

As mentioned in section on guidance of search function, the government set targets for olive and olive oil sector in the year 2004 for the year 2014. In this framework, the olive sapling supports has been launched in 2005, parallel with the start of certified saplings production. These supports, which required formation of minimum 10 decares of olive plantations, were modest in 2005 but in 2006, there has been a significant increase supports, which triggered many investors, to invest in olive sector (**Table 5.17**).

Table: 5.17 Supports for Olive Saplings between 2005 and 2014

Year	**Gemlik Cultivar TL/decar**	**Others TL/decar**
2005	30	30
2006	250	250
2007	45	250
2008	40	100
2009-2014*	0	50 standard 100 certified

*Since 2009 the supports are given for olive cultivars for olive oil

Though the support was generic and encompassed all cultivars as mentioned before, new plantations were formed with mainly Gemlik Cultivar. This was because *first*, Gemlik cultivar was easier to reproduce, *second*, the sapling producers did not have knowledge capacity and infrastructure to produce other cultivars, *third*, black table olives produced from Gemlik cultivar consumed much with a significant domestic market and *finally*, Gemlik cultivar has a significant oil content and can be processed for olive oil as well.

Because of government supports, emergence of new producers with plantations mainly composed of "Gemlik olive cultivar" is creating *a barrier* for market formation for all of the regions in different respects:

- *First*, in plantations of Southern regions (in Adana plains for instance) problems have been arising because of olive cultivar selection other than regionally adapted cultivars. Olive trees have grown quickly as these plain were fertile and wetland but in return fruit bearing has been low and olive fungal diseases arisen because of wetlands. Many trees have been uprooted[70]. Because olive tree produce better fruit and oil in poor soil than they do in rich.
  Besides, though Gemlik cultivar is mainly used for table olives, their yields in these regions are not so convenient for processing for table olives production. One of the table olive processor in Gemlik region (int#54) underlined this problem: "*Olives from Adana or Hatay do not serve for us. They are watery. There, plantations are formed without informing people. They continuously irrigate. Olives are swelled with water. They are no use, neither for table olives nor for olive oil.*"
- *Second*, though the origin of Gemlik Cultivar is Marmara region and black table olives processed from Gemlik cultivar are mainly produced there, emergence of new plantations mainly composed of Gemlik cultivar is creating *a barrier* for market formation of olives produced in Marmara region. Especially for Gemlik basin, though "*olives of Gemlik is more convenient for table olive processing*". Because of lower prices of olives from Southern regions, higher quality but high cost olives from Gemlik region cannot compete with them.
- *Third*, blurring of demarcations of olive cultivars according to regions as result of wrong supports is creating *a barrier* for the use of Geographical Indications (GIs) as

[70] See "Murat Öztanrıöver ile Çukurova Zeytinciliğin de Son Durum" in Z&Z Dergisi http://zzdergisi.org/?p=890

> a tool for regional market formation and competing with better prices. (Current problems of GIs will be elaborated more in this section as a separate part.)

It is important to underline that not only the government supports or the capacity of sapling producers, but *expectations on relative economic returns in table olives and olive oil-subsectors* are definitive for selection of olive cultivar for new plantations in olive sub-sector. One of the olive producers for olive oil in Ayvalık (int#49) has signified this as follows:

> Table olive producing regions are gaining more than us… With government's sapling supports, I have formed 36 decars of olive plantation with our regional olive cultivar, Ayvalık. I regret so much. If I were to choose Gemlik cultivar, there would be more economic returns.

Briefly, design of government policies by not regarding, *first*, olive, table olive and olive oil sub-sector needs *second*, interactions and feedbacks between these sub-sectors and *third*, territorial differences, is creating a barrier for market formation function in olive sub-sector.

5.5.2 Table Olives Subsector

Because of the extension of olive plantations based on "Gemlik cultivar", which is more convenient for processing as table olives, specifically for naturally fermented black olives, there is an excess supply of table olives as of 2014. The representative of Gemlik Commodity Exchange (int#53) underlined this problem as *a barrier* for market formation as follows:

> There was already an excess supply in table olives. This is growing. Does this increase in supply reflects as fall in prices? No. because costs of production are higher. Furthermore, we cannot export the excess. Other countries do not like our processing style as naturally fermented black olives. In return, we cannot process olives in this region they would like. Gemlik cultivar olives are not convenient for other processing techniques. We would then decay olives. This is in fact a macro level problem. They (government) do not consult us on regulations. There is no planning in Turkey on how much to produce olives, olive oil or how much to export.

Again, *weak capacity of government in guidance of search function* and *weak interaction with sector representatives (e.g. with UZZK, Zeytindostu association)*, are creating *a barrier* in market formation of table olives sub-sector.

Currently, there is high domestic consumption of table olives in Turkey therefore there is no barrier of demand for domestic market formation. However, as processing techniques are established according to domestic consumers' palate, for external market formation:

- Processing technology infrastructure and accordingly skills of producers have to be developed,
- olive cultivars relevant for these processing techniques have to be bred and planted,
- Effective market promotion has to be implemented to create niche external markets with palate for our current types of table olives.

One of the barriers for external market formation for our table olives with current processing technologies have been their high salt ingredient. Salt is a required ingredient for fermentation, taste and food safety of table olives. Currently, new regulation on table olives food codex[71] enacted by GTHB in 2014 foresees this problem by setting salt limits. Besides, there is R&D on substitution of different salts to diminish sodium salt in table olives in Turkey. These are *inducements* for external market formation of table olives.

Another *barrier* for external market formation of table olives sub-sector is arising from olive sub-sector. There is the lack of supply of relevant olive cultivars, such as Domat and Uslu, convenient for processing table olives suitable for external consumer's palate (i.e. cocktail olives or used for pizza). Gemlik Cultivar, which has spread because of government subsidies, is not convenient for external markets. The reason that Domat and Uslu cultivars were not preferred for plantation was that, when planted, one third of their plantations are successful whereas for Gemlik cultivar it is two third. Besides, for Domat and Uslu it takes more time to give fruit.

As mentioned before, this problem is a result of barriers such as *first* generic government subsidies that disregard regional differences and *second*, lack of knowledge of value chain actors.

[71] Communiqué of GTHB no:29097 enacted on 23 August 2014
http://www.resmigazete.gov.tr/eskiler/2014/08/20140823-7.htm

Actually, *main structural problems* behind these barriers were:

- Weak interactions of government with other sector actors for policy design
- Weak interactions of research institutes with value chain actor inhibiting relevant knowledge diffusion on olive cultivars suitable for regions
- Lack of a sector policy due to inefficient government guidance

According to all of the value chain actors interviewed, significantly high share of informal part of the olive and olive oil sector is *one of the main barriers* to market formation of packed, high value added production in both table olives and olive oil sectors.

Some of the actors mentioned that though the high value added market segment i.e. packed (and formal) is increasing, the bulk market for table olive and olive oil (mostly informal) is dominating.

In table olives sub-sector, there is a significant number of olive producers, who produce olives and who process them for their own consumption and for trading. Instead of being only part of the high end of the value chain, olive producers composed of peasants, process their olives and sell them to traders. Without control and any standards, the domination of this informal part in table olives sector is *a barrier* for branding, as "the smallest producer (informal) is the biggest rival in the market".

One of the branded table olive producers from Gemlik (int#54) underlined that:

> Ask any one of the housewives, none of them can tell you a table olive brand. The only brand they can tell you is Marmarabirlik. Because it is an old and known brand of cooperative union, once government led. They trust it. Other than that for sure there is no table olives brand established in the market.

Another main barrier for market formation of table olives is complexity, therefore the difficulty, of setting standards in the sector. Of course, existence of informal part of the sector is negatively affecting the standardization process in the sector.

Established standards for products are building stones for market formation i.e. existence of both for the supply side (producers) and the demand side (consumers) of branded table olives. The *barriers* for setting standards can be analyzed according to raw olives, processing and marketing standards.

In table olives sub-sector, in addition to taste of table olives, shape and size of olives are important factors for market formation. Higher grades of olive sizes can be priced higher in the market. However, bigger sizes do not guarantee better market for olives. Arguably, based on the interviews, the budget of the consumer is the primary concern in their table olives preferences. Then, given the budget limits, the taste seems to be the next concern for the consumer. If he likes the taste consumer goes for small sized but cheaper olives. If he can afford, but if he likes the taste, he may go for bigger sizes.

As mentioned by the same table olive producer (int#54):

> The taste and consumer's choice is important. Years ago, we supplied medium sized table olives to one of my customers. His customers liked those olives. They liked its saltiness and the taste. He (my customer) told me that he could not sell bigger olives anymore. He wants us to supply him medium sized ones.

There is no regulation of GTHB on standards on size of raw olives. Current regulation on codex standards of table olives grades sizes of processed olives only. However, there seems to be a rule of thumb on grading raw olives in olive market. Arguably, this rule of thumb has been established in time as result of purchasing campaigns of cooperatives union Marmarabirlik.

Regarding raw olives, lack of regional infrastructure such as regionally established warehouses, mainly due to weak financial infrastructure of cooperatives, is *a barrier* for table olive processors to get standard sized raw olives for processing. This is also *a barrier* for regional market formation of olive producers themselves as well. The table olive producer in Gemlik underlined the problem of finding standard raw olives as follows:

> There is no standard in this region. In İznik it is rule of thumb. I myself do not go there to buy olives. They take a handful of olives and grade them. There is lots of fraud. In Akhisar there is at least olive selection and sieving machine. You have the chance to tell your price according to different sizes.

The need to find olives for processing, is forcing table olive processors to do business with commissioner traders unwillingly. This is *another barrier* for processors not only because of costs but also to find standard raw olives, as "*in order to earn more, traders buy olives that olive processors do not want*" and sometimes "*cheat on olive grades*".

Same table olive processor mentioned that:

> We should not solicit for olives. If there could have been regional cooperative warehouses … Then the production would be registered, the government would know type of olives produced, would know whether there is an excess for olive oil or table olives, would support accordingly … There would be a benchmark. I would know how much olive exists in the market.

Lack of regional olive warehouses, i.e. *weak (regional) infrastructure,* as *a barrier* for market formation has been mentioned by a couple of interviewees. Strengthening of producer cooperatives with warehouses could have been a solution to overcome this barrier.

Though regulation on establishment of producer cooperatives exist and some supports are given, due to problems in regulations i.e. *weak hard institutions problem* and lack of relevant managing skills of producers, i.e. *weak human capital infrastructure*, these organizations do not function properly. (Barriers related to cooperative system will be elaborated more in entrepreneurial activities function in the next section).

Regarding the processing, as the quality of table olives depend on that year's season and harvest of raw olives, taste and size of processed olives also changes each year. It is by nature very difficult to standardize table olives, which is *another barrier* to market formation of the sector. As mentioned by the table olive processor (int#54):

> Our product is not an industrial product. You cannot modify as you wish. It is hard to keep the same standard. If it is rainy that year, olives are watery. In some years olives are smaller, in others they are bigger. When it is cold, it becomes curly. This season, for instance, olives are bright, not curly.

Effective functioning of formal product exchanges for table olives is important for market formation in terms of *first*, bringing buyers and sellers together, *second*, enabling healthy price formation. There are *physical infrastructure barriers,* for example for Gemlik Commodity Exchange, to perform this function (int#53):

> We do not have a saleroom. We cannot perform our purpose of existence… The problem is that it is difficult to standardize table olives. You need samples and types. You may sell same olives with same caliber at different prices. Because in table olives physical and sensory qualities play role. Qualities that could not be differentiated in laboratories. For instance, we eat same table olives, you like it but I do not.

This standardization problem is arising as a methodology for categorizing sensory qualities of table olives do not exist and regional taste panels have not institutionalized in Turkey yet. The standardization problem is not specific to Turkey, but it concerns all olive producing countries. There has been skills development in organoleptic assessment of olive oil and a sensory methodology for olive oil evaluation by taste panels in olive producing countries.

In Turkey, olive oil taste panels have significantly improved in the last decade. However, regarding table olives, sensory analysis methodology is still in its development stage. Taster and panel leader training for sensory assessment of table olives has recently started. Besides, these trainings are not extensive enough nationwide which is currently *a barrier* for establishment of relevant skills i.e. *knowledge infrastructure* for market formation.

Not only lack of physical and knowledge infrastructure, but also *beliefs and expectations* are creating a barrier for establishing regional commodity exchange for table olives, as "*both the produces and sellers believe that they could maximize their profit via bargaining with one to one correspondence instead of trading in a formal market*."

Therefore, both olive producers and traders are not eager for formation of a commodity exchange for table olives even though they would get win-win situation. Especially the producers are resisting even though they are the most victims according to (int#53):

> Olive producers do not know the real market value of their olives. In the village café, they learn at what price the other peasant has sold his olives. That is his world. The olives that he heard to be sold in the market at a price of 4.5 liras would in fact worth 7 liras if sold in the commodity exchange. The more important thing is that, half of the olive producers cannot receive their money from the traders they sell olives.

Furthermore, existence of high number of traders, for instance in Gemlik, is *a barrier* that exacerbates this situation.

Regarding the standards on size grades of packed table olives, table olive processors underlined the problems related to standards on sizes of olives, which are set by government in codex of table olives. This is *a barrier* for market formation according to interviewee from Gemlik (int#57):

> They (government) prepare regulations without taking into account of its reflections on consumers. In the new codex, there are sizes of XS, XL. The argument is to change the perception of the consumer on sizes of olives. Because when you write the number of olives on the packs, high number but small olives are perceived as better than the low number but bigger olives...But how many men knows what XL means?

Another barrier underlined by table olive producers related to *frequently changing regulations on food standards*, for instance standards on packing table olives. As mentioned by representative from Marmarabirlik *"We use pressed labels, not sticker labels. Should regulations on labels be changed so frequently? Do they think it is easy to produce pressed labeled packs?*"

Another producer (int#56) mentioned inefficiency of government's regulations related to this problem:

> I stick a label on the tin. Before a year passes, they (government) say it is not sufficient. I stick another label on the tin. Now there remains almost no spare part of tin without a label. They (government) come together every two months and add to regulations what they have forgotten before, I guess.

Regarding informal part of the sector, its existence is negatively affecting table olive producing regions in varying ways. In Turkey, in the market of table olives sector "black olives" have a significant share. As mentioned before, main technology used to produce black olives is the natural fermentation of olives with salt. This processing technology is what Marmarabirlik uses and the palate of consumers in domestic markets is prone to this type of table olives.

Existence of many informal and small producers in table olives sector is *a barrier* for the standardization of qualities of table olives in the market. For instance, the saltiness of naturally fermented black olives could be more easily standardized in the market if all the producers were formal. Informal part of the sector is *a barrier* not only for standardization of qualities of table olives but also for developing customer *trust in the sustainability* of the quality of table olives. As mentioned by a table olive producer in Gemlik (int#54):

> Production and consumption of branded table olives are funny amounts. In fact, we have the technology. We can adjust saltiness and pack accordingly. We can do all types of pack, canned or vacuum pack etc. However, consumers do not trust. When they cannot see they doubt about the quality…Actually packed marketing would be emancipation for the sector.

Low demand for packed food products, which is not specific to table olives but in general of agro-food sector mainly due to higher prices for packed foods, *is a barrier* for market development of branded products.

In Turkey, there is significant consumption of table olives domestically. Main challenge is to increase the consumption of more value added packed table olives. One of the reasons of low demand for packed table olives is budget concerns of consumers as it is cheaper when they buy from bulks sales. Another reason is lack of consumer knowledge on quality of the products.

Above all, as mentioned by interviewees, low demand for branded and packed products is a result of the established consumer habits: the need to taste "delicatessen" food products, cheese, olives, etc. before buying. This consumption habit is *a more significant barrier* to table olives sector compared to olive oil sector as consumers have the chance to taste table olives at delicatessen sections of supermarkets.

As underlined by the table olive processor (int#54) with a brand: *"That is the nature of our people. They have to see and taste. For instance, each time they want to buy cheese they request to unpack cheese to taste before they buy. If we would try to sell olives all packed, then for sure total consumption would halve.*"

This consumption habit is *a barrier* that limits the capability of table olives producers to sell their brand products via supermarkets in small packs. Their sales to supermarkets are mostly composed of bulk sales for delicatessen sections of *t*hem. Regarding small size of producers, their limited marketing capabilities and supermarkets as their main way of marketing, current consumption patterns is a significant *barrier* for market formation of branded table olive producers.

In table olives market, price formation is inefficient as result of the *barriers* mentioned previously. F*irst*, ambiguity in product standards (raw and processed olives standards), *second*, lack of institutionalized regional commodity exchanges, *third*, high informal part of the sector, *fourth*, existence of many traders between value chains, and *fifth*, informal existence of olive producers in the processing stage of the value chain. Furthermore, lack of reliable statistics on yearly production is *another barrier* to form expectations on price formation.

Inefficiency in price formation is also negatively affecting the quality of olives produced, as significant part of production is informal. Ambiguity in market prices is leading informal producers to keep their processed olives until a market price emerges or, if they do not need money immediately, until they see a price they like. As the physical conditions they keep their olives are not convenient in general, the quality of olives deteriorate in time. Besides, as salt is the best way to protect olives from decaying, therefore salt used in informal table olive production is very high.

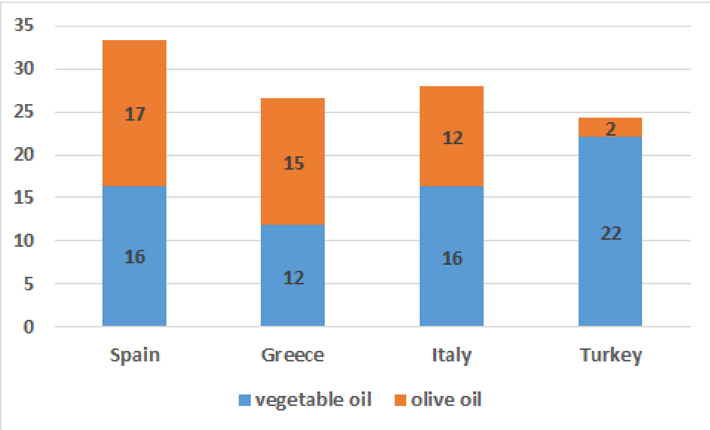
As there is no food controls on informal production these table olives enter the market via traders. This vicious circle is mentioned directly or indirectly by most of the value chain actors interviewed. Similar conditions are appearing in olive oil sub sector as well, that will be discussed later on.

As efficient commodity markets lack in the sector, Marmarabirlik, cooperatives union, is currently the benchmark organization for price formation in table olives. Marmarabirlik's purchasing prices according to different olive grades are guiding the market. All of the interviewed value chain actors in table olives sector mentioned the benchmark role of Marmarabirlik and they appreciate its existence as an actor.

Individual traders are also *a barrier* for the functioning of Marmarabirlik's price mechanism by effecting the timing of Marmarabirlik's announcement of olive purchases. Marmarabirlik announces its prices usually a bit late to see trading in the market in order to not to set prices below traders prices which will led its olive producer members to go to traders instead of the cooperative.

5.5.3 Olive Oil Subsector

In contrast to table olives sector, there is lack of domestic demand in olive oil subsector. Based on the latest FAO data, there is significantly low olive oil consumption and high vegetable olives consumption in Turkey compared to other producer countries (**Figure 5.31**). Low level of olive oil consumption is the *main barrier* for domestic market formation in olive oil sub-sector.



Source: http://faostat3.fao.org/faostat-gateway/go/to/download/FB/FBS/E

Figure 5.31 Vegetable Oil vs Olive Oil Consumption as of 2011, kg/per capita

This is not a recent problem in Turkey. As mentioned before, *first*, except in olive producing regions, *consumption habit* of Turkish people is more prone to animal fats. *Secondly*, most of the consumers do not know differences between different types of olive oils. For instance, arguably, most of the consumers do not know the basic differences between virgin olive oil and refined ones or cannot differentiate a high quality or a bad quality olive oil. Briefly, there is *lack of knowledge and consumer awareness*. *Third*, most of the consumers cannot afford significantly higher olive oil prices compared to vegetable oils as GDP per capita is very low and there is uneven income distribution in Turkey.

In Turkey, initially, consumers have to learn consuming olive oil. In other words, they have to develop palate for olive oil so that they would prefer olive oil compared to other cooking oils and higher quality olive oils to lower quality ones. This depends on consumer knowledge development on olive oil via informing campaigns on relative benefits of olive oil consumption as well tasting trainings.

All of the interviewees, whether from value chain actors, government representatives or NGOs, underlined the low olive consumption problem. Besides, most of them mentioned that there is no significant campaign to improve consumption, though this problem is known by everybody.

One of the reasons for not being able to increase consumption levels is the lack of a government sector policy. An interviewee (int#44) underlined this as follows: *"There is no sector policy. As result of the general world trend in appreciation of olive oil health benefits, there is also some increase in consumption in Turkey. That is all."* Another one (int#23) told: *"There has to be an olive oil policy of the government. They are causing people to plant olive trees since 2002. Now it is 2014 and there is no government campaign to increase consumption."*

The barrier for value chain actors to assume role in olive oil market formation, via advertisement campaigns for instance, is *weak financial situation of producers* because of significantly high costs. Weak financial infrastructure is also a barrier for NGOs to assume this role fully.

As mentioned in the section on knowledge diffusion function, UZZK and Zeytindostu have some individual activities to improve consumer awareness, but they are limited because of lack of funds. Chambers Union TOBB could have organized this, but as TOBB embrace other sectors and *lobbying activities* of them has been *a barrier* as mentioned by one of the producers (int#26):

> There has been a project of TOBB. There would be a public spot for olive oil sector. TOBB would be financing this public spot. The contribution of each chamber of olive producing regions for this project was defined. When this project has reached to implementation stage, vegetable oil producer representatives demanded fund for themselves as well. Olive oil public spot project halted. … This is the result of populist approach of head of TOBB not to miss a single vote of his electors.

Olive and Olive Oil Promotion Committee (ZZTK) is one of the main organization for promotion. However, ZZTK is constituted by Exporters Union EİB and therefore its target is mainly external market formation. They have only one quarter of their budget for domestic market formation and their financial infrastructure is rather weak to assume organization of a public spot individually.

Briefly, due to *weak financial infrastructure* of value chain actors and NGOs, collective action has been the only solution. However, until 2014, *weak collaboration of main actors* due to factors such as power struggles, lack of trust, varying expectations etc. has been a barrier for collective action. Those factors will be further elaborated in the section related to lobbying activities function.

As of mid-2014, due to changes in the management of main NGOs of the sector, i.e. Zeytindostu, ZZTK, EİB and UZZK, established views creating a barrier for collaborative action seems to be changed. Currently, as of end 2014, there is a public spot project of ZZTK for olive and olive oil sector, under the auspices of EİB in collaboration with other actors, which is an *inducement* for market formation function.

Though production levels are not so high, there is an excess supply of olive oil production due to lack of demand in domestic markets. Without any systematic effort to increase in consumption levels, extension of olive plantations is exacerbating this excess supply problem. Furthermore, illicit flow of olive oil from Syria borders in the last couple of years is a recent *barrie*r for market formation in olive oil sector as "*there already has been a production of which Turkey did not know what to do.*"

This is a threat for all of the olive oil producers, especially the ones in traditional olive producing regions of which production costs are significantly higher. Due to internal war, olive oil from Syria, which has been exported to Spain and Italy previously, has been entering to Turkey since 2012, via Southeastern Anatolia region with prices significantly lower than world price levels.

Based on the interviews, olive oil transferred from uncontrolled Syria borders are registered as national olive oil production by giving producer receipts. Besides worsening the olive oil market by introducing illicit olive oil, by using these receipts they get government support given for olive oil as well. Furthermore, olive oil entering in the Turkish market under improper conditions is low quality and creating food safety problems.

These problems are already presented many times by sector representatives to Ministry of Finance, GTHB as well as Customs and Trade Ministry. GTHB has announced that there is no problem with registered olive oils and control mechanisms related to registration system has been tightened. However, sector actors believe there exists *weaknesses in infrastructure of government control mechanism* and no real solution has been presented by the government.

In fact, the problem of illicit olive oil flows is arising from *barriers* in the sector, which inhibit market formation in general, as follows.

First, non-existence of statistics and inventory of regional olive and olive oil production i.e. *weak knowledge infrastructure* of the olive and olive oil sectoral innovation system is a barrier for market formation function. One of the olive producer and olive oil processor underlined this problem as follows (int#27):

> They do harvest forecast by asking expectations of producers. There is no serious study on yearly olive production. EİB announces high harvest amount so that olive prices fall, for the good of exporters. Cooperative unions announce low harvest so that producers glow with expectation of high prices. UZZK is in the middle way. Nobody looks at what the realization is when compared to initial forecasts… If a region forecast 10 tones olive production but come with 60 tones olive oil, then there should be problem in registration.

Second, already existence of informal olive oil production in the sector as a result of lack of relevant food control mechanisms i.e. *weak (hard) institutions* that also inhibits keeping track of informal olive oil, whether national or from external sources. As mentioned by one of the branded olive oil producer in Ayvalık (int#52):

> You see people informally selling olive along the roads, without any date or food label. I got sanction because I have written "virgin" word 5mm bigger. I am subject to legal sanctions but they are not. When you ask officials, they say, "they are not registered, we cannot fine". What kind of a mentality is this? Do we all be informal? Put any oil in cans, write virgin olive oil on it and sell?

Though some of the interviewees mentioned that transfer of food control function from ministry of Health to GTHB as an *inducement* for the system, they underlined that there are loopholes in the design of food control mechanism i.e. *weak (hard) institution problem*. Besides, district provincial offices of GTHB are responsible for food control of which *weak human capital infrastructure* is not sufficient for handling food control as well as extension activities properly.

Third, existence of weak social morality and weak trust i.e. *weak soft institutions* is enhancing continuity of informal production. Everybody is blaming others for using informal olive oil, whether its source is national or external:

> Last year (2013) 60 thousand tones olive oil entered our market from Syria borders. It is more than one third of our olive oil production. It is impossible to market that

> big amount informally along the roads. This olive oil is sold in the supermarkets that we know and trust under the brands of olive oil that we know and trust.

Fourth, *weak soft institutions problem* (lack of trust, weak morality etc.) is partly a result of non-existence of an established value chain organization in the sector i.e. *weak hard institution problem*. Value chain actors playing multi role in the value chain (producer, processor, traders) and acting according to the prevailing circumstances, lowers the trust and collaborative action for market formation. According to (int#27):

> They (value chain actors) carry more than one identity. One of the main actors in our region (name X), is he a producer, processor or a trader? One of his identities for sure conflict with another. Another olive and olive oil producer with his brand (name Y), is also supplier of a big known olive oil processor and bottling (firm X). Therefore, he has to guard benefits of (firm X) as well. In a community composed of them, when you ask to collaborate against informal olive oil from Suriye, they take their time to act.

In addition to these problems, as in olive and table olives sub-sectors, existence of many individual traders in olive oil sector is *a barrier* for price formation, quality improvement, sustainability of sales cooperatives (as members can go to traders), therefore to domestic market formation for formal olive oil producers.

Ambiguity in production levels and market price formation is leading to stocking of olive oil in the hands of small producers and traders. They present their olive oil depending on the market price conditions. Olive oil kept under bad conditions is leading low quality olive oil in the market. This unsustainable supply of olive oil combined with low quality is creating *a barrier* for both domestic and external market formation. Weaknesses in market formation are then enhancing informal production. Briefly, there is another vicious circle.

Regarding the quality standards that are important for market formation, *first*, unregistered and uncontrolled informal olive oil production is *a barrier* for both domestic and external market formation as it inhibits the establishment of quality standards sector wide. S*econd*, there is, arguably, significant olive oil adulteration enhanced by informal production. In addition, though food quality standards are set and control mechanisms have been improved in recent years, food control mechanisms for adulteration are ineffective even for branded olive oils on the shelves. Therefore, adulteration practices are still a significant *barrier* to market formation, external lowering consumer trust and market competitiveness.

There are codex standards set by the GTHB for olive oil. The applicability of these standards is low because of the informal sector and weak control of adulteration. As mentioned before, blurred boundaries within the supply chain with very small sized olive producers who process and trade olive oil with no consistency in their quality standards is *a barrier* for product standardization in the market.

There are also contradicting regulations and rules i.e. *hard institutions* creating barrier for market formation. For instance, in addition to codex standards, producers have to obey TSE standards (TS 341) for product safety of exports of edible olive oils to external markets. As mentioned by the representative of UZZK (int#40):

> In the absence of regulations on codex standards, TSE standards have been used to minimize adulteration in the markets. Now there are codex standards for olive oil aligned with EU regulations. There is no need for TSE standards any more. Besides, TSE standards are not up to date. There are problems in its standards and control mechanism of its application. It is creating unfair competition and a disadvantage for country image.

Table 5.18 Main supports of Ministry of Economy for External Market Formation

Market search and entrance support	• E-trade membership support • Sectorial trade committee and purchasing committee support • External Market Report support
International Competitiveness supports	Since 2010, • Education support • UR-GE project support
International market unit, brand and promotion support	Since 2010 • Rent support for external units of firms • Promotion support • International brand registration support • Turkish trade centers support
Trade fairs support	• External fairs participation support • Domestic Organization of sectorial international fairs support
Branding in external markets and “Turquality” support	Since 2006, • Many supports for production, marketing, sales, and after-sales services to reinforce the “Made in Turkey” image through developed Turkish brands
Export refund for agricultural products	• Significantly for olive oil

Source: www.ekonomi.gov.tr

There is various government support for external market formation as shown in Table 5.18. However, due to previously mentioned barriers, such as instable supply of tale olives and olive oil due to high fluctuations in olive production levels and prices, low quality production due to informal sector and adulteration practices etc., effectiveness of these supports to increase high quality branded exports is arguable.

Geographical Indications (GI) in Olive and Olive Oil Sector

Geographical indications (GIs)[72] are used as differentiation tools in marketing strategies for agricultural products. In addition to marketing, GIs are used for rural development (structuring of supply chain around product reputation, formation of stable and higher product prices, value creation in all stages of supply chain, improvement of regional tourism etc.) as well as preserving regional knowledge, knowhow and culture.

Barriers inherent to olive and oil innovation system that inhibit market formation in general sector level are also *barriers* to regional market formation by the use of GIs.

Regarding table olive sub-sector, currently there are two registered GIs by TSE. One of them is Uslu olives of Akhisar and the other Gemlik olives of Gemlik region. As the origin of Uslu olive cultivar is Akhisar and main plantations are in that region, there seems to be no significant barrier for the implementation of it. For Gemlik GI it is not the same case.

Because of extension of olive plantations based on Gemlik cultivar with excess supply in the market, the producers in Gemlik region registered Gemlik olives GI in 2003. Though they get registration in 2003, the GI program could not be activated until 2014 and does not effectively function because of various problems.

Gemlik GI is registered as a Protected Designation of Origin (PDO), which covers three districts: Gemlik, İznik and Orhangazi districts. This PDO means that olives produced and processed in these districts are Gemlik olives. Based on the interviews, some of the *barriers*

[72] See World Intellectual Property Organization WIPO http://www.wipo.int/geo_indications/en/ , WTO https://www.wto.org/english/tratop_e/trips_e/gi_e.htm EC http://ec.europa.eu/trade/policy/accessing-markets/intellectual-property/geographical-indications/ for detailed information for definition and international regulations on GIs.

i.e. structural problems, those led to wrong implementation of Gemlik olives PDO and its malfunctioning are as follows.

- There are problems related to the design of Gemlik PDO as result of *lack of knowledge on GIs* i.e. *weak knowledge infrastructure*. *First*, all interviewees from Gemlik mentioned the problems arising from the delineation of the territory of Gemlik olives. For instance, though there is Gemlik cultivar olives that are produced in Mudanya, a district very close to Gemlik, it was not included in the PDO territory. There are different views on the definition of the territory of current PDO and regional consensus has not settled yet. Some of the interviewees mentioned that "*it should have been all Gemlik basin not the districts themselves*" and others mentioned that "*it should not be a PDO but protected Geographical Indication (PGI)*" or "*it should be both cultivar and territory as Gemlik type Gemlik olives, Gemlik type İznik olives*". *Secondly*, in the registration of GDO of Gemlik olives, the quality that differentiates Gemlik olives produced in these districts were not defined clearly, which is the most important factor so that GI can function can effectively as a marketing tool. All these ambiguities have arisen because of *weak knowledge infrastructure* on marketing with GIs.
- *Weaknesses in regional knowledge infrastructure* have been a barrier, but *lack of proper guidance by research institutes,* as result of *weaknesses in scientific knowledge* on GIs has been *another barrier*. Gemlik district olive producers initiated the GI protection and they started their search process as "*they wanted to protect competitiveness of their region but did not know how"*. At the beginning of 2000s, they consulted Uludağ University on GIs and to get some guidance but it was not sufficient according to interviewees. "*It was surprising that there has been no study on GIs of olives in the universities till then*". (Currently, after a decade, relevant knowledge accumulation seems to be established on GIs and now they are content with project guidance they get from Uludağ University.)
- *Soft institutions* such as regional fraternity, morals and trust are important factors in the implementation in GIs. In Gemlik *weakness or lack of these soft institutions* are creating a barrier for implementation of PDO according to (int#53):

> There should be strong regional community spirit so that it can function. If the regional olive producers put other regions' olive in their containers, how can we

continue? We all have to construct regional consciousness: producers, traders and processors.

- Implementation of PDO is under the responsibility of Gemlik Commodity Exchange, of which members are traders. There is conflict of interest in current mechanism of PDO execution and control system i.e. *weak (regional) institution problem*. Traders, though owner of the PDO, may cheat selling other regions' olives. These traders are also in the audit boards to apply sanction mechanism. There is hologram stickers as part of control mechanism, but it is impossible to know for hundred percent whether olives are from Gemlik. The spread of gemlik olive cultivar in all regions is exacerbating this situation as traders can find olives from different regions. Besides, in a rather small community such as Gemlik district, social ties are inhibiting Commodity Exchange board to apply sanction mechanism for commercial immorality "*though everybody knows what everybody does*". As mentioned by the same interviewee (int#53), "*it comes to the issue of social morality and our problem is morality*".
- *Weaknesses in regional physical infrastructure* such as lack of well-functioning warehouses, lack of reliable statistics on production levels, existence of unregistered production etc. is creating a *barrier* in establishment of efficient control mechanisms.
- As being a main player in table olives sector, marketing policies of Marmarabirlik do not align with the use of Gemlik olives PDO. Because they have to protect the competitiveness of sales cooperatives of districts other than Gemlik. Therefore, Gemlik Sales Cooperative as part of Marmarabirlik, do not use Gemlik PDO though it is the main buyer of Gemlik olives. *Lack of an actor* such as Marmarabirlik in PDO system is weakening Gemlik PDO as a marketing tool.
- The rules in new codex on table olives contradict the application of GIs. New table olive codex foresees to write olive cultivar type (for instance Gemlik) in big prints and origin of production (for instance Adana) in small prints. Table olive producers of Gemlik underlined that this standard will affect the perception of consumer. They will buy these olives assuming that they are from Gemlik region. This will weaken the power of Gemlik PDO as a marketing tool.
- Turkish standards Institution (TSE) is presenting the registration of GIs. However, Gemlik Commodity Exchange is eager to overcome the problems related to Gemlik PDO,

current regulations of TSE do not allow them to do. In other words, there is *stringent hard institutions problem* as a barrier for market formation via GIs.

Regarding olive oil GIs there have been three registrations: Southern Aegean GI and Edremit Gulf GI (or Northern Aegean GI) of TARİŞ, Ayvalık GI of Ayvalık Chamber of Commerce. In Southern Aegean region Memecik Cultivar is dominant and in Northern-Aegean region Ayvalık/Edremit cultivar is dominant. Ayvalık GI is also defined for Ayvalık cultivar. There are problems in implementation of all these GIs,which have arisen as a result of structural problems.

First, due to wrong design, Edremit Gulf GI, which has been registered as a PDO in 2004, has been cancelled by Supreme Court of Appeal in 2014. The complainants were Chambers of Commerce of Burhaniye and Edremit, the defendants were TSE, presenter of PDO, and TARiŞ cooperatives Union, holder of PDO. The main subject matter of the complaint was the definition of the territory. In Edremit Gulf PDO, territory districts other than districts of Edremit Gulf (i.e. Edremit, Havran, Burhaniye, Gömeç and Ayvalık) were also included. The extensiveness of territory also created dispute on the definition of quality of olive oil that will be protected, as the quality was argued to be differing. Besides, Edremit Gulf olive oils are high priced in the market due to their special organoleptic qualities. Therefore, Edremit Gulf PDO was carried on a lawsuit with an argument that it was creating regional imperfect competition and unjust gain by favoring olive oil producers other than Edremit Gulf territory and included in the territory of PDO by using the positive image of Edremit Gulf producers.

Similar to Gemlik olives PDO, the *real barriers i.e. structural problems* that inhibited implementation of Edremit Gulf PDO were:

- *Weak knowledge infrastructure* of research component on GIs to guide regional organizations: Though during the design of Edremit Gulf PDO, the view of Olive Research Institute ZAE was taken, scientific base of the PDO was not sufficient to prevent court decision. Most of the actors knew the extensive definition of the territory would be a problem in the future but *"they preferred to wait and see what will happen."* It is important to note that, Southern Aegean Olive Oil PDO of Tariş still exists but with the same design problem arising because of extensive territory definition. Depending on the future relative competitiveness of sub-territories included in this PDO territory, the problems may arise or not similar to Edremit Gulf PDO.

- *The weak collaboration and the weak lobby power of regional organizations* for effective regional marketing: Before the PDO of Tariş, there was a project of Edremit Gulf districts to get GI for their territory. As confessed by one of the interviewees (int#52):

  > Tariş opposed this project. Therefore, we (Edremit Gulf organizations) could not manage to come together. If we could, Edremit Gulf would be a strong lobbying power. Then the southern Aegean olive oils would be cheaper…Tariş did not want to lose southern votes.

- Ayvalık olive oil GI is a PGI that foresees the origin of olives to be from Ayvalık territory and processing can be anywhere. Compared to Gemlik Olives PDO, there is not a standardization problem of Ayvalık olive oil as its organoleptic qualities are defined in GI. Besides, there exists a chemical and sensory laboratory of Ayvalık Chamber of Commerce recognized internationally by IOC. In other words, *there is not a problem arising from regional knowledge infrastructure*. There is not a problem in the stage of discriminating olive oils based on samples and giving PGI logos accordingly. However, the problem for the effective implementation of Ayvalık PGI is afterwards, when all the olive oils are on the shelves. Ayvalık Chamber of Commerce is controlling brands, which they give GI logos from supermarket shelves randomly to identify adulteration. As mentioned by the representative of Ayvalık Chamber of Commerce:

  > We have sufficient infrastructure. There is no problem for us to define origin of olive oil. However, we do not know how much olive oil exists same as the given sample. For the time being, when we confirm a sample we cannot control how much of it is the same quality. We do controls, but we should do more frequent.

- Though the qualities are defined in GI, use Ayvalık olive cultivar in all Edremit Gulf, of which Ayvalık is a part of it, is weakening the trustworthiness of Ayvalık PGI. Some of the interviewees confessed their mistrust to the analysis stage of Ayvalık olive oil and they argued, "*olive oils are produced in other districts of Edremit Gulf but Ayvalık traders use them as it were from Ayvalık.*"
- The need to increase control mechanism is arising from, as mentioned by a couple of interviewees, lack of honesty i.e. *weak soft institution problem*. There is adulteration

problem. Weak control mechanism of GTHB provincial offices is a barrier for implementation of Ayvalık PGI as well.

- Existence of Edremit Gulf PDO of Tariş has created discussions within regional actors as Tariş objected Ayvalık GI. These discussion i.e. *lack of regional collaboration* created a barrier for initiation of Ayvalık GI for a while. As can be noticed, existence of Tariş in Aegean region as a dominant regional actor is negatively affecting the use of GIs regional marketing policies of olive oil, similar to the role of Marmarabirlik in table olives GI of Marmara region.

Briefly, in olive and olive oil sectoral innovation system, there are structural problems that create barriers for both domestic and external market formation as well as regional market formation. As can be seen, some of barriers are specific to that subsector itself, but some of them are generic or arising from agricultural sector, i.e. olive production, that affect food sector, i.e. table olives an olive oil sub sectors. Some of the barriers are sources of other barriers and they reinforce each other by creating a vicious circle.

5.6 Entrepreneurial Activities Function

Structural problems that create barriers in the entrepreneurial activities can be analyzed according to

- Barriers in individual entrepreneurship
- Barriers in cooperative system i.e. collective entrepreneurship

Regarding supports for entrepreneurship, there are various direct and indirect supports for capacity building for entrepreneurship. Main supports targeting individual entrepreneurship, mainly Small and Medium Sized Enterprises (SMEs), and Agricultural cooperatives are shown in **Table 5.19**.

Table 5.19 Main Supports for Individual and Cooperative Entrepreneurship

Supporting Organization	Individual Entrepreneurs	Cooperatives
Small and Medium Enterprises Development Organization (KOSGEB)	• Entrepreneur Support • Thematic Project Support • General Support • SME Project Support • R&D, Innovation and Industrial Application Support • Emerging Enterprises Market SME Support • Loan Interest Support	• Cooperating-Leaguing Support
Ministry of Customs and Trade		• Cooperatives Project Subsidy, since 2013
Credit Guarantee Fund KGF (partnership of KOSGEB, TOBB and commercial banks)	• Collateral Support Bank credits (SMEs, young and women entrepreneurs)	
Undersecretariat of Treasury	• Credit Support for Credit Guarantee Fund, since 2009	
Regional Development Agencies	• Various financial supports	• Various financial supports
Agriculture and Rural development Support Institution (TKDK)	• IPARD Supports (for farmers who have farmer registration)	• IPARD Supports
Ministry of Food, Agriculture and Livestock (GTHB)	• Agricultural Insurance Support (for farmers who have farmer registration)	• Subsidized Agricultural Credit for Agricultural Cooperatives (via Ziraat Bank and Agricultural Credit Cooperatives)

Source: www.kosgeb.gov.tr , www.gthb.gov.tr , www.treasury.gov.tr , www.kgf.com.tr

In the following sections, *barriers* to individual and collective entrepreneurship will be assessed in a detailed manner, but briefly, *main barriers* based on interviews can be summarized as follows:

- Small scales, high costs of production and weak financial infrastructure that inhibit entrepreneurship in formal sector
- Significant size of informal market, adulteration and lack of consumer awareness that inhibit fair competition in price and quality
- Inefficient price formation and speculative price fluctuations

- Increasingly stringent food standards and controls in formal part of the sector that exacerbate costs to compete with informal part free from any control
- Underdeveloped niche markets for boutique and organic products
- Lack of human capital infrastructure with technical knowledge, or regional skills mismatch
- Regional differences in costs of production and competitiveness
- Weaknesses in design of existing government supports not so much favoring SMEs in agricultural sector and not taking into account regional disparity of sector competitiveness
- Ineffective local economic and employment development plans

Regarding weaknesses in design of supports mentioned above, based on interviewees, *barriers* that inhibit SMEs and cooperatives to benefit from them can be summarized as follows:

- Not being able to collaborate with project advisors due to weak human capital infrastructure, lack of advisors who have technical but not sector knowledge
- High bureaucracy in procedures, complicated and dispersed regulations

5.6.1 Individual Entrepreneurship

Regarding olive sub-sector, in Turkey a significant part of olive producers are still "peasants" not "farmers" with low levels of education. This is *a barrier* for entrepreneurial activities in olive sector and high end of the value chain of table olives and olive oil subsectors. Without any plans or goals for developing their productivity and quality of production, current producer "peasants" have only an economic concern of subsistence level or above.

As mentioned by an interviewee from Ayvalık region (int#45):

> Everything is money for living for them. Olive producers, peasants who transformed their vineyards, tobacco fields to olive orchards, ask himself "I am a peasant. I sow and reap. Today I sow and lose. If I will continue, what should I sow to make money?"

A farmer is the one who have a professional idea on his business and what is going in the sector, who can make productivity and cost analysis, who has an acceptable scale of production: "*Of course peasants have an economic concern. Everybody does. But a farmer is the one who can analyze this economic concern, even with a simple math calculation.*"

As result of mainly agricultural land scale problem, which is *a barrier* in entrepreneurship in agricultural sector, "*today there is not farmer in Turkey but peasants*": *"There are of course examples of transformation from peasants to farmers. However, this process is currently difficult in Turkey. It is an issue of scale. In Turkey main problem in agriculture is the scale."*

There are historical reasons of this barrier, such as political economy of Ottoman Empire that led agricultural sector to a different path compared to European countries, briefly mentioned in the chapter on historical developments. However, besides historical reasons scale problem has been deepened because of lack of relevant laws and regulations i.e. *lack of institutions or weak institutional set up* in Turkish Republic since 1920s. Fractioning of the olive orchards into smaller sizes continued since then because of weaknesses in ongoing inheritance law and the lack of land consolidation law.

Significant steps are taken in 2014 to overcome scale problem by enacting law on land consolidation. Many interviewees assessed this law as *an inducement* to agricultural sector, but they also underlined the deficiencies. *First*, it is too late for land consolidation. *Second*, it does not provide a solution for traditional regions with inclined topography. As mentioned by one of the interviewees (int#57):

> If we could have done this at the proper time, then agricultural land would be at certain scales. In the last century, there could be a soft transformation of peasant to farmer. We did not do this until now. Current efforts of the government will give results in the next 50 years. Everybody is expecting a result today. But we cannot feel the change today.

Problems in land consolidation especially in traditional olive producer regions, is creating *a barrier* for farmer registration to ÇKS system, therefore formalization of olive sector. This barrier is leading other barriers such as *first*, ineffective use of government supports by farmers, i.e. *weak financial infrastructure for farmer entrepreneurship* and *second*, enhancement of informal sector as olive producers cannot articulate in value chains formally by improving their financial situation via these subsidies. Same interviewee from Gemlik region (int#57) underlined this as follows:

> First, all the land is split in small portions. Second, most of the olive orchards of producers formally belong to father or grandfather. Besides, according to heritage law, a land below 5 decars cannot be divided. They are jointly owned lands. You cannot get registration in ÇKS system for them. There is a barrier at the very start.

Small-scale olive orchards and problems in consolidating them, partly as a result sloped topography, are increasing production costs significantly in traditional areas. As underlined by the interviewee from Ayvalık region (int#45):

> Currently, average olive orchard area in Turkey is 12-13 decars. Almost 75 percent of establishments are below 50 decars. With most optimistic probability, fifty decars is divided into minimum 4 portions. If it is 7-8 portions, producer is finished. He has to go by tractor from one orchard to another. With fuel cost of go between orchards, he could have covered other costs, tilling, insecticide and trimming, if it were a 50 decars parcel.

Small size of producers and processors is *a barrier* exacerbating the cost of staying in the olive and olive oil sector formally, therefore entrepreneurship in formal sector. They cannot use scale economies to benefit from technological improvements. Besides, costs such as soil and leaf analysis are increasing if agricultural area is divided in small portions here and there.

Existence of unregistered olive producers because of small-scale problem is deepening extends of informal sector, as "*unregistered olive producers do not care to get invoice as they do not expect to get any subsidy*." Informal marketing of olives in the hands of producers is triggering *"informal entrepreneurship"* instead of formal entrepreneurship in olive processing, as mentioned by one of branded table olive producers (int#54):

> In Gemlik, being in the table olives sector is the easiest thing. You need no qualification. You only need a weighing balance and 50 boxes. They (informal entrepreneurs) go to villages, buy olives and sell in markets. With zero capital, by tricking producers. They distort our market and lower quality. This will not end as long as producers sell olives individually. Each year a couple of us are sinking. Because there is no (formal) owner and standards of olives.

Lack of consumer awareness is *another barrier* for entrepreneurship in formal table olives sector in general and in high cost traditional regions in particular. Especially, consumer awareness is currently very important for Gemlik region, as it has to compete with other regions with same olive cultivar. One of the olive producers in Gemlik (int#56) mentioned this as follows:

> In the past, our fear was Akhisar. Now, it is Southeastern region, Hatay, Amik plains. If they were all the same quality olives. Everything depends on consumer dimension. We buy raw olives in this region at seven TL/kg and sell table olive at 15 TL/kg. There, they buy at three TL/kg and sell at 15 TL/kg. This leads to unfair competitiveness.

Low competiveness in traditional regions as a result extension of olive plantations in various regions led to vanishing of regional differences, therefore lowered the possible use of regional quality and taste differences as niche markets for entrepreneurship. According to an interviewee from gemlike (int#57):

> In Turkey, tobacco is finished and transformed to olives. Cotton has finished and transformed to olives. Now, in half of the provinces there is olive production. As a result regional differences and price scales disappeared. Now the consumer looks, is it black? Black. Is it round? Round. Is it olive? Olive. Then it is ok. What is the origin, it is unknown.

Problems in price formation and price fluctuations in the market (as a result of barriers such as existence of informal market, stocking of olives and olive oil by traders and informal producers, lack of reliable national and regional statistics on size of sector) are impeding and complicating strategic business planning. This is *a barrier* for not only seizing opportunities of entrepreneurship in formal part of the sector but also staying in the sector formally. For instance in 2014/2015 season, a low harvest in Turkey and an expectation of world price increase as a result of drought in Spain, led to stocking of olive oil by producers led to a significant increase in domestic prices.

The price of virgin olive oil doubled from 6 TL/L to 12 TL/L on average. As indicated by head of UZZK, price increases were not due to low harvesting levels, but because of speculative arguments that led to price increase expectations.

Speculation on prices and price formation manipulated by stocking is triggering frauds and adulteration of branded olive oil on the shelves. Controls by UZZK and GTHB identified "so to be olive oils" on the shelves composed of mostly cotton, canola or sunflower oil. Representative of UZZK underlined this problem, which is also a result of *lack of consumer awareness* as follows:

> There were samples with sparing amount of olive oil. This is a serious problem and it deepened this year. Consumers are buying expensive vegetable oils whereas they are assuming that they buy cheap olive oil … Consumer awareness should develop. If consumers do not demand cheap products then adulteration would be lower.

Adulteration in olive oil is a problem worldwide and not specific to Turkey. It is not easy to detect by simply looking its color or tasting it. As result of structural problems in market formation function mentioned previously (for instance weak registration and control mechanisms) scale of adulteration in Turkey is not known.

Adulteration is *first*, harming honest olive oil producers, processors and merchants as it create doubts on all business transactions and lowering trust in the sector i.e. *creating soft institution problem*, *second*, harming consumers, as they consume expensive vegetable oils instead of olive oils, and *third*, value added that created by producers are transferred to frauds.

Weak control mechanisms of government and loopholes in the distribution of responsibilities within government organizations i.e. *weak hard institutions problem* is another barrier for combatting adulteration in the sector. As mentioned by one of the branded olive oil producers in Ayvalık (int#23) region:

> Of course, olive producers can sell their olive oils in regional markets. However, there should be controls. We got four samples from Küçükkuyu regional market. Laboratory of Ayvalık Chamber of Commerce analyzed them. None of them was olive oils … One (GTHB District Office) say "it is not my duty" other (municipality) says, "It is not my responsibility". However, it is the municipality authorizing counters in regional markets. Food safety should be regulated in regional markets as food safety in firms.

Besides, control mechanism of GTHB provincial offices is mainly based on individual complaints. This complaint mechanism also does not function in small communities, i.e. in Ayvalık and Gemlik, as "*everybody knows each other*". This is also *a barrier for trust building* in sector community and weakening already weak collaborative culture in the sector.

High informal part of olive and olive oil sector, almost 70-75 % of total sector, is *a main barrier* for formal entrepreneurial activities in olive processing. As mentioned by the representative from Marmarabirlik, around 15 % of olives are purchased by Marmarabirlik for processing table olives. Remaining 85 % is purchased either by traders or in the hands of olive producers themselves for processing.

These olives do not enter formal market unless traders sell them with invoice. 60-70 % of this 85 % are not registered in the sector. This is unfair competition for registered producers, who pay their taxes regularly according to interviewee from Gemlik (int#57):

> This is harming both government and producer. In addition, the consumer. Why? He is eating expensive olives… this again comes to the government. Its control mechanisms. The 75 % of olives are informal. If it could have been formalized. We come to same point: if there could have been government support for olives.

The formal part assumes the burden of the keeping up with the increasingly stringent standards of the food sector i.e. food control and safety standards such as ISO, HACCP, cost of formal employments, etc. However, informal part is assuming none of them. This leads imperfect competition environment. This is creating *a barrier* for the entrepreneurial activities in the formal part of the sector. Furthermore, existence of the stringent control and sanction mechanism for the compliance of the formal sector to the food safety standards, but in contrast the lack of control of the informal sector deteriorates the situation for entrepreneurial activities in formal part of the sector.

One of the known olive and branded olive oil producer in Ayvalık region (int#23) underlined this barrier as follows:

> The butcher next to me is selling olive oil right now. 5 kilos of olive oil for 60 liras. We sell 5 kilos for 65 liras. The adversity is that for this 65 liras we pay 8 % value added tax and 3 % income tax withholding. Besides, as it is a registered sale we have to comply with ISO, HACCP and ensure job security. We establish infrastructure for all of these. We use automatic filling and keep olive oil in hygienic chromium tanks. In return, he (butcher) puts directly in tins.

Informal sector is the main barrier for entrepreneurship in branded segment of the sector. Representative of UZZK stressed this issue as follows:

> It is high informal market, which is the biggest barrier to develop branded segment. We consume two kilos on average. Total production is the 150 thousand tons. However, branded production is 70-80 thousand tons. This means we consume half of it informally, with low quality. 1 kilo of informal consumption against 1 kilo of branded one. This is unfair competition… Two neighbors. One is registered the other is informal. One has to assume all costs of formality, the other not. They sell at same prices. Why the informal one would enter the formal sector, is he out of his mind?

Weak food control infrastructure of GTHB is creating extra-burdens on formal producers. A table olive producer in Gemlik (int#64) underlined the effect of this on their production quality:

> We are not against control. However, we want justice. If there are 100 table olives producers, not 10 of them, but all of them have to be controlled. So that we can compete and bargain a fair price in the market that covers our costs. Currently we have to compromise quality.

The existences of structural problems that lead informality in the sector impede effectiveness of new regulations on control, such as barcode for traceability to combat with informality. New barcode system does not improve the market "*but only create extra burdens to formal part of the sector*" according to one of the olive oil producers (int#9). All of these cost burdens on formal sector is *a barrier* for entrepreneurship, as they have to compete with informal sector. According to interviews, most of the SMEs in formal part of the sector try to survive in the market. They cannot take the risk of diversifying their products or enter in niche markets segments i.e. entrepreneurship.

One of the barriers for informal producers to transform into formal entrepreneurs is their *weak financial infrastructure* arising from small scales problem. According to interviewees, p*hysical infrastructure supports* for small-scale olive producers are not effective enough to ensure this transformation.

Current government supports are not effective and sufficient to improve their situation so that they can invest in mechanization, improve quality losses arising from harvesting or processing, get more value added and have a chance to enter the formal part of olive sector according to an interviewee from Ayvalık (int#23): *"It is directly related to weak financial infrastructure. You pay 15 liras for a harvesting stick but 6.5 thousand liras for a harvest machine. Which olive producer can afford this?*"

Though existing supports of course helps producers who can afford some money, they do not favor small producers at subsistence level, as mentioned by another olive and olive oil producer from Ayvalık region (int#52):

> Today the first thing that an olive producer who earns some money is to buy an electronic olive harvesting rake. The ones that can be carried at the back. There is of course government support. However, supported harvesting rakes are 8

> thousand liras. Government supports only half of the price. You also have to pay value added tax. In fact, there are cheaper harvesting rakes in the market for 3-4 thousand liras. Government could have specified a good but cheaper one and support small producer by donating these harvesting rakes instead of giving current supports.

Government supports for olive and olive oil processors to develop infrastructure also seems to be designed for firms above medium scale, which is a barrier for SME entrepreneurship. As mentioned by the same producer (int#52), who is also one of the boutique olive oil producers with an award-winning brand:

> If you tell me to extent my production tenfold, I would not. If I do it, I cannot sustain same quality. The government (development agency) is supporting half of a 500 thousand TL investment project. If I had 250 thousand TL I would do it by myself. Why do I invest such an amount? I do not need it. Support me when I need to buy 50 thousand liras of filling machine instead of big investments. I am a boutique producer. I buy a storage tank one year and another one other year. I do not have the wish and the courage to invest 250 TLs and buy 20 tanks all at once.

Same producer also confessed that, "*they do not need supports but better control mechanism*" for both informal sector and formal sector so that they could compete by product quality improvements.

Boutique olive oil production is expensive as olive orchards are relatively small and there are no economies of scale. Boutique producers are competing against large olive oil producers who do not need to make same efforts. Besides, the difference in the cost and quantity of supermarket olive oil and boutique oil is significant: *"We are not strong enough to put our product on their shelves. They talk about 50-100 tons of olive oils on their shelves of their chains. A boutique producer with this quality cannot afford to produce such amounts."*

Proliferation of supermarkets chains is creating *a barrier* for both market formation and entrepreneurship in boutique products of small producers. They are involuntarily forced to bulk supply with informal contracting with them. Arguably, lack of regional vertical and horizontal coordination among small producers with formal contracting is *a barrier* to market entry and entrepreneurship in the high value added product area.

Another olive oil producer mentioned supermarkets' aggravating role (on market barriers created by informal sector, adulteration and weak government control) for boutique producers to establish high quality olive oil value chain and to get high value added for quality olive oils according to the producer from Ayvalık (int#23):

> If you blend low quality olive oil with high quality olive oil and get 0.8 acidity olive oil, you get the same price in the market. Supermarket chains deteriorated the situation for high quality extra virgin olive oil. They ask you to fill their bottles with olive oil. However, what kind of olive oil is this? Virgin? Extra-virgin? Each year 6-7 tons of olive-pomace oil is lost in the sector… There is lack of control. Organoleptic control.

Existing codex is defining olive oil acidity levels and organoleptic quality standards for an olive oil to be extra virgin olive oil. Organoleptic quality standards are necessary to be an extra-virgin olive oil. Although quality criteria exist in Codex it is not yet an established standard in the market as mentioned by the same interviewee:

> In the past we were initially looking at sensory quality, then go to numeric values. Now they look at numeric and do not care about sensory quality. Codex standards say olive oil below 0.8 acidity is extra virgin. They write on all olive oil below 0.8 acidity as extra virgin. To be extra virgin, olive oil first has to pass quality standards and then numeric ones.

In the market as *physical and knowledge infrastructure* for detecting frauds is not sufficient, boutique olive oil producers with high organoleptic and acidity qualities cannot get the value added they deserve compared to high costs they assume. This is of course also result of *weak market formation* for boutique olive oil producers as consumer awareness and a niche market for high quality olive oils is not established yet.

Because of *barriers* in marketing and demand, boutique producers are sometimes forced to sell their high quality olive oil bulk no matter how high its quality. As mentioned by one of interviewees (int#58) "*Even one of the international award winning olive oil producer (from Ayvalık region) was not able to sell its olive oil in domestic market. He unfortunately sold its production to a main olive oil processor in bulk*".

Entrepreneurship in high quality, branded boutique olive oil niche market is currently difficult, because of these barriers. Effective establishment of quality criteria in existing standards and prevalence of these standards in the market is primary for entrepreneurship in the high quality, extra-virgin olive oil niche market. One of the branded boutique olive oil producers (int#24) told his experience on this issue:

> I was very eager to produce low acidity olive oil. Once I got 0.2 acidity olive oil. Immediately I visited my olive oil processor friend in İzmir to verify it in his laboratory. He asked me "how much olive oil I have with this quality and what is the cost". He told me that I am crazy as I bother myself so much and the market price he gives will not be able to cover my costs. Because if he buys, he will be blending this olive oil with 0.8 acidity oil.

Same producer underlined uselessness of efforts to produce very high quality olive oil in current market conditions without consumer awareness and a niche market for boutique producers:

> It is sufficient that extra virgin olive oil you produce is flawless and does not smell bad. Are we cutting diamonds? In the end, you will be stir frying onions in it. … Once I sent 0.3 acidity olive oil to Saudi Arabia. They sent me back as they did not like it.

Organics and good agriculture practice (GAP)[73] products market for table olives and olive oils is in its developing stage. There are standards set and financial supports given by GTHB for organic agriculture and food production. Again low demand for packed products in general is *a barrier* for entrepreneurship in these niche markets. One of the table olive and olive oil producer in Gemlik region (int#64) underlined the role of demand for organic products:

> Producer looks at the price. They do not care its health benefits. They do not consume. Some of them bought half a liter for their child, not for themselves. We tried organic production and sold for two years. Price of our organic products does not cover its costs. You cannot enter the market because of this.

Stringent regulations for organic production necessitate management capabilities but lack of human capital with technical knowledge is *a barrier* for entrepreneurship in these niche markets as mentioned by the same producer:

> The procedure for organic production is complex. You have to make formal notifications etc... However, we lack human capital for all these management operations. To organize ISO, HAACP, food security… I asked technical students from technical school to train and recruit. They said ok but no student came.

[73] Good Agricultural Practices, or GAP, are production and farm level approaches to ensure the safety of fresh produce for human consumption.

Another interviewee (int#45) underlined that improving entrepreneurship in boutique olive oil niche market would be good but initially *existing barriers to mainstream market should be overcome* so that quality in olive and olive oil sector develop:

> They talk about a bottle of olive oil sold at prices 70-80 Euros in the word. But how many bottles? A thousand? It is an absurd remark. With this mentally we can neither see our problems nor produce solutions to them. This understanding saves only one person. We have 3-4 million in the sector and 400 thousand establishments. What we will do about them?

Significant regional differences in costs of olive production are effecting entrepreneurship capabilities in olive and olive oil sector at different levels. With mechanization, big scale producers in plain lands have comparative advantage in costs and opportunities of entrepreneurship compared to medium to small-scale olive producers in traditional regions. In traditional regions current topography, harvesting costs etc. are barriers so much that "*sustainable production is impossible even if they had high scale olive plantations*".

According to the interviewee from Ayvalık region (int #45), the huge regional differences as a barrier for entrepreneurship in traditional regions:

> Olive production in first class agricultural lands diminishes costs seriously. You can produce olive oil with a cost of 3 Liras. With these costs, one can compete in any market. Currently olive oil market price is 9 liras. You can profit even when olive oil price is 4 liras, depending on the scale. Currently, olive producer in Edremit basin does not have the capability to compete with a producer in Akhisar region. I cannot sell my olive oil at 15 Liras how high the quality it has.

In addition, government's investment support system based on 6 different zones defined in 2012, does not take into account olive and olive sector cost and competitiveness differences between regions. This is further deepening disparity in regional competiveness.

For instance, KOSGEB's entrepreneurship support is based on this zone system. KOSGEB provides 60 % support for SMEs in investment zones 1 and 2, 70 % support for SMEs in zones 3 to 6. Bursa province, therefore Gemlik district, is in zone 1 whereas some other olive producer provinces such as Manisa province, therefore Akhisar district, Mersin, Gaziantep, Hatay, Kilis are included in zones 3 to 5. This support system is *a significant barrier* for entrepreneurial activities in Gemlik region, which has already higher olive production costs but significantly less supported compared to Akhisar region, which already has cost advantages. One of the table olive producers form Gemlik (int#64) underlined this as *a barrier* for entrepreneurship:

> Our enterprise scale is very small compared to theirs (Akhisar). They produce in plains. Their cost of production of olives is low… For instance, I would like to by machinery equipment. I have to finance by our own capital or lease it. As we are in zone 1, it is hard to get government support. However, they get support even for a pin.

Because of harvesting costs, the profile of the farmer in the very near future is as follows as mentioned by an interviewee from Ayvalık region (int#51):

> Big scale farmers who can adopt mechanization to its land conditions will gain, medium sized farmers will struggle or hand over to big farmers for harvesting, small-scale farmers will continue if they can handle olive production with family labor. In our country, we are currently at the edge of this transformation.

In traditional regions, such as Ayvalık and Gemlik, in 50s and 60s medium sized olive and olive oil producers have accumulated significant wealth. Labor cost was very convenient for olive farming. All of the interviewees from Ayvalık and Gemlik region mentioned that "*at epoch one kg of olive oil worth one kg of cheese, meat and daily labor*". Currently, a kg of olive oil is high below the cost of labor or prices of meat and cheese.

Because of recent developments in the sector, leading to uneven regional competitiveness, second or third generations running olive oil enterprises in traditional regions who have once seen wealthy days are struggling involuntarily to continue. This is because of not only costs but also lack *of enthusiasm because of disappointment and unhappiness related to current conditions*, which is *a main barrier* for entrepreneurship in these regions.

As mentioned by the interviewee from Ayvalık region (int#51) "*Once medium or large sized family enterprises are step by step getting smaller or exiting the sector. Remaining ones are continuing for the sake of family patrimony and souvenir.* " An olive producer from Gemlik region (int#56) underlined the same problem:

> At epoch, with harvesting money we were giving wedding feasts for our children's marriages. Now, farmers do not go to village coffee house because of lack of money. There remain three of 10 coffee houses… Thanks god there are young generation working in factories. They realized that there is no use of olive production.

In traditional regions, significantly in Ayvalık, entrepreneurship is in *organization of olive production*. Some olive producer merchants succeeded creating economies of scales by leasing olive orchards of small producers. They look after their olive orchards, harvest them, give some share of olives or pay rent and by this way create scale economies for processing olive oil and table olives.

According to interviewees, entrepreneurship profiles differ in non-traditional olive growing regions. According to some of them "*as these regions recently enter the market, they have the enthusiasm and endeavor for trying new things and entrepreneurship*". There are also new plantations in regions "*who have the culture of fruit growing, such as Mut. They are inclined to olive growing and eager to devote their labor.*" However, some interviewees are pessimistic about the profile of a segment of olive producers in these regions. They underlined that they do not have olive culture but only have profit concerns, as "*new comers do not know the difference between sowing and planting. They see olive tree something like parsley. They say that they have sowed olive tree*" according to an olive producer from Ayvalık (int#27).

Briefly, type of entrepreneurs and incumbents of the olive and olive oil sector is differing among regions, which is partly a result of differences in regional productivity and competitiveness:

- In traditional regions, incumbent producers are mostly the family enterprises, who are born into olive culture and who try to continue "the culture" of olive and olive oil. They are rather trying to sustain their productivity. Some of the family enterprises are exiting the sector rather than experimenting entrepreneurial activities. Entrepreneurs in the traditional olive producing regions are either in the high end of the value chain i.e. people from big cities trying to enjoy country life and olive culture or the merchants creating and benefiting from scale economies by organizing small-scale producers and processors.
- Non-traditional regions consist of entrepreneur individuals or firms who have capital and enter the sector as they see profitability in olive and olive oil production in those regions. Most of the recent institutional entrepreneurs are in other business and may exit from the sector as they do not heritage olive culture.

As typical traditional olive producing regions, in Ayvalık and Gemlik, leaving aside entrepreneurship in the sector, new generations do not even want to continue in olive production. One of the olive producers in Gemlik region (int#56) summarized this issue as follows: "*My daughter does not know the borders of our olive orchard. After me, they will sell or find somebody to look after it. In fact she has capital, tractors, everything to continue.*"

As mentioned before, olive producers in these two regions assume high costs of production. In addition to low competitiveness because of high costs, due to lack of effective regional planning, sustainability of olive production has further deteriorated. Therefore, inefficient regional plans and programs that do not take into account regional differences in competitiveness, capabilities and infrastructure has been *a barrier* for entrepreneurship of the new generation.

In Ayvalık, tourism sector has been a main threat. Most of the olive farmers sold and still selling their olive orchards for residential building construction. Because of weaknesses in regional urban planning and weak municipality enforcement favoring construction sector for rent seeking, seasonal touristic residential buildings invaded Edremit Basin, including Ayvalık. The interviewees from Ayvalık region (int#51) underlined that:

> We all get angry that farmers sell their olive orchards. However, when we take into consideration their difficulties, our conscience accepts their legitimacy. If we were in their position we could have act the same. Besides, surrounded with buildings it is impossible to continue olive production… We have to have regional plans to sustain olive producers in the region.

In Ayvalık, there are no other dominant industry or agricultural sector, but mainly tourism and olive sector, for earning livelihood. In fact, if there has been a good regional planning, opportunities in both tourism sector and olive sector could been developed simultaneously. Because these two sectors complement each other, as olive harvesting is in winter season, when tourism season is over or vice versa. Local employment opportunities and economic development could have been planned accordingly.

Gemlik is also at the seaside like Ayvalık. In 1980s, as in most of the seaside provinces in Turkey, residential buildings invaded also Gemlik coastline a result of weaknesses in regional planning. Most of the olive orchards have disappeared at that epoch. Currently in

Gemlik, not tourism sector but industrial sector is the main threat to olive production. There are many industrial plants and factories in vicinity of Gemlik. Currently, selling of olive orchards is continuing, as mostly new generations prefer to find a job, even an inferior one, instead of being a farmer.

In fact, there are agricultural technical schools in both Ayvalık and Gemlik that could constitute *regional human capital infrastructure to* sustain olive production and processing sectors. As mentioned before, there also seems to exist demand of olive processing firms for technical schools graduates. There is arguably *regional skills mismatch* because of lack of effective local employment and economic development plans. As mentioned by the representative of Uludağ University (int#55), who is also an instructor in Gemlik vocational school:

> Students of agricultural schools should primarily be selected from farmer families. There is no real vocational guidance. Our students lack enthusiasm. They do not want to go on the job training. Therefore, we cannot initiate collaborative working with the sector. If students were ambitious, in fact in the region there are leading small sized processing firms those are on the way of being a brand.

Existence of employment opportunities in industrial sector in Gemlik region is leading mobilization of agricultural labor to that sector. Also farmer families in Gemlik regions seems to be supporting their children to work in industrial plants as they do not see future in olive sector because of high costs. Vice versa is also true. Because of high costs in the olive sector, farmer children inevitably need to work there to sustain their living.

The role of municipality is important for regional planning, infrastructure and capacity building. With a law enacted in 2005 municipality levels has been redefined. Most of the villages governed at municipality level have become quarters of municipalities. This law have pros and cons. Nonexistence of village municipality as an autonomous decision making unit and being a quarter in a district is *a barrier* for consensus building as underlined by representative of development cooperative of Umurbey (int#56):

> When the village was a municipality, everything was fine. Everybody in the municipality management was farmers, olive producers from village. We were able to do something collectively for our village… Now, it is not the same with district municipality. They do not have our concerns but only seek for profit.

5.6.2 Collective Entrepreneurship and Cooperative System

In olive and olive oil sector, in order to overcome small scales problem and create economies of scale, institutionalizing cooperatives is a solution as in most of agricultural and food sectors. For instance, by creating economies of scales, Sales Cooperatives Union Marmarabirlik and Tariş were able to diversify their product range by entering in niche markets such as organic production.

Though legal infrastructure of cooperatives has been significantly restructured to improve cooperative system in the last decade, *main barriers* to cooperative system, i.e. collective entrepreneurship and market formation, can be summarized as follows:

- Weaknesses in government regulations related to cooperative system
- Weak human capital infrastructure of cooperatives as a result of low literacy and education among farmers
- Weak ownership of cooperatives by farmers and weak institutionalization
- Low trust to cooperative system as a result of learnt lessons from cooperative experiences of the past
- Inefficient government supports not taking into account structural weaknesses in olive sector
- Existing weaknesses in current organization structure of Sales Cooperatives and Unions

Agricultural unions and cooperatives that are related production processing and marketing in olive and olive oil sector are included in **Table 5.20.**

Table 5.20 Cooperatives related to olive production, processing and marketing

Type	Regulating Ministry
Agricultural Producer Unions	Ministry of Food, Agriculture and Livestock (GTHB)
Development Cooperatives	
Sales Cooperatives and Unions	Ministry of Customs and Trade

Source: Authors compilation

There are *irrigation cooperatives* and *agricultural credit cooperatives* under the responsibility of GTHB, which are also related to physical and financial infrastructure of olive sector.

In Turkey, agricultural cooperatives system had significant weaknesses in the past. In order to improve them government took some steps in the last decades. Main initiatives of government can be briefly summarized in follows:

- Agricultural Sales cooperatives and unions (Marmarabirlik, Tariş), which were functioning as administratively related and financially dependent to government, have been restructured as autonomous entities in 2000. Their accumulated debt to government has been restructured.
- Legal infrastructure for agricultural producer unions has been established with a law enacted in 2004. Before then, there was no regulation on agricultural unions.
- In 2012 “Turkish Cooperatives Strategy and Action Plan 2012-2016” has been launched with coordination of Ministry of Customs and Trade.
- In 2014 in order to further improve functioning of sales cooperatives and Unions, “Principal Agreement” between sales cooperatives and unions, sales cooperatives and farmers that define relationship between units and functioning of the system has been restructured by Ministry of Customs and Trade.

Though these steps seem as inducements to system, there are *significant barriers arising from structural problems in the cooperative system* that still inhibit its effective functioning for collective entrepreneurship.

Regarding regulation on agricultural unions, because of bad design of related law, agricultural unions system is, “dead born” i.e. there is *weak hard institution problem*. There are significant responsibilities assigned to producer unions, but relevant revenue sources for a relevant financial infrastructure so that these unions can function is lacking in the law. Besides, some of the duties that are defined in the law are assessed to be unrealistic, given the capacity of agricultural producers. The cause of these weaknesses in the law seems to be *weak interaction of government* with related NGOs and not efficiently taking into account of their views during the preparation of the draft law.

As mentioned by most of the interviewees, o*ne of the main barriers* for institutionalization of agricultural cooperatives in general is *weak human capital infrastructure*. For instance, even though olive production is the main livelihood in Ayvalık, there is no olive producer union there. In Gemlik there is olive producer cooperative but it is on the paper and does not function, as confessed by olive producer, once head of this cooperative. It was established in order to initiate Gemlik olive geographical indication.

An olive producer from Ayvalık region (int#49) underlined human capacity problem:

> In my opinion, socio-economic and cultural levels of producers and farmers are low. We have tried producer cooperatives in animal husbandry in Altınova, Gömeç. They still exist but not efficient in the sense of generating collective power. We cannot succeed institutionalizing cooperatives. In time, these organizations become politicized.

Representative from Agricultural Chamber of Gemlik (int#31) also underlined this "politicization problem" mentioned by various interviewees as a general *barrier* for collective action: "*Each cooperative management election processes as a political election. They continue to elect people who are no use to them. Participation of producers is weak and they do not act for their benefit.*" Because of this fact, there is *weak trust* to cooperatives i.e. *soft institution problem* as producers think that the management seek their self-interest.

According to interviewees, *weak financial infrastructure* of cooperatives in general is *another barri*er for their functioning. As farmers are small-scale producers at subsistence levels, agricultural cooperatives' financial infrastructure is weak as well. There are supports and initiatives of government to overcome this barrier. However, partly from the design of supports, partly from small-scale problem, weak financial infrastructure problem of farmers is not yet overcome. Marmarabirlik representative (int#57) underlined the barriers for functioning of these supports because of very small scales of producers:

> Marmarabirlik has signed a protocol with Ziraatbank (agricultural bank) to get credits to its members. The first aim was to make olive purchasing payments via Ziraatbank. Secondly, the bank was giving subsidized credit to producers. Government is financing 50 % of these credits. We wished to open a subsidized

> credit account to each member. However, our members could not afford it. First, most farmers are indebted to other banks. Second, the bank wants farmer registration ÇKS. Third, it requires agricultural insurance. Most of them have neither ÇKS nor insurance.

Agricultural insurance system (TARSİM) has been launched in 2005 to protect producers from natural disasters. This is a very good development for olive production as in the last decades due to changes in climate there have been significant losses of producers. However, *small scale of producers is a barrier* for benefiting from subsidies as well as TARSİM according to the same interviewee (int#57):

> Tarsim is a significant cost to farmers. We (Marmarabirlik) made an agreement with Tarsim so that producers get insurance for 1 decar of land. Besides, producer gets subsidized credit via Ziraatbank and in kind support for fuel by delaying payment. Only some of the producers managed to apply. Farmers cannot succeed because of small scales. If the scale could have been higher, this system would function well.

Other than government, supports there are agricultural credits of banks for farmers and cooperatives. But producers do not have the courage to get financial support from banks for new initiatives because they are afraid of not being able to pay as "*they are indebted either to a private bank, agricultural credit cooperative or development cooperative*" as mentioned by the representative of development cooperative of Umurbey (int#56).

Cooperatives cannot benefit fully from supports of KOSGEB or Regional Development Agencies mainly because of *first,* lack of human capital to manage procedures and *second,* weak financial infrastructure.

In other words, these supports are not designed by taking into account of weaknesses in agricultural sector. As mentioned by the representative of Umurbey development cooperative:

> These cooperatives do not have real staff. Everything is honorary. I myself did not get payment for years. Supports are good. However, they have stringent procedures. You have to hire an advisor. Organizations like development cooperatives do not have the capacity to handle these procedures.

The representative of Ayvalık Sales cooperative (int#50) also underlined the same problem of human capital:

> I am the manager, legal advisor, head of personnel, social security advisor of this cooperative. I deal with everything. We had a project financed by development agency. For many nights I dealt with reports that development agency required for

> the project. Project guideline is almost a book. It is hard to find what you need in it. We appointed an advisor. He knew the procedures but not the sector. I myself had to write reports.

It is mentioned that hiring advisors to get these subsidies is another *barrier* for benefiting financially from rural development and regional subsidies as it costs to them significantly.

Lack of initial capital because of weak financial infrastructure of cooperatives is a *barrier* for collective entrepreneurship, as underlined by the representative of Ayvalık Sales Cooperative: "*We have financing problems. Cooperative board of directors has to show their personal wealth as collateral to get loans or subsidies. There should be easier financing opportunities for cooperatives*.

Representative of Umurbey Development Cooperative underlined this problem as follows:

> The cooperative does not have anything to give as collateral. They ask for my property registry. When I ask why, they say it is for the risk of cooperative bankruptcy. I have been pursuing this mission for years voluntarily, for the good of olive producers in the village. However, I want to quit. Why? I am afraid of personally assuming financial burdens.

Some of the procedures of supports are *a barrier* for cooperatives to benefit from these supports, because of lack of initial capital because of weak financial infrastructure. For instance, this is the case related to infrastructure subsidies of development agencies, as mentioned by the representative of Marmarabirlik (int#57):

> Previously development agencies were financing 50 percent of project at the start of the project. They changed this procedure 5-6 months ago. Now you have to finance whole project yourself. When you get the license after completing the project, they pay their subsidy in the following 3 months.

Furthermore, bad cooperatives experiences and bankruptcies of the past, *arising from weak human capital infrastructure of cooperative management*, is negatively effecting the cooperative perception of the farmers and members as mentioned by him (int#57):

> M… village cooperative has been a bad example for development project application. They bought land for infrastructure project with credit. The credit was on cooperative members. The agency support for the project was over, but debts were not covered. Now whole of the village is under debt enforcement.

This *learnt perception leading to weak trust to cooperatives*, i.e. *weak soft institution problem*, is weakening participation to cooperatives as a member and weakening the sense of ownership of the cooperative by the members, as mentioned by the representative of development cooperative of Umurbey: "*There is fear in the village. Fear of what if the cooperative bankrupts. They expect every support from our cooperative. In return, they do not bring their olive harvest to the cooperative. Besides they are not loyal to their debt to the cooperative.*"

In addition to bad experiences of cooperative management, because of long decades of government intervention, farmers still do not have consciousness of ownership of the cooperatives and collective action spirit, i.e. *soft institution problem*.

As mentioned by the representative from Marmarabirlik:

> In this region, farmers see cooperatives as government. Whether it is development, producer, or sales cooperative, it does not matter. They just want to give their product and get their money in return. Other than that, they do not have the intention of dealing with the cooperative… A perception of cooperatives is established after a long period of government intervention. It is hard to change this perception.

Currently, sales cooperatives and their unions, Marmabirlik and Tariş, are the main cooperative system that has significant weight in olive and olive oil sector. Therefore, effective functioning of them is important for collective entrepreneurship and marketing functions.

Legal infrastructure of agricultural sales cooperatives and unions has been established by a law enacted in 1935. Therefore, history of table olives and olive oil sales cooperatives unions, Marmabirlik and Tariş, goes back to beginning of 1940s. Since then until change in law in 2000 that allows them to act autonomously with private structure, Marmarabirlik and Tariş were managed as government organizations. As mentioned previously, "Principal Agreement" that sets rules on functioning of and interactions between sales cooperatives and unions has renewed in 2014 so that they can function as a private corporate.

There are many changes introduced by new "principal agreement". Most important changes are the ones that target to overcome previous bad management problems. It foresees establishment of board of directors that come by election to prevent ossification and politicization in the management, inclusion of the manager of the cooperative in board of directors, prerequisite for at least two members in the board who have university degree to overcome low skills problem in the management. These are all inducements to organization and capacity development of cooperative system.

As underlined before, there are still reflections of being under government control for almost 60 years. Even though there has been more than a decade that sales cooperatives have private statue, farmers still see sales cooperatives as government organizations apart from themselves. They are accustomed to get prices for their olives set by the government. For years, these prices have been a tool of populist policies of governments before political elections.

Regarding above facts into consideration, *barriers* to the functioning of current cooperative system can be summarized as follows:

- Farmers that are members of the cooperatives have not accumulated relevant knowledge on what they should expect from a cooperative system and how a cooperative should be run for improving collective benefits.
- It was always the Unions, who managed and decided on all the issues related to sales cooperatives. Sales cooperatives always acted as intermediate agents between farmers and Unions. Sales cooperatives buy raw olives from member farmers and Unions process and market these olives. Dependent nature of sales cooperatives to capacity of Unions inhibited them to develop relevant *organizational knowledge and physical infrastructure* for corporate management.
- Even though new principal agreement foresees sales cooperatives to act as autonomous entity they could not yet transformed into a corporate entity as also underlined by the representative from Ministry of Customs and Trade (int#28):

  > Legally they are autonomous entity. However, they do not yet become autonomous. They still act as purchasing agent of Unions. In Europe, cooperatives decide on their price and purchasing policies. They sell olives to Unions with value added. This is not established in our country yet.

- There is a*sset specificity* between sales cooperatives and unions. The Union owns the assets of sales cooperatives. New "principal agreement" requires both sales cooperatives and unions to act as "prudent merchants". However, because of dependency on Union's assets, it seems difficult for sales cooperatives to institutionalize, break free from Unions on management issues and transform to an autonomous corporate. As mentioned by the representative of Gemlik Sales Cooperative (int#32):

> This building of the cooperative, these olive warehouses, everything belongs to the Union… Board of directors of the cooperative assumes all responsibility of these transactions. We sign billions of olive purchasing. However, as the head of this cooperative I do not have the authority to buy a computer by myself. I am entitled up to one thousand liras of transaction. We have to ask the union and they have to authorize us.

As experts related to legal issues, accounting etc. are recruited in Unions, sales cooperatives are dependent on human capital of Unions when a problem arises, which is again *a barrier* for knowledge and skills development in sales cooperative. Representative of Ayvalık Sales Cooperative underlined this issue:

> I am not capable of knowing everything. There is legal advisor of the Union in İzmir. I always try to get his advice. Sometimes we need his advice immediately, but he may be busy… Regulations are changing so much. We sometimes cannot keep up with how and what to follow up.

- *Established practices i.e. soft institutions* are also a barrier that slows down transformation of cooperatives to autonomous entities.

  Even though cooperative members decide on the members of board of directors of Unions, there is *habit of obeying Union's instructions because of established perception among cooperative members that Union is superior to cooperatives*. This is *a barrier* for capacity development and autonomous functioning of sales cooperatives. As mentioned by representative of Gemlik Sales Cooperative (int#32):

  > There is chicken or egg problem. Cooperatives compose Unions. We select the Union's board members. However, it is surprising that they try to impose on us. Our (Sales cooperatives) members do not defy. Because otherwise there would be friction.

- Though new "principal agreement" aims cooperatives to act autonomous organizations, rearrangements in the agreement in fact do not fully allow them to be so. There are weaknesses in regulation i.e. *hard institution problem.*

  In the agreement, there is the statement that "*cooperatives have to obey Union's instructions during product purchases unless these instructions contradict principal agreement rules or good intention*". This rule is empowering the Union to set purchasing prices, enduring already weak statute of cooperatives against Unions in acting autonomously.

Representative from Customs and Trade Ministry also admitted, "*Principal agreement has been renewed taking into consideration that Unions have accumulated better management and marketing capabilities.*" In the short term, better management skills of Unions that compensate weaknesses in sales cooperatives may help effective functioning of the cooperative system by saving the day. However, in the long term this is *a barrier for organizational capacity building of sales cooperatives and to effective functioning of whole of the cooperative system.*

- Perception of Unions that they have the right to govern sales cooperatives continues as in the past. The interaction between sales cooperatives and Unions seems to be weak because of dominance of Unions in the cooperative system. Besides, Unions are the ones who interact with government and other organizations on behalf of whole of cooperative system. Therefore, weak interaction within the system is *a barrier* for knowledge flow from bottom up, from sales cooperatives to unions and other related institutions. As underlined by the representative of Ayvalık sales cooperative:

  > When Sales cooperatives Unions were being restructured, they (government experts) declared us what to do. We told them that their proposal would not function; it would stay on the paper. It may be rational for them, but you cannot apply what they say in practice… Same problem during renewal of principal agreement of sales cooperatives. We were not included in drafting. The Union dealt with it. They asked our opinion after it was legalized. We (sales cooperatives) know application. I wish we could have told our opinion beforehand.

- New "principal agreement" is designed regarding problems in functioning of agricultural sales cooperatives and Unions of all products. It does not take into account product specific problems. The representative of Marmarabirlik underlined this issue: "*Marmarabirlik has excess supply. However, Trakyabirlik (sunflower union) has deficit. Law on principal agreement is too broadly designed. Some of the clauses of the agreement are in favor of them and some others are in favor of us.*"
- Differences in olive purchasing system of Marmarabirlik and Tariş sales cooperatives is a *barrier for* creating economies of scales by cooperative system in olive and olive oil sector as a whole.

Olive oil sales cooperatives of Tariş either buy raw olives for processing or olive oil from its members. They also process olives and return olive oil to its members if they demand so. This purchasing system is deepening problems in the sector arising from small scales and informal sector. In fact, Tariş has to purchase only olives and plan whether to produce olive oil or table olives.

Marmarabirlik's sales cooperatives olive purchasing system is more effective than Tariş as they purchase raw olives only. The problem Marmarabirlik's system is that as there is over supply in their region, they have to put purchasing quota because of their capacity limits.

- Eastern Mediterranean Olive Union (Doğu Akdeniz Birlik) and Southeastern Mediterranean Sales Cooperatives Union (Güneydoğu Birlik), which have had smaller scales compared to Marmarabirlik and Tariş until last decades but have potential to improve scales with newly established olive plantations in their regions, are still in infancy of their institutionalization process in olive sector.

5.7 Lobbying Activities Function

Lobbying power of a sector is an important tool for legitimization of the sector and enforces changes in standards, rules, regulations etc. so that the sector can sustain, with high productivity and improved quality of products. Lobbying function can be assessed at different sectorial levels:

- Lobby power of olive and olive oil sector as a whole
- Lobbying within olive and olive oil sector

Agricultural sector in Turkey, therefore olive sector, has *weak lobbying power* because of main barriers that can be summarized as below:

- Very long term economic returns of olive sector compared to other sectors
- Strong rent-seeking culture for the short term
- Weaknesses in governance capabilities of government
- Small scales, high costs, low economic returns in traditional olive producing regions
- Weaknesses in institutionalization and reach capacity of NGOs due to lack of financial infrastructure
- Weak collaboration culture in general

As typical of an agricultural sector, long-term nature of economic and social contribution of olive sector is weakening olive sector's lobby power against other sectors with shorter economic returns that contest for the same land. At this point design of government policy is important for complementing this deficiency and sustaining viability of agricultural sector. According to interviewees, currently, weak governance capability because of rent seeking behavior of government is *a barrier* for olive sector. One of the interviewees from Ayvalık (int#26) underlined these *barriers* for lobby power of olive sector as follows:

> Lobby power of energy and mining sectors is high above ours. They have the money. This is the first issue. Secondly, we contribute to economy in very long terms. With small contributions, but continuously for hundreds of years… Existing view of current government cannot resist projects that bring money in the short term.

Furthermore, not only in regards to government but *strong short term rent-seeking behavior in general* is a barrier for lobbying function i.e. there is *soft institution problem*:

> People can easily risk big scale nationwide costs for the sake of their smallest individual benefits. Most of the NGOs on the line of new highway construction from İzmit via Gemlik, Orhangazi and Bandırma to İzmir are in favor of changes in olive law. One decar of land that worth 8-9 thousand liras will go up to 165 thousand liras. They cannot resist when they see this rent. When the issue is economic rent, it is the same attitude at the Aegean coastline. Olive orchard prices in Cunda Island increased significantly… For these people the harm they give is no importance but short-term economic rent. They have the same view of government.

Current problems of olive producers such as high cost, small scales, low economic returns etc., mentioned in the previous parts, are leading them to assume this attitude as they have lost their enthusiasm to continue in olive sector.

In 2014, one of great challenges for olive sector has been the proposal on changes in on the law no 5373 on olive culturing and vaccination of wild olives that has been enacted in 1939 and modified in 1995. This law has been a significant legal protection for small-scale olive orchards. The law defines 10 decars of olive plantations as olive orchard. It forbids any industrial construction, other than olive processing plantation, in 3 km vicinity of olive orchards. The law also gives right of presenting permission for construction of olive processing establishment in this vicinity to GTHB. Furthermore, the law only permits 10 % of olive orchards within municipality administration to be open for residential construction.

One of proposals was to change definition of olive orchard to 25 decars of plantations. Furthermore, proposal was foreseeing opening of olive plantations for mining and energy sector. This proposal was threatening most part of olive production areas in traditional regions to most part of olive plantations were below 25 decars. Especially it would led almost extinction of olive production in Edremit Basin, of which Ayvalık was a part of it, as the territory is very rich in gold and coal mines. This proposal of changes in the law aroused frustration and indignation in olive and olive oil sector. After a significant time of discussions and resistance of the sector representatives change proposal has been suspended.

This proposal was not the first attempt to change the law and there have been some attempts in the last decades. The latest proposal has also revealed the structural problems that inhibit lobbying activities of olive and olive oil sector.

According to interviewees, unequal policy stance of government with an attitude of favoring energy and mining sector is *a significant barrier* for olive and olive oil sector in performing lobbying activities in equal platforms with other sectors. Changes to the law has been proposed and presented to National Assembly commission by the Ministry of Energy and Natural Resources. Non-existence of the Minister for GTHB during the sub-commission discussions and approval of proposed changes to the law by GTHB representatives are evaluated as significant indicators of *weaknesses in governance mechanism*. According to the interviewee from Ayvalık (int#26):

> Approval of anyone who is in relation with agricultural sector or an agriculturist should be impossible, as this would be a suicide for agriculture. However, when it is an issue of economic rent, all eyes are shut down….It is a shame that Ministry of Agriculture approved this proposal to change law. However, this is badness of bureaucracy. This is a decision given under pressure. This system has to change.

Another interviewee from Ayvalık region (int#25) underlined government's unjust attitude as *a barrier* for their lobbying activities as follows:

> There is signature of prime minister under the change proposal with his instruction to "solve this problem". This is very dangerous. We (sector representatives) do not have the right to present our views in National Assembly sub-commission… We can lobby and contest against vegetable oil sector at the same platform via price and quality competition. However, we cannot struggle with other party (government).

Some of the interviewees mentioned how the draft law is far away from rationality. For them, it is for sure that there could have been found a common ground for solutions to answer needs of both olive sector and energy sector. However, there has been no discussion platform inclusive of sector representatives for designing changes in the law for the good of all sectors i.e. *weak interaction problem*. Lack of attitude of government for consensus building is *lowering level of trust for governance capabilities of the government* according to interviewee form Ayvalık (int#26):

> They (Ministry of Energy) propose 25 decars as there is a 23 decars of olive plantation in vicinity of Akkuyu nuclear plantation. This is a proof of how far away from a scientific base this proposal is, how malicious it is. They could have taken the view of Ministry of Agriculture beforehand. Then the Ministry could have developed a rational solution for the common good. Some part of olive plantations could have been sacrificed if necessary…But current state of proposal can lead extinction of olive sector.

Regarding the lobbying power of Cooperatives Unions, it is underlined by the same interviewee that government attitude has an intimidating effect on lobbying activities of Unions i.e. there is *soft institutions problem*: "*They of course lobby for olive sector. They are sufficiently against the unfavorable changes in the law. But with fear of government they do not confront explicitly but take roundabout ways.*"

For some of the interviewees ossified management of sales cooperative unions locked into certain views and not capable of transforming themselves has been another *barrier* for lobbying activities of olive and oil sector as a whole. Management and head of Marmarabirlik has been renewed during recent regulation changes. However, current head of management board of Tariş has been in charge for decades and is called "plane tree".

Existence of same management in Unions has pros and cons. Stability in management of the Union for a period is good for organizational knowledge accumulation and capacity building. However, stability of the same management for such a long time may arguably creating *cognitive lock-in situation and myopia problems i.e. soft institution problem*. As sales cooperative Unions are main players in the market, their flexibility to open themselves to new ideas in the sector and capability to transform themselves accordingly are necessary attributes for effective lobbying activities coherent with needs of the sector, therefore functioning of the innovation system.

One of the reasons for ossification of cooperative management is non-inclusiveness of members of cooperatives actively and effectively in the management. This has many reasons, occasionally mentioned in previous parts before as barriers to other functions as well: such as lack of ownership due to small scales, low education, low trust to cooperative system due to learnt lessons… etc.

Regarding the lobbying power of NGOs, as already mentioned in previous part, *weak financial infrastructure* is the main barrier for them to assume an effective lobby function. UZZK has a significant mission in lobby function as lobbying is its “raison d'être”. Almost all interviewees underlined establishment of UZZK as a framework organization has been a benediction for the sector, but also confessed its inability to institutionalize and assume its role because of lack of finances i.e. *financial infrastructure problem*. Representative from UZZK has openly stressed this problem:

> We have not established our institutional identity on firm grounds yet. Unfortunately, it is due to unavailable finances… It is a fact that the Council needs continuous income. Otherwise, you cannot do much for the sake of institutionalization.

Lack of finances is arising from weaknesses in government regulation related to establishment of agricultural product council i.e. *weak hard institution problem*. One interviewee (int#25) summarized the problem as follows:

> Currently everybody in the sector reached a consensus that UZZK is framework organization of the sector. UZZK has all the gears needed. However, the problem is source of finance. It lacks in the regulation… It is hard to pay voluntarily. It has to be regulated by the law...Everybody in UZZK is dedicatedly working. But they need a source of finance.

Weak financial infrastructure of UZZK is causing members of management board to finance their activities by themselves or be dependent on financial resources of other actors. This is a *barrier* for effective functioning of UZZK as this lack of finances is arguably creating *asset specificity problem* harming neutral stance and equal distance of UZZK to actors in the sector. Even it is not the case; it is weakening its credibility as a framework organization and trust of sector actors. This *asset specificity problem* is not only a barrier for institutionalization of UZZK but also for its neutral stance as it could force it to take side of financing actor.

According to interviewee from Ayvalık (int#26) "*If someone finances UZZK, let say Tariş, then UZZK would abide by and defend what Tariş approves but not for the good of the sector…There should not be gratitude of UZZK to anyone in the sector. UZZK should be objective.*"

Weak financial infrastructure, and therefore lack of recruitment of relevant staff, is effecting reach capacity of UZZK to all olive producing regions. This situation is *a barrier* for establishing sufficiently strong ties with regional actors to institutionalize as a framework organization inclusive of all olive producing regions. In other words, there is *weak interaction problem because of weak ties* as result of *weak financial infrastructure* and *weak human capital infrastructure*. These *barriers* are not only limiting its lobbying activities in reflecting needs of the sector in a balanced way, but also *weakening confidence* of some actors to UZZK as a framework organization.

Though it is a common view that existence of UZZK as framework organization has been what the olive sector always looked for, it is also confessed by some of the interviewees that they cannot feel its regional existence. This is the case for Gemlik region, for instance. However, they feel the distance of not only UZZK but also Zeytindostu organization as well. As already mentioned in knowledge diffusion function, UZZK organized as sub-committees so that it could reach all representatives of different actors from all regions. This organization seems to not effectively functioning is as mentioned by an olive producer and head of development cooperative "*it does not seem to function as a genuine product council and has a very bureaucratic organization.*"

This sense of bureaucracy is arising from current centralized management of UZZK. One of the interviewees (int#1) underlined this as *a barrier* for proper functioning of UZZK:

> If head of a factory assumes every function, that factory does not operate… Managers of UZZK should not aim to exercise control on everything. They have to devolve authority to sub-committees. This is vital so that members take possession of sub-committees and UZZK functions as it should.

Weak reach capacity of UZZK to voice regional problems is remarked by one of the branded olive and olive oil producer from Gemlik region (int#63) as follows, who underlined urgent need to establish a regional olive council:

> Only in our region, there is hundred percent Gemlik type olive cultivar. In other regions, you can find other cultivars. They are mixed with each other. Our olives are special. However, there has been low production consecutively for 3 years. Now for 2015 we again expect low production due to freeze…We need to establish olive council in this region. A council, which will bring all related organizations together for innovative solutions. We need support for olive production. We need functioning of geographical indicator. We need preventing informal production… We need olive council.

According to most of the interviewees, acting individually rather than interaction in our culture is *a main barrier* for collective action in general. This seems to *a barrier* in lobbying function as well. As mentioned by one of the interviewees from Gemlik region, NGOs such UZZK, Zeytindostu or others "*do not function because everybody is saying me first*".

Another interviewee from Gemlik region underlined *weak capability of institutionalization of regional organizations because of weak human capacity inhibiting collaboration*. This is *a barrier* for not only nationwide but also region wide lobbying activities according to interviewee from Gemlik (int#53):

> Everybody wants to be head of an organization. You ask yourself what will be the contribution of them to that organization. They do not assess themselves critically. They deem themselves worthy. Are you competent enough to be a manager? Do you know anything about olive sector? Do you know the statistics? You should initially be capable of seeing problems so that you could produce solutions. We have to discuss whether these people contribute or take away from these organizations. As there is no mission and vision of these organizations, there is no interaction between them. Because there is no good management, so that collaboration could happen.

An olive and olive oil producer from Ayvalık region (int#25) also underlined culture of individual action as *a barrier* for collaboration for lobbying activities:

> In this region, unfortunately, there is no institutionalization and collaboration. Without institutionalization, regional firms remained weak… the cause is being self-centered. My olives, my olive oil, my etc. There is no desire for collective gain… Maybe it is the fate of these lands, I do not know. This region is on Aeolian lands. At epoch, ancient Greek polis in this territory could never succeed to collaborate as well.

In the last decades, *the main barrier* for lobbying activities in olive and olive oil sector was the incapability of actor groups in the sector and NGOs to come together and form consensus on sector's needs. There has been strong disagreement and struggle among main NGOs of olive and olive oil sector. Disharmony among sector actors accelerated with the establishment of UZZK in 2007 as a framework organization. There have been two significant parties of this struggle: namely, UZZK on one side and EZZİB, ZZTK and Zeytindostu on the other side. The main disagreement issue was whether to introduce inward processing regime[74] (DİR) in olive and olive oil sector. Olive and Olive Oil Exporter Union (EZZİB) was supporting launch of DİR so that they can continue when olive oil lack in domestic markets. UZZK was against DİR with an argument that it would harm domestic olive and olive oil producers who were already at subsistence levels. ZZTK and Zeytindostu, which were on the side of EZZİB, were blaming UZZK to be the voice of cooperatives Union Tariş, as head of UZZK was primarily worked for Tariş. UZZK management was blaming Zeytindostu management to be the voice of EZZİB. And so on. The main NGOs, UZZK and Zeytindostu, who should go hand in hand to lobby for olive and olive oil sector were not coming together literally, in any occasion related to the sector, whether it be olive festival or a technical workshop.

In 2014, these arguments ended as management of UZZK, EZZİB, ZZTK and Zeytindostu, all changed. New management of EZZİB announced that they are no more supporting DİR and made their ceasefire visits to other NGOs. One of the olive producers from Ayvalık region (int#26) summarized the situation as follows:

> A good thing happened in our sector. Head of EZZİB has changed. New EZZİB management volunteer to work more harmoniously thanks God. Zeytindostu was under the guidance of previous management of EZZİB. Both Zeytindostu and EZZİB gave harm to sector for the sake of their self-interests. It has changed now. Fight is over.

Of course, DİR issue could have been discussed by sector actors. However, it could be in a constructive way. In fact, one of sector actors interviewed underlined how hard for exporters to sustain in foreign markets because of significant fluctuations in production levels and prices. A compromising solution could have been reached under the aegis of Zeytindostu and UZZK.

[74] İn Turkish “Dahilde İşleme Rejimi”. Currently, as of 2014, it is forbidden to import olive oil from abroad to process and re-export within the framework of DİR.

Actually, the real structural problem creating *a barrier* to both UZZK and Zeytindostu for fulfillment of their unifying and consensus building role in the sector was in fact their *weak financial infrastructure*. Due to their dependence on financial resources of other actors i.e. *asset specificity problem*, they could not be able to institutionalize and establish their nonpartisan stance in the eyes of other sector actors. The friction is over not because Zeytindostu or UZZK succeeded in consensus building, but EZZİB ceased fire on DİR discussion. As long as *weak financial infrastructure problem* of UZZK and Zeytindostu is overcome, primary function of UZZK as a framework organization and Zeytindostu as a watchdog will be under stake. Therefore the lobbying activities of olive and olive oil sector.

Though most of the actors assessing this peace environment as a great improvement, some of them remarked that it would take some time to see whether the fight is really over. One of the interviewee from Ayvalık region (int#52) underlined that "*we ended the struggle between actor groups. But we could not established solidarity among sector actors yet.*" Another interviewee from Gemlik region (int#63) told, "*It was better in the past as they were discussing openly, in front of us. But now undercurrents of counter actions are going on, I believe.*"

Acceptance of UZZK as a framework organization was not an easy process because of lack of collaborative environment in the sector. The interviewee, who is also member of management board of UZZK (int #25), underlined its difficulty:

> We have struggled with different parties who were against UZZK. It was very tiring. I hope that it will better in the coming days. However, there is no real change right now… Can you imagine that, Tariş, İzmir Trade Chamber, EİB and UZZK, we all were announcing different harvest projections separately? It was such a disorganized environment…When we succeed to overcome individual self-interest, everything will be much better.

The divided nature and lack of unified voice of the sector has been also *a barrier* for the government to decide on whom to listen and what to do for the good of olive and olive oil sector. Lack of consensus among sector representatives, in turn, *a barrier* for design of regulations and laws according to needs of the sector as these needs were not reflected efficiently. This is creating problems arising from inefficient rules and regulations related to the sector i.e. *hard institution problem*.

5.8 Mobilization of Resources Function

Mobilization of resources function in olive oil innovation system is about availability of financial and human capital resources as well as ability to access them.

Three actor groups may have role in mobilization of these resources for development of olive and olive oil sectoral innovation system: Value chain actors including cooperatives, NGOs and government. In the previous parts on other functions, most of the activities of value chain actors, cooperatives, NGOs and government for development of financial physical and human capital infrastructure have been covered and barriers to efficiency of these activities have been underlined.

Regarding value chain actors, cooperatives and NGOs, barriers to mobilization of resources function are similar to the ones already referred in the analysis of previous functions. If we very briefly summarize:

- Due to barriers such as small scales, inability to create scale economies, weak financial, knowledge and human capital infrastructure, capacity to create and mobilize available resources for the innovation system is limited.
- In addition to barriers above, due to weaknesses in the design of government subsidies, lack of regional supply of human capital with technical skills (or regional skills mismatch) etc. ability to access available resources is limited.

Despite these barriers, there are significant initiatives of private sector and NGOs that should be reminded, which are inducements for long-term resource mobilization. Some of them are below:

- The Cooperative Unions have initiatives for long-term capacity development. As mentioned before, MARMARABİRLİK have R&D projects for sustainable production. TARİŞ has announced its strategy document and action plan in 2014 for the improvement of its cooperative system.
- Olive processing technology suppliers, for instance HAUS as one of the main technology provider in olive and olive oil sector, have significant R&D projects for technology development.
- EİB has launched "innovation management academy" program for the improvement in the human capital infrastructure of the exporters and "food R&D

projects market" to develop knowledge infrastructure for innovation in sustainable food production, including olive sector.

- Initiatives of UZZK to establish "degustation panelist" infrastructure as well as consumer and producer education for improving the awareness for quality are significant steps for development of human capital infrastructure for the long term.

The role that government plays in mobilization of resources is significant, especially in agricultural sector of a developing country with weak private sector capacity. F*irst*, government has budget resources and *second*, it is the main authority to design laws, regulations and rules, *i.e. hard institutions,* fundamental for mobilization of financial and human capital resources.

In previous part of the analysis of other functions, most of the weaknesses of government role in financial, physical and knowledge infrastructure have also been covered. Therefore, in this part of analysis on mobilization of resources, mainly weaknesses in government's role and capacity in long-term mobilization of resources will be discussed.

Regarding long-term policy development capability of government, *one of the barriers* mentioned by some of the interviewees is *the lack of long-term sectoral vision of the government*. Inconsistencies within government policies are seen as indicators of this lack of long-term vision and lack of genuine intention to develop olive sector. Some of the interviewees underlined contradictory behavior of government. They remarked that, on one side, government provides significant supports for development of olive sector, but on the other side, it also nullifies all mobilized resources by approving badly formulated law changes that harm the sector.

As previously mentioned, GTHB targets to improve olive production. The target is to be the second in the world olive production after Spain. There are direct and indirect government resource mobilization (such as subsidies for production and technology development, R&D supports etc.) to reach this target.

In return, ambition of the government to change the law on olives to allow mine and energy sectors strongly contradicts with itself as it will destroy olive production in the traditional regions. This is seen as an indicator of the weak governance capacity of government, and arguably corruption, as a great *barrier* to efficient mobilization of government resources.

The barrier of short living and contradictory policy formulation of government has been mentioned by one of the sector representatives (int#40) as follows:

> Stability in policies is fundamental. When you form a policy, you should not say today it is like this, but tomorrow it is not like that. Tomorrow you should not say we do not need so much olive plantations, if you support today to sustain olive production. We should not tell that as government or as an individual… They should not support policies that will destroy olive sector. We need to form sustainable policies.

Many of the interviewees remarked *lack of holistic regional sector policy as a barrier* for effective mobilization of resources. One of the olive oil producers in Ayvalık (int#25) underlined this by giving reference to change proposal to the law on olive cultivation that allows mining activities on olive production areas:

> Pollution of environment, underground waters, atmosphere, these are irreversible things. From Bergama to Kaz Mountains, there exist gold ores. On these lands have been cultivating olives for 6 thousand years. For these gold ores, they will ruin these lands in 5-10 years. What after? People will starve. In Balya district for instance, it has been almost 70 years since they stopped mining iron. Still, grass does not develop there. Their population diminished from 30-40 thousands to 1.5 thousand. These are our fears. Do we have to mine gold in this region? Do we have to destroy these mythological lands with wonderful climate and geography? There could be other convenient territories that we can mine gold by assuming some financial costs. Why do not all ministries come together to discuss pros and cons to formulate plans? ... Both agriculture and industry should develop together. We can continue without neither agriculture nor industry.

Lack of mobilization of resources with a long-term planning has negative consequences on agricultural production in general and olive production in particular. An olive producer from Ayvalık region (int#26), which has been a family enterprise for generations, has told that they are experiencing the consequences of inefficient regional policies formulated decades ago:

> Olive yields in this region have diminished significantly due to climate change. We had Northeast winds and no rains during flowering period in May-June. Our microclimate that gave its specialty to our olives has changed. Now there are south winds and rains that destroy flowering. There is change in climate in general. However, I believe, the real factor is establishment of two hydrolic dams, Madra and Havran, in this region. After then, our climate changed more and more… Low

> yields due to low flowering are the main reason that olive farmers do not gain in this region.

Arguably, due to weak coordination between ministries on long term strategies, more powerful ministries over some others and short term budget concerns over long term benefits are *barriers* for designing government regulations for effective mobilization of resources i.e. *weak hard institutions problem*. For instance, even though mobilization of resources for strengthening financial infrastructure of UZZK by designing a government regulation would have significant benefits for olive and olive oil sector and even though everybody is aware of the solution, this has not been materialized due to these barriers. As mentioned by a sector representative (int#25) as well:

> We discussed this issue with GTHB officials. Subordinate level staff has knowledge on what to do. They tell that they know other country good practices very well. However, when they want to adopt them, they get "red card" from Ministry of Finance… Private sector cannot succeed by itself because of self-interests. Government has to define a budget cut and put his hands in our pockets formally.

Regarding mobilization of human capital resources, most of interviewees mentioned significant lack of human capital with technical knowledge. As mentioned by a sector representative (int#45) "*In our sector we need qualified technical staff. Not only university graduates as engineers but intermediate technical staff and master artisan. This our barrier."*

Main barrier to existence of qualified technical staff is the current education system, which supplies theoretical knowledge but does not allow skills development by on the job training i.e. *learning by doing*. This is a problem in education system in general according to same interviewee:

> Primary school, high school, university. They graduate from all but become nothing. There is something wrong in this system. It has to be changed… The weakness is in applied training. A student should start and graduate from theoretical and practical education at the same time. He should graduate when his master artisan's approves him.

In this regard, effective education system in vocational high schools is remarked as vital for mobilization resources to develop qualified human capital for olive and olive sector. As mentioned by the same sector expert who has taken part in preparation of reading materials for olive section of technical schools:

> You can mold students who come to vocational high schools more easily. At that age, you can embroider the soul of olive sector and develop him as an artisan. At later ages, it is hard to bend or flex. Then they only wish to be a manager in front of a desk.

Furthermore, local employment and skills development regarding specificities of olive sector and other sectors in the region is important for sustainable human capital mobilization for olive and olive oil sector. This is underlined as follows by the representative from Ayvalık region (int#45):

> There is a serious problem in our sector, especially in of olive oil sector. It functions seasonally, only for 3 to 5 months. Then you cannot work in an olive oil processing factory. What will happen in the rest of the year? Each one has his own solutions. Some work as a cook or a waiter in hotels… This is the nature of our sector. It is as it is. We do not have another option.

As mentioned occasionally in previous parts of analysis, there are many initiatives of the government for physical, financial and human capital resource mobilization to improve food and agricultural sector. Main long-term policy framework of government that is assumed to guide governmental policies is Turkey's Strategic Vision Project (2008-2023)[75].

Although, as of 2014, there has been 8 years since the launch of the strategic vision (2008-2023) current education system has not yet improved as it is foreseen in strategic plan. Government has a long-term vision on the paper, but this does transform to practicality. One of the *barrier* for this transformation is frequently changing rules and regulations not congruent with the Vision that confuse and do not allow actors to adopt.

Furthermore, as a part of Turkey's Strategic Vision Project (2008-2023) framework, strategic plan (2013-2017) of GTHB has five strategic goals: safety in agricultural production and supply, food reliability, plant and animal health and wealth, agricultural infrastructure and rural development, institutional capacity.

[75] See http://www.tsv2023.org/index.php/en/ The Vision 2023 aims improvements in education and human capital development. There are six main themes of strategic vision, of which "Education, Science and Technology" is one of them. Activities related to "strategic locomotive sectors" are also defined. Among them are "Agriculture, Food and Livestock", "Vocational education, industry and high technology", "Innovation and Human Development in Public Management".

Regarding the effectiveness of strategic plan of GTHB in mobilization of resources for olive and olive oil sector, *a barrier* is that performance indicators of the strategic goals of GTHB are generic. For instance, it sets total number of organic producers, GAP producers, number of registered plant etc. as performance indicators. These indicators are for agricultural sector as a whole. It does not take into account and measure subsector performances. There is no indicator specifically aims to measure improvements in the olive and olive oil sector. These generic performance indicators do not measure effectiveness of mobilization resources to subsectors, including olive and olive oil sector.

Actually, weak governance capability of the government in the last decade seems to be the *main barrier* for (public) resource mobilization. Since 2002, there has been one party government and Turkish economic indicators have been significantly much better than previous decades. Government budget deficit, interest rate, inflation and public debt levels have diminished considerably. A stable economic and investment environment has been established. Besides, with becoming a candidate country for EU membership, many steps have been taken in regulatory areas since 2001 aiming to converge EU regulations, as result of EU accession process.

These developments could have been weaving a stronger economic and regulatory background for development of any sector rapidly, including olive and olive oil, if there was not counteracting deterioration in governance capability of the government.

First, *one of the main barriers* that lead diminishing capabilities of government agencies is the very frequent restructuring of responsibilities of ministries by the government. This is inhibiting institutionalization of functions of ministries as well as skills and knowledge accumulation of government employees i.e. development of human capital for better functioning governance mechanism. This has been already mentioned in the analysis of knowledge development function, by giving example of how the frequent restructuring of ministries for agricultural research has been a barrier for institutionalization of government agricultural research system.

Another *barrier* is the significant trend of politicization of civil servants[76]. In the last decade, existing government officials have been increasingly replaced by the new ones according to their political affiliations instead of based on merit. A government organization mostly composed of politicized government officials has been formed. First, this led to a huge group of "dormant" government officials who have accumulated skills, knowledge and experience. Secondly, these developments weakened trust among government officials.

Arguably, with this transformation, objectivity of government agencies degenerated as *culture of obeisance to priorities of affiliate part*y is established among government agencies. Prioritization of institutional goals of Ministries and common interest of public probably became a secondary issue in public service i.e. *soft institution problem,* creating *a barrier* to design sustainable policies and regulations i.e. *hard institution problem* for effective mobilization of government resources.

The situation deteriorated when power struggles between groups with similar ideologies has started in 2013. This led to frequent removal of government officials who are in charge in groups. High mobilization of staff further accelerated loss of institutional memory of government agencies, i.e. *weak human capital infrastructure,* which is necessary for good governance capability.

Indicators published by international organizations on performances of country governments and economy are good benchmarks for assessing governance capability of Turkish government and its effectivity in mobilization of resources.

In order to compare governance capability of different countries, Worldwide Governance Indicators (WGI), that is aggregate indicators of six broad dimensions on the quality of governance, are yearly produced by World Bank. WGI indicators related to governance quality in Turkey are shown in **Table 5.21.**

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[76] "Politicization of the civil service" is defined as "the substitution of political criteria for merit-based criteria in the selection, retention, promotion, rewards, and disciplining of members of the public service" (Peters, B. G. and Pierre, J. 2004 pg.2).For "alternative conceptions and measurements of politicization as well as some of its causes and consequences" see B. Guy Peters and Jon Pierre (2004) "Politicization of the Civil Service in Comparative Perspective: the quest for control", Routladge studies in governance and public policy

Table 5.21 Rank of Turkey in the Worldwide Governance Indicators (WGI)

Indicator	2007	2011	2013
Voice and Accountability	45,7	43,7	40,8
Political Stability and Absence of Violence/Terrorism	19,7	18,9	11,9
Government Effectiveness	64,1	65,4	65,6
Regulatory Quality	62,1	63,0	65,1
Rule of Law	54,6	57,3	55,9
Control of corruption	59,7	60,2	61,7

Source: www.govindicators.org , as of September 2014

In Turkey single party government constituted in 2002, continued with majority in general elections of years 2007 and 2011 consecutively. This stability in government was assessed as good for the system. However, as can be seen from WGI indicators, there is no sharp improvements in quality of governance in Turkey since 2007. The higher the indicator the better it is and four of the indicators have slightly improved, but two of them have deteriorated. According to Corruption Index of Transparency International[77], Turkey is at 64th rank out of 175 countries in 2014 whereas it was 56th out of 178 in 2010. In the last 4 years corruption level has been increased in Turkey significantly. When we look at OECD Better Life Index[78] that compare well-being across countries based on 11 dimensions of quality of life (health, education, local environment, security, etc.) Turkey is at the very low end compared to other member countries.

Briefly we can conclude that weak institutionalization of government agencies due to frequent restructuring of government organization, weak human capital infrastructure arisen as a result of politicization and high mobility, combined with weak trust among government officials, are *main barriers* for effective governance and interaction between government organizations to establish long term sectorial vision and policies on mobilization of resources.

[77]See http://www.transparency.org/country#TUR

[78]See http://www.oecdbetterlifeindex.org/

5.9. Chapter Conclusion

Functional - Structural Analysis of Olive and Olive oil Sectoral Innovation System unveils that there are systemic problems as barriers to innovation processes in olive and olive oil sector. These systemic problems manifest themselves as various specific problems in different segments and activities of olive and olive oil sector. Main systemic problems laid down in this study are summarized in **Table 5.22.**

These problems indicate two main issues for government policy making:

- Government policy should initially target to overcome existing systemic problems. Designing government policy to overcome specific problems in the olive and olive oil sector, of which most of them are manifestation of existing systemic problems, will be inefficient to improve current situation of the sector.
- Some of these systemic problems are not specific to olive oil sector but nationwide, may be effecting all sectors and agricultural sub-sectors. Some of them are regionally specific whereas some are specific to olive, table olive and olive oil sub-sectors. Hence, government policies should be designed at national, sectoral and regional levels to overcome systemic problems that inhibit innovation processes in olive and olive sector.

Regarding these facts and type of systemic problems revealed in this study, some policy suggestions and recommendations are discussed in the next chapter.

Table 5.22 Summary Table for Systemic Problems in Functions of Olive and Olive Oil Sectoral Innovation System

KNOWLEDGE DEVELOPMENT FUNCTION

• Weaknesses in rules and regulations related to organization and governance mechanism of public R&D system (**weak hard institution problem**)
  o low motivation/weak culture of doing research/low trust between R&D staff (**weak soft institution problem)** / lack of relevant R&D staff **(actor capacity/knowledge infrastructure problem**) of public R&D Institutes/Olive research Institute due to bureaucratic organization/lack of reward and promotion mechanisms/staff regulation based on civil servants law (**weak/lack of hard institution problem**) leading high mobility of R&D staff and low knowledge accumulation by learning by doing (**weak knowledge infrastructure problem**)
  o Weak collaboration between public R&D actors/research institutes (**weak interaction problem)** mainly due to above mentioned systemic problems.
• Lack of sufficient government financial resources for (long term) agricultural /olive R&D (**weak financial infrastructure problem**) due to weaknesses in governance of R&D support mechanisms (**weak soft institution problem)**/limited financial supports (**weak financial infrastructure problem**).
• Low basic research/applied research/linguistic capabilities of public R&D staff/university researchers (**actor capacity problem**) due to current curricula of tertiary agricultural/food related education (**weak hard institution problem)** leading to low level of self-confidence (**weak soft institution problem**)/low levels of international collaboration of R&D projects **(weak interaction problem).**
• Low level of expertise/knowledge accumulation on olive and olive oil production and processing in university departments **(weak knowledge infrastructure**) due to rules and regulations of academic promotion/lack of olive related university departments (**weak hard institution problem**)
• Lack of relevant / qualified technicians (**actor absence/capacity problem**), due to weaknesses in curricula (**weak hard institution**)/limited financial infrastructure **(weak financial infrastructure**)/ limited applied education capacity (**weak knowledge infrastructure**) of vocational education.
• Weak private R&D capacity due to small scales (**actor absence/capacity problem**) and weak collaborative/cooperative action of value chain actors (**weak interaction problem**)
• Limited information on olive and olive oil sectors due to absence of reliable statistics/indicators systems (**presence/quality of knowledge infrastructure problem**)

KNOWLEDGE DIFFUSION FUNCTION

• Weaknesses in rules and regulations (similar to public R&D system) related to organization and governance mechanism of Public Extension System (**weak hard institution problem**)
  o Limited number/weak capacity of extension agents (**actor presence/capacity problem**)
  o Low/lack of trust of farmers to extension system (**weak soft institution problem**)
  o low level of collaboration of olive farmers and extension agents/researchers (**weak interaction problem**) arising mainly due to weaknesses in governance of extension system and public research system
  o Weak bottom up knowledge flow (**weak knowledge infrastructure**), due to top-down organization of extension system (**weak hard institution problem**)

Table 5.22 (cont'd) Summary Table for Systemic Problems in Functions of Olive and Olive Oil Sectoral Innovation System

• Limited capacity of education/extension activities of Olive Research Institute/public research institutes (**actor absence/capacity problem**) due to systemic problems related to knowledge development function. • Limited capacity of private extension system (**actor absence/capacity problem**) due to small scales **(weak financial/knowledge/physical infrastructure**) • Limited reach capacity of NGOs/UZZK (**actor absence/capacity problem**) due to limited financial resources (**weak financial infrastructure**) with limited number of relevant staff, infrastructure etc. (**weak knowledge/physical infrastructure**) • Weak collaboration of government representatives with NGOs/sector representatives **(weak interaction problem)** • Weak collaboration culture in general (**weak soft institution problem**)
GUIDANCE OF SEARCH FUNCTION
• Lack of government's policy guidance/consistent direction of government policies/ vision of government (**actor absence/capacity problem**) due to weaknesses in governance mechanisms (**hard/soft institution problem**) leading to inefficient long-term national/regional/sectoral policy coordination/design. • Insufficient interaction of government with sector actors (**weak interaction problems**) for sectoral policy formulation • Lack of effective region based sub-sector level planning and programming of government policies related to olive, table olives, olive oil, taking into account of territorial specificities of olive production (**weak hard institution problem**). • Lack of efficient macro level territorial planning capacity (**weak hard institution/actor capacity problem**) • Limited capacity of NGOs/UZZK **(actor absence/capacity problem**) to voice sector needs due to systemic problems mentioned related to knowledge diffusion function.
MARKET FORMATION FUNCTION / ENTREPRENEURIAL ACTIVITIES FUNCTON[79]
• Existence of value chain actors mainly in informal market / limited existence in formal market of olive, table olives and olive oil sub-sectors (**actor presence/capacity problem**) due to small scales with (**weak financial/physical/knowledge infrastructure**) • Limited cooperative action due to weaknesses in organization and governance mechanism of cooperative system (**weak hard institution problem**) / limited capacity of district level (third-tier) sales cooperatives (**weak financial/physical/knowledge infrastructure**) / low level of trust to cooperative system (**weak soft institution problem**) as a result of previous experiences • Inefficient government supports and regulations **(weak hard institution problem)** which does not take in to account of sectoral/regional specificities (e.g. support of Gemlik olive cultivar, inefficient financial supports for olive producing farmers/SMEs, stringent standards of food sector enhancing informality etc.) • Weak government food control mechanisms due to lack of staff, limited budget etc. (**weak physical/financial infrastructure**) and weak coordination/inefficient allocation of responsibilities between different levels of government (**weak interaction problem/hard institution problem**).

[79] Systemic problems for market formation and entrepreneurial activities are summarized jointly as both functions share common problems.

Table 5.22 (cont'd) Summary Table for Systemic Problems in Functions of Olive and Olive Oil Sectoral Innovation System

• Lack of regional warehouses, organoleptic taste panels, laboratories etc. (**weak physical/knowledge infrastructure**) inhibiting establishment of product standardization mechanisms (**hard institution problem**) and formal regional table olive and olive oil value chains (**actor presence/capacity problem)**. • Lack of regional human capital infrastructure with technical knowledge or regional skills mismatch (**actor capacity /weak knowledge infrastructure problem**) due to inefficient local and economic and employment programs (**weak hard institution problem**) • Lack of national/regional information systems that would guide olive and olive oil innovation system actors (**weak knowledge infrastructure problem**) • Lack of standard and continuous production of olive and olive oil/existence of adulteration/exacerbated price fluctuations due to (mainly) above systemic problems
LOBBYING ACTIVITIES
• Strong rent seeking culture for the short term (**soft institution problem**) due to very long term economic returns of olive sector compared to other sectors, coupled with low productivity in traditional olive producing regions as a result of small scales, high costs, inferior technology etc. (**weak physical/financial/knowledge infrastructure problem**) • Weaknesses in governance capabilities and rent seeking behavior of government (**hard/soft institution problem**) • Weaknesses in institutionalization and reach capacity of NGOs (**actor presence/capacity problem**) due to asset specificity as a result of lack of sufficient financial resources (**weak financial infrastructure problem**) • Weak collaboration among NGOs, UZZK, sector representatives (**weak interaction problem**) due to weak institutionalization of NGOs and UZZK, mainly because of asset specificity problem
MOBILISATION OF RESOURCES
• Limited mobilization of/ability to access financial and human capital resources by private sector and NGOs (**actor presence/capacity problem**) due to small scales, inability to create scale economies, weak financial, knowledge and human capital infrastructure, weaknesses in the design of government subsidies, lack of regional supply of human capital with technical skills etc. • Limited mobilization of financial and human capital resources by the government (**actor presence/capacity problem)** due to lack of long term sectoral vision and holistic regional sector policy, short living and contradictory policy formulation, weak governance capability of the government etc.

CHAPTER 6

POLICY RECOMMENDATIONS

6.1 Introduction

As underlined in the analysis chapter, this research reveals that there are significant systemic problems that inhibit functioning of Olive and Olive Oil Sectoral Innovation System. Behind most of the apparent individual problems, there are common systemic problems creating barriers for the development of olive and olive oil sector. Therefore, using policy tools and designing innovation policy that do not overcome these systemic problems will not bring permanent solutions. Taking this fact into regard, in the next part, some policy recommendations are formulated that target current systemic problems of olive and olive oil innovation sectoral system identified in this research.

There is no "one size fits all" perspective for policy design as innovation systems of different countries are context specific or at different development stages (OECD 2013, pg.75). Moreover, they are path dependent. Though these facts should be kept in mind, on the other hand, taking into account of good practices of other country systems during the design of policies is a pragmatic way for governments to be more efficient.

Briefly, the general policy aim of the specific policy recommendations presented in this chapter is to enable functioning of olive and olive oil sectoral innovation system by overcoming current systemic problems.

Hence, as underlined before, policy recommendations proposed in this part does not intend to overcome individual barriers but target main systemic problems in Olive and Olive Oil Innovation System in Turkey. For this aim, based on selected good practices of other countries including such as leader producer countries Spain and Italy, international guidelines, some policies are recommended.

The guidelines of International Organizations have rich information on various country good practices with different contexts that would guide policy makers in design of their agricultural innovation policies to overcome their own context specific systemic problems.

Among these guidelines, recent ones remarkable to mention are as follows:

- OECD (2013) "Agricultural Innovation Systems: A Framework for Analysing the Role of the Government",
- EU SCAR (2013) "Agricultural Knowledge and Innovation Systems Towards 2020- an Orientation Paper on Linking Innovation and Research"
- OECD (2012) "Improving Agricultural Knowledge and Innovation Systems: OECD Conference Proceedings"
- World Bank (2012) "Agricultural Innovation System: An Investment source book"
- IAAKST (2009) "International Assessment of Agricultural Knowledge, Science and Technology for Development: Global Report" with contributions of various international organizations including FAO, the World Bank.

Policy recommendations briefly proposed in this research as follows can be diversified, enriched and fine-tuned based on key policy issues covered in above-mentioned guidelines, which are based on various country experiences.

6.2 Policy Recommendations

Policy Recommendation no 1: Establish a public research and extension system that allows effective scientific knowledge development and diffusion.

Analysis in the previous chapter on knowledge development and diffusion functions indicates that significant number of barriers is arising from the governance and organization of public research system and extension system[80]. As analysis of this study points out,

[80] Extension and advisory services are defined as "systems that facilitate the access of farmers, their organizations, and other value chain and market actors to knowledge, information, and technologies; facilitate their interaction with partners in research, education, agribusiness, and other relevant institutions; and assist them to develop their own technical, organizational, and management skills and practices as well as to improve the management of their agricultural activities" (World Bank 2012 pg. 180)

though there are significant improvements in financial and physical infrastructure of the research and extension system, there are systemic problems arising from the organization of the research system that inhibit efficient knowledge development and diffusion. For instance weaknesses in public research system, i.e. hard institution problem, is leading to soft institution problems such as lack of trust, lack of researcher spirit… etc. among researchers, which further lead to weak interaction within and between research institutes as well as olive and olive oil sector actors, and so on. Similar problems exist in the public extension system as well. Therefore, restructuring of the organization and governance mechanisms of public research and extension systems will overcome significant part of the existing barriers of scientific knowledge development and diffusion in Olive and Olive Oil Innovation System.

In designing organization and governance mechanisms[81] of public research and extension systems, national, regional and sectoral dimensions should be elaborated, given the fact that agricultural sub-sector knowledge is regionally context specific. Public Research and Extension system is not a separate component but part of a wider system.

For this aim, Ekboir and Rajalahti (2012) draw broad aspects of "*coordination and collective action for agricultural innovation*" not only for the actors of research and extension dimension of AIS but for all actors of AIS at *macro (national) level, meso (sectoral, regional, or provincial) level and micro (farmer) level* (Ekboir and Rajalahti (2012) in Worldbank 2012 p. 15-33). They compile various country examples of coordinating bodies and participating actors at macro, meso and micro levels of coordination and underline key policy issues related to organization of AIS actors that would guide policy makers.

Furthermore, Rajalahti (2012) reviews lessons emerging from the three commonly applied modes of coordinating innovation for agriculture at higher levels to date: the national agricultural innovation council or committee, competitive innovation/ research funds, and

[81] "Governance concerns the mechanisms by which decisions are made in an organization, whether public, private, or nonprofit. Governance has several dimensions, including power, culture, incentives, leadership, and coordination. In the governance of a national innovation system, special attention is given to the systems and practices for setting priorities and agendas, designing and implementing policies, and obtaining knowledge about their impacts." Ekboir and Rajalahti (2012) in World Bank (2012) pg. 21)

coordination by theme or subsector, which would inspire policy makers in design of organization of public research and extension components of AIS.

__Sub-policy recommendation no 1.1:__ *Establish a unique autonomous public research organization with new rules and regulations that emancipate researchers from their government official identities and allow them to assume their researcher roles. Gather current public research organizations under this unique authority, which are currently under the auspices of different government authorities.*

Currently, most part of public research institutes related to agricultural and food research is under the responsibility of TAGEM General Directorate of GTHB and TÜBİTAK, mainly Marmara Research Center (MAM), affiliate of Ministry of Science, Industry and Technology. There is no unique dominant authority responsible for the governance of research on agriculture and agro-food sectors, but two dominant ones. There are some adverse consequences of current organization and governance mechanism with two main actors, of which some of them have already mentioned in the analysis of knowledge development function.

Functioning of current public research organization with TAGEM and TÜBİTAK as main players, its governance mechanism and project funding tools can be improved by establishing coordination mechanisms between TAGEM and TÜBİTAK. Improving coordination by taking into account of the above-mentioned barriers, public research organization would better serve for agricultural R&D. In addition, current system could be further improved by

- Presenting autonomy and flexibility to TAGEM for the management of its research institutes its R&D budget,
- Raising researcher staff salaries, allowing researcher promotion based on performance evaluation, would remove most of the barriers in knowledge development function.

However, establishing a governance mechanism to ensure congruence between two separate organizations with different organizational rules and culture would arguably be more complicated and would require significant effort to sustain. Hence, organizing public R&D institutes under responsibility of a unique government agency would be another option. This type of organization would improve congruity of the mission and vision as well as efficient funding of agricultural R&D, from which olive research would benefit more.

In this respect, public R&D organization in EU olive producer countries could be good benchmarks. As already outlined in knowledge development function, analysis indicates significantly higher performance of public research institutes of EU olive producers, Spain, Italy and France, most significantly Spain, compared to public research institutes of Turkey, TAGEM and TÜBİTAK research institutes.

The Spanish National Research Council (CSIC) ranks 1st, the National Research Council of Italy (CNR) ranks 4th and National Center for Scientific Research of France (CNRS) ranks 7th in total publication related to olive research, between 2000 and 2014. Research Organization of CNRS, CNR and CSIC can be assessed as good country practices as their performance is good in olive research and they can be good benchmarks for public research organization in Turkey (**Table 6.1**).

Table 6.1 Public Research Organizations for Food and Agriculture in Spain, Italy, France [82]

SPAIN
Spanish National Research Council (CSIC): Largest public research institution, related to the Ministry of Economy and Competitiveness via the Secretary of State for Research, Development and Innovation. It has 131 research Institutes, organised around eight scientific-technical areas (Humanities and Social Sciences, Biology and Biomedicine, Natural Resources, Agricultural Sciences, Physical Science and Technologies, Materials Science and Technology, Food Science and Technology, Chemical Science and Technology). **Spanish National Institute for Agriculture and Food Research and Technology (INIA):** The Autonomous Public Research organization with regions system. President of the Coordination Commission of INIA is the Secretary of State for Research, Development and Innovation. There are 17 research institutions, one for each autonomous region. For instance, I**FAPA of Andalusia** region activities are grouped into seven thematic areas (Agricultural Production, Breeding and Biotechnology, Crop Protection, Agricultural Economics and Rural Sociology, Post-harvest Technology and Agri-food Industry, Marine Aquaculture and Fisheries Resources, Organic Production and Natural Resources) and have 18 research centers. **Institute of Fats (IG)**[83] **as part of IFAPA** deals with research on olive and olive oil.
ITALY
National Research Council of Italy (CNR): Main public research institution under the Ministry of Education, Universities and Research. It has 109 research institutes, organized as seven departments: Earth System Sciences and Technologies for the Environment, Engineering, ICT and Technologies for Energy and Transport, Humanities, Social Sciences and Cultural Heritage, Chemical Sciences and Technology of Materials of Matter, Agri-food and Biosciences, Biomedical Sciences, Physical Sciences and Technology. **Agricultural Research Council (CRA)**: operates under the supervision of the Ministry of Agriculture. CRA has been restructured as 15 Centers and 32 Research Units organized in 5 Departments (Vegetal Biology and Production, Animal Biology and Production, Transformation and valorization of Agro-Industrial Products, Agronomy, Forestry and Land Use, Other activities) according to "Reorganization and Rationalization Plan" released in 2006. **Olive Growing and Olive Product Industry Research Centre (CRA-OLI)**[84] is a part of CRA Transformation and Valorization of Agro-Industrial Products department. It has in two scientific units and a peripheral unit at different locations.
FRANCE
National Center for Scientific Research of France (CNRS)[85] is under the responsibility of the French Ministry of Education and Research. It is a multidisciplinary institution, covers 10 group of scientific disciplines (humanities and social sciences, biological sciences, nuclear and particle physics, information sciences, engineering and systems, physics, mathematical sciences, chemistry, Earth sciences and astronomy, ecology and the environment) with 10 institutes and 19 divisions in the regions. **National Institute for Agricultural Research (INRA)**[86] is characterized by its strong regional foundations resulting from decentralization policies for regional development. Its 74% of staff based in the provinces on more than 150 sites. Almost 80 % of its budget comes from Ministry of Education and Research.

[82] Information on research systems of these countries can be reached on website of European Commission's ERAWATCH "Platform on Research and Innovation policies and systems" http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/

[83] http://www.ig.csic.es/pagina/ver/Foreign%20contact

[84]http://sito.entecra.it/portale/cra_dati_istituto.php?lingua=EN&id=210&id_gruppo=&tipo=&tipo_org=&sezione=&opz_menu=&access_flag=0

[85] http://www.cnrs.fr/en/aboutCNRS/overview.htm

[86] http://institut.inra.fr/en

Among these three organizations, Spanish CSIC can be taken as a benchmark in this study. First, as its performance is the highest, it has "*6 % of all the staff dedicated to Research and Development in Spain, and they generate approximately 20% of all scientific production in the country*"[87]. Furthermore, along with the global financial crisis in the last decade and serious budget cuts that negatively affected Spanish R&D system, there have been reforms in R&D system of Spain since 2011 with some organizational innovations. One of them is the establishment of the State Research Agency[88] to improve effectiveness public resources for R&D, which could also be used as benchmark in a possible re-organization of Turkish public R&D system.

There are many possible re-organization alternatives given the context in Turkey and research organization that will best fit that context should be assessed in a thorough study.

After emphasizing this fact, taking into account of, *first*, the specificities of systemic problems in public research system in Turkey mentioned before *second,* broad outlines of governance of Spanish CSIC research system, a public R&D organization with a new governance mechanism as depicted in **Figure 6.1** could be established in Turkey, broadly underlined as follows:

- Establish a new autonomous government agency named "Turkish National Research Council" (TNRC) and gather research institutes as well as research related functions of TAGEM and TÜBİTAK under the governance of TNRC.
- Establish an organizational management structure with medium term objectives with a four-year planning system, based on bilateral contract between the Government and the TNRC that allows governance autonomy to TNRC, with requirement of accountability based on performance evaluation.
- Release TNRC from constraints of annual budget limits in line with medium and long term budget planning and assign flexibility to TNRC in the management of their funds as well as in staff management and recruitment.

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[87] See http://www.csic.es/presentacion

[88] See OECD 2011 "OECD Perspectives: Spain Policies for a sustainable recovery",p:15 and http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/es/highlights/highlight_0009

- Give fund management flexibility for TNRC of funding of very long term (agricultural) R&D projects
- Restructure responsibilities of research institutes and their location so that they can develop multi-disciplinary and multi-sectoral knowledge at national and regional levels

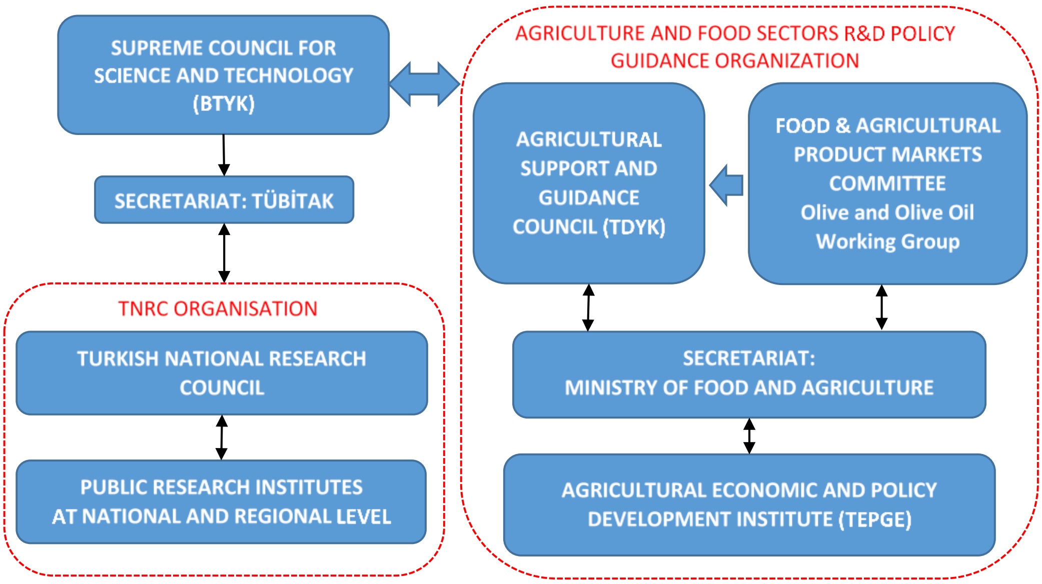
Separating the design of policy and implementation of research is important (Rajalahti 2012). Regarding governance mechanism, in Spain coordination with all public research institutes, including CSIC is under the umbrella of Ministry of Economy and Competitiveness established in 2011 via Secretary of State for Research, Development and ınnovation. In Turkey, this secretariat role can be assumed by TÜBİTAK as it has been already performing this role and it has established an institutional capacity. Instead of being under an umbrella of a specific Ministry, TNRC could function with the mandate of Supreme Council for Science and Technology (BTYK) with the secretariat of TÜBİTAK. However, it is important that TÜBİTAK gain its stronger autonomy as before 2010.

Furthermore, Agricultural Support and Guidance Council (TDYK), which already exists, can guide BTYK for food and agricultural sector developments and R&D priorities on food and agriculture accordingly. This guidance should be not only be at the level of aggregate agricultural developments, but at-sub sector levels as each sub--sector has its own specificities and different policy requirements, as the analysis of olive and olive oil innovation system indicates. The secretariat of TDYK could be sustained by GTHB, as present.

According to the regulation, TDYK comprises of different sector representatives including agricultural producers, NGOs etc. However, whether it functions as it is aimed to be is also have to be assessed to improve its guidance capacity. There should be sufficient agricultural sub-sector representatives in the council, including olive and olive oil sector, so that sectoral R&D needs could be reflected bottom-up. This would also improve possession of R&D guidance by small-scale producers.

By the end of 2014 Food and Agricultural Product Markets Surveillance and Assessment Committee (GTİDK) has been established to tackle with price fluctuations that distort markets. Though newly established, possible organization of this Committee based on sub-sector working groups, (such as olive and olive oil working group) can feed relevant agro-food sub-sector knowledge (e.g. olive oil sector) to TDYK, so that TDYK could guide BTYK accordingly.

GTHB could keep its research institutes like TEPGE by significantly improving its financial, physical and human capital infrastructure. TEPGE would do research on social and economic effectiveness of food agricultural policies of GTHB for capacity building of GTHB's policymaking.



Source: Author's compilation

Figure 6.1: An Alternative Agro-food Public R&D System for Turkey

While restructuring organization and governance mechanisms of public R&D system in Turkey, it is important that the new system really function "*with a mandate to coordinate and prioritize investments in agricultural innovation at the highest level*". Because "*despite their presence, national innovation councils and agricultural research councils rarely operate as true agricultural innovation organizations or councils"* (Rajalahti 2012 in World Bank 2012 p.35). This organization would be "*nationally mandated but independently governed*".

For this aim,

- *mandate and management structure,*
- *resources,*
- *operating practices and values,*

In other words "*characteristics and norms that shape a "true" organization for national coordination and governance of research and innovation*" based on previous lessons of country practices underlined by Rajalahti (2012) can be used as guidance during the restructuring process in Turkey. Furthermore, Lynam (2012) describes the contrasting roles of research and AISs in well-functioning market contexts and underdeveloped market contexts, which should also be taken into account in designing public R&D organization and governance mechanism in a developing country such as Turkey.

In fact, current systemic problems in R&D system have been ongoing in previous decades. With an awareness of these problems, an administratively and financially autonomous public R&D system model which would gather public R&D institutes and would be directly related to Prime Ministry has been developed by TÜBİTAK and presented to BTYK in 1998; but could not be launched due to resistance of related Ministries (Göker and Özdemir 2001 p.30-33). Alternatively, BTYK decided to launch a framework law that would give financial and administrative autonomy to related directorates of the Ministries for the governance of their R&D Institutes, but this alternative could not be successful, as financial, administrative and scientific autonomy could not be provided to due to existing institutional context (Göker and Özdemir 2001 p. 33-35).

Briefly, similar systemic problems of 1998 are ongoing and would be creating barriers to functioning of various ISs, including Olive and Olive Oil Innovation System if financial, administrative and scientific autonomy is not presented to public R&D organization; in other words, systemic problems of current system are not overcome.

<u>Sub-policy recommendation no 1.2</u>: *Assess thoroughly, and re-structure accordingly, current i) organization structure ii) governance mechanism iii) scientific discipline coverage of Olive Research Institute ZAE. Improve its human capital infrastructure that fits into its current responsibilities. Establish in each olive-producing region an olive research institute* *(or strengthen capacity of department in existing research institutes) that will be responsible for olive research.*

There are significant number of systemic problems in knowledge development function due to weaknesses in governance and organization of agricultural research system of TAGEM, which also lead to weaknesses in functioning of Olive Research Institute ZAE. Most of these problems would be overcome by re-structuring public research organization as proposed in sub-policy recommendation 1.1.

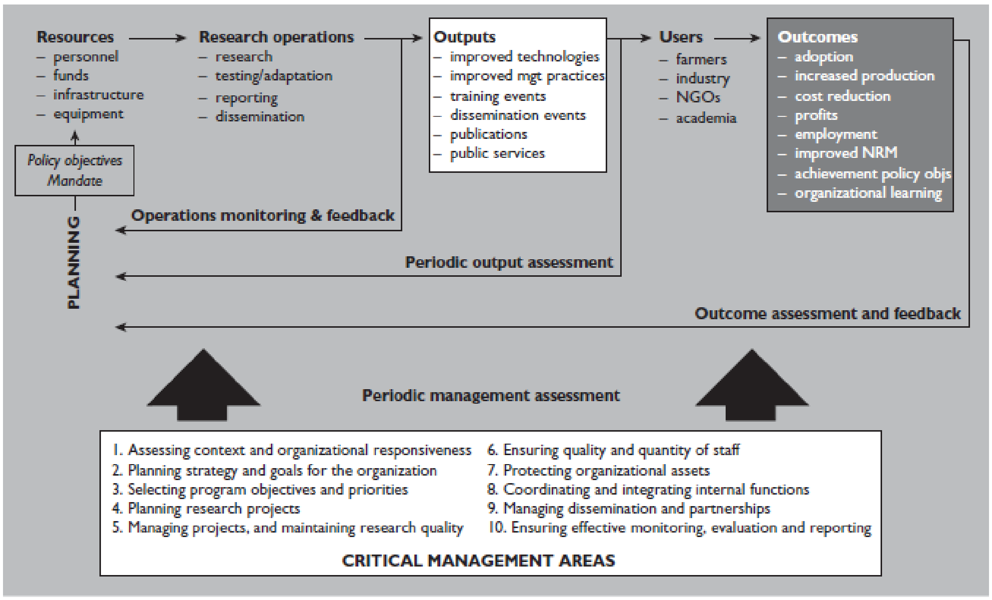
In addition to this re-structuring at macro-level, organizational effectiveness of ZAE, i.e. functioning of individual research institutes at micro level, should also be assessed. Above all, giving flexibility to management of ZAE for the recruitment of staff according to its evolving needs should be the primary goal, as a significant part of low performance is arising from weak human capital infrastructure of ZAE due to dependency on upper bureaucratic levels for staff management.

Birner (2012) overviews methods to assess specific organizations such as agricultural research institute or extension organization within an agricultural innovation system. One approach for organizational assessment proposed by Birner (2012) is the *Organizational Performance Assessment System (OPAS)* developed by the former International Service for National Agricultural Research (ISNAR) that is particularly relevant for innovation systems (Peterson, et al. (2003) cited in World Bank 2012 p.556-558). Peterson et al. (2003) identify four main approaches to performance assessment of agricultural research organizations:

- Economic evaluation of research outputs and outcomes
- Program evaluation approaches
- Performance audits
- Organizational performance assessment models

First three approaches are with external perspective whereas the OPAS is an internal performance assessment system that has significant advantages over other methods (Peterson, Gijsbers and Wilks 2003 p. 6-7).

The OPAS can be established for Olive Research Institute ZAE, as well as for other public research institutes, for continuously and dynamically evaluate organizational performance.



Source: World Bank 2012 pg. 557 reproduced directly from Peterson et al. 2003 p.6

Figure 6.2 Diagram of Organizational Performance Assessment System (OPAS)

Regarding the scientific disciplines as well as education and training activities, in addition to research that will be assigned to Olive Research Institute ZAE, activities of below research institutes of Spain and Italy can be used as benchmarks:

- Institute of Fats (IG) as part of The Spanish National Research Council (CSIC)
- Agricultural Research Institute of Andalusian IFAPA in GEOLIT Science and Technology Park in Jaen: It is the former olive research station of Jaén and specialized currently on oil technology and quality virgin olive oil. IFAPA is part of National Institute for Agriculture, and Food Research and Technology (INIA).
- Olive Growing and Olive Product Industry Research Centre (CRA-OLI) as part of Italian Agricultural Research Council (CRA)

Sub-policy recommendation no 1.3: *Ensure regional and sub-sectoral needs and knowledge feeds in public R&D system via inclusion of related sector representatives in the governance process of public R&D.*

Sub-policy recommendation no 1.4*: Establish effective regional and sectoral knowledge platforms that bring olive and olive oil producers, regional actors with research institutes to develop regional sector priorities for R&D so that knowledge flows bottom up for R&D policy development*.

Regional and sub-sectoral aspects of knowledge development should be taken into consideration. Olive, table olives and olive oil sub-sectors have their own specificities compared to other agricultural sub-sectors. These specificities (technological, geographical, olive variety etc.) differ within each sub-sector between regions. This requires establishment of efficient regional platforms to source out context specific sectoral knowledge.

Regional mechanisms as part of public R&D governance system, such as “regional advisory councils” (see Allegri 2002) can be constituted to foster participation of olive and olive oil producers in R&D priority setting and planning together with regional public research institutes. These councils can be used as platforms for assessing local needs and as forum for exchanges of views and close contacts between producers and research institute staff (World Bank 2012, p.39).

Sector-based R&D planning priorities can be set by forming a formal network, which may be called “Oliveconnect” for instance; with regional actors of olive, table olives and olive oil value chain, similar to “Bioconnect” in Netherlands, which is a research-oriented, multi-stakeholder network for organic agriculture organized by product workgroups (see Klerkx, Hall and Leeuwis 2009, Worldbank 2012 p.40-41). In Bioconnect, network actors have decision-making authority in research funding and utilizing public funds from the Ministry of Agriculture.

If such a network would be established in Turkey, since human capital infrastructure is still weak in the sector, initially this network would function only to prioritize sectoral R&D

needs and by taking account of their priorities decision making on funding would be governed by the national coordinator of the public R&D system.

Spanish Olive Technology Platform ALENTA, launched in 2011, is another good practice. It aims to bring together all the public and private actors of the value chain to identify and prioritize technology and research needs of the sector for medium and long term, by this way to advise to the bodies responsible for technology policies.

Sub-policy recommendation no 1.5: *Improve effectiveness of allocation of public financial resources for R&D and ensure fair competition environment for users of these resources by reorganizing rules and regulations that define R&D project funding processes.*

As underlined in the analysis of knowledge development function, there are various problems arising from public financing of agricultural R&D by different government authorities with different rules, financing periods and timing that create inefficiency in agricultural knowledge development.

With the establishment of a unique and autonomous agency TNRC that will be responsible for governance of public research institutes, as broadly proposed as above, would solve most of these inefficiencies. In addition to TNRC, establishment of a Research Government Agency (RGA) could be another step to improve governance of public R&D system. Similar to Research State Agency established in 2012 in Spain, RGA would be responsible for

- Launch of new funding instruments and mechanisms,
- Competitive allocation of resources based scientific-technical criteria, in order to improve the quality and quantity of R&D activities.

Ensuring competitive science and technology funds has positive contributions for research governance in many respects (see World Bank (2006b), Rajalahti (2012) in World Bank 2012 p.41).

Sub-policy recommendation no 1.6: *Improve effectiveness of public agricultural extension system by distinguishing extension organization and functions within the current provincial organization of Ministry of Food, Agriculture and Livestock (GTHB) by enforcing new rules and regulations that establish a separate and more flexible governance mechanism of public extension system.*

Previously, existing barriers to knowledge diffusion in olive and olive innovation system as result of current organization and governance mechanism of public extension system have already been broadly summarized. These barriers are not specific to olive and olive oil sectors, but generic to other agricultural sub-sectors as well. Furthermore, weaknesses in newly emerging private advisory system and advisory functions of other bridging institutions mainly due to weaknesses in financial infrastructure and human capital are already underlined. Taking into account of weak capacity of other non-public extension and advisory services in in Turkey, the role of public extension system has a pivotal role in agricultural knowledge diffusion function. Hence, strengthening current public extension system by overcoming its current systemic problems with an AIS perspective should be one of the priorities in government policy making.

According to World Bank (2012) the tremendous need for establishment of new capacities within extension system is most probably the broadest challenge as a result of evolving demands and new roles for advisory services in the wider innovation system (World Bank 2012 pg.179). Government policies should favor changes in extension and advisory systems that would allow extension services to advise farmers not only on production issues but also on issues such as accessing markets and farmer entrepreneurship. In many countries traditional top-down extension systems, such as training and visit (T&V) extension model used in Turkey, are giving its way to more group-based and participatory approaches to providing advisory services (see World Bank 2012 pg. 182-183).

As mentioned in the part related to knowledge diffusion function, current TAGEM management as well as Extension and Education Department (EYYDB) of GTHB are aware of these challenges and developments.

They are trying to establish a collaboration mechanism for better interaction and coordination of researchers, extension agents and other agricultural sector actors with an AIS system perspective. For this aim, they have established “Agricultural Innovation and Knowledge Sharing System” with the coordination of EYYDB (see table 5.3.3 of in the previous chapter 5). However, without overcoming systemic problems of *first*, public research system, for which policy recommendations have proposed above, and *second*, public extension system, this initiative will be inefficient.

Birner et al. (2009) underline three major characteristics of agricultural advisory services that policy decisions would be made for developing effective extension and advisory services: *governance structures, capacity and management of organization, advisory methods.* They propose that implementation of reforms should focus on “best fit” rather than “best practice”.

Overcoming systemic problems of g*overnance structures, capacity and management of organization, advisory methods* of current public extension system as part of GTHB will improve knowledge development and diffusion in not only olive and olive oil sector but in other agricultural sub-sectors as well. For this aim, government policy targets should include:

- Recruitment of staff, equipped with relevant financial and physical infrastructure, who will only be responsible for extension activities: for instance, giving TARGEL staff the autonomy and physical infrastructure they need could be the initial step to improve current system.
- Redefining current extension services to ensure it would serve development of AIS in general and agricultural sub-sector IS development in particular (e.g. olive and olive oil innovation system)
- Improving human capacity by training and skills development of extension agents with an innovation system perspective,
- Recruitment of extension agents based on their expertise on sub-sectors: For instance, extension agents who would be responsible for extension activities in olive and olive oil sector should be graduates of olive and olive oil departments of

vocational schools and universities, who also got multi-disciplinary education during their education period.

- Establishment of flexible working hours and ensuring stability of an extension agent, in a task for a sufficient period to improve their reach capacity to farmers by building strong linkages and trust
- Improving salaries which allow promotion based on performance
- Using advisory methods that allow more face to face farmer contact

Furthermore, OPAS summarized in **Figure 6.2** can be used for extension organizations as well. OPAS is an organizational assessment system not only for research institutes but also for extension and training organizations as underlined by Birner (2012).

Sub-policy recommendation no 1.7: *Establish a formal of R&D and extension planning and programming on olive, table olive and olive oil sectors with cooperation of related actors that would underline medium and long term sectoral mission and vision of public research and extension agents.*

Currently one of the weaknesses is the lack of a sectoral common vision of public research institutes and extension agents. There are mission and vision of GTHB and its units around some principles, but there is no formal document underlining sub-sectoral targets. Regarding this, even though a new actor as producer in olive sector "Australian Olive Industry RD&E Plan 2010–2015"[89] of Australian Government, which is the third of consecutive plans, could be inspiring for Turkey.

Sub-policy recommendation no 1.8: *Establish innovation and technology centers, research centers and technology platforms for agro-food sectors - including olive, table olives and olive oil sub-sectors- within the framework of broader science and technology parks in olive producing regions to improve interaction and knowledge diffusion between research, education and value chain actors.*

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[89] See https://www.google.com.tr/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=aaustralian%20research%20developmen%20and%20extension%20plan%202010%202015, RIRDC, 2010 "Australian Olive Industry Research, Development and Extension Plan 2010-2015"

Science and Technology parks (STPs) bring regional and sectoral actors (e.g. research institutes, university, industry, government) for collaboration and interaction by supplying physical, financial and knowledge infrastructure facilities as shared resources (e.g. incubators, telecommunication infrastructure, education programs, collaboration activities, offices, security, bank facilities…etc.). STPs intend to create technological and economic development by advancing knowledge development and diffusion[90].

The success and potentials of STPs depend on characteristics of the local economy, e.g. local research base and the degree of local partnerships among public and private stakeholders. Comparative studies on STPs indicate the "*link between the apparent success of STPs and the strength and diversity of the local economy where they are founded*" (EU 2013 pg.2). Hence, it is important that investment in STPs should go hand in hand with regional capacity development. It is for this reason that regional "*smart specialisation strategies*"[91] based on strong partnership between private sector, public organizations and knowledge institutions is required as a condition to use funding from the European Structural and Investment Funds (EU 2013).

Regarding these aspects of STPs into consideration, experiences of other olive producing countries could be good benchmarks to see the way that public, private and R&D actors of olive and olive oil sectors could be integrated in STPs. In this respect, two STPs in the main olive producing region Andalusia in Spain, *GEOLIT Olive Grove and Olive Oil Science-Technology Park of Province of Jaen* and *RABANALES 21 the Science and Technology Park of Cordoba*, are good examples of how in various ways olive sector actors organize under the umbrella of STPs[92]. GEOLIT and RABANALES 21 are the two of seven STPs in Andalusia region in which around 80 % of olive oil of Spain is produced, predominantly in Jaen province but

[90] For EU country practices and thorough analysis many aspects of STPs see EU 2013 "Setting up, managing and evaluating EU Science and Technology Parks, An advice and guidance report on good practice" European Commission, Directorate-General for Regional and Urban policy REGIO DG Unit G1, October 2013

[91] see http://ec.europa.eu/research/regions/index_en.cfm?pg=smart_specialisation

[92] See http://english.geolit.es/, http://www.rabanales21.com/

also in Cordoba. Selected olive sector actors that are active in GEOLIT and RABANALES 21 are briefly described in **Table 6.2.**

Table 6.2 Olive and Olive oil Sector Actors active in GEOLIT and RABALANES 21

GEOLIT Science and Technology Park of Province of Jaen
Centre for Innovation and Technology in Olive and Olive Oil CITOLIVA: A non-profit foundation to implement innovative methodologies and technological systems as well as training activities (e.g. to promote the culture of entrepreneurship and innovation in the food industry in general and especially olive). **Olive Technology Platform ALENTA:** promoted by CITOLIVA, to bring together all the public and private actors of the value chain to prioritize R&D needs of the sector **Agricultural Research Institute IFAPA:** R&D for innovation in farming and olive oil processing **Center for Research Excellence in Olive Oil and Health CEAS**: mainly related to olive oil benefits on health and try to coordinate all research carried out in Andalusia on this subject **Olive Oil FINCALINK**: a platform for e-commerce, marketing and logistics at the service of producers of Spanish olive oil. Initiative is to sell internationally olive oil high-end directly to end consumers. **Foundation for the Promotion and Development of Olive and Olive Oil**: a public and private initiative, promoter of the Scientific and Technical Symposium EXPOLIVA, the International Exhibition of Extra Virgin Olive Oil, Extra Virgin EXPOLIVA, the Active Museum of Olive Oil and Sustainability TERRA OLEUM, implementation of olive-sector price information system "POOLred" in Spain. **Heritage Community Foundation OLIVARERO**: a nonprofit organization, under the Protectorate of Ministry of Environment and Rural and Marine Affairs, assumes functions such as promoting olive oil in domestic and foreign markets and collaborate on advertising campaigns to support consumption **Active Museum of Olive Oil and Sustainability TERRA OLEUM**: Founded in 2012 in GEOLIT, promoted by Foundation for the Promotion and Development of Olive and Olive Oil, primarily an educational exhibition space, to disseminate the culture of olive, including an "**Olive Oil and Mediterranean Diet Gastronomy Center**". **Olive Oil Biotech:** a technology-based company for development of technologies for producing olive oil, with young olive Technologists and Researchers who work R&D + Innovation. **The Foundation OLIVARUM :**conduct development of research projects in olive grove, has activities on training and dissemination, analysis, advice and support, research GEOLIT also provides platforms for inclusion of other actors such as **Association of Teachers and Oil Mill Operators AEMODA** for training and knowledge exchange.
RABANALES 21 the Science and Technology Park of Cordoba
Spanish Olive Technology : Spanish technology for cultivation and olive oil production in the service of international producers, formed by companies of Spanish machine suppliers, products and services for industrial olive and olive oil, from olive cultivation to bottling of olive oil and table olive packaging. When customers contact with Spanish Olive Technology they contact the manufacturers directly, without intermediaries. **OlivoGlobal:** A company, which has innovations mainly packaging for better quality olive oil

Source: http://english.geolit.es/, http://www.rabanales21.com/

University of Jaen has a leadership role in R&D and education on olive oil. It is also a partner to the UNICA project (Shared Research Unit on Olive Oil) located in GEOLIT within the framework of the agro-food International Campus of Excellence, coordinated by the

University of Cordoba, in association with four other universities in Andalusia (see Box 4.5. in OECD 2010a p.208).

Furthermore, with the initiative of Innovation and Development Agency of Andalusia (IDEA), the Network of Technology Spaces of Andalusia (RETA) brings together technology centers, including CITOLIVA, to facilitate access to innovation by all Andalusian firms, regardless of their size and particularly in traditional sectors (OECD 2010a p.72-73).

Both STPs, especially GEOLIT, with variety of actors and collaborative activities that they consists of - not only related to olive sector but also other agro-food sectors which are not tabulated in Table 6.2 - could be inspiring for government policy makers in Turkey for structural investments and for value chain actors for organizational innovations.

Policy Recommendation no 2: Establish multidisciplinary and multi-sectoral secondary and tertiary education and training capacity that correspond requirements of food and agriculture sub-sectors, including olive, table olive and olive oil sub-sectors.

Agricultural education and training (AET) play a major role in creating human capital capacity that will enable olive and olive oil sectoral innovation system to function more effectively. A "growing focus on innovation systems in agriculture" requires skills beyond the ones traditionally developed in agricultural education, especially soft skills that enable better communication and cooperation at many levels of AIS (Maguire 2012a in World Bank 2012 p.108).

In the analysis chapter, barriers to Olive and Olive Oil Innovation System arising from the weaknesses in tertiary agricultural education system (i.e. agricultural faculties of universities) and secondary education system (i.e. agricultural/technical/vocational education and training (VET) which prepares technicians for agricultural sub-sectors) have been underlined.

Regarding problems in AET, Maguire (2012a) proposes four major policy guidelines for sound government policies that would address weaknesses of AET systems:

- Clarify the role of agricultural education (in the development agenda, with clear links to the agendas of the respective ministries)

- Ensure sustainable, regular funding
- End political interference in university administration
- Create a favorable environment for investing in AET and improve the balance of investments in agricultural research, extension, and education.

In Turkey, while restructuring rules and regulations as well as governance mechanisms of AET system at macro level, it would be beneficial for the government to take into consideration above-mentioned principles.

Sub-policy recommendation no 2.1: *Establish agricultural universities*, r*estructure curriculum of agricultural faculties and social science faculties in order that they support multidisciplinary studies and variety of skills development for food and agriculture sub-sectors.*

Effective innovation systems require knowledge and skills beyond a particular specialization and AET programs need to balance technical curriculum with training in a wide range of skills and competencies in order to respond to these requirements (see Box 2.4 in World Bank 2012 pg.116). They should empower people to innovate (OECD 2010b).

One of the main weaknesses in knowledge development function mentioned by the interviewees has been the weak human capital infrastructure due to low quality agricultural faculty graduates in Turkey. This problem indicates the need for a reform in agricultural education system in universities.

First, in Turkey, there are agricultural faculties, but there is not an agricultural university, which do multidisciplinary education and research on food and agriculture. For instance, *Wageningen University in Netherlands*, which is one of the leading universities in its field and offer variety of education programs that combine various fields of natural and social sciences, could be a very good benchmark.

Establishment of agricultural universities in Turkey that function similar to Wageningen University (or its equivalents), could overcome weak human capital infrastructure due to weaknesses in tertiary education on food and agriculture.

Secondly, relevance of curriculum of agricultural faculties in Turkey has to be assessed and restructured according to current requirements. Agricultural curricula have to be frequently updated to stay relevant and has to reflect changes in the agricultural context (e.g. changes of technological, social, consumers' preferences and concerns as well as external conditions such as climate change, globalization, natural resource governance) (Maguire 2012b pg:1).

Finally, bibliometric analysis in the section for knowledge development function indicates very low levels of economic and social research on olive and olive oil sector. Designing curricula of agricultural faculties that enhance these disciplines for economic and social studies on agricultural sub-sectors would overcome barriers arising from current curricula. For instance, Cordoba university in Spain has master programs related to agricultural sector in social and legal sciences (e.g. on Agro-ecology: A Sustainable Approach to Organic Farming), in engineering (e.g. Agro-industrial Plants: Projects and Management) in Sciences (e.g. Global Change: Natural Resources and Sustainability)[93].

Sub-policy recommendation no 2.2: *Develop applied agricultural education and training capacity of agricultural faculties/universities.*

Sub-policy recommendation no 2.3: *Restructure vocational education and training system in agriculture and food related disciplines so that the system allows skills development by learning by doing.*

Applied education and training in agricultural faculties, i.e. learning by doing, is weak and has to be improved in Turkey, as the analysis indicates.

One option to overcome this weakness is to design agricultural curricula so that the student has to graduate from both scientific and applied courses at the same time. Curricula of agricultural universities/faculties could balance both theoretical and applied education. In addition to agricultural universities, establishing vocational universities would enhance balance between theoretical and applied education on agriculture. For instance, VHL

[93] See http://www.uco.es/internacional/internacional/factsandfigures/documentos/Presentacion%20facts%20&%20figures%20UCO%20final%20para%20web%20ING.pdf

University of Applied Sciences[94] in Netherlands has MS degrees on food and dairy, horticulture chain management, rural development etc.

There are Vocational High Schools and Vocational Higher Education Schools (MYO) as part of VET system in Turkey. However, there are significant weaknesses in applied training capacity of the VET system in addition to physical and financial infrastructure weaknesses. Besides, demand for VET graduates is low. As of 2014, there remains one of the MYOs focusing on olive and olive oil sector, the one in Edremit, because of lack of demand for technicians.

VET system could be improved by establishing an effective "*dual education system*" in vocational education, used in a number of countries but namely Germany. Establishment of such a system would combine apprenticeships in a firm and a vocational course at a vocational school. The system and vocations could be defined and strictly regulated by national standards as in German system. Current apprenticeship system of vocational schools in Turkey can be improved by this way.

<u>Sub-policy recommendation no 2.4</u>: *Develop university education and training capacity on olive, table olive and olive oil production and processing technologies in olive producing regions.*

<u>Sub-policy recommendation no 2.5</u>: *Restructure rules and regulations in the university system that would allow development of expertise on olive related studies requiring long-term knowledge accumulation.*

As mentioned before, there are not specific programs on olive, table olives and olive oil in agricultural faculties. Olive related studies are sustained as part of horticulture departments. Furthermore, very long term nature of olive sector studies but in the meantime current academic promotion mechanism that disfavors expertise and long term studies is a barrier for knowledge development in olive and olive oil sector. Establishment

[94] http://www.vhluniversity.com/vhl-studies.aspx

of separate agricultural departments of olive production and processing to enhance expertise would overcome some of these barriers.

Higher education programs with collaboration of universities and research institutes could contribute training professionals and researchers in olive sector and develop cooperation between the participants. For instance, University of Jaen has developed a master degree program in olive oil production covering all aspects of the industry (see Box 4.5. in OECD 2010a p.208). There is also International master program of olive growing and olive technology[95] jointly organized by Cordoba University with collaboration of many related actors, such as Research institutes of CSIC, INIA as well as the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) and International olive Council (IOC). A national master program in Turkey, similar to above-mentioned initiatives, can be launched with the participation of relevant actors of olive and olive oil sector in Turkey.

Sub-policy recommendation no 2.6: *Re-organize research and education functions of Universities by enhancing food and agricultural R&D capacity of University research Institutes in order that both functions better. In this framework, enhance public–private partnership initiatives for olive and olive oil research, education and training.*

In order to improve knowledge development and diffusion, establishing and strengthening physical, financial and human capital infrastructure of research institutes of universities in olive producing regions that would conduct R&D on olive and olive oil sectors should be one of the policy targets of the government. Furthermore, the government should create necessary infrastructure and environment to improve effectiveness of public-private partnership of olive and olive oil R&D in these research institutes.

In Turkey, rules and regulation related to University revolving funds has been inhibiting university faculty members to carry out agricultural R&D partnership with the private sector. As an inducement to R&D infrastructure, in 2014 the “the Law on Support of Research Infrastructure” has been enacted which would allow public-private partnership of

[95] See http://www.masterolivicultura.org/index_in.html

the University research institutes. This would enhance in the coming future the public and private partnership in R&D.

Related to public-private partnership in Olive and Olive R&D, UC Davis Olive Center [96] as part of University of California is very good example. It is a self-funded university/industry coalition and established in 2008. It has been established by the Institute of Wine and Food Science "*so that UC Davis could do for olives what it did for wine*". It brings faculty members, research specialists and farm advisors to promote research and education needs of California olive growers and processor. Since its establishment until the end of 2014, it has developed more than 80 projects. The Center has its own olive orchards and olive oil production commercialized with different brands. The center is supporting itself through product sales, course revenue, research grants, and donations.

Policy Recommendation no 3: Create enabling environment for the development of formal value chains in table olives and olive oil sectors, inclusive of small producers currently in the informal part, by taking into account of the regional specificities of olive production.

One of the main barriers to development of olive and olive oil sectors is the significant informal part of these sectors and inability of small producers to integrate formal value chains due to various problems arising from weak financial, physical and knowledge infrastructure. The degree of these problems are at varying degrees in different olive producing regions depending on production scales, productivity olive trees and technological infrastructure in each region. Problems as a result of informal part is common to all regions, but it seems to be deeper in traditional olive producing regions in which scales are small and olive trees are less productive due to inclined topography and old age.

Hence, integrating actors of the value chains in a formal value chain would solve most of the problems in the sector arising from informality and help small producers to get more

[96] http://olivecenter.ucdavis.edu/

part of the value added created. Value chain analysis and development by taking into account of the context in each region should be part of government policies.

Development of agro-value chains has various benefits: improves employment in both rural and urban areas, provides market access to smallholders and business linkages to small and medium enterprises (SMEs), builds up responsible and sustainable relationships among chain actors, enhance food security by reducing post-harvest losses and by extending the shelf life (UNIDO 2009 p. v).

United Nations Industrial Development Organization (UNIDO) underlines that prior to any government intervention, analysis of value chains is indispensable and for this aim, it proposes a guideline for main aspects of agro-value chain analysis and development of them, which foresees pro-poor growth "*while bearing in mind pragmatic economic parameters to ensure their sustainable development*" (UNIDO 2009).

Government policies that would target improvement in performance of table olives and olive oil value chains should focus on below mentioned areas, as proposed by UNIDO (2009):

- increasing the quantity and improving the regularity and continuity of production;
- improving the quality and safety of products,
- reducing the time needed to reach the customer,
- minimizing transactional costs,
- improving the capacity of chain actors to follow and assimilate technology and market developments

In order to achieve these objectives, UNIDO (2009) suggests the following stages:

- Selecting and prioritizing value chains for promotion
- Mapping value chains to obtain a clear understanding of the sequence of activities and relationships involved in the value chain
- Analyzing the value chain technological capacities
- Analyzing the value chain economic performance and competitiveness
- Formulating an upgrading strategy for the selected value chain
- Implementing the upgrading strategy, monitoring and impact assessment

Guidelines of international organizations on (agro-) value chain development, which include country practices, such as UNIDO (2009), could be used for government policy guidance in development of table olives and olive oil value chains.

Sub-policy recommendation no 3.1: *Improve organization and governance capacity of Olive and Olive Oil Cooperative System so that it would be more inclusive of small producers and better articulate in regional, national and global value chains.*

Cooperatives are a pillar for agricultural development and security (FAO 2012a). Through cooperatives, small producers can both sustain their livelihoods and play a greater role in local, national and international markets. The success of a cooperative depends on how they govern and manage (FAO 2012b). In this regard, Ekboir (2012) assess many aspects of developing organizational capabilities of farmer organizations including cooperatives, for innovation.

In Turkey, even though there are significant improvements in olive and olive oil sales cooperatives union system in the last decade, there still exist barriers to effective functioning of cooperative system, mentioned in the analysis chapter.

Most of the barriers arising from current olive and olive cooperative system can be grouped under three main *systemic problems*, of which he government policy should primarily target:

- Non-uniform organization and governance mechanisms sales cooperatives and unions responsible for different regions: They interact with each other when necessary but act rather detached from each other in long term strategic planning and programming for whole of cooperative system. Furthermore, they are due to same government regulation on "principle agreement". However, they govern their olive purchases, processing and marketing based on different principles (e g. they separately announce prices and purchase olives on different time schedule; or Marmarabirlik purchase only olives but Tariş purchase both olives and olive oil, process olives and give back olive oil to its members if demanded etc.).

- Significant weak trust to cooperative system, which has been established in decades and which does not seem to be reversed in the very near future even though the cooperative system has been improved with many changes in the last decade.
- Sub-regional (i.e. district level first-tier cooperatives) weak infrastructure and human capital: For instance, lack of regional warehouse infrastructure, weak management capabilities, limited staff etc.

Non-uniform organization and governance mechanisms of cooperative unions are inhibiting effective formation of value chains:

For instance, purchasing rules of Tariş, which allow its member to bring olives, process in the cooperative and take back olive oil afterwards, is reinforcing *informality problem* of the olive sector. If Tariş were purchasing only raw olives from its members like Marmarabirlik, many barriers would have been overcome, or minimized.

In addition, value chain organization within Marmarbirlik and Tariş union system is different. Sales cooperatives in Marmarabirlik are only responsible for purchasing of olives from the members i.e. high end of the value chain. Olive processing, packaging, marketing, distribution and promotion activities are all responsibilities of the cooperatives union, Marmarabirlik. In contrast, in Tariş system, sales cooperatives have processing functions as well. They process and send olive oil in bulk to Tariş for bottling and distribution. Tariş Union has marketing and distribution functions. Regarding the international markets, both Unions act separately based on their own marketing policies.

Furthermore, Marmarabirlik's capacity and scale does not allow it to purchase all of its members' olives i.e. over quota production cannot integrate into cooperative value chain. This is also *reinforcing weak trust of members for cooperative* system, as they cannot bring all their olives to the sales cooperative. If Marmarabirlik has been part of a larger organization of a cooperative system, this scale problem would have been overcome and the rest of olives could have been processed in other parts of the larger system. This would also allow more member farmers to integrate into the cooperative system. In addition to these, production scales in southern regions are increasing and cooperatives in these regions should improve their capacity and effectiveness of their system.

Briefly, in current market conditions, all of the olive cooperative unions should better organize and coordinate within the cooperative system to overcome informality, scales problem and enhance integration of producers into the system to upgrade olive and olive oil value chain. In this regard, ensuring uniformity in organization and governance mechanisms of all olive and olive oil cooperative unions would improve functioning of the cooperative system.

One way to achieve this goal is to improve coherence of the current system with changes in organization and governance mechanism regarding the problems mentioned above. Another way is to abolish the current system and create a brand new cooperative union organization and governance mechanism, of which current Unions, Marmarabilik, Tariş and others, would be part of it.

This second option, totally abolishing the system and restructuring it, would probably be more helpful to break negative perception of farmers of the current cooperative system and construct trust in a much shorter period, compared to the first option. Developing a positive image of the system and trust building to the functioning of the cooperative system is needed to ensure integration of the farmers to cooperative system so that it would function, as it should be.

In this regard, establishment of a brand new olive and olive oil cooperatives unions system that would differentiate production, processing, packaging and marketing of table and olive oil at different tiers of cooperative system may be a good policy option (**see Figure 6.3**). This would create a positive image of the cooperative system as well as scale development by differentiating functions at different levels.

The new cooperative system can be designed by taking into account of functioning of two-tier/three-tier cooperative system[97] of European olive producing countries[98].

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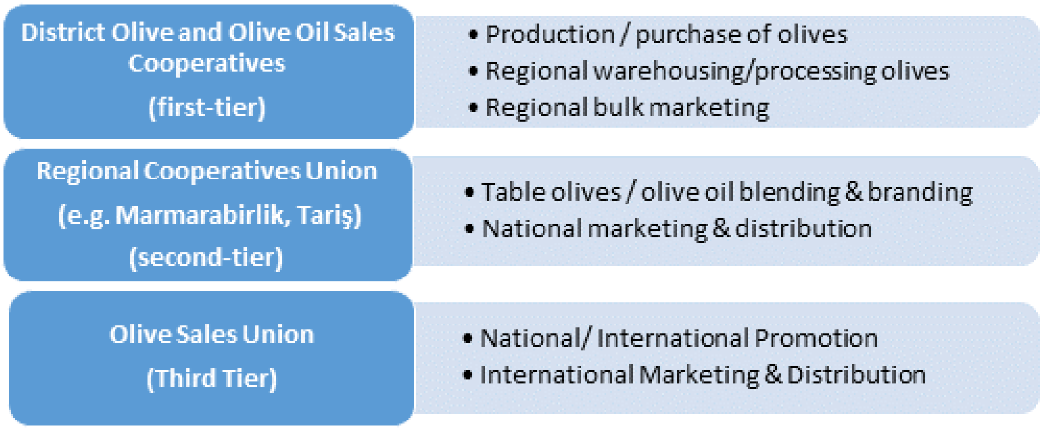
[97] Cooperatives made up of cooperatives joining forces. Second-tier cooperatives composed of first-tier cooperatives; and second-tier cooperatives unite for establishment of third-tier cooperative.

[98] Iliopoulos et al. (2012a) analyse the success/failure of olive cooperatives system of EU countries , based on factors related to i) position in the food supply chain ii) internal governance and iii) the institutional environment. Regarding division of responsibilities between different tiers in EU, first-

Among EU countries, Spanish cooperatives have a significant market share in food chain of olive and olive oil in domestic markets and in Europe (Iliopoulos et al. 2012a p. 17-19). Pros and cons of Spanish cooperative system can be taken as a benchmark for restructuring olive and olive oil cooperative system in Turkey. It is important to remember that there should not be "one size fits all" approach in policy design, as functioning of cooperative system is also context specific.[99]



Source: Author's compilation

Figure 6.3 Alternative Organization of Olive and Olive Oil Sales Cooperative System

In the new cooperative system, however the organization is designed, first tier cooperatives (current sales cooperatives) should be only purchasing raw olives and farmers should leave their olives to the cooperatives with the consciousness that after leaving their olives everyone's olives belong to everyone i.e. to the cooperative. This would overcome informality, quality and standardization problems arising from current functioning of sales cooperatives, especially Tariş sales cooperatives.

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tier cooperatives mostly operate olive mills while second-tier cooperatives, due to economies of scale, focus on processing and commercialization (Iliopoulos et al. 2012a p.20)

[99] Taking this account, Iliopoulos et al. (2012b) analyse whether differing organizational structures affect success of cooperative organization and the coordination of the olive oil supply chain in Crete and Andalusia.

Along with restructuring of organization and governance mechanism of the cooperative system, current physical and human capital weaknesses at first tier level cooperatives i.e. sales cooperatives - also development cooperatives and agricultural unions- at district level should be overcome. Regional Development Agencies and Rural Development Agencies could cooperate with each other. They would target capacity development of regional cooperatives systems as part of regional/rural development programs and design their regional subsidies complementing with each other.

Current weaknesses of olive and olive oil olive and olive oil cooperatives at district levels that should be targeted primarily are as follows:

- Establishment of regional warehouse system of agricultural cooperatives at district level: This would overcome a significant part of informality, quality and standardization problems that is arising from lack of good functioning warehouse system, which is also enforcing weaknesses in market formation due to significant existence of individual traders. There is government initiative to improve licensed warehouse system of agricultural products and the Law no 5300 is enacted in 2005 for this aim. The law foresees firms with capital above a threshold with large-scale capital investment and does not take into account of small-scale cooperatives with limited capital. In this regard, Marmarabirlik and Tariş Unions have their own licensed warehouses but sales cooperatives at district levels do not have physical infrastructure as warehouses.
- Support/subsidize human capacity development of first-tier olive and olive oil sales cooperative as well as development cooperatives and agricultural unions of olive and olive oil.

Sub-policy recommendation no 3.2: *Develop regional formal contract relationships, vertical and horizontal, that would better integrate regional producers and processors along the value chain.*

Contract farming[100], a form of vertical integration within agricultural commodity chains[101] could be an option to integrate small olive producers with olive processor firms along the value chain in olive producing regions.

Empirical evidences indicate that contract farming is more likely used for crops that exhibit a high degree of variation in quality, perish easily, therefore which are hard to grow, or command a higher price per kg (Prowse 2012 p. 5). Olive is such a fruit. Hence, establishing contract farming would be a good policy option for formal market formation and quality improvement in olive sector as well as integrating small producers in a formal value chain.

In addition to its numerous opportunities, there are numerous risks of contract farming, particularly for small-scale producers, e.g. dependency on the contracting firm (Prowse 2012 p.68-69). One way to overcome these risks is institutional innovation such as producer owned, market- oriented producer organizations that can help to rebalance the power relationship between firms and farms by collective bargaining and reduce the risks that farmers face (Prowse 2012 pg.75-76). Regarding the low level of literacy of olive producer farmers in Turkey, instead of single farmer contract farming, enhancing establishment and capacity of Olive Producer Unions could be a good government policy option to ensure collective action for contract farming in olive and olive oil sector.

Sub-policy recommendation no 3.3 *Strengthen regional physical, knowledge and human capital infrastructure for regional and national market formation for olive and olive oil.*

The analysis in this study indicates the importance of regional infrastructure development for regional quality improvement and market formation in terms of

- Physical infrastructure: warehouse, formal trading center, laboratories etc.

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[100] "Agricultural production carried out according to a prior agreement in which the farmer commits to producing a given product in a given manner and the buyer commits to purchasing it" (Minot 2007 in Prowse 2012 p.10).

[101] It stands between fully vertically-integrated investments (when a firm is involved in all the nodes of the value chain, from production, through processing to marketing) and spot markets (where price determination is a function of supply and demand) (Prowse 2012 p.9)

- Knowledge infrastructure: e.g. information system for regional statistics on olive production, price indicators, olive futures market etc.
- Human capital capacity: e.g. organoleptic analysis, taste panels etc.

The need for regional warehouse system can be overcome by integrating it to sales cooperative system, as underlined in sub-policy recommendation 3.1. Sales cooperatives testing laboratories infrastructure could be established at district levels, similar to first-tier cooperative system in Spain, so that olive oil content and quality of raw olives can be detected, when purchased from the farmer and reimburse farmers immediately.

In order to guide market on prices, oil and olive oil price information system similar to Spanish Olive Oil Farm Gate Pricing Information System (POOLred)[102] can be established in Turkey. This system could be based on regional olive trade market prices.

Physical infrastructure of regional olive trade markets should be developed, which could be established under the auspices of Chambers of Commodity Exchange/Trade in olive producing regions. An olive and olive oil futures market can be established, similar to Spanish Jaén-based futures market (MFAO)[103], that would also feed into price information system, as in Spanish POOLred system.

Not only physical infrastructure but also human capital infrastructure should be developed to allow organoleptic analysis of table olives and olive oil so that its trade can take place. These infrastructure developments could be developed with coordination of Chambers of Commodity Exchange/Trade and Regional/Rural Development Agency cooperation.

A more effective and uniform olive sector statistic base at district levels could be established, with the coordination of GTHB province organization and regional NGOs, to produce sector indicators which would be updated on a defined timetable. These district level statistics would bottom up form regional and nationwide sector statistics.

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[102] See http://www.poolred.com/

[103] First olive oil futures market, established in 2004. See http://www.mfao.es/inicio/inicio.asp

In this regard, current project of Olive Research Institute ZAE on development of olive sector statistics is very ambitious, but its success is debatable due to limited human capital and finance when we take into account of the wide scope of the project. This project can be transformed into a longer-term nationwide project with more funding and with coordination of GTHB, TÜBİTAK and TÜİK. The purpose of this longer-term project should be establishment of a reliable regional and national statistical database of olive sector.

Sub-policy recommendation no 3.4: *Enhance regional skills match in olive producing regions as part of a local economic and employment program.*

Regional skills development programs as part of a local economic and employment development (LEED) can be establishes in olive producing regions, targeting skills development in olive and olive oil sector in each region for "*building the right skills and turning them into better jobs and better lives*" as recommended by the OECD[104].

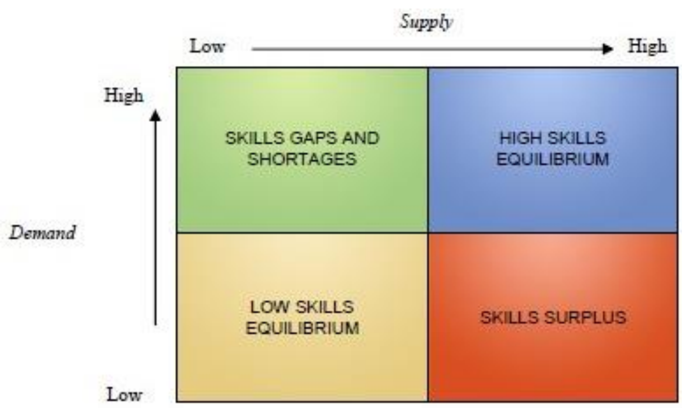
Similar to the OECD LEED program, a skills strategy focusing on four themes in all olive producing regions, with an olive and olive oil sector focus could be launched to overcome existing systemic problems arising from regional human capital infrastructure:

- Establishing local skills strategies, with a particular focus on youth: non-existence of the young generations in olive and olive oil sector is one the main challenges, especially in traditional regions.
- Improving how human capital is utilised in the labour force: by looking at both supply and demand side of skills, i.e. skills match, whether there is skills surplus or shortage (**Figure 6.4**). According to OECD, skills shortage arises due to lack of training for local people or problems of work organization and retention. By the help of regional skills strategies, a high skills equilibrium environment could be reached in olive producing regions as depicted in table 6.4.
- Leveraging training and skills development in SMEs: There is already an OECD LEED project carried out in Turkey, in OSTIM organized industrial zone located in Ankara

[104] see http://skills.oecd.org/ , http://www.oecd.org/cfe/leed/oecdleedskillsstrategy.htm

Province, one of the Turkey's largest SME industrial zones[105]. This project could be adopted to agro-food sectors and be a benchmark for SME development in olive and olive oil sector.

- <u>Developing skills and competences for entrepreneurship</u>: As the analysis indicate traditional and non-traditional olive and olive oil producing regions have differing infrastructure and needs for entrepreneurship. Hence, for each olive producing regions, regional policies for entrepreneurship could be developed, as recommended by the OECD, by "*looking at what skill and competence sets are needed for entrepreneurship and where and how these can be developed*".



Source: directly adopted from http://www.oecd.org/cfe/leed/oecdleedskillsstrategy.htm

Figure 6.4 Moving from a Low to High Skills Equilibrium

<u>Policy recommendation 4</u>: Improve bridging organizations capacity to strengthen their role in enhancing interaction between value chain actors, research and education actors and supporting organizations including government.

Regarding the systemic problems in Olive and Olive Oil Innovation system due to weaknesses in bridging organizations (e.g. Zeytindostu and UZZK) government policy should aim at least three main issues:

[105] See http://www.oecd.org/cfe/leed/49180428.pdf for the project report.

- Strengthening general financial infrastructure of NGOs in general, by using policy tools (indirect supports, such as tax reduction or direct financial supports). This will improve viability of Zeytindostu organization.
- Improving UZZK's financial infrastructure by enacting a government regulation setting rules for sources of finance,
- Establishment of regional/national platforms or designing regular meetings, that bring government officials and NGO representatives to discuss and to get recommendations of NGO on sectoral issues, such as effectiveness of on existing regulations or further needs.

In order to create financial infrastructure for UZZK a funding system of UZZK could be established by enacting a government regulation similar to fund system of Spain's "Olive Oil Industry Inter-professional Organization"[106]. It represents all olive oil industry members in the value chain including farmers, cooperatives, olive mills, packers and exporters. It was founded in 2002, but it was in 2008 that financial contributions of the different actors were officially imposed. This financial resource is allocated to promotion campaigns to increase consumer awareness of Spanish olive oils in Spain, the EU and third countries[107].

With a stronger financial infrastructure, both Zeytindostu and UZZK could establish their regional organizations to improve their reach capacity, which is currently very limited, and institutionalize in the eyes of sector actors by overcoming asset specificity problem due to their dependency on financial contributions of a few actors, creating weak trust on their autonomy.

[106] "Interprofesional del Aceite de Oliva Español" is a non-profit organization and its activity is regulated by the Law on Food and Agriculture Inter-professional Associations. The Ministerial Order (extension of the regulation), approved in August 2008, establishes the economic contributions of the different actors involved in the olive oil production, transformation and commercialisation processes (mills, dispensers, refineries and operators) depending on their activity. http://www.interprofesionaldelaceitedeoliva.com/en/index.php?option=com_content&view=article&id=54&Itemid=3

[107] http://www.oliveoiltimes.com/tag/interprofesional-del-aceite-de-oliva-espanol

As a framework organization, strengthening its regional organizations and devolving its functions to its committees, should be primary target of UZZK so that it can be accepted as the framework organization in each olive-producing region and effectively give voice of sector needs varying by region to the government.

Policy recommendation no 5: Ensure congruency of national, regional, sectoral and technological policy formulations by taking into regard of regional/territorial specificities of agro-food sectors (e.g. olive and olive oil sector) with a long-term perspective.

Ensuring congruency among different levels of policy areas in AISs requires good governance systems including clear planning and priority setting as well as effective coordination, measurement, monitoring and evaluation mechanisms (see OECD 2013).

There is a broad agenda of governance issues that governments face in further developing innovation policy such as policy coherence and integration, coordination, stakeholder involvement…etc. (OECD 2005a). There are various governance structures and processes of OECD countries (OECD 2005b), of which Turkey could take lessons. Some of the OECD member country practices could be good benchmarks on mechanisms and practices for better coordination and integration across policy areas (see OECD 2005c).

In order to evaluate governance mechanisms of AIS, OECD (2013) propose possible questions on governance mechanisms of AIS and possible indicators (**Table 6.3**). In addition to governance of AIS at national level, these questions and indicators could be applied to sub sector level, i.e. Olive and Olive Oil Innovation System and effectiveness of governance mechanisms at different levels of AIS (national, sub-sectoral, regional etc.) could be assessed accordingly.

Above all, there should be a government foresight on all socio-economic targets and based on these socio-economic targets, priorities (in science and technology, education, finance etc.) should be decided so that sectoral visions could be effective (Göker and Özdemir 2001 pg.30). In this regard, technological/sectoral foresight practices would be good policy tools to establish long term vision for sectoral policy formulation for Olive and Olive oil Innovation System.

Table 6.3 Possible Questions and Indicators on Governance of AIS

POSSIBLE QUESTIONS
• What are the respective roles of the following actors in the agricultural innovation system: government, private sector, academia, non-profit organisations, and producer organisations?
• What is the governance structure? Umbrella ministries, co-ordination, funding, performing, monitoring and evaluation agencies in the form of a flow-chart.
• How is the AIS integrated into general innovation system? Are there features of the agricultural sector that require the AIS to be different from the general system?
• How are innovations priorities established and communicated? How are market and system failures identified?
• Are there mechanisms to co-ordinate national innovation priorities and their implementation?
• Who is in charge of evaluating staff, projects, overall system performance? How is performance measured and evaluated? What information is available?
• What criteria are used? What input and output indicators are available? What tools are used for benchmarking?
• Are the economic and social impacts of innovation evaluated? How (methods)? By whom? How frequently? How are evaluation results used in priority setting and decision-making?
• How is information needed to measure and evaluate AIS collected?
POSSIBLE INDICATORS
• Diversity of stakeholders involved in strategic planning
• Frequency of evaluation
• Number of indicators and models used in evaluation;
• Content and timeliness of databases

Source: OECD 2013 "Agricultural Innovation Systems: A Framework for Analysing the Role of the Government" p.57

6.3. Chapter Conclusion

Policy recommendations proposed in this chapter are aiming to target current systemic problems of olive and olive oil sectoral innovation system. Actors, institutions and context of the olive and olive oil IS are changing and evolving in time. Functional-structural analysis framework helps to diagnose problems in olive and olive oil IS at a point in time with existing structure of the sector at that period. Hence, after designing policy to overcome existing problems that this research revealed, functional and structural analysis of olive and olive oil IS should be done regularly at certain periods of time, as proposed in the systemic innovation policy framework of Wieczoreck and Hekkert (2012). This would allow to capture the dynamic nature of the olive and olive sector and diagnose its existing problems, if any.

CHAPTER 7

CONCLUSION

7.1 Introduction

The aim of this research has been to reveal barriers that impede innovation processes in olive and olive oil sector in Turkey. Even though Turkey is a significant producer in the world olive and olive oil sector, olive productivity, olive oil quality, market shares in the high value added segment of both domestic and international markets with branded products are low, compared to leader producer countries such as Spain and Italy. In the last decade, there have been attempts of the government and private sector to develop the sector by overcoming productivity and product quality problems, but the success of these attempts has been limited.

The above-mentioned problems of olive and olive oil sector implicitly imply low levels of innovation in the sector. In other words, product, process, marketing and organizational innovations along the value chains of olive, table olives and olive oil - that would improve productivity, product quality and market shares- are insignificant. Hence, a sectoral (innovation) policy that will enable innovation and innovativeness of value chain actors in the olive and olive oil sector is needed to overcome these problems.

In the last decades, main assessment framework used for government policy design for agricultural development has been based on Innovation System (IS) perspective. Agricultural Innovation System (AIS) framework has become more and more mainstream approach as a diagnostic tool for designing policies for agricultural development. AIS framework allows a holistic approach to tackle increasingly complex challenges of agricultural sector.

Regarding these developments, assessment of problems in the olive and olive oil sector with an innovation system perspective and designing of government policies accordingly would be a wise alternative for the development of the sector.

For this aim, in this research study, barriers that impede innovation processes in olive and olive oil sector in Turkey are identified and policy implications are underlined by using IS framework. In the next section, brief summary of analysis and policy conclusions based on IS framework are presented. Later on limitations to this research study are outlined and by taking into account of these limitations- as well as specificities of agricultural and food sectors- further studies that could complement this research and further contribute to the literature are suggested. Finally, in the last part of this chapter critical contribution of this study to innovation system literature is briefly discussed.

7.2. Brief Summary of the Study and its Conclusions

In order to identify barriers to innovation in olive and olive oil sector, based on innovation system perspective as the main framework of analysis, functional-structural analysis framework of Wieczoreck and Hekkert (2012) has been applied in this research. Functions proposed by Hekkert et al. (2007) have been used to decompose olive and olive oil sectoral innovation system into seven functions. Their good functioning is assumed an indicator for the functioning of the innovation system as a whole, therefore happening of innovation in the sector, or vice versa.

These functions consist of, knowledge development, knowledge diffusion, guidance of search, market formation, entrepreneurial activities, lobbying activities and mobilization of resources. These functions of IS are not used in a mechanical sense of components that compose the whole system, but rather used to deconstruct a complex hypothetical innovation system into reasonable components to better analyze barriers and inducement mechanisms in the system functioning.

In the analysis, initially, a sectoral boundary of olive and olive oil sectoral innovation system is defined to include olive, table olives and olive oil sub-sectors. Based on sector delineation, main actors of the olive and olive oil sectoral innovation system are sorted out. A list of interviewees composed of representatives of main actors of the sector is interviewed for diagnosis of problems in the sector.

These interviewees were semi-structured and based on a list of diagnostic questions prepared for each function, as proposed by Wieczoreck and Hekkert (2012). Value chain actors and regional actors selected from two traditional olive producing regions, Gemlik and Ayvalık Districts due to defined criteria underlined in the methodology chapter. Based on these interviews, functional-structural analysis olive and olive oil sectoral innovation system is carried on function by function in chapter 5.

The analysis indicates that there is significant number of systemic problems related to each function, inhibiting functioning of the innovation system, as summarized in Table 5.22. As proposed by Wieczoreck and Hekkert (2012), policy tools should be designed to target these systemic problems. Hence, taking into account of these systemic problems, policy recommendations are formulated to overcome them. These policy recommendations are briefly summarized in Table 7.1.

Table 7.1 Summary of Policy Recommendations for Systemic Problems

POLICY RECOMMENDATIONS	GOALS
Restructure public research and extension system • Establish a unique autonomous public research organization with new rules and regulations • Re-structure current organization, governance mechanism and scientific discipline coverage of Olive Research Institutes ZAE • Ensure inclusion of related sector representatives in the governance process of public R&D • Establish effective regional/sectoral knowledge platforms that bring producers, regional actors with research institutes to develop regional sector priorities for R&D • Reorganize rules and regulations of R&D project funding processes • Establish a separate and more flexible governance mechanism of public extension system. • Establish a formal of R&D and extension planning on olive, table olive and olive oil sectors with cooperation of related actors • Establish innovation and technology centers, research centers, technology platforms for agro-food sectors within the framework of broader science and technology parks	**To enable effective scientific knowledge development and diffusion** By allowing researchers to fully assume their roles; improving human capital infrastructure, that fit responsibilities of research institutes, ensure regional/sub-sectoral needs and knowledge feeds in public R&D system; enhance knowledge flow bottom up for R&D policy making; improve effectiveness in allocation of/ fair competition environment for public R&D support; improve knowledge diffusion via extension system; develop medium/long-term sectoral mission and vision for public research and extension; improve interaction between research, education and value chain actors.

Table 7.1 (cont'd) Summary of Policy Recommendations for Systemic Problems

Establish multidisciplinary and multi-sectoral secondary and tertiary education and training capacity • Establish agricultural universities, restructure curriculum of agricultural faculties and social science faculties • Develop applied agricultural education and training capacity of agricultural faculties/universities. • Restructure vocational education and training system in agriculture and food related disciplines • Develop university education and training capacity on olive production and processing technologies in olive regions • Restructure rules and regulations in the university system • Re-organize research and education functions of Universities by enhancing food and agricultural R&D capacity of University research Institutes in order that both functions better. • Enhance public–private partnership initiatives for olive and olive oil research, education and training.	**To meet knowledge and skills requirements of food and agriculture sub-sectors, including olive, table olive and olive oil sub-sectors.** (By supporting multidisciplinary studies and variety of skills development based on learning by doing; allowing development of expertise on olive related studies requiring long term knowledge accumulation; enhancing research capacity of universities; to enhance collaborative research and education)
Create enabling environment for the development of formal value chains in table olives and olive oil sectors, inclusive of small producers currently in the informal part, by taking into account of the regional specificities of olive production. • Improve organization and governance capacity of Olive and Olive Oil Cooperative System • Develop regional vertical/horizontal contract relationships to better integrate regional producers along the value chain. • Strengthen regional physical, knowledge and human capital infrastructure for regional/national market formation • Enhance regional skills match in olive producing regions as part of a local economic and employment program	**To improve regional physical, knowledge, capital and human capital infrastructure of value chain actors for entrepreneurship and market formation** (By ensuring collective entrepreneurship of small producers, ensuring market formation by better articulating in regional, national and global value chains, by developing regional skills in line with needs of value chain actors)
Improve bridging organizations capacity (e.g. NGOs, Zeytindostu association, UZZK) by strengthening their financial and human capital infrastructure, by creating regional/national platforms that bring government and bridging organizations together	**To strengthen role of bridging actors in enhancing interaction between value chain actors, universities, research institutes and government**
Ensure congruency of national, regional, sectoral and technological policy formulations by taking into regard of regional/territorial specificities of agro-food sectors (e.g. olive and olive oil sector) with a long-term perspective.	**To improve governance capacity and efficiency of government policies**

Source: Author's compilation

It is important to underline that systemic problems diagnosed and policy recommendations presented in this study is based on a hypothetical olive and olive oil sectoral innovation system defined at a point in time. The boundaries and actors of this system are changing and its context is evolving in time. Therefore, for an effective innovation policy design, functional-structural analysis of IS has to be done regularly to diagnose existing problems, as proposed by the IS literature.

7.3 Limitations of the Study and Further Research Issues

The methodology used in this research and scope of the research has been very useful to answer the research question of this study, which aim to sort out problems that create barriers to innovation in olive and olive oil sector, therefore to productivity and quality improvement, market formation and value added creation in the sector.

Even though so, there are limitations to this research due to its methodology and delineation of scope because of time and physical constraints, which could be taken into regard in further research that would contribute this study.

Limitations of this research study, which could be subject matter of further studies, are as follows:

- In this research, qualitative analysis method based on face-to-face semi-structured interviews has been used. Quantitative indicators and statistics are used where available to support this analysis. Though face-to-face, semi-structured interviews have been very useful to deconstruct the olive and olive oil innovation system, quantitative analysis methods, which could strengthen the diagnostics, has been very limited in this research.

  This study could be enriched quantitatively by producing statistics based on structured interviews and surveys, which would also improve its objectivity.

  The functional-structural analysis of Wieczorek and Hekkert (2012) based on qualitative analysis can be further adapted to the specificities of the agricultural sector, by defining and using performance indicators of IS proposed by the literature.

For instance, *AIS performance indicators* developed and proposed by Spielman and Birner (2008), Spielman and Kelemework (2009), Daane et al. (2009), Agricultural Science and Technology Indicators (ASTI) Initiative IFPRI (2009). Combining these indicators with selected general science, technology and innovation indicators suggested by the OECD, would further enrich the quantitative analysis capacity of this study. Using AIS indicators will support the conclusions based on qualitative analysis and help to capture more information on the functional performance of the system.

- Interactions between various actors of the Olive and olive Oil Innovation System has been assessed (qualitatively) based on semi-structured interviews, which only gives a broad idea of the quality of interaction. Networks within and between actors could be analysed based on, for instance, *Social Network Analysis* (Hanneman and Riddle 2005) or *Net-Map*, a participatory social network mapping approach proposed by Schiffer and Hauck (2010) (See Schiffer 2012). Based on the result of these analyses, policy recommendations for developing innovation networks could have been proposed (See Ekboir 2012).
- Olive oil sector delineation has been limited to extra-virgin olive oil production and olive oil refining value chain actors were not included in this study. Olive oil refining is very important for olive oil sector to produce blended olive oil brands, e.g. Riviera olive oil and there is significant amount of low quality virgin olive oil production in Turkey that goes to refining. Blended olive oil production is important for national and international market formation by targeting consumers favoring Riviera olive oil. A further study with a broader delineation of olive and oil innovation system including olive oil refining sector would be useful to sort out other systemic problems arising from functioning of this segment of the sector that were not included in this study.
- Another limitation of this study is that interviews of regional actors and value chain actors have been limited to two traditional regions, Ayvalık and Gemlik. Including other traditional regions in Southern, southeastern and Aegean regions or significant producing regions such as Akhisar district and newly established non-traditional olive producing regions could improve breadth and depth of this study.

In addition to limitations to methodology and sector delineation of this study that could be subject matter of further work, analysis results of this study indicate many issues that could be selected for research which would significantly complement this research and contribute to innovation system literature:

- Each of the policy recommendations proposed in this chapter deserves in depth analysis, with an innovation system perspective and they can be assessed as a separate research subject.
- A further study could be is benchmarking of the olive and olive oil sectoral innovation system in Turkey with other country innovation systems. For instance, Spain and Italy could be selected, as they are the leader countries in productivity and quality in the international markets. Actors, activities and institutions of IS in these countries could be broadly compared to further assess systemic problems in the olive and olive oil innovation system in Turkey.
- Another issue is size of informal part of sectors in a developing countries and non-inclusiveness of the small producers. Informal part in the agricultural sector of developing countries is high, for which olive and olive oil sector in Turkey is a good example. Therefore, focusing on the inclusiveness of small producers in the olive and olive oil sectoral innovation system in Turkey is an important further study.

  There is growing literature on inclusive development and inclusive innovation systems (see Globelics thematic report 2011/2012). There are some studies in the literature, for instance research study of van der Hilst (2012) which focuses on inclusiveness problem of potato producers in Vietnam and proposes a framework for "Inclusive Innovation System" based on Wieczorek and Hekkert (2012) functional-structural analysis methodology. This research study could be a good benchmark for studying inclusiveness of olive and olive oil IS.

  Women labor is significant in olive production. Especially in more traditional producer regions. The study of the IS focusing on the women inclusiveness and entrepreneurship capabilities in is another important array of study for the olive and olive oil sector in Turkey.

As mentioned before, young generations in olive and olive oil sectors are marginalizing due to problems in the sector. A research study on barriers to youth inclusiveness in Olive and Olive Oil Innovation System.

- Regional context and organizations seem to be very important for the functioning of the olive and olive oil sectoral innovation system. In this study two regions of the sector have been included as part of a single Olive and Olive Oil Innovation System. Analysis of the sector by taking olive producing regions as separate "Regional-Sectoral Olive and olive oil innovation system" is a good subject for further study. This would also allow to compare the IS dynamics in different regions, e.g. more traditional regions such as Ayvalık and Gemlik maybe compared versus new regions such as Akhisar and newly established non-traditional olive producing regions to see whether and how dynamics of functions of these regional sectoral IS differ significantly and government policies could be designed accordingly.
- Olive production has rural development implications as olive can be produced in less favored areas (LFA)[108]/or Areas facing Natural Constraints (ANC). One further study may be to analyze the systemic problems in the olive and olive oil IS those inhibit rural development in LFA/ANCs and formulate sectoral innovation policies for rural development in olive producing LFAs/ANCs[109].
- Another study that would contribute to this study could be on analysis of barriers to the development of two phase and three-phase olive oil processing technologies with a "Technological Innovation System (TIS)" perspective. This time delineation of IS would be a specific technology instead of a sector.

  Furthermore, analysis olive oil TIS in Turkey could be evaluated in comparison with olive oil TIS in Spain and Italy to assess technological catch up capabilities in Turkey.

[108] "In the European Union, less-favoured area (LFA) is a term used to describe an area with natural handicaps (lack of water, climate, short crop season and tendencies of depopulation), or that is mountainous or hilly, as defined by its altitude and slope" https://stats.oecd.org/glossary/detail.asp?ID=1520

[109] For instance, EU common Agricultural Policy (CAP) has support schemes for ANCs (previously LFAs). See http://europa.eu/rapid/press-release_MEMO-11-685_en.htm

- Analysis in this study and systemic problems sorted out indicate that significant part of problems of the sector is related to "social capabilities" problems in different components of the IS. Therefore, selection of the functions of innovation system should take into account of the developing country reality. Functional-structural analysis offered by Wieczoreck and Hekkert (2012) allows analysis of an IS based on structural system failures (i.e. systemic problems related to actors, networks, institutions, infrastructures). As systemic problems underlined in this study indicates, system failures based on structural failures as in the analysis methodology of this study is necessary but may not be sufficient for sectoral studies in a developing country context.

  Assessing functions of olive and olive oil innovation system based on not only on structural system failures, but also on transformational system failures (i.e. directionality, demand articulation, policy coordination and reflexivity) as proposed by Weber and Rohracher (2012)[110] could be a very appropriate study to better analyze policy implications of IS in a developing country context. Inclusion of "transformational system failures" would bring more macro-level perspective to current study. For instance, Lamprinopoulou et al. (2012) analyse Scottish and Dutch Agri-food Innovation System by combining frameworks of Weber and Rohracher (2012), Wieczoreck and Hekkert (2012).
- Innovation System Perspective is a closed system and does not take into account of implications of changes in the external environment. In fact, olive and olive oil sectors are evolving embedded in a global context. Hence, studying transformation dynamics of Olive and Olive Oil Sectoral Innovation System of Turkey as part of global olive and olive oil "socio-technical regime" based on multi-level perspective (see Geels 2004) would be another area of research. This research could be done in a comparative historical perspective, by comparing olive and olive oil sectoral

[110] Weber and Rohracher (2012) aims "combining the strengths of structurally oriented innovation systems approaches and the transformation-oriented multi-level perspective" to improve "the conceptual foundation and actual implementation of transformation oriented innovation policies" see Weber and Rohracher (2012) p.1038.

development in Turkey as a socio-technical system in time, with systems in leader olive producing countries, Spain and Italy.

- By combining IS approach and multi-level perspective, functioning of Olive and Olive Oil Innovation System (sub-sector level) as part of broader Agricultural Innovation System (sector level) or Organic Olive and olive Oil Innovation System (technology level) as part of Olive and Olive Oil Innovation System can be analyzed to draw complementary policy implications. For this aim, multi-level research framework proposed by König et al. (2012) that combine different systemic levels, which has been developed based on multi-level perspective offered by Geels (2004) and IS literature, can be useful framework to apply.

7.4. Contributions of this Study and Conclusion

In this study, using Innovation System Approach based on Functional-Structural Analysis Method has been a useful framework for understanding and explaining what is (not) going on in the olive and olive sector in Turkey. The methodology used in this study has allowed figuring out existing barriers to innovation dynamics in olive and olive oil sector.

This research has various contributions to IS literature as well as social studies on olive and olive oil sector.

First, an "Olive and Olive Oil Sectoral Innovation System" has been defined for the first time to evaluate problems in the olive and olive oil sector for sectoral policy making based on IS perspective. This is a significant contribution as there has been no previous study on designing a sectoral policy for the olive and olive oil sector in Turkey with such a holistic approach.

Secondly, this study contributes empirically to the current literature of IS studies. It contributes to the stock of empirical studies on agriculture and agro-food sectors with an IS approach in general. It also contributes to the stock of empirical studies using Functional-Structural Analysis Framework applied on agro-food sector in particular, which has been a limited number.

Furthermore, Functional-Structural Analysis Framework of Wieczoreck and Hekkert (2012) have evolved mainly based on empirical studies of "Technological Innovation Systems" in developed country context. By applying this framework to olive and olive oil sector in Turkey, a traditional agro-food sector in a developing country context, contributes significantly to applicability of this framework for the analysis of agricultural innovation systems for government policy making.

Finally, quality of systemic problems sorted out in this study and policy implications of them indicate and confirm IS literature on the fact that a Sectoral Innovation System is an intersection of National Innovation System, Regional Innovation Systems and Technological Innovation Systems. Therefore, government policies that target different levels of IS should complement each other so that Sectoral Innovation System functions properly.

To conclude briefly, this study indicates that Innovation System Approach and IS analysis methodology used in this study is a useful framework for government policy makers to diagnose problems in functioning of a sector, prioritize policy targets and design government policy tools to enable innovation in that sector. This framework would be very helpful not only to government policy makers but to researchers who aim to make research on a specific sector. This framework would help the researcher to learn the sector they wish to make research on, thoroughly and in a holistic way, to sort out what are the research needs in that sector, and design research area and appropriate methodology more effectively.

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APPENDICES

A. POTENTIAL DIAGNOSTIC QUESTIONS AND INDICATORS FOR FUNCTIONAL- STRUCTURAL ANALYSIS

GENERAL QUESTIONS

Activities

- What are the main activities of your organization?
- What is the role of your activities related to the olive and olive oil sector?

Actors:

- Who are the main actors in the olive and olive oil sector?
- Which governmental bodies formulate, monitor and enforce policies for the agricultural sector/olive and olive oil sector?
- Which research organizations deal with olive and olive oil production?
- Which education organizations provide training for olive and olive oil sector at different levels (diploma, graduate, postgraduate)?
- Which extension organizations provide advice on olive production?
- Who are the major players in the value chain?
- Which non-governmental organizations (of olive farmers, olive oil producers) exist?

Interaction:

- Which actors/organizations do you interact related to the sector?
- Do you collaborate with:
    - Knowledge and education institutes?
    - Bridging Institutes (NGO's, Agricultural Extension Institutes, cooperatives) ?
    - Value chain actors (input suppliers, farmers, proccessing firms, ..) ?
- What type of collaboration? What are the main motives for/benefits of these collaborations?
- How important and satidfactory are your cooperation with knowledge and education/extension/business organisations?

Institutions:

- What are the main institutions (hard: regulations, rules/soft: trust, habits) that support/inhibit your activities for knowledge development, knowledge diffusion, entrepreneurship … functions?
- What are the most important changes in agricultural policy that effect the sector over the last 5-10 years?

KNOWLEDGE DEVELOPMENT FUNCTION

QUESTIONS

- Who are the main producer of scientific, technological and knowledge for the sector? Public, private? National, international?
- Are there missing actors that should be in the knowledge development process?

- Is the scientific knowledge created is sufficient in quality and quantity?
- Is the knowledge basic or applied?
- Are there many R&D projects, research, patents and articles?
- What is the focus of knowledge development (top-down/push or bottom up/pull)?
- How do agricultural/sectoral research priorities are set?
- How do mission of agricultural research institutes are set?
- Does the (mission and vision) of current public research system fit into the changing global conditions and challenges?
- Do the research institutes collaborate with each other?
- Are there multidisciplinary groups to tackle with complicated multidisciplinary research questions?
- Do different knowledge producers (public, private research institutes, universities) collaborate with each other?
- Do knowledge producers and users (SMEs, farmers, cooperatives) collaborate with each other for research development?
- Is knowledge development process participatory (i.e. farmer involvement)?
- Is there international collaboration on knowledge development?
- What is the state of collaboration? too strong or too weak? Is there lock-in problem or lack of orientation?
- How is the physical, knowledge, financial infrastructure of knowledge development?
    - Existence of research labs, ICT, information networks
    - Agricultural education and training systems, skills, know-how, expertise of researchers
    - financial subsidies, grants, prograMS for research and development

INDICATORS

- Universities/Research institutes producing scientific articles
- number of agricultural research institutes that are involved/not involved/maybe involved in research
- Share of public/private research
- Universities/research institutes as stakeholders of national/international R&D projects
- Patent holders (new varieties, technologies)
- Volume/orientation/ citation frequency of national/international scientific publications
- number, size and orientation, share of R&D projects related to the sector
- number of new plant varieties, agricultural patents
- existence/frequency of agricultural foresight studies
- Frequency of priority setting, strategic planning, and reform exercise in research and education institutions
- Number of co-patenting and co-publication among universities, public research institutes and industry
- Number, size and orientation of collaborative R&D projects

- Extent of individual or organizational membership in regional and international research and education networks
- General Network Structure of research collaboration among public R&D Institutes
- General Network Structure of national and international co-authorship patterns of public and university researchers
- General Network Structure of co-patenting patterns
- General Network Structure of multi-stakeholder R&D projects (universities, public R&D Institutes and producers)
- Industry-vocational education cooperation activities
- Intensity of co-patenting and co-publication among universities, public research institutes and industry
- Intensity, size and orientation of collaborative R&D projects
- Number of specialised research labs/centers dedicated to the sector
- Number of high schools/higher education dedicated to the sector
- Share of public/private financial sources dedicated to sectoral knowledge development
- Expenditure on agricultural/sectoral research and education
- Enrollment rates in primary secondary and tertiary levels of agricultural education
- Share of agricultural students sent abroad for advanced training
- Quality of information and communications technology available to the research and education system
- Organizational structure and governance of public R&D
- Frequency of priority setting, strategic planning, and reform exercises in research and education institutions

KNOWLEDGE DIFFUSION FUNCTION

QUESTIONS

- Which actors interact with each other for knowledge in the sector?
- Do all the relevant actors of AIS interact with each other?
- Are there bridging organizations? Who are them?
- Are there missing actors?
- Are the bridging institutes (e.g. extension agents) relevant competent in quantity and quality?
- What is the capacity to learn?
- What methods are used for knowledge dissemination?
- By what channels do knowledge diffuse in the sector?
- Are there missing interactions/links between and within actor groups?
- What is the direction of knowledge diffusion? Is the knowledge demand driven or produced top down?
- Are there strong partnerships? between whom?
- Is there strong network failure? (myopia, lack of weak ties, dominating partners)
- Is there weak network failure?
- Are the methods used for knowledge dissemination appropriate?
- Do different actors/actor groups of AIS trust each other?
- Do current institutional structure support efficient interaction and knowledge diffusion?

- how is physical/knowledge/financial infrastructure for the extension system?
- Is infrastructure adequate for the needs of efficient functioning of knowledge diffusion?

INDICATORS

- number and diversity of participants of networks, consortia, platforms created in the sector
- General Network structure of AIS
- Number of agricultural extension agents by degree and area of specialization
- training/education activities of extension agents
- Frequency of training and skills upgrading for extension agents
- Frequency of priority setting, strategic planning, and reform exercises in extension system
- Share of farmers with regular access to extension services/ratio of farmers to extension agents
- number of different consultation methods used by extension services (e.g. brochures / user manuals, farmer field days)
- Number/type of networks, consortia, platforms created for extension
- participation of bridging institutions in sector wide knowledge platforms
- General Network structure of AIS (ties of nodes/actor groups)
- Share and quality of extension services that are based on collaborations among innovation system actors
- farmers satisfaction with the quality and timeliness of extension service
- Expenditure on agricultural extension
- Quality of information and communications technology available to the extension system
- Organizational structure and governance of the agricultural extension system
-

GUIDANCE OF SEARCH FUNCTION

QUESTIONS

- Is there a clearly articulated and shared goal for the system?
- Are there specific goals set (short, medium, long term) for the (olive and olive oil) sector?
- What are these goals?
- Which actors of the AIS are involved?
- Who are the system's frontrunners? Are there dominant actors/groups?
- Are these targets realistic?
- Are there strategies/roadmaps on how to realize these goals?
- What is the focus of different stakeholders? (government, private sector)
- Do different actors of the AIS collaborate in setting sectoral goals?
- To what extend farmers and SMEs are included?
- What is the state of collaboration? too strong or too weak? Is there lock-in problem or lack of orientation?
- Are there dominating actors?

- What are the laws, rules, norms, regulations, strategies that effect/bind setting a common goal?
- Is there dependence on dominating actors due to asset specifity?
- What is the extent of regulatory pressures?, e.g. regulations on minimum level of adoption of food safety certificates?
- Does the articulated vision fit in the existing legislation?

ENTREPRENEURIAL ACTIVITIES FUNCTION

QUESTIONS

- Who are main actors in the value chain?
- How is the structure/size of the producers/firms? (SMEs, family farms)
- Which producer organizations/cooperatives of value chain actors exist?
- Are there new actors entering the market?
- Are there business plans/strategies of farmers/cooperatives/SMEs?
- Are there food quality certification schemes hold by farmers/SMEs?
- Are there education programs for family farms/ smallholders/SMEs?
- Are there collaboration between farmers and main value chain actors?
- Are there collaborations within farmers for collective action?
- Are there collaboration between the producer cooperatives with other value chain actors?
- Are there collaboration between family farms, research organization, extension agents related to entrepreneurial activities? What is the state of collaboration? too strong or too weak?
- What are the laws, rules, norms, regulations, strategies that effect/bind entrepreneurship and collective action?
- Are there tax incentives / subsidies / standards for entrepreneurship and collective action?
- Is there trust between stakeholders for collective action? Between value chain actors? among farmers? Cooperative members?
- How can the business environment be characterized?
- How is infrastructure?
    - Physical: are there ICT, information networks?
    - knowledge: education and training systems, skills, know-how, expertise supporting farmer, SME entrepreneurship?
    - Financial: Who finances entrepreneurship? Are there subsidies, grants, programmes?
- To which extend farmers/SMEs/cooperatives are involved in entrepreneurial activities?
- How difficult is it to enter the market?
- Which barriers to entry exist (bureaucratic burden, high initial investment..)
- Is physical/knowledge/financial infrastructure adequate for the needs of efficient functioning of single/collective entrepreneurship?

INDICATORS

- number of new entrants

- the number of diversification activities of incumbent actors
- Share of farmers/SMEs participating in different types of value chain arrangements, e.g., membership in a producer organization, preproduction contracts with agricultural firms, or market based sales of output
- Share of actors adhering to certain product or process standards within a specific value chain
- Share of farmers who have tried/adopted some new agricultural production practice (good agricultural practice, organic production, sustainable agricultural practice)

- farmers who have tried/adopted some new agricultural marketing practice (e.g., pre-production contracts, collective marketing, geographical indicators PGI, PDO)
- farmers who have tried/adopted some new natural resource management technique (e.g., conservation tillage, soil erosion controls, water harvesting)
- Partnership/outsourcing
- Contract farming
- Collective input/machinery usage
- farmers/cooperatives/SMEs access to agricultural inputs, financial services, transportation services, and marketing services
- farmers/cooperatives/SMEs satisfaction with agricultural inputs, financial services, transportation services, and marketing services

MARKET FORMATION FUNCTION

QUESTIONS

- Which actors are involved in market formation activities?

- Who takes the lead (public/private parties)?
- What is the consumer profile (current and potential)?
- What does the market look like?
- Are there niche markets?
- Is the size of the traditional and niche markets sufficient?
- Must a new market be created or an existing ones be enlargened?
- Are there opportunities to get market premium in domestic and in international markets? e.g. on quality, organic / sustainable production method?
- Do actors of the value chain collaborate with other AIS actors for market formation? What is the state of collaboration?
- Are there policies or programs in place that support market formation (e.g. subsidies, exemptions, standards)?
- To what extent international sectoral institutions and trade agreements affect/bind/promote market formation?
- Are the incentives for market formation sufficient?
- Are there good functioning certification schemes that support market formation?
- What instruments for market formation exist? (e.g. challenge funds, public-private partnerships, incubators)
- Who finances market formation? Are there subsidies, grants, programs?

INDICATORS

- Number of niche markets introduced
- participation of firms in industry-wide standardisation activities
- New standards that improve niche markets

LOBBYING ACTIVITIES FUNCTION

QUESTIONS

- Which actors are involved in lobbying activities?
- Who are the leaders?
- Are there any interest groups or unions that seek to influence policymaking?
- Is there much resistance to change and where does it come from?
- How does this resistance manifest itself?
- What is the lobbying power of the actors in the system?
- Is coalition forming occurring (farmer associations, product associations)?
- Do public and private sector show commitment to the advancement of the sector?
- Which AIS actors collaborate for lobbying activities?
- What is the state of collaboration? too strong or too weak? Is there lock-in problem or lack of orientation?
- What are the laws, rules, norms, regulations, strategies that effect/bind legitimation activities?
- Are there tax incentives / subsidies / standards?
- Do sector outputs have good reputation (e.g. food safety concerns, quality, adulteration..)?

MOBILISATION OF RESOURCES FUNCTION

- Is there a long term national (technology) foresight program that sets priorities for the economy?
- Is public sector consistent in its commitment to the advancement of the sector?
- What is the status and priority of agricultural/ olive oil sector?
- Does the university system build up adequate education and skills on disciplines such as biotechnology, nanotechnology, genetics…etc.?
- Are there sufficient financial resources for the development of innovation system?
- Do they correspond with the system's needs?
- What are these resources are mainly used for?
- Is there sufficient risk capital?
- Is there adequate public funding?
- How is allocation level of public resources for the agricultural sector /olive sector?
- Which actor groups (research institutes, government, private) benefit from these funds?
- Can farmers, SMEs easily access to these resources?

B. LIST OF SECTOR REPRESENTATIVES INTERVIEWED

no	Component of Olive and Olive Oil Innovation System						organization/role
	Research & Education	Bridging Organization	Value Chain			Supporting organization	
			farmer	processor	region		
1	1						Ankara University
2		1	1	1	gemlik		Katırlı Development Coop./olive producer
3		1				1	GTHB Gemlik district office/ extensionist
4	1					1	TAGEM Coordinator/Researcher
5	1						Çanakkale University
6	1						Edremit Voc.School/Student
7	1						Edremit Voc. School/Student
8	1		1				Edremit Voc. School/Student
9		1		1			zeytindostu member/ olive oil producer
10	1		1				Çanakkale University
11	1					1	GTHB TAGEM/Coordinator/Researcher
12	1					1	GTHB TAGEM/Researcher
13	1						GTHB TAGEM/Coordinator/Researcher
14						1	GTHB BÜGEM/Coordinator
15						1	GTHB BÜGEM/agricultural engineer
16						1	GTHB BÜGEM/agricultural engineer
17						1	GTHB BÜGEM/Coordinator
18						1	GTHB BÜGEM/Coordinator
19						1	Min. Economy/expert
20						1	Min. Economy/expert
21	1					1	GTHB TAGEM/Manager
22	1					1	GTHB TAGEM/Manager
23			1	1	ayvalık		olive/olive oil producer/trader
24			1		ayvalık		olive producer/olive oil trader
25			1	1	ayvalık		olive/olive oil producer/trader
26			1		ayvalık		olive producer/NGO representative
27			1	1	ayvalık		olive/olive oil producer/trader
28						1	Min. Customs and Trade/ Cooperatives/manager
29						1	GTHB EYYDB/Coordinator
30		1					Gemlik TZOB/ private farmer advisor
31		1	1		gemlik		Gemlik TZOB /olive producer
32		1	1	1	gemlik		Gemlik Sales Coop./olive producer
33	1						Edremit Voc.School/Instructor

B. LIST OF SECTOR REPRESENTATIVES INTERVIEWED (cont'd)

34	1						Akhisar Voc.School/Instructor
35	1						GTHB TEPGE/researcher
36						1	Min. Of Development/Manager
37		1					EİB/ EZZİB representative
38	1						EİB/ researcher
39		1					Zeytindostu Association representative
40		1					UZZK representative
41	1						Olive research Institute ZAE/researcher
42	1						Olive research Institute ZAE/researcher
43	1						Olive research Institute ZAE/researcher
44	1						Olive research Institute ZAE/researcher
45				1	ayvalık		table olive/olive oil producer/ sector expert
46		1					GTHB Ayvalık district office /extensionist
47		1					GTHB Ayvalık district office /extensionist
48		1					Gemlik Commodity Exchange representative
49		1	1		ayvalık		Ayvalık TZOB representative/ olive producer
50		1		1	ayvalık		Ayvalık Sales Coop.representative
51		1				1	GTHB Edremit Sapling Station / sector expert
52		1	1	1	ayvalık		olive/olive oil producer/trader/ NGO representative
53		1					Ayvalık Chamber of Commerce representative
54			1	1	gemlik		olive/table olive producer
55	1						Uludağ University / Gemlik Voc. School/ instructor
56		1	1	1	gemlik		Umurbey Development Coop./ olive producer
57		1	1		gemlik		Marmarabirlik representative/ olive producer
58		1	1				olive /olive oil producer/trader
59	1						Yalova research Institute/researcher
60	1						Yalova research Institute/researcher
61	1						Yalova research Institute /researcher
62	1						Uludağ University representative
63			1	1	gemlik		olive/olive oil producer/trader
64				1	gemlik		table olive/olive oil producer/trader
65			1		ayvalık		olive producer
total	**25**	**20**	**18**	**13**		**17**	

C. CURRICULUM VITAE

PERSONAL INFORMATION:

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EDUCATION:

Degree	**Institution**	**Year of Graduation**
MA	Boston University, Economics	1997
BS	METU, Economics	1991
High School	Bursa Anadolu Lisesi	1987

WORK EXPERIENCE

Year	**Place**	**Enrollment**
2013-present	Undersecretariat of Treasury	Expert
2010-2012	Permanent Delegation of Turkey to the OECD,	Economic Counsellor
1992-2010	Undersecretariat of Treasury	Expert, Department Head

D. TURKISH SUMMARY

Bu tez, zeytin ve zeytinyağı sektörünün gelişimine engel olan problemleri, bir başka deyişle yeniliğin önündeki engelleri ortaya konulmasını amaçlamaktadır. Bu amaçla, zeytin ve zeytinyağı sektörünün işleyişini olumsuz etkileyen yapısal zayıflıklar (aktörler, kurumlar, etkileşim ve altyapı) yenilik sistemi yaklaşımı ile ortaya konulmuştur.

Türkiye zeytin üretiminde önde gelen ülkelerden bir tanesidir. Türkiye, son on yıllık dönemde, toplam dünya zeytin üretiminde ortalama yüzde sekizlik payla İspanya, İtalya ve Yunanistan'dan sonra dördüncü zeytin üreticisi konumundadır. Yine aynı dönemde, yıllık zeytin üretimdeki değişkenliklere bağlı olarak, dünya sofralık zeytin üretiminde Mısır'la ikinci veya üçüncü sırayı paylaşmıştır. Zeytinyağı üretiminde ise Tunus ve Suriye ile birlikte üçüncü veya beşinci sırada yer almıştır. 2013/2014 sezonunda, yüzde 18 payla Türkiye ikinci en büyük sofralık zeytin üreticisi ve yüzde 5,8 payla üçüncü en büyük zeytinyağı üreticisi olmuştur.

Akdeniz ülkeleri arasında, dünya zeytin, sofralık zeytin ve zeytinyağı üretiminde İspanya öncü ülkedir. Son beş yıllık dönemde İspanya'nın ortalama olarak toplam dünya üretimi içerisindeki payı, zeytinde yüzde 35, sofralık zeytinde yüzde 22 ve zeytinyağında ise yüzde 45 olarak gerçekleşmiştir.

Türkiye, geçtiğimiz on yılda zeytin verimi ilk dört ülke içinde olmasına rağmen zeytin üretkenliği İspanya ve İtalya'ya göre çok geridedir. Bunun temel sebepleri arasında, çiftçilerin zeytin yetiştirmeyle ilgili kültürel işlemleri doğru uygulamamaları, zeytinin saklama ve taşınmasının uygun koşullarda yapılmaması nedeniyle danelerin bozulması yer almaktadır. Zeytin, kolayca bozulmaya müsait bir meyvedir. Zeytinin kalitesi de doğrudan sofralık zeytin ve zeytinyağının kalitesini etkilemektedir. Bu nedenle, çiftçilerin gerekli bilgi ve altyapı ile donatılması, kültürel işlemlerin doğru uygulanması ve üretim safhasında etkinliği artırmak için gereklidir. Türkiye'de, hem sofralık zeytin hem de zeytinyağı endüstrisinde, zeytinin işlenmesinde teknik etkinlik düşüktür. Bu durum, ürün kalitesini olumsuz etkilemektedir.

Sofralık zeytin işlenirken fazla tuz kullanılması veya daha fazla zeytinyağı elde etmek için yüksek ısı uygulanarak düşük kaliteli zeytinyağı elde edilmesi düşük etkinliğe birer örnektir.

Diğer taraftan, Türkiye'de zeytinyağı teknolojisi İspanya ve İtalya'ya kıyasla geridedir. Son yıllarda üç ve iki fazlı sürekli üretim teknoloji sistemleri yaygınlaşmaya başlamakla beraber, zeytinyağı endüstrisinde klasik baskı yöntemi ile parti üretimi yapan bir kesim vardır. Kısacası, sofralık zeytin ve zeytinyağı değer zincirindeki zeytin üretim ve işleme aşamalarındaki problemler nedeniyle, Türkiye'de zeytin üretkenliği ve ürün kalitesi İspanya ve İtalya'ya göre düşüktür. Ayrıca, iç pazarda kayıt dışı üretim ve tağşiş kaliteyi etkileyen diğer önemli problemler arasındadır.

Zeytinyağı kalitesindeki problemler nedeniyle Türkiye küresel zeytinyağı değer zincirinin aşağı kısmında yer almaktadır. Dünya zeytinyağı ihracat pazarında, Türkiye'nin düşük katma değerli, dökme zeytinyağı payı, yüksek katma değerli, markalı ve kutulu zeytinyağına göre belirgin biçimde yüksektir. Markalı ve kutulu zeytinyağı ihracatında İspanya ve İtalya lider ülke konumundadırlar.

İç pazarda, yüksek sofralık zeytin tüketimi olmakla beraber, zeytinyağı tüketimi çok düşüktür. İspanya, İtalya ve Yunanistan'da ortalama kişi başı 15 kilogram civarında zeytinyağı tüketilirken, Türkiye'de tüketim iki kilogram civarındadır. Bunun sebepleri arasında, alım gücüne kıyasla zeytinyağı fiyatlarının çok yüksek olması, damak tadının bitkisel yağ ve hayvansal yağlara daha yatkın olması, zeytinyağının çeşitleri ve faydaları hakkında tüketici bilincinin olmaması bulunmaktadır.

İç pazarda yaşanan problemlerin yanı sıra küresel zeytin ve zeytinyağı pazarında son yıllardaki gelişmeler sonucunda tüm ülkeler için rekabet ortamı artırmıştır. 2000 yılından bu yana zeytin üretimi yüzde yirmi artmış, sofralık zeytin ve zeytinyağı küresel gıda ürünlerine dönüşmüştür. 2000-2014 yılları arasında, sofralık zeytin üretimi yüzde 70 ve ihracatı yüzde 88, zeytinyağı üretimi yüzde 28 ve ihracatı yüzde 63 artmıştır. Bu dönemde Avrupa Birliği (AB) zeytin ve zeytinyağı sektöründe üretim, tüketim ve ihracattaki belirgin payıyla temel oyuncu olmuştur. Birer AB üyesi olan İspanya ve İtalya, sadece küresel katma değerdeki yüksek paylarıyla değil, aynı zamanda Türkiye gibi zeytin üretici ülkelerin rekabet gücünde bağlayıcı olan, sektöre yönelik gıda ve ticaret standartlarına yön verilmesinde önemli ağırlığa sahiptir.

Sektörün genişlemesiyle beraber, Arjantin, Avusturalya, Yeni Zelanda, Şili ve ABD gibi yenidünya ülkelerinin zeytin ve zeytinyağı sektöründe oynadıkları rol de belirginleşmiştir.

Üretici olarak, dünya zeytin üretimindeki payları 2000 yılında yaklaşık yüzde bir civarından 2014 yılında yaklaşık yüzde üç civarına yükselmiştir. Dünya zeytinyağı ithalatında bu ülkelerin payı yüzde 60 seviyesine ulaşmıştır. Önceki dönemlerde toplam dünya zeytinyağı üretiminin yüzde 80-85'ik kısmı Akdeniz ülkelerinde tüketilirken, bu oran yüzde 70-75 civarına düşmüş, kalan kısım ihraç edilmektedir. Önemli zeytinyağı tüketicisi olarak yenidünya ülkelerinin gıda ve ticaret standartları da zeytin üretici ülkelerin rekabet gücünde önemli rol oynamaktadır. Kısaca özetlemek gerekirse, dünya piyasalarında yaşanan gelişmeler sonucunda artan uluslararası rekabet ortamı ile daha sıkı gıda ve ticaret standartları zeytin üretici ülkelerinin aşması gereken zorluklar arasındadır.

Sektördeki mevcut problemler politika yapıcılar tarafından bilinmektedir.2000'li yılların başından beri sektörü geliştirmek için çeşitli adımlar atılmıştır. Tarım bakanı tarafından 2004 yılında, 2014 yılı itibariyle gerçekleştirilmek üzere, zeytin ve zeytinyağı sektörüne ilişkin hedefle açıklanmıştır. Aynı zamanda İspanya'dan sonra ikinci en büyük zeytin üreticisi ülke olmak hedeflenmiştir. Bu çerçevede de, zeytin üretim alanın genişletilmesi için, başta zeytin fidanı desteği olmak üzere, çeşitli tarım destekleri verilmiştir. Ancak 2014 yılındaki gerçekleşmeler hedeflerin çok altında kalmıştır. Bunun temel sebebi, hedeflerin olmasına rağmen bu hedeflere ulaşmak için kullanılacak strateji ve politika araçlarını belirleyen bir zeytin ve zeytinyağı sektör politikasının olmamasıdır. Aslında bu amaçla 2008 yılında bir Meclis araştırma komisyonu oluşturulmuş; sektör temsilcileri ile birlikte kapsamlı bir çalışmanın sonucunda zeytin ve zeytinyağı sektöründeki problemler ve atılması gereken adımlara ilişkin kapsamlı bir rapor hazırlanmıştır. Bu rapor TBMM'ye sunulmuş, ancak bir hükümet politikasına dönüşememiştir.

Kısacası, sektöre dair bir takım hedefler devlet tarafından arada bir açıklanmakla beraber, Türkiye'nin zeytin ve zeytinyağı sektöründeki mevcut sorunları aşmayı, zeytin üretimini ve üretkenliğini artırmayı, ürün kalitesini yükseltmeyi hedefleyen bir sektör politikası yoktur. Dış pazarda rekabet edebilmesi, İspanya ve İtalya'yı yakalayabilmesi ve küresel değer zincirinde yükselebilmesi için Türkiye'nin zeytin üretimini artırması, zeytin işleme teknolojisini geliştirmesi ve zeytinyağı kalitesini yükseltmesi gerekmektedir.

Türkiye'nin bu sorunları aşacak bir sektör politikasına ihtiyacı vardır. Diğer taraftan, düşük zeytin üretimi, düşük üretkenlik, zayıf iç piyasa, dış piyasada yüksek katma değerli ve markalı ürünlerin düşük payı, zeytin ve zeytinyağı sektöründe yeniliğin düşük seviyede gerçekleştiğinin bir göstergesidir. Bu nedenle, zeytin ve zeytinyağı sektöründe yeniliği artıracak bir sektör politikası gereklidir.

Oslo Kılavuzunda, yenilik "yeni veya belirgin bir şekilde geliştirilmiş ürün veya işleme yöntemi, yeni pazarlama yöntemi, yeni organizasyon yapısı" olarak tanımlanmaktadır. Yenilik, sektör düzeyinde artan üretkenliğin, ulusal düzeyde artan katma değer, rekabet gücü ve ekonomik büyümenin, mikro düzeyde (firma, çiftlik) kaynakların etkin kullanımı, üretkenlik artışı, dolayısıyla gelir artışının arkasındaki itici güçtür (OECD 2013). Dünya Bankası'na (2012) göre, tarımda yaşanan gelişmelerle başa çıkabilmek ve rekabet edebilmek için çiftçiler, gıda işletmeleri ve hatta ulusların sürekli olarak yenilik yapmaları gerekmektedir. Bu nedenle, yeniliği teşvik etmek birincil politika hedefi olmalıdır (OECD 2013).

Zeytin ve zeytinyağı sektör politikası oluşturulurken, iç ve dış piyasadaki sorunlara ilaveten, tarım ve gıda sektörünün karşı karşıya olduğu daha geniş kapsamdaki zorluklar da göz önüne alınmalıdır. Örneğin, küresel iklim ve çevreyle ilgili yaşanan değişikliklerin sonucunda oluşan zorlukların üstesinden gelmek, zeytin üretiminin sürdürülebilirliği, dolayısıyla sofralık zeytin ve zeytinyağı sektörlerinin sürdürebilirliği için gereklidir. Veya zeytinyağı sektörünün sürdürülebilirliğinin sağlanması için bitkisel yağ sektörüyle rekabet edebilme gücüne sahip olması gerekmektir. Bu da zeytin sektörünün hayatta kalabilmesi için önemlidir; çünkü zeytin meyvesinin bir özelliği zeytinyağı veya sofralık zeytin olarak işlenmeden tüketilememesidir.

Türkiye'nin rekabetçi pozisyonu, zeytin ve zeytinyağı sektör aktörlerinin tüm bu zorlukları görebilme ve stratejik tepki verebilmesine bağlıdır. Bu nedenle, sektör aktörleri öğrenmek ve becerilerini geliştirmek durumundadırlar. Diğer taraftan, ülkelerin farklı sosyal, tarihsel, teknolojik, ekonomik, politik ve coğrafi gelişim patikalarının bu günkü zeytin üreticisi ülkelerin rekabet gücünü belirleyici olduğunu akıldan çıkartmamak gerekmektedir. Bu nedenle, sektör politikası oluştururken ülkeye özgü durumlar göz önüne alınmalıdır.

Diğer taraftan, tarımın çok fonksiyonlu olması, gelişmekte olan ülkelerde tarım politikalarının oluşturulmasında önemli olası diğer sonuçları da ortaya koymaktadır. Zeytin sektörü ile ilgili politikalar oluşturulurken, gıda sektörüne girdi sağlaması dolayısıyla ekonomik öneminin yanı sıra, sosyal, kırsal, kültürel ve çevresel boyutları da dikkate alınmalıdır.

Bir sektörün gelişiminde teknolojik ve sosyal faktörlerin etkileşim içerisinde olduğu gerçeği, sektör politikaları oluşturulurken sistem yaklaşımının, bir başka deyişle yenilik sistemi yaklaşımının (Freeman 1987, Nelson 1993, Lundvall 1992, Edquist 1997) benimsenmesinin gerekliliğine işaret etmektedir. Yenilik sistemi yaklaşımı, 1980'li yıllardan bu yana geliştirilmiş ve devletin sektör politikalarını oluşturulmasında önerilen temel yaklaşımlardan birisi olmuştur. Yenilik sistemi bütüncül bir yaklaşımı benimsemektedir. Yenilik Sistemi yaklaşımı, yenilik süreçlerinde rol alan sosyal, ekonomik, politik, organizasyon yapısı gibi tüm faktörleri göz önüne almaktadır. Geçtiğimiz yıllarda bu yana, tarım alanında politikalar oluşturulurken, "Tarımsal Yenilik Sistemi" yaklaşımı çok kullanılır olmuştur. Dünya Bankası, Gıda ve Tarım Örgütü (FAO), İktisadi İşbirliği ve Kalkınma Teşkilatı (OECD), Avrupa Komisyonu ve G20 platformu gibi uluslararası örgütlerin bu yaklaşımı benimsemesi ve katkıları Tarımsal Yenilik Sistemi yaklaşımının politika oluştururken ana akım yöntem olarak benimsenmesini sağlamıştır.

Kısacası, yukarıda belirtilen hususların ışığında, Türkiye'de zeytin ve zeytinyağı sektöründe üretkenliğin artırılması ve ürün kalitesinin yükseltilmesinin yanı sıra tarım ve gıda sektörünün karşı karşıya olduğu genel zorluklar ile zeytin ve zeytinyağı sektörüne özel zorluklarla mücadele edebilmek için sektörde yeniliğin olması gerekmektedir. Bu nedenle, bu tezin temel amacı sektör politikasına temel oluşturması amacıyla, yenilik sistemi yaklaşımı ile zeytin ve zeytinyağı sektöründe yeniliğin oluşmasının önündeki engellerin belirlenmesidir. Bu tezin amacını özetleyen araştırma sorusu şu şekilde ifade edilebilir:

- Zeytin ve Zeytinyağı Sektörel Yenilik Sistemi'nin etkin işleyişini engelleyen sistemik problemler nelerdir?

Bu soruya ilaveten ek araştırma sorusu da aşağıdaki gibidir:

- Zeytin ve Zeytinyağı Sektörel Yenilik Sistemi'nin daha iyi işlemesini sağlamak için ne tür politika hedefleri belirlenmeli ve politika araçları kullanılmalıdır?

Bu çalışmada, yukarıdaki araştırma sorularının cevabını bulabilmek amacıyla, yenilik sisteminin analizi için Weizoreck ve Hekkert (2012) tarafından önerilen Fonksiyonel-Yapısal Analiz Yöntemi kullanılmıştır.

Çalışmada kullanılan yöntemin detaylarına girmeden önce, yenilik sistemi yaklaşımına ilişkin bilgi vermek gerekmektedir. Yenilik sistemi yaklaşımının temeli, evrimci iktisat ve kurumsal iktisat teorilerine dayanmaktadır. Yenilik sistemi yaklaşımı zaman içerisinde bir analitik çerçeveye dönüştürülmüştür (Bakınız Edquist 2005). Yenilik sistemi analitik çerçevesi, sınırları belirlenmiş bir sistemin işlerliğine ilişkin durum tespiti yapmak ve/veya sistemin işlerliği için politika tasarlamak amacıyla geliştirilmiştir. Yenilik sisteminde vurgu öğrenme süreçleri üzerindedir. Çünkü yenilik, tek başına bir firmanın gerçekleştirdiği yalıtılmış bir süreç olmayıp, sektör aktörlerinin etkileşim içerisinde beraber öğrenmeleri sonucunda oluşmaktadır. Yenilik, var olan bilgi ve yaratılan yeni bilginin yeni biçimlerde eklemlenmesi sonucunda oluşmaktadır. Yenilik sisteminin temel taşları aktörler, kurumlar ve bunlar arasındaki etkileşimlerdir. Aktörler ya da oyuncular, firmalar, sivil toplum kuruluşları, üniversiteler vs. gibi organizasyonlardır. Kurumlar ise, kanun, düzenleme, yönetmelik gibi "dışsal" veya "yazılı" kurumların yanı sıra güven, alışkanlık, inanışlar, gelenekler gibi "içsel" veya "yazılı olmayan" kurumları kapsamaktadır. Kurumlar, "oyunun kurallarıdır". Kurumlara vurgu yapması ve süreçlerde kurumların rolüne önem atfetmesi, diğer analiz yöntemlerine kıyasla yenilik sistemi yaklaşımının en güçlü yanlarından birisidir. Her sistemde olduğu gibi, yenilik sisteminin de fonksiyonu vardır. Yenilik sisteminin ana fonksiyonu yenilik süreçlerinin sürdürülmesidir; yani yeniliğin oluşturulup, kullanılıp, yayımıdır. Yenilik sisteminin aktiviteleri veya "özel fonksiyonları" ise yenilik süreçlerinin belirleyicileridir. Yenilik yaklaşımı sonuçlarla değil süreçlerle ilgilenmektedir (Edquist 2005). Bu nedenle, yenilik sistemi yaklaşımına göre politika yapıcılar sistemde işlemeyen alanlar olduğunda, bir başka deyişle "sistemik problemler" yaşandığında müdahale etmelidirler. Yenilik sistemi yazınında "sistemik problemler" yenilik sisteminin gelişimini engelleyen, bir başka deyişle yenilik süreçlerinin hızını ve yönünü olumsuz etkileyen problemler, zayıflıklar, yetersizlikler olarak tanımlanmaktadır. “Sistemik araçlar” ise yenilik sistemi düzeyinde ortaya çıkan sistemik problemleri hedefleyen ve yenilik süreçlerinin yönetiminde rol oynayan süreçleri destekleyen politika araçları olarak tanımlanmaktadır.

1980li yıllardan itibaren, analitik bir çerçeve olarak yenilik sistemi yaklaşımı zaman içerisinde bugünkü yapısına evrilmiştir. Yenilik sistemi yaklaşımında ilk olarak yapılar (aktör, kurum, altyapı) ön plana çıkartılmış; farklı yenilik sistemlerinin başarı veya başarısızlıklarının arkasındaki sebepler yapılardaki farklılıklarda aranmıştır. Daha sonra, ülke veya bölgeye özgü ortamlardaki farklılıkların göz önüne alınması gerektiği, farklı yenilik sistemlerindeki benzer yapıların farklı roller üstlenebileceği, dolayısıyla yapıların incelenmesi veya kıyaslanmasından ziyade sistem fonksiyonlarının işlerliğine bakılması gerektiği ön plana çıkartılmıştır. Son yıllarda ise, aktiviteleri ve fonksiyonları yürütenlerin yapılar olduğu, bu nedenle yenilik sistemi analizinde yapılar ve fonksiyonların beraber değerlendirmesi gerektiği daha çok vurgulanmaya başlamıştır.

Bu çalışmada analitik çerçeve olarak kullanılan Wieczoreck ve Hekkert (2012) tarafından önerilen yenilik sisteminin fonksiyonel-yapısal analizi yöntemi bu son bakış açısıyla oluşturulmuştur. Bu analiz metodu, yenilik sisteminin fonksiyonlarının yapısal elementleri perspektifinden analizini öngörmektedir. Wieczoreck ve Hekkert (2012) yenilik sistemi yazınında yer alan fakat birbirinden kopuk yazın dizileriyle geliştirilmiş dört temel yenilik sistemi unsurunu - yapılar, fonksiyonlar, sistemik problemler, sistemik araçlar- birleştirerek fonksiyonel-yapısal analiz yöntemi ile bir “sistemik politika çerçevesi” önermektedir. Bu analiz çerçevesinin arkasındaki temel mantık, sistemin yapılarını etkilemeden sistem fonksiyonlarının işleyişinin değiştirilemeyeceğidir. Çünkü sistem fonksiyonlarını icra eden sistemin yapılarıdır. Yenilik sistemi iyi işlemiyorsa, yani yenilik oluşmuyorsa, yapılardan kaynaklanan problemler nedeniyle sistem fonksiyonlarının (bilginin oluşumu, bilginin yayımı, girişimcilik vs.) iyi işlememesinden kaynaklanmaktadır.

Wieczoreck ve Hekkert (2012) yenilik sisteminin yapılarını dört guruba ayırmaktadır: Aktörler, kurumlar (yazılı, yazılı olmayan), etkileşimler (bireysel, ağlar) ve altyapı (fiziki, mali, bilgi). Yenilik sisteminde yapılardan kaynaklanan problemler, yani sistemik problemler, bu dört ana yapı gurubundan kaynaklanabilmektedir. Aktör eksiktir veya kapasitesi zayıftır.

Kurumsal yapı yoktur, örneğin bir düzenlemenin eksik olması veya aktörler arası güvenin olmaması veya kalite problemi vardır, örneğin küçük işletmelerin sektöre girmesini engelleyen büyük yerleşikleri destekleyen teknoloji destekleri. Aktörler arası etkileşim yoktur veya kalitesizdir, örneğin zayıf ağ bağları veya fazla güçlü ağ bağları nedeniyle belli bir düşünce yapısına kitlenmek gibi. Altyapı yoktur, örneğin gerekli finansal desteğin olmaması veya yetersizdir, örneğin sektörde istatistik veya bilişim altyapısının yetersiz olması gibi. Wieczoreck ve Hekkert (2012) yapılardan kaynaklanan sistemik problemlerin her bir sistem fonksiyonu için tespit edilmesini, belirlenen sistemik problemler çerçevesinde sistemik politika hedefleri ve araçlarının belirlenmesini önermektedirler.

Bu çalışmada, Wieczoreck ve Hekkert (2012) tarafından önerilen fonksiyonel-yapısal analiz yönteminin zeytin ve zeytinyağı sektörüne uygulanması amacıyla Hekkert ve ark. (2007) tarafından önerilen yedi yenilik sistemi fonksiyonu esas alınmıştır. Bu fonksiyonlar, bilginin oluşumu, bilginin yayımı, arayışın yönü, pazarın oluşumu, girişimcilik aktiviteleri, lobi aktiviteleri ve kaynakların aktarılması fonksiyonlarıdır.

Yenilik sistemi yazınında zaman içerisinde birbirini içeren, kesişen veya farklı tanımlar altında aslında aynı olan çeşitli fonksiyonlar tanımlanmıştır. Hekkert ve ark. (2007) tarafından önerilen bu yedi fonksiyonun analiz için seçilmesinin sebebi, yenilik sisteminin temel fonksiyonları olmaları, daha önce önerilen fonksiyonları kapsamaları ve net bir şekilde tanımlanmış olmalarıdır. Diğer taraftan, sektördeki mevcut problemlere ilişkin yapılan çalışmaların bulguları göz önüne alındığında, bu fonksiyonların analizinin gerekli olduğu görülmektedir.

Ancak bu fonksiyonların kapsamı, daha çok gelişmiş olan ülkelerde alternatif enerji teknolojileri gibi yeni oluşan teknolojilerin teknolojik yenilik sistemi çerçevesinde analizine yönelik geliştirilmiştir. Bu nedenle, Türkiye gibi gelişmekte olan bir ülkede tarım ve gıda sektörlerinin kendine has özelliklerini dikkate alınması gerekliliği nedeniyle bu fonksiyonların kapsamı bu çalışmada uyarlanmıştır.

Çalışmada Zeytin ve Zeytinyağı Sektörel Yenilik Sistemi'nin fonksiyonel-yapısal analizi dört aşamada gerçekleştirilmiştir:

- Analizi yapılacak yenilik sisteminin sınırları tanımlanmıştır.
- Yenilik sisteminde rol alan aktörler tanımlanmıştır.
- Her bir fonksiyonun fonksiyonel-yapısal analizi yapılarak işleyişine engelleyen yapısal zayıflıklar, yani sistemik problemler, tespit edilmiştir.
- Yenilik sisteminin daha iyi işlemesi için sistemik problemlere yönelik politika önerilerinde bulunulmuştur.

Bu çalışmada Zeytin ve Zeytinyağı Sektörel Yenilik sistemi, üç alt sektörü içerecek şekilde tanımlanmıştır: zeytin sektörü (tarım), sofralık zeytin sektörü (gıda) ve sızma zeytinyağı sektörü (gıda). Zeytinyağı rafine sektörü bu çalışmanın dışında bırakılmıştır. Zeytinyağı rafine endüstrisi, Türkiye'de zeytinyağı sektörünün önemli bir parçasıdır. Birincisi, zeytinyağı pazarında düşük kaliteli sızma zeytinyağının payı yüksek olduğundan önemli ölçüde zeytinyağı rafine edilmektedir. Kaliteli sızma zeytinyağı ile karıştırılarak Riviera çeşidi olarak pazara giren rafine zeytinyağının payı sektör için önemlidir. Rafine endüstrisinin bu çalışmanın dışında bırakılmasının birincil sebebi, Türkiye'de sızma zeytinyağının kalitesinde yaşanan problemler ve yüksek katma değerin sızma zeytinyağı pazarında olmasından dolayı, çalışmada buna yoğunlaşmak gerekliliğidir. Diğer taraftan, rafine sektörünün teknolojik altyapısının sızma zeytinyağından tamamen farklı olması, farklı aktörler, süreçler dolayısıyla farklı problemler yaşıyor olmasıdır. Çalışmanın yeterince kapsamlı olması, zaman ve işgücü kısıtı göz önüne alınarak, rafine sektörü bu çalışmanın dışında tutulmuştur.

Zeytin ve Zeytinyağı Sektörel Yenilik Sistemi'nin aktörleri tanımlanırken Arnold ve Bell (2001) uyarlaması olan Spielman ve Birner (2008) tarafından önerilen şema ile Rivera ve ark. (2006) esas alan Dünya Bankası'nın (2012) önerdiği şemadan faydalanılmıştır. Sektördeki aktörler, analizin kolaylığı açısından, Spielman ve Birner (2008) tarafından önerildiği şekilde dört ana bileşene ayrılmıştır: Araştırma ve eğitim bileşeni, Değer zinciri aktörleri bileşeni, bu ikisini bağlayan köprü kuruluşlar bileşeni ile sektörde düzenleme, finansal destekleme gibi rolü olan destekleyici ve düzenleyici Kurumlar bileşenidir.

Zeytin ve Zeytinyağı Sektörel Yenilik Sistemi'nin fonksiyonlarının analizi yapılırken, Wieczoreck ve Hekkert (2012) tarafından da önerildiği gibi, bu güne kadar yapılmış çalışmalardan faydalanılarak (Wieczoreck ve Hekkert2012, Hekkert ve Ark. 2007, Bergek ve Ark. 2008, van der Hilst 2012, Bleeker 2013, Spielman ve Birner 2008, Daane et al. 2009, OECD göstergeleri gibi) her bir fonksiyon için kullanılabilecek teşhis soru listesi ve olası göstergelerin listesi oluşturulmuştur (Ek A).

Bu çalışmada, ana analiz metodu olarak, yüz yüze, yarı yapılandırılmış derinlemesine görüşmelere dayanan nitel analiz yöntemi kullanılmıştır. Bu yöntem, hem araştırma sorusu hem de kullanılan analitik çerçeve göz önüne alındığında uygun yöntem olarak değerlendirilmektedir. Araştırma yöntemi, araştırma sorusuna uygun seçilmelidir (Bryman 2008 syf: 395). Yenilik sistemi çerçevesinde, belirgin yerel dinamikleri olan tarım ve gıda sektörünün analizi, sektör aktörlerinin içinde bulunduğu yerel ortamın sosyal gerçekliklerinin dikkate alınmasını gerektirmektedir. Örneğin, yerel aktörler arası ilişkilerin durumu veya güven ortamı, alışkanlıklar, beklentiler gibi yazılı olmayan kurumların analizi gibi. Bu tür analizler için yarı yapılandırılmış yüz yüze mülakatlar hem zengin veri sağlaması hem de mülakatın akışı sırasında derinlemesine görüşülmesi gereken hususlar olduğunda mülâkatı yapan kişiye bu imkânı sağlamasından dolayı çok yerinde bir yöntemdir.

Görüşmeler sırasında hazırlanmış olan teşhis soruları kullanılmıştır. Yine, veri ulaşılabilirliğinin elverdiği ölçüde, göstergeler kullanılarak nitel analiz desteklenmeye çalışılmıştır. Nicel Analiz için 2000 ve 2014 arasındaki dönem seçiliştir. 15 yıllık bir dönem sektördeki değişimleri anlayabilmek için yeterince uzun bir süredir. Ayrıca, 2000 yılından itibaren AB'ye üyelik çerçevesinde uygulamaya konan çeşitli kanun ve düzenlemelerle kurumsal yapıda önemli değişimler olmuş ve birçok alanda AB kaynaklarını kullanma imkânı kazanılmıştır.

İlaveten, mülakatlara dayalı nitel analizi zenginleştirmek ve doğrulayabilmek amacıyla, diğer nitel analiz metotları da kullanılmıştır. Mesela, daha önce sektöre ilişkin yapılmış bilimsel çalışmalar, yayınlanmış resmi raporlar internet üzerinden araştırılmış; anahtar kelimeler kullanılarak sektörle ilgili bilimsel çalışmaların yazın taraması yapılmıştır. Sektörle ilgili sosyal paylaşım sayfalarındaki (örneğin UZZKTurk yahoo gurubu, Zeytindostu facebook sayfası gibi) bilgi akışı üzerinden sektöre dair gelişmeler takip edilmiştir. Sektördeki temel aktörlerin sektörle ilgili TV görüşme kayıtları izlenmiştir (örneğin toprağın sesi, tarım hayattır gibi TV programları, Tarım Bakanlığının resmi Tarım TV kayıtları gibi). Ayrıca sektörle ilgili kongre, çalışma toplantısı gibi sektörle ilgili aktivitelere bireysel olarak katılım sağlanmıştır.

Örneğin, UZZK tarafından Mart 2014'de Ankara'da gerçekleştirilen "Anadolu'da zeytin ve Zeytinyağı Günleri", Mayıs 2014'de Konya'da gerçekleştirilen 4. Zeytin öğrenci kongresi, TÜBİTAK tarafından yürütülen zeytin kümelenme projesi kapsamında Ekim 2014'de gerçekleştirilen Bursa çalıştayı ve Kasım 2014'de UZZK Ekonomi Gurubu toplantısı gibi.

Görüşme yapılacak yerel sektör aktörlerinin belirlenmesi amacıyla iki zeytin üreticisi ilçe seçilmiştir: Gemlik ve Ayvalık ilçeleri. Bu ilçelerin seçilmesinin birkaç sebebi vardır. Her ikisi de geleneksel yöntemlerle (eğimli arazide insan gücüne dayalı hasat gibi) zeytin üretim yaptıkları için sektörde yaşanan sıkıntıları (mali, fiziki altyapı gibi) daha çok hissetmektedirler. Her ikisi de bölgelerine uyum sağlamış zeytin çeşidini kullanmaktadır. Gemlik bölgesi sofralık zeytinde, Ayvalık bölgesi ise sızma zeytinyağında uzmanlaşmış ve isim yapmıştır. Her iki bölge zeytinle ilgili genel sorunlarla yüzleşmekle beraber, farklı zeytin çeşidi ile farklı gıda ürününde uzmanlaşmaları nedeniyle zeytin kültürel uygulamaları ve işleme yöntemleri, dolayısıyla gerektirdiği bilgi ve fiziki altyapı, hususlarında farklılaşmaktadır. Böylece, bu iki bölgenin seçilmesi sofralık zeytin sektörü ile sızma zeytinyağı sektörüne has bölgesel problemlerin tespitine de imkân vermektedir.

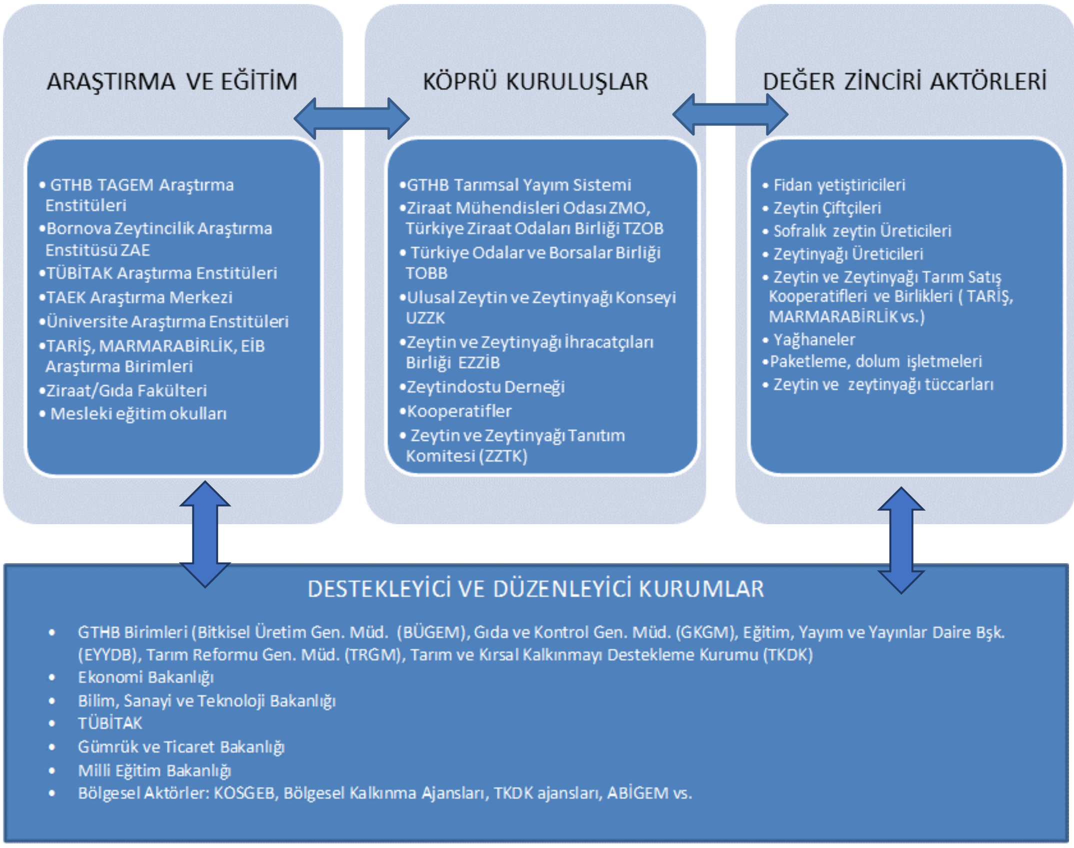
İnternet üzerinden ve yazılı belgelere dayanarak sektör aktörlerinin genel bir listesi oluşturulmuştur. İlaveten, mülakat için en uygun aktörlerin listesi oluşturulurken "kartopu" metodu kullanılmıştır. Mülakat yapılan kişiye mülakat için uygun olabilecek sektör aktörlerinin isimlerini önermeleri istenmiştir. Ayrıca mülakat yapılacak değer zinciri aktörleri belirlenirken, hem değer zinciri, hem tedarik zincirinde yer alan ve sadece zeytin ve zeytinyağı sektöründen geçimini sağlayan, aynı zamanda sektörde aktif olarak yer alan kişiler seçilmiştir. Bu çerçevede, Mart 2014 ve Aralık 2014 döneminde 65 sektör temsilcisi ile yüz yüze görüşme yapılmıştır (Ek B). Görüşmeler ortalama bir saat ve üzerinde sürmüş, çoğunluğunun ses kaydı alınmış ve analiz için birebir yazılı dökümü yapılmıştır.

Araştırma sonuçlarına göre, Zeytin ve Zeytinyağı Sektörel Yenilik Sistemi'nin temel aktörleri dört ayrı bileşen çerçevesinde Şekil 1'de gösterilmektedir. Sektörün araştırma ve eğitim Bileşeni, genel olarak tarım ve gıda konusunda araştırma ve eğitimden sorumlu kurumsal yapıya gömüktür ve üç ana guruba ayrılmaktadır:

- Kamu araştırma ve geliştirme (AR-GE) kurumları,
- Üniversitelerin ziraat ve gıda ile ilgili fakülteleri, araştırma enstitüleri,
- Özel Sektör ve Sivil Toplum örgütlerinin AR-GE birimleri

Zeytin ve Zeytinyağı ile ilgili konularda çalışma yapan kamu AR-GE kurumları ise aşağıdaki gibidir:

- Gıda, tarım ve Hayvancılık Bakanlığı (GTHB) araştırma enstitüleri,
- Türkiye Bilimsel ve Teknolojik Araştırma Kurumu (TÜBİTAK) Marmara Araştırma Merkezi (MAM) araştırma enstitüleri (örneğin gıda araştırma enstitüsü) ve laboratuvarları
- Türkiye Atom Enerjisi Kurumu (TAEK) Sarayköy Nükleer Araştırma ve Eğitim Merkezi



Şekil 1: Türk Zeytin ve Zeytinyağı Sektörel Yenilik Sistemi'nin Aktörleri

Tarım araştırmaları konusunda Türkiye'de en belirgin role sahip olan kurum GTHB'dır. Halen GTHB Tarımsal Araştırmalar ve Politikalar Genel Müdürlüğü'ne (TAGEM) bağlı tarım konusunda araştırma yapan 11 merkez, 10 bölgesel ve 27 konu olmak üzere 44 araştırma enstitüsü faaliyet göstermektedir. Ayrıca GTHB gıda kontrol laboratuvarları da araştırma yetkisine sahiptir. Bu araştırma enstitülerin çoğu zeytin ve zeytinyağı sektörünün ihtiyaç duyduğu konularda doğrudan veya dolaylı olarak araştırma yapmakla beraber, sektörle ilgili hususlarda ar-ge yapmakla İzmir'de bulunan Bornova Zeytincilik Araştırma Enstitüsü (ZAE) yükümlüdür. ZAE zeytinle ilgili hususlarda araştırma yapmakla görevlendirilmiş tek araştırma enstitüsüdür ve kurulma aşamasında olan Hatay zeytincilik araştırma enstitüsü henüz faaliyete geçmemiştir.

2014 sonu itibariyle zeytinle ilgili konularda temel ve uygulamalı araştırma yapabilecek olan üniversitelerde 30 civarında ziraat fakültesi ve 38 gıda mühendisliği bölümü bulunmaktadır. Birçok bölgedeki üniversitelerde zaman zaman zeytinle ilgili araştırmalar yürütülmekle beraber, zeytin üretilen bölgelerdeki üniversiteler daha aktiftir. Üniversite fakültelerine ek olarak tarım ve gıda konusunda araştırma yapan 26 tane üniversite araştırma enstitüsü zeytinle ilgili konularda araştırma yapabilme kapasitesine sahiptir (DPT 2010, TÜBİTAK 2010).

Üniversitelere bağlı meslek yüksek okulları (MYO) ile endüstri/tarım meslek liselerinde bahçe bitkileri, gıda işleme ve zeytin işleme gibi sektörle ilgili eğitim verilmektedir. Zeytin üretimi yapılan bölgelerde bu konularda eğitim veren 30 kadar MYO olup zeytincilikle ilgili üç tane bulunmaktadır: Aydındaki Çine MYO, Manisa Akhisar MYO ve Balıkesir Edremit MYO. 2014 sonu itibariyle, talep olmamasından dolayı, sadece Edremit MYO eğitim vermektedir. Ayrıca, zeytin üretilen bölgelerde, gıda işleme programı olan 50 kadar meslek lisesi olup bunlar arasında 17 tanesinde zeytin işleme alt konusu bulunmaktadır.

Sofralık zeytin ve zeytinyağı değer zincirinde üretim, işleme/paketleme ve dağıtım olmak üzere üç ana adım bulunmaktadır. Üretim safhası bahçe tesisi, gübreleme, ilaçlama, budama, hasat gibi zeytin kültürel faaliyetlerini içermektedir. Değer zincirindeki her bir adımın arasında yer alan zeytin/zeytinyağı depolama ve nakliye çok önemli aktiviteler arasındadır.

Zeytin ve zeytinyağı kolaylıkla bozulmaya müsait ürünler olduğu için zeytinde hasat sonrası sağlıklı depolama ve işleme için en kısa sürede transfer işlemi, zeytinyağında ise hava, ısı, koku ve güneşe maruz kalmayacak şekilde depolama, kaliteli ürün elde etmenin vazgeçilmezidir.

Sektörün değer zinciri bileşeninde yer alan aktörler arasında, zeytin fidanı yetiştiricileri, zeytin çiftçileri, sofralık zeytin işleme tesisleri, sofralık zeytin paketleme işletmeleri, zeytinyağı işleme tesisleri, zeytinyağı dolum tesisleri bulunmaktadır. İşleme ve paketleme ayrı işletmelerde olabildiği gibi tüm faaliyetleri içeren entegre tesislerde bulunmaktadır.

Türkiye'de Zeytin ve Zeytinyağı Tarım Satış Kooperatifleri ve Birlikleri, özellikle MARMARABİRLİK ve TARİŞ, önemli değer zinciri aktörleridir. MARMARABİRLİK Marmara bölgesinde, TARİŞ ise Ege bölgesinden sorumludur. Güneydoğu Anadolu bölgesinden sorumlu olan GÜNEYDOĞUBİRLİK sadece zeytin değil üzüm, antepfıstığı gibi ürünleri de kapsamaktadır ve diğer birliklere göre zeytinyağında aktiviteleri daha sınırlıdır.

Türkiye'de değer zinciri aktörleri, birden fazla adımda rol oynamaktadır. Örneğin, çiftçiler topladıkları zeytinlerini doğrudan kooperatiflere verebildikleri gibi, sofralık zeytin işlemekte, zeytinyağı sıktırmakta, işledikleri ürünü yerel pazarlarda satabilmekte veya tüccarlara pazarlayabilmektedirler. Veya üretici-tüccarlar, kendi ürettikleri zeytini işleyip kendi markaları ile pazarlayabildikleri gibi, çiftçilerden ve küçük üreticilerden işlenmemiş zeytin veya işlenmiş ürün alıp kendi ürünleri ile karıştırıp pazarlayabilmekte veya daha büyük işletmelerin tedarikçiliğini de yapabilmektedirler. Türkiye'de değer zincirinin her bir aşamasında tüccarların belirgin oyuncular olması ve kayıt dışı üretimin önemli düzeylerde olması, değer zinciri aşamalarının arasındaki sınırları önemli ölçüde muğlaklaştırmaktadır.

Değer zinciri aktörleri ile diğer sektör aktörleri arasında köprü rolü gören temel kuruluşlar arasında:

- Türkiye Ziraat Odaları Birliği (TZOB)
- Türkiye Odalar ve Borsalar Birliği'ne (TOBB) bağlı yerel düzeydeki ticaret, sanayi odaları, ürün borsaları,
- Türkiye İhracatçılar Meclisi'nin (TİM) altında Ege İhracatçı Birlikleri'nin (EİB) bir parçası olan Ege Zeytin ve Zeytinyağı İhracatçıları Birliği (EZZİB)

- EZZİB tarafından icra edilen Zeytin ve Zeytinyağı Tanıtım Komitesi (ZZTK)
- Ulusal Zeytin ve Zeytinyağı Konseyi (UZZK)
- Zeytindostu Derneği
- Kooperatifler (Tarım satış kooperatifleri ve birlikleri, zeytin ve zeytinyağı üretici Birlikleri, zeytin işleyen Tarım Kalkınma Kooperatifleri) yer almaktadır.

Özellikle, bir ürün konseyi olan UZZK'nın sektörde üstlendiği birleştirici rol önemlidir[111]. 1998 yılında Türkiye'nin Ulusal Zeytin Konseyi'nden (IOC) ayrılmasının ardından ortaya çıkan bir konsey ihtiyacı açığını kapatmak üzere sivil girişim ile gayrı resmi bir oluşum olarak başlayan UZZK, daha sonra GTHB'nın 2007 yılında yürürlüğe giren ve ürün konseylerinin oluşturulmasına olanak veren yönetmeliği ile resmen kurulmuş olan ilk ürün konseyidir. Diğer taraftan 2006 yılında kurulan Zeytindostu Derneği'nin de sektördeki tek sivil toplum örgütü olarak üstlendiği birleştirici görev önemlidir.

Düzenleyici ve destekleyici kurumlar bileşeninde, GTHB'nin birçok birimi doğrudan veya dolaylı olarak zeytin ve zeytinyağı sektörünü ilgilendiren önemli roller üstlenmektir. Örneğin, TAGEM kendine bağlı araştırma enstitülerinin araştırma fonksiyonuna ilaveten özel sektör, sivil toplum kuruluşlarına ve üniversitelere ayni ve nakdi AR-GE desteği vermektedir. Bitkisel Üretim Genel Müdürlüğü (BÜGEM) mazot, toprak, gübre gibi tarımsal girdi destekleri, zeytin fidan desteği, zeytinyağı pirim desteği gibi destekleri belirlemekte ve yönetmektedir. İyi Tarım Uygulamaları ve Organik Tarım Daire Başkanlığı zeytin de olmak üzere iyi tarım ve organik tarım destekleri vermektedir. Gıda Kontrol Genel Müdürlüğü gıda kontrolüne ek olarak, zeytin ve zeytinyağı kodeksi gibi, gıda standartlarını belirlemektedir. Eğitim, Yayım ve Yayınlar Dairesi tarımsal yayım sistemini yönetmekte; Tarım Reformu Genel Müdürlüğü arazi toplulaştırma, tarım havzaları, tarım kooperatifleri gibi tarımsal altyapılarla ilgili düzenlemeleri yapmakta, Tarım ve Kırsal Kalkınmayı Destekleme Kurumu (TKDK) ise AB fonlarının bölgesel olarak kullanımını yönetmektedir.

Ekonomi Bakanlığı, Kalkınma Bakanlığı, Gümrük ve Ticaret Bakanlığı, Bilim, Sanayi ve Teknoloji Bakanlığı, Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme İdaresi Başkanlığı (KOSGEB), Türk Standardları Enstitüsü (TSE), Türk Patent Enstitüsü (TPE) ile

[111]Bakınız http://www.uzzk.org/Belgeler/uzzk_misyon.txt

bölgesel kalkınma ajansları sektörle ilgili düzenlemeler yapan, ar-ge, teknoloji ve altyapı destekleri veren başlıca kurumlardır.

Zeytin ve Zeytinyağı Sektörel Yenilik Sistemi'nin fonksiyonel- yapısal analizinde, sadece bilginin oluşumu fonksiyonunda nitel analizin yanı sıra nicel analiz önemli ölçüde kullanılmıştır. Sektördeki istatistiki bilgi altyapısının zayıf olması nedeniyle, anlamlı göstergeler üretilemediğinden, diğer fonksiyonlara ilişkin nitel analizi destekleyebilecek bir nicel analiz yapılamamıştır.

Bilginin oluşumu fonksiyonunda hangi kurumların, ne ölçüde etkin rol aldığını tespit edebilmek amacıyla, 2000-2014 yılları arasında temel araştırma, ar-ge, patent ve bitki ıslah/tescil aktivitelerinin analizi yapılmıştır[112]. Bu çerçevede, Türk araştırmacıların diğer ülke araştırmacılarına kıyasla uluslararası yayın ve ulusal yayın performasını görmek için, uluslararası veri tabanı ISI WoS SCI-EXPANDED, TÜBİTAK ULAKBİM, YÖK tez veri tabanları kullanılarak bibliometrik analiz yapılmıştır. Ulusal destekli ar-ge faaliyetleri için TÜBİTAK ULAKBİM ve MİSTUG veri tabanları, AB destekli ar-ge faaliyetleri için Avrupa Komisyonu'nun CORDIS veri tabanı, patent performansları için TPE ve Avrupa Patent Ofisi (EPO) veri tabanları, zeytin ıslah ve tescil faaliyetleri için de GTHB'nin resmi verileri kullanılmıştır.

Kısaca özetlemek gerekirse, 2000-2014 arası nicel analiz sonuçlarına göre,

- Türk araştırmacıların zeytin konusundaki uluslararası yayınlar içerisindeki payı, İspanya, İtalya gibi zeytin üretici ülkelerin araştırmacılarına göre çok düşüktür. TÜBİTAK Araştırma Enstitüleri, TAGEM araştırma enstitüleri, özellikle ZAE'nin payı yok denecek kadar azdır. Yıllar itibariyle Türk araştırmacıların yayın miktarı artmakla birlikte bu artış çok alçak gönüllü bir artıştır. Yurtiçi yayınlar ve tezler incelendiğinde, araştırmaların ağırlıklı olarak temel bilimlerde yoğunlaştığı, tıp,

[112] Bu analizlerde temel amaç, araştırma bileşeninde yer alan aktörlerin göreceli performansını görmek olduğu ve birden fazla kelime kullanarak karmaşıklığa sebep olmamak için, veri tabanlarında konusunda "zeytin" kelimesi geçen tüm çalışmalar analize konu edilmiştir.

mühendislik ve sosyal bilimler alanındaki araştırmaların sayıca çok zayıf kaldığı görülmektedir.

- Yurtiçi destekli ar-ge faaliyetlerinde, TÜBİTAK desteklerini ağırlıklı olarak üniversiteler kullanmakta olup TAGEM enstitüleri ve ZAE'nin payı çok azdır. AB projeleri de diğer zeytin üretici ülkelerine göre az sayıda olup yine kamu araştırma enstitülerinin AB projesi bulunmamaktadır. ZAE'nin ar-ge projelerinin sayısında yıllar itibariyle belirgin bir artış görülmemektedir. ZAE'nin projeleri daha çok TAGEM kaynaklarıyla desteklenmekte olup, TÜBİTAK ve yurtdışı kaynaklı projelerinin sayısı azdır. Ayrıca, TAGEM araştırma Enstitüleri ve ZAE'nin tarımsal alanda ar-ge faaliyeti göstergesi olan zeytin çeşit tescil faaliyetleri de sınırlıdır.
- Aynı şekilde, zaman içinde ölçülü bir artış göstermekle beraber, diğer zeytin üretici ülkelere göre Türk patent faaliyetleri düşük seviyededir. ZAE'nin patent kaydı olmadığı gibi TÜBİTAK ve üniversitelerin kayıtlı patentleri çok azdır.
- Bilimsel bilginin oluşumunda değer zinciri aktörlerinin rolü çok zayıftır. Bunun temel sebebi, zeytin ve zeytinyağı üreticilerin ölçeğinin genelde çok küçük olmaktadır. Bu bağlamda, kooperatiflerin, Marmarabirlik ve Tariş'in, ar-ge ve patent faaliyetleri de çok ölçülü düzeyde olup daha çok altyapı geliştirilmesine yönelik projeleri bulunmaktadır.

Kısacası, 2000li yılların başından bu yana TÜBİTAK, TAGEM başta olmak üzere kamu kuruluşları kaynaklı veya AB kaynaklı, kamu ve özel sektöre verilen araştırma desteklerinde belirgin bir artış olmasına rağmen, zeytin ve zeytinyağı sektörüne ilişkin temel ve uygulamalı bilimsel araştırmalarda belirgin bir artış görülmemektedir.

Bu durumun arkasındaki yapısal problemleri yani sistemik problemleri ise nitel analiz sonuçları ortaya koymaktadır. Yapılan görüşmeler çerçevesinde, kamu araştırma enstitülerinin araştırma kapasitelerindeki düşüklüğün temel sebeplerinin araştırmacıların yani insan kaynağı kalitesindeki düşüklük, kamu araştırma yönetişim mekanizmasındaki aksaklıklar, eğitim sistemindeki zayıflıklar vs. olduğu anlaşılmıştır.

Çalışmada yapılan derinlemesine mülakatlara dayalı fonksiyonel-yapısal analiz sonuçları çerçevesinde her bir fonksiyon için tespit edilen sistemik problemler aşağıda özetlenmiştir. Pazarın oluşumu ve girişimcilik fonksiyonlarının ortak problemleri çok olduğu için bu iki fonksiyon için sorunlar beraber özetlenmiştir.

Bilginin Oluşumu Fonksiyonu'nun sistemik problemleri:

- Kamu araştırma sisteminin organizasyonu ve yönetişimi ile ilgili düzenlemeler ve kurallardan kaynaklanan zayıflıklar (**zayıf kurum problemi**):
  - Bürokratik yapılanma/ mükafat ve terfi mekanizmasının eksikliği/araştırmacıların devlet memurluğu kurallarına tabi olması (**zayıf/eksik kurum problemi**) nedeniyle araştırmacıların sistem içinde yüksek devingenliği ve kalıcı olmamalarından kaynaklanan yaparak öğrenmeye dayalı düşük bilgi birikimi (**zayıf bilgi altyapısı problemi**) sonucunda oluşan düşük motivasyon/zayıf araştırma kültürü/araştırmacılar arasında düşük güven düzeyi **(zayıf kurum problemi)/**uygun araştırmacı eksikliği (**zayıf aktör kapasitesi/bilgi altyapısı problemi**)
  - Yukarıdaki sorunlar nedeniyle araştırmacılar ve araştırma kurumları arasındaki zayıf etkileşim (**zayıf etkileşim problemi**)
- Kamu ar-ge desteklerinin yönetiminde zayıflıklar (**zayıf kurum problemi**) nedeniyle genel olarak etkinliği kısıtlı finansal destekler (**zayıf finansal altyapı problemi**)/ tarım ve zeytinle ilgili uzun vadeli ar-ge için kamu finansal kaynaklarının olmaması (**eksik finansal altyapı problemi**)
- Üniversitelerdeki tarım ve gıda alanlarında öğretim programındaki zayıflıklar (**zayıf kurum problemi**) sonucunda kamu ve üniversite araştırmacılarını zayıf temel araştırma/uygulamalı araştırma/dil yeteneklerinin (**zayıf aktör kapasite problemi**) yol açtığı araştırmacılarda düşük öz güven (**zayıf kurum problemi**) /düşük uluslararası ar-ge işbirliği düzeyi (**zayıf etkileşim problemi**)
- Meslek okullarının eğitim programındaki problemler **(zayıf kurum problemi)**/kısıtlı finansal altyapısı **(zayıf finansal altyapı)** /kısıtlı uygulamalı eğitim kapasitesi **(zayıf bilgi altyapısı)** sonucunda uygun ve nitelikli teknik eleman eksikliği **(aktör eksikliği/kapasite problemi)**
- Küçük ölçekten dolayı zayıf özel sektör ar-ge kapasitesi **(aktör eksikliği/ kapasite problemi**) ve değer zinciri aktörleri arasında zayıf işbirlikçi, kooperatif hareket etme **(zayıf etkileşim problemi)**

Bilginin Yayımı Fonksiyonu'nun sistemik problemleri:

- Kamu araştırma sistemine benzer şekilde kamu yayım sisteminin (GTHB'nin) organizasyonu ve yönetişimi ile ilgili düzenlemeler ve kurallardan kaynaklanan zayıflıklar (**zayıf kurum problemi**):
    - Kısıtlı sayıda ve kapasitedeki yayım elemanları **(aktör eksikliği/ kapasite problemi**)
    - (Kamu araştırma ve yayım sistemindeki zayıflıklar nedeniyle) zeytin çiftçileri, yayımcılar ve araştırmacılar arasındaki zayıf işbirliği (**zayıf etkileşim problemi**)
    - Yayım sisteminin yukarıdan aşağıya doğru (araştırmacı'dan yayımcıya, yayımcıdan çiftçiye) teknoloji transferi yaklaşımı/bürokratik merkez-taşra organizasyon yapısı (**zayıf kurum problemi**) sonucunda aşağıdan yukarı (çiftçiden araştırmacıya) gerekli bilgi akışının az olması **(zayıf bilgi altyapısı)**
- Kamu araştırma Enstitüleri ve ZAE'nin kısıtlı eğitim ve yayım aktiviteleri (**aktör eksikliği/ kapasite problemi)**
- Küçük ölçekli yapı/zayıf kooperatifleşme sonucunda kısıtlı özel sektör yayım kapasitesi
- Yeterli finansal, fiziki altyapı ve insan kaynağı eksikliği **(zayıf finansal/fiziki/bilgi altyapı problemi)** nedeniyle UZZK, Zeytindostu, ziraat odaları vs. gibi köprü kuruluşlarının eğitim ve bilgi yayımında kısıtlı erişim kapasitesi (**aktör eksikliği/ kapasite problemi)**
- Kamu kuruluşlarının sektör temsilcileri ve sivil toplum örgütleri ile zayıf işbirliği (**zayıf etkileşim problemi)**
- Genelde toplumumuzda işbirliği kültürünün zayıf olması **(zayıf kurum problemi)**

Arayışın Yönü Fonksiyonu'nun sistemik problemleri:

- Devletin yönetişim mekanizmasındaki zayıflıklar (**zayıf kurum problemi**) nedeniyle ortaya çıkan devlet kurumlarında vizyon eksikliği/zayıf devlet politikası yönlendirmesi/ devlet politikalarında tutarsız yönün sebep olduğu uyumlu ve uzun vadeli olmayan ulusal, bölgesel, sektörel politika koordinasyonu ve tasarımı (**zayıf kurum problemi**)

- Kamu kuruluşlarının sektör temsilcileri ve sivil toplum örgütleri ile (sektör problemlerini anlamaya yönelik) zayıf işbirliği (**zayıf etkileşim problemi)**
- Makro düzeyde etkin toprak planlama kapasitesinin olmaması/bölgesel farklılıkları dikkate alarak oluşturulmuş bölge bazında zeytin, sofralık zeytin ve zeytinyağı sektörel devlet politikalarının olmaması **(zayıf kurum problemi)**
- Sektörün sivil toplum örgütleri ile UZZK'nın sektör ihtiyaçlarını devlet politikasına dönüştürecek yeterlilikte ses getirememeleri **(aktör eksikliği/kapasite problemi)**

<u>Pazarın Oluşumu Fonksiyonu /Girişimcilik Fonksiyonu'na ilişkin temel sistemik problemler:</u>

- Çiftçilerin, üreticilerin küçük ölçekli olmaları nedeniyle zayıf finansal, fiziki, bilgi altyapısına **(zayıf altyapı problemi)** sahip olmaları nedeniyle değer zinciri aktörlerinin daha çok kayıt dışı sektörde yer almaları, kısıtlı kayıtlı sektör **(aktör eksikliği/kapasite problemi)**
- Zeytin ve Zeytinyağı Tarım Satış Kooperatif sisteminin organizasyonu ve yönetişimindeki zayıflıklar **(zayıf kurum problemi)/**ilçe düzeyindeki tarım satış kooperatiflerinin kısıtlı kapasitesi **(zayıf mali/fiziki/bilgi altyapısı problemi)**/ kooperatif sistemine güven eksikliği **(zayıf kurum problemi)** nedeniyle sektörde kısıtlı kooperatifleşme hareketi
- Bölgesel-sektörel özellikleri dikkate almadan tasarlandığı için etkin olmayan devlet destekleri **(zayıf kurum problemi**) (örneğin bölgeye has çeşit yerine genel zeytin fidan desteği, zeytin üretimine prim desteği vermek yerine zeytinyağına dönüşecek zeytine destek, üretici ölçeğindeki bölgesel farkları dikkate almayan teknoloji destekleri vs.)
- Yetersiz bütçe, insan kaynağı **(zayıf altyapı problemi)** ve farklı düzeylerdeki kamu kurumları arasında etkin olmayan bölgesel iş bölüşümünden (örneğin GTHB il, ilçe müdürlükleri ve belediyeler arasında) <u>dolayı</u> Devletin gıda kontrol mekanizmasındaki zayıflıklar **(zayıf kurum problemi)** (örneğin kayıtlı işletmelerin sıkı kontrole tabi olması, kayıt dışındakilerin hiçbir kontrole tabi olmaması)
- Bölgesel düzeyde zeytin ve zeytinyağı depoculuk sistemi, duyusal analiz panel sistemi, kimyasal analiz laboratuvarları vs. olmaması **(fiziki/bilgi altyapı problemi)** sonucunda (bölgesel) ürün standartlarının oluşturulamaması **(zayıf kurum**

problemi) / (bu nedenle) bölgesel değer zincirinin oluşamaması **(aktör eksikliği/kapasite problemi)**

- Etkin olmayan yerel ekonomik ve işgücü programları **(zayıf kurum problemi)** nedeniyle teknik bilgi ve beceriye sahip insan kaynağı eksikliği, bölgesel beceri ihtiyacı ve arzı arasındaki uyumsuzluklar (**bilgi altyapısı problemi)**
- Zeytin ve zeytinyağı sektöründeki aktörleri yönlendirecek ulusal/bölgesel istatistik bilgi sistemlerinin olmaması **(bilgi altyapısı problemi)**
- Yukarıdaki sistemik problemler sonucunda oluşan veya derinleşen diğer problemler: kayıtdışılık, ulusal düzeyde standart eksikliği, etkin olmayan gıda kontrolü, tağşiş, düşük ürün kalitesi, sürekli ve standart olmayan ürün arzı, fiyatın etkin oluşamaması, belirgin fiyat dalgalanmaları, değer zincirinde tüccarların baskın varlığı, zayıf tüketim alışkanlıkları probleminin derinleşmesi vs.

<u>Lobi Faaliyetleri Fonksiyonu'ndaki temel sistemik problemler:</u>

- Zeytin sektörünün diğer sektörlere göre ekonomik getirisinin çok uzun vadeli olması/geleneksel zeytin bölgelerinde üretkenliğin zayıf olması (küçük ölçek, eğimli arazi, yüksek maliyet vs.) buna karşılık kısa vadeli rant elde etme kültürünün güçlü olması **(zayıf kurum problemi)**
- Devletin yönetişim kapasitesindeki zayıflıklar, sektörler arası tarafsız duruşunu koruyamaması ve rant kültürünün olması **(zayıf kurum problemi)**
- Sivil toplum örgütlerinin altyapı zayıflıkları, UZZK, Zeytindostu gibi temel çatı ve köprü organizasyonlarının başka sektör aktörlerine finansal olarak bağımlı olması nedeniyle kurumsallaşamaması, tüm zeytin üretilen bölgelere erişim kabiliyetlerinin zayıf olması, bu sebeplerle de sektördeki aktörlerin bu kuruluşların taraflara eşit duruş sergilemeleri hususunda güveninin olmaması **(zayıf kurum problemi)**
- Kurumsallaşamama ve başkalarının kaynaklarına bağımlı olmaları nedeniyle oluşan güvensizlik ortamı nedeniyle UZZK, EZZİB, ZZTK, Zeytindostu gibi lobi faaliyetlerinde önemli görev üstlenmesi beklenen temel köprü kuruluşları arasında işbirliği ortamının eksikliği **(zayıf etkileşim problemi)** dolaysıyla sektör adına işbirliği içerisinde ses getirebilme konusunda yoksunluk **(aktör eksikliği/kapasite problemi)**

Kaynakların Aktarılması Fonksiyonu'na ilişkin sistemik problemler:

- Küçük ölçek, kooperatifleşerek ölçek yaratmada problemler, zayıf finansal, fiziki ve bilgi altyapısı, devlet d..esteklerinin ihtiyaçlarına yönelik etkin tasarlanmaması, bölgesel fiziki ve beceri altyapısının olmaması gibi sebeplerden dolayı değer zinciri aktörleri, sivil toplum örgütlerinin finansal kaynaklar ve insan kaynağını aktarma ve kullanabilme kapasitesinin sınırlı olması**(aktör eksikliği/kapasite problemi)**
- Uzun vadeli görüş ve bütüncül bölgesel sektör politikaların eksikliği, kısa vadeli ve birbiriyle çatışabilen politikaların oluşturulması, zayıf yönetişim kabiliyetler vs. gibi sebeplerden dolayı Devletin kaynak aktarabilme kabiliyetinin kısıtlı olması **(aktör eksikliği/kapasite problemi)**

Çalışmada tespit edilen sistemik problemlerin yapısına baktığımızda, devlet politikası oluştururken dikkat edilmesi gereken iki temel husus ortaya çıkmaktadır:

- Devletin sektör politikaları mevcut sistemik problemleri hedeflemelidir. Sektördeki sistemik problemler sonucunda oluşan sorunları hedeflemek kalıcı çözüm getirmeyecektir.
- Zeytin ve zeytinyağı sektörel yenilik sisteminin işleyişini engelleyen sorunların sadece bir kısmı sektöre özel sorunlar olup, bir kısmı ulusal düzeyde tüm sektörleri olumsuz etkileyecek sorunlar, bir kısmı ise bölgesel sorunlardır. Bu nedenle sektördeki problemleri hedefleyen devlet politikaları ulusal, bölgesel ve sektör düzeyinde tasarlanmalıdır.

Bu çerçevede, bu çalışmada tespit edilen sistemik problemlerin üstesinden gelerek zeytin ve zeytinyağı sektörel yenilik sisteminin işleyişini sağlayabilmek için aşağıdaki politika önerilerinde bulunulmuştur:

- **Politika önerisi 1:** Bilimsel bilginin etkin oluşumunu ve yayımını sağlayacak bir kamu araştırma ve yayım sistemi oluşturulmalıdır.
  - **Alt-politika önerisi 1.1:** Araştırmacıları memur kimliğinden kurtaracak ve araştırmacı rolünü tam olarak üstlenmelerini sağlayacak, yeni kural ve düzenlemelere tabi, özerk yapıda bir kamu araştırma organizasyonu oluşturulmalıdır. Farklı kamu kurumlarıma bağlı araştırma enstitüleri bu özerk yapı altında toplanmalıdır.

- **Alt-politika önerisi 1.2:** Zeytincilik Araştırma Enstitüsü'nün organizasyon yapısı, yönetişim mekanizması, bilimsel bilgi altyapısının etkinliği kapsamlı bir şekilde değerlendirilerek bu çerçevede yeniden yapılandırılmalıdır. İnsan kaynağı altyapısı yükümlülüklerine uygu olacak şekilde güçlendirilmelidir. Her bir zeytin üretici bölgeye bir zeytin araştırma enstitüsü kurulmalı veya mevcut enstitülerin zeytinle ilgili bölümleri güçlendirilmelidir.
- **Alt-politika önerisi 1.3:** İlgili sektör temsilcilerinin kamu araştırma sisteminin yönetişim sürecine katılımının sağlanarak sektör bazında bölgesel ihtiyaçlar ve bilginin kamu araştırma sistemini beslemesi sağlanmalıdır.
- **Alt-politika önerisi 1.4:** Sektörde ar-ge politikaları tasarlanırken bilginin aşağıdan yukarıya akmasını sağlamak için, bölgesel ar-ge önceliklerini belirlenme sürecinde zeytin ve zeytinyağı üreticilerini, bölgesel aktörleri araştırma enstitüleri ile bir araya getirecek etkin bölgesel platformlar oluşturulmalıdır.
- **Alt-politika önerisi 1.5:** Ar-ge proje finansman süreçlerini tanımlayan kuralları tekrar düzenleyerek, kamunun ar-ge finansal kaynaklarının bölüşümündeki etkinliğin artırılması ve kaynakları kullananlar için eşitlikçi rekabet ortamı yaratılmalıdır.
- **Alt-politika önerisi 1.6:** Yeni düzenlemelerle özerk ve daha esnek bir kamu tarımsal yayım sistemi oluşturularak mevcut kamu yayım organizasyonu ve işlevleri GTHB'nin taşra teşkilatından ayrıştırılmalıdır.
- **Alt- politika önerisi 1.7:** Kamu araştırma ve yayımcılarının orta ve uzun vadeli sektör misyon ve vizyonunu ortaya koyacak, zeytin, sofralık zeytin ve zeytinyağı sektörüne ilişkin sektör aktörlerinin işbirliği ile gerçekleştirilecek bir ar-ge ve yayım planlama süreci resmi olarak tanımlanmalıdır.
- **Alt- politika önerisi 1.8:** Zeytin üretilen bölgelerdeki araştırma, yayım ve değer zinciri aktörleri arasında etkileşim ve bilgi yayımını geliştirmek için, bilim ve teknoloji parkları bünyesinde, zeytin, sofralık zeytin ve zeytinyağı sektörlerini içerecek, tarım ve gıda sektörlerine yönelik yenilik ve teknoloji merkezleri, araştırma merkezleri ve teknoloji platformları oluşturulmalıdır.

- **Politika önerisi 2:** Zeytin, sofralık zeytin ve zeytinyağı sektörleri ile tarım ve gıda sektörlerinin ihtiyaçlarını karşılayacak, çok disiplinli ve çok sektörlü, orta ve yüksek öğretim kapasitesi oluşturulmalıdır.
    - **Alt- politika önerisi 2.1:** Tarım ve gıda sektörleri için çok disiplinli çalışmalar ve çeşitli beceriler geliştirilmesini destekleyecek biçimde tarım üniversiteleri kurulmalı ve mevcut ziraat fakültelerinin öğretim programı gözden geçirilmelidir.
    - **Alt- politika önerisi 2.2:** Tarımla ilgili fakülte/üniversitelerin uygulamalı tarımsal eğitim kapasitesi geliştirilmelidir.
    - **Alt- politika önerisi 2.3:** Tarım ve gıda alanındaki mesleki eğitim sistemi uygulamalı öğrenimle becerilerin geliştirilebilmesini sağlayacak şekilde yeniden yapılandırılmalıdır.
    - **Alt- politika önerisi 2.4:** Zeytin üretilen bölgelerde zeytin, sofralık zeytin ve zeytinyağı üretim ve işleme teknolojilerine yönelik üniversite eğitim kapasitesi geliştirilmelidir.
    - **Alt- politika önerisi 2.5:** Üniversite sistemindeki kural ve düzenlemeler, zeytin gibi uzun vadeli bilgi birikimi gerektiren konularda uzmanlaşma geliştirilmesini sağlayacak şekilde değiştirilmelidir.
    - **Alt-politika önerisi 2.6:** Üniversitelerin eğitim ve araştırma işlevleri, üniversite araştırma enstitülerinin ar-ge kapasitelerinin güçlendirilmesi suretiyle, yeniden organize edilmelidir. Bu bağlamda, zeytin ve zeytinyağı sektörü ile ilgili araştırma ve eğitim için kamu-özel işbirliği girişimleri desteklenmelidir.
- **Politika önerisi 3:** Zeytin sektörünün bölgeye özgü farklılıklarını dikkate alan, sofralık zeytin ve zeytinyağı sektörlerinde kayıt dışı üreticileri kapsayıcı bir değer zinciri oluşumunu sağlayan bir ortam yaratılmalıdır.
    - **Alt-politika önerisi 3.1:** Küçük üreticileri kapsayıcı olacak ve bölgesel, ulusal, küresel değer zincirine daha iyi eklemlenebilecek biçimde zeytin ve zeytinyağı tarım satış kooperatif sistemi organizasyonu ve yönetişimi geliştirilmelidir.

- **Alt-politika önerisi 3.2:** Bölgesel düzeyde çiftçileri ve işletmeleri değer zinciri boyunca bir biriyle daha iyi birleştirmek amacıyla yatay ve dikey resmi kontrat sistemi geliştirilmelidir.
- **Alt-politika önerisi 3.3**: Zeytin ve zeytinyağı sektörünün bölgesel ve ulusal pazar oluşumunu desteklemek amacıyla, bölgesel düzeyde fiziki, bilgi ve insan kaynağı altyapısını geliştirilmelidir.
- **Alt-politika önerisi 3.4**: Bölgesel ekonomi ve işgücü geliştirme programları çerçevesinde zeytin üretilen bölgelerde becerilerin (arz ve talebinin) eşleştirilmesi sağlanmalıdır.

- **Politika önerisi 4:** Köprü kuruluşlarının değer zinciri aktörleri, eğitim ve araştırma aktörleri ile destekleyici ve düzenleyici kurumları birleştirici rolünü daha etkin üstlenebilmesi için finansal ve insan kaynağı kapasiteleri geliştirilmelidir.
- **Politika önerisi 5:** zeytin ve zeytinyağı sektörü de olmak üzere, tarım ve gıda sektörlerinin bölgesel/yerel özellikleri dikkate alınarak, uzun dönem bakış açısıyla, bir biriyle uyumlu ulusal, yerel, sektörel ve teknoloji politikaları oluşturulmalıdır.

Burada dikkat edilmesi gereken başka bir hususu vurgulamakta fayda bulunmaktadır. Yukarıda özetlenen devlet politikaları mevcut sistemik problemlere yöneliktir. Yenilik sisteminin aktörleri, kurumları ve bulunduğu ortam zaman içinde değişmektedir. Bu nedenle, Wieczoreck ve Hekkert'in (2012) de önerdiği gibi, yenilik sisteminin fonksiyonel-yapısal analizi belli zaman aralıkları ile tekrar edilerek sistemin işlerliğinin değerlendirilmesi ve o günkü sistemik sorunlara yönelik güncel politikalar tasarlanması gerekmektedir. Böylece bu yaklaşımla yenilik sisteminin dinamik yapısı da yakalanmaktadır.

Bu çalışmada kullanılan yöntem, araştırma sorusu olan zeytin ve zeytinyağı sektörünün gelişimini engelleyen problemlerin ortaya çıkartılması konusunda çok faydalı olmuştur. Bununla beraber, bu çalışmayı tamamlayıcı nitelikte ileride yapılacak çalışmalara konu olabilmesi amacıyla, bu çalışmanın kısıtları aşağıda özetlenmektedir:

- Bu çalışma, ağırlıklı olarak yüz yüze derinlemesine görüşmelere dayalı nitel analiz içermektedir. Her ne kadar söz konusu görüşmeler sorunların tespitinde çok faydalı olsa da, örneğin yapılandırılmış anketler aracılığı ile istatistikler üretilerek, nicel analiz yöntemleri kullanılması çalışmanın bulgularının objektifliğini destekleyecektir.

- Zeytin ve zeytinyağı yenilik sistemi aktörleri arasındaki etkileşimin değerlendirmesi yine görüşmelere dayanarak nitel olarak ilişkilerin kalitesine genel olarak değinmenin ötesine geçmemiştir. Bu bağlamda Sosyal Ağ Analizi (Hanneman ve Riddle 2005) veya Net-Map katılımcı sosyal ağ haritalama yöntemi (Schiffer ve Hauck 2010) kullanılarak aktörlerin ilişki ağ yapısı değerlendirilmelidir.
- Bu çalışmada zeytin ve zeytinyağı yenilik sisteminin sınırları içerisine zeytinyağı rafine endüstrisi, sektörün önemli bir ayağı olduğu halde, daha önce özetlenen sebeplerden dolayı dahil edilmemiştir. Rafine endüstrisinin sistemde içerilerek sektörün bu kesiminden kaynaklanan sistemik problemlerin değerlendirilmesi, sistemin bütüncül olarak işlerliğine yönelik politika önerilerinin tasarlanması için çok faydalı olacaktır.
- Bu çalışma sadece iki geleneksel zeytin üreticisi bölgeyi, Gemlik ve Ayvalık, içermektedir. Diğer bölgelerin, örneğin zeytinciliğe daha geç başlamış ancak başarı elde etmiş Akhisar bölgesi veya güney bölgelerimizde yeni oluşturulmuş, çok büyük ölçekli, mekanizasyona yatkın bölgelerin de içerilmesi çalışmanın derinliğini ve kapsamını arttıracaktır.

Bu çalışmanın birkaç önemli katkısı vardır. Birincisi, ulusal ve uluslararası düzeyde, ilk defa zeytin ve zeytinyağı sektörel yenilik sisteminin tanımı yapılmaktadır. Daha önce Türkiye'nin zeytin ve zeytinyağı sektörüne yönelik bütüncül bir şekilde sektör politikası öneren diğer bir çalışma bulunmadığı için bu katkı önemlidir. İkinci olarak, bu çalışma yenilik sistemi yazınına ampirik katkıda bulunmaktadır. Hem tarım ve gıda alanında yenilik sistemi uygulamalarına genel bir katkı, hem de fonksiyonel-yapısal analiz yönteminin tarım ve gıda alanında uygulanabilirliğine özel bir katkıda bulunmaktadır. Wieczoreck ve Hekkert'in (2012) fonksiyonel-yapısal analiz yöntemi daha çok gelişmiş ülkelerin teknolojik yenilik sistemleri üzerinden geliştirilmiş bir yöntem olup Türkiye gibi gelişmekte olan bir ülke ortamında, sektör politikası oluşturmak amacıyla, geleneksel birer sektör olan tarım ve gıda alanlarına uygulanabilir olduğunun gösterilmesi önemli bir katkıdır.

Diğer taraftan, bu çalışmada tespit edilen sistemik problemlerin kalitesi, yenilik sistemi yazınının ortaya koyduğu gibi, sektörel yenilik sisteminin ulusal, bölgesel ve teknolojik yenilik sistemlerinin bir kesişim kümesi olduğunu doğrulamaktadır. Bu nedenle, sektörel yenilik sisteminin işlerliğinin sağlanması için devletin farklı düzeylerdeki yenilik politikalarının birbirleriyle uyumlu olması gerekmektedir.

Kısaca özetlemek gerekirse, bu çalışma yenilik sistemi yaklaşımı ve analiz yönteminin, devletin bir sektörün işleyişini engelleyen problemleri tespiti, politika hedeflerinin önceliğini belirlemesi ve politika araçlarını tasarlaması için çok kullanışlı olduğunu ortaya koymaktadır. Bu yaklaşım, sadece devlet politikası yapıcıları için değil, belli bir sektör üzerine çalışmak isteyen araştırmacıların, o sektörün işleyişi hakkında bütüncül ve derinlemesine bilgi sahibi olması, sektörde araştırmaya ihtiyaç duyulan alanları tespit edebilmesi, bu çerçevede araştırma alanını ve uygun araştırma yöntemini belirleyebilmesi için de çok uygun bir yaklaşımdır.

E. TEZ FOTOKOPİSİ İZİN FORMU

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Bölümü : Bilim ve Teknoloji Politikası Çalışmaları

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