ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY

AGRICULTURAL POLICY IN TURKEY:

EVALUATION OF WHEAT SUPPORT POLICY EFFICIENCY USING POLICY ANALYSIS MATRIX

M.Sc. THESIS

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Department of Management

Management Engineering Programme

May 2015

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May 2015

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Mayıs 2015

Sanda Maciç, a **M.Sc.** student of ITU **Graduate School of Science Engineering and Technology** with student ID 507111032, successfully defended the **thesis** entitled "**AGRICULTURAL POLICY IN TURKEY: EVALUATION OF WHEAT SUPPORT POLICY EFFICIENCY USING POLICY ANALYSIS MATRIX**", which she prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

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To my family,

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May 2015 Sanda MACİC

(Telecommunication engineer)

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ABBREVIATIONS

ACC : Agricultural Credit Co-operatives
ARIP : Agricultural Reform Implementation Project
ASCU : Agricultural Sales Co-operative Unions
CAP : Common Agricultural Policy
CARD : Centre for Agricultural and Rural Development of Iowa State University
CGE : Computable General Equilibrium
CIF : Cost, Insurance, Freight
Da : Decare
DEVPEM : Developing Policy Evaluation Matrix
DIS : Direct Income Support
DRC : Domestic Resource Cost
EU : European Union
EC : European Commission
EPC : Effective Protection Coefficient
FAO : Food and Agriculture Organization of the United Nations
FAOSTAT : Statistics Division of FAO
FAPRI : Food and Agricultural Policy Research Institute
GATT : General Agreement on Tariffs and Trade
GDP : Gross Domestic Product
Ha : Hectare
Kg : Kilogram
MFN : Most Favoured Nation
NPC : Nominal Protection Coefficient
OECD : The Organization for Economic Co-operation and Development
PAM : Policy Analysis Matrix
PC : Profitability Coefficient
PCR : Private Cost Ratio
PEM : Policy Evaluation Matrix
PSE : Producer Support Estimate
SAM : Social Accounting Matrix
SAPS : Single Area Payment Scheme
SEE : State Economic Enterprises
SPS : Single Payment Scheme
SRP : Subsidy Ratio to Producers
TAPAM : Turkish Agricultural and Policy Analysis Model
TGB : Turkish Grain Board
TL : Turkish Lira
TURKSTAT : Turkish Statistical Institute
US : United States
USD : US Dollar
VAT : Value Added Tax
WTO : World Trade Organization

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AGRICULTURAL POLICY IN TURKEY:

EVALUATION OF WHEAT SUPPORT POLICY EFFICIENCY USING POLICY ANALYSIS MATRIX

SUMMARY

With the overall spending for agriculture mostly in the form of the distorting support measures constantly rising, effects of such policy instruments need to be clearly presented in order for the policy to be justified or abolished.

In Turkey different policies have been introduced since the formation of the Republic in 1923. Government intervention has been present in the agriculture ever since. Historically, price supports in combination with input subsidies and border protection have been major policy instruments. While some authors argue that this type of agricultural support are proved to distort prices and impose net losses on society, others think that intervention in the agricultural sector can correct market failures, stabilize prices and increase income; support programs have positive impact on growth through investments in infrastructure, new technologies or provision of public goods. Farm policies in most countries are argued to be inefficient and serve only the wealthiest farmers.

Agricultural policy in Turkey is being under scrutiny for its distorting effects mainly due to high price supports and input subsidies. Direct area-based production coupled support in Turkey is planned to rise from 29% of total budget for agriculture in 2013 to 45% until 2018. According to OECD indicator Total Support Estimates is much higher than in EU-27 and USA, indicating the high level of domestic support, taxes and tariffs. Wheat as a major crop product in Turkey has been supported since the early days of Republic.

Despite the high level of support, wheat production efficiency stayed relatively low, with average yields being almost two times lower than average wheat yields in major wheat producing countries. High input costs combined with relatively low yields leave Turkish farmers with low profits and farmers are not able to recover their variable costs of production. Agricultural policymakers attempted to solve the problem by raising domestic prices, and thus cushion the effects of high production costs. In the end, Turkish consumers are the ones who bear the highest costs of agricultural policy.

Considering both international criticism regarding Turkish agricultural policy as well as implications in the domestic agricultural market, it is necessary to understand the relationship between current agricultural policy and market conditions. Using the Policy Analysis Matrix (PAM) domestic and trade policy for wheat, as a major crop product is assessed in order to determine the divergence or distortion effects of the current Turkish agricultural support policy. For this purpose data from 2010/2011 planting season on wheat production level, costs, revenues and profits at private and social prices are used to calculate different indicators within the PAM analytical framework. Calculations are made for rainfed common wheat with maximum and minimum yield potential depending on the crop care activities performed, as well as for irrigated common and durum wheat cultivation in Turkey. Results have shown

that wheat production and profitability in Turkey highly depends on the weather season, with variations depending on the rainfall and general weather conditions. In case of the unfavourable weather Turkey relies more on import due to fall in domestic production. In 2010/11 season with relatively favourable weather conditions, wheat production and yield was above the average, however profitability of the sector differs significantly between the rainfed and irrigated cultivation. Results obtained within Policy Analysis Matrix analysis of wheat production indicate competitiveness of rainfed wheat with low yields due to lower production costs that stems from the low employement of resources for the crop care. Relatively low comparative advantage of wheat production in Turkey stems mainly from input costs and output prices higher than in the major wheat producers in the world. Amongst the four different types of wheat cultivation, rainfed cultivation with minimum yields is most competitive due to lowest production costs; however best performer is certainly irrigated common wheat cultivation with high private profits, but negative social profitability due to high opportunity costs of scarce water resources in Turkey. Using the divergence identity of PAM, distorting effects of the policy is analysed. Changing the input parameters, different policy implications with respect to alignment with the European Union CAP is assessed in order to understand the possible outcomes of introduction of less distorting policy instruments in Turkish agriculture. Under the scenario analysis, results have shown that there exists a large potential for improvements in rainfed wheat production sector, either through lowering input costs, optimizing fertilizers consumption or utilizing the irrigation potentials. Usage of high yielding cultivars and supplemental irrigation could lead to significant increase in wheat yields. Therefore lowering input costs in order to decrease the burden of farmers together with improvements in productivity could yield fruitful results for the wheat production sector in the future.

TÜRKİYE'DE TARIM POLİTİKASI:

POLİTİKA ANALİZİ MATRİSİ YAKLAŞIMIYLA BUĞDAY DESTEK POLİTİKASININ ETKINLIĞININ DEĞERLENDIRILMESI

ÖZET

Turkiye'de tarım alanında çeşitli desteklerle sürdürülen piyasa müdahalesi sonucu tarımsal harcamalar sürekli yükselmektedir. Bu tür bir politikanın sürdürülmesi veya sona erdirilmesi için desteğin çiftçi kârlılıkları ve sosyal refah üzerindeki etkilerinin analiz edilmesi gerekmektedir.

Tarım destekleri 1923'te Cumhuriyet'in kuruluşu ile beraber başlamış ve bugüne kadar farklı şekillerde devam etmiştir. Fiyat destekleri, girdi sübvansiyonları, sınır koruma ile birlikte destekleme politikasının önemli araçları olmuştur. Bazı çalışmalarda, girdi ve fiyat sübvansiyonlarının, fiyatları yükseltip piyasa dengesini bozabildiği ve toplum açısından net kayıplara yol açtığı öne sürülürken, diğer yandan tarım sektöründeki müdahalenin piyasa başarısızlıklarını düzeltmek, fiyatları stabilize etmek ve gelir artırmak gibi olumlu sonuçlarına işaret eden görüşler de bulunmaktadır. Öte yandan destek programları, altyapı veya yeni teknolojilere yatırımlar ile tarım sektörününün büyümesine olumlu etki sağlar. Buna rağmen tarım politikasının bir çok ülkede verimsiz olduğu ve bu politikanın sadece zengin çiftçilere avantaj sağladığı yönünde şikayetler de sürmektedir.

Türkiye'nin fiyat destekleri ve girdi sübvansiyonları, dünya tarımsal üretimi ve rekabati üzerinde etkili olduğu için uluslarası kuruluşlar tarafından da ayrıntılı olarak izlenmektedir. Öte yandan 2013 yılı bütçesindeki payı % 29 düzeyinde olan ekili alan başına desteğin, 2018 yılında % 45'e ulaşacağı planlanmaktadır. OECD Toplam Destek Tahmini göstergesine göre Türkiye'de toplam destek ödemelerinin AB-27 ve ABD'ye göre çok daha yüksek olduğu görülmektedir. Yüksek desteğe rağmen kırsal bölgelerde gelir oldukça düşük kalmakta, bu duruma kırsal bölgelerdeki tarım dışı çalışma fırsatlarının düşüklüğü eklenince alternatif gelir kaynağı yoksunluğu sonucu, çiftçiler hem tarım sektörünü hem de kırsal bölgeyi terk etmektedir. Sonuç olarak halihazırda tarımsal politikanın sektördeki sorunları çözme çabalarının yetersiz kaldığını söylemek mümkündür.

Türkiye'de tarımsal üretimde büyük yer tutan buğday üretimi Cumhuriyet'in ilk günlerinden beri desteklenmektedir. Destek yüksek düzeyde olmasına rağmen, Türkiye'nin buğday üretim verimliliği dunyanın en büyük buğday üreticileriyle karşılaştırıldığında ortalama olarak iki kat daha düşüktür. Diğer kurak olan ülkelerdeki gibi buğday verimi en büyük üreticilerle karşılaştırıldığnda daha yüksektir, ancak Türkiye'de kişi başı buğday tüketimi çok yüksek olduğundan dolayı fazla ihracat yapılamıyor; ithalat yapılmak zorunda kalınır. Bununla birlikte yüksek girdi maliyetleri çiftçinin kazancını olumsuz etkilemektedir. Girdi fiyatlarının yüksekliği Türkiye'deki vergi ve gümrük tarifelerinden kaynaklanmaktadır. Devlet, yerel fiyatları yükselterek yüksek üretim maliyetlerinin etkilerini hafifletmeye çalışıyor. Sonuç olarak, tarım politikasının yüksek maliyetlerini ödemek zorunda kalan nihai tüketici olmaktadır. Bu bağlamda devlet tarafından üstlenilen tarım

politikalarının çiftçi, sosyal refah, ekonomik verimlilik ve tarım sektörünün rekabet gücü üzerindeki etkisini anlamak büyük önem taşımaktadır.
Bu nedenle, bu çalışmada tarım politikasının etkisi buğday üretimi üzerinde değerlendirilmiştir. Bu değerlendirmenin ilk kısmında Politika Analizi Matrisi (PAM) kullanılarak dört farklı buüğday üretimi tipi değerlendirilmiştir: bakım faliyetleri yapılan ve yapılmayan kuru tarım, ekmeklik ve makarnalık sulu tarım. Kuru/sulu ekmeklik ve makarnalık buğday üretiminde yurtiçi ve ticaret politikası verimliliği ve rekabet gücü gibi parametler hesaplanmıştır. PAM analitik çerçevede farklı göstergeleri hesaplamak için 2010/2011 buğday ekim sezonun özel ve sosyal fiyatlarla; maliyetler, gelir ve kâr verileri kullanılmıştır. Sonuç olarak, Türkiye'de buğday üretiminin özel ve sosyal kârlılığı kuru ve sulu buğday tarımı için değerlendirilmiştir. Buğday tarımın karlılığı hava koşullara bağlı olarak yıldan yıla değişiyor. Kuraklık olduğu durumlarda Türkiye'deki kişi başı yüksek buğday tüketimi ithal edilerek çözülüyor, fakat 2010/2011yılında buğday üretimi ortalamasından daha yüksekti. Çftçilerin elde edilen kar da kuru ve sulu tarımın arasında oldukça farklı olduğu görülmüştü. Bu nedenle de Türkiye su potansiyeli daha tasarrüflü bir şekilde kullanılmasına özen gösterilmelidir. Stratejik ürün olan buğdayın üretimi hava koşullara bağlı olduğundan dolayı verimi ve çiftçilerin kazancını arttırmak amacıyla su potansiyeli ve gübre kullanımı optimize edilmelidir.

Bu çalışmanın ikinci kısmında Türkiye'nin en yaygın yüksek verimi olan kuru buğday tarımın PAM duyarlılık analizi yapılmıştır. Duyarlılık analizinde girdi parametreleri değiştirilerek farklı senaryolar oluşturulmuştur. Elde edilen sonuçlara göre Türkiye'de verimi arttırmak ve girdi fiyatlarını azaltmak en önemli amaçlardan biri olmalıdır. Senaryolarda verimi yükseltilerek hem çiftçinin kâr edebildiği, hem de sosyal refahın yükseldiği görülmüştür. Yapılan duyarlılık analizi buğday üreticilerinin kâra başlaması için girdi fiyatlarının en az %20 oranında düşmesi gerektiğini ortaya koymuştur.
Diğer bir senaryoda AB politikasının araçları kullanılarak rekabet gücü gibi parametler incelenmiştir. Türkiye'de tarımsal verimsizliği engellemek üzere yapılacak çalışmalar, AB tarım politikasının geçmiş deneyimlerinden ve reformlarından mutlaka yararlanmalıdır. Bu doğrultuda doğrudan girdi ve fiyat desteklerinin düzenlenmesi gerekmektedir. Türkiye'de tarımda gerçekleştirilecek iyileşme, ayrıca Türkiye'nin AB üyeliğine de olumlu etki yapacaktır. Türk tarım politikasının ilk ve en önemli amacı verimliliği yükseltmek ve birim alandan elde edilecek geliri arttırmak olmalı, bunun yanında teknolojik gelişme ve çiftçilerin yeni üretim süreçleri ile ilgili eğitilmesi hedeflenmelidir. Bu şekilde devlet, tarımsal politikanın etkinliğinin artmasını sağlayacaktır.
Diğer yandan verimliliği yükseltmek için önemli bir nokta olan gübre kullanımı optimize edilmelidir. Gübre kullanımının dünya genelindeki istatistiklerine bakıldığında; verimliliğin kullanım ile doğru orantılı olduğu görülür. Türkiye'de dekar başına gübre kullanımı Avrupa Birliği ve OECD gübre kullanımın ortalamasının altındadır. Bu da verimliliğe açıkça etki etmektedir. Ayrıca, buğday üretiminde gübre kullanımı artırılacak ise, gübre fiyatlarının düşmesi de gereklidir.

Bu çalışmada üretim, maliyet ve fiyat ile ilgili istatistiksel verilere bakıldığında buğday üretiminin kârlılığı ve etkinliği yıldan yıla değişken olduğu görülmüştür. Çiftçi gelirlerinin yükselebilmesi için, tarım politikasının, üretim maliyetleri üzerindeki negatif etkiyi azaltacak şekilde reform sürecinden geçmesi gereklidir. Mevcut politika bir yandan fiyatların yüksek kalmasına yol açarken, diğer yandan

aynı yüksek fiyatlardan dolayı çiftçilere destek verilmektedir. Bu şekilde hem üretici hem de nihai tüketici kaybetmektedir. Sonuç olarak mevcut tarımsal destek politikasının yönü değişmeli, Türkiye AB üyeliği açısından sorun yaratan verimsiz tarım sektörünü iyileştirmelidir. Mevcut politika hem AB üyeliğini hem de uluslararası ticari ilişkileri olumsuz etkiliyor. Bu ilişkilerin daha güçlü olabilmesi ve çiftçi gelirinin yükseltilebilmesi için tarımsal destek programlarının düzeltilmesi gerekmektedir. Ancak, tarım poltikasının son gelişmelere bakacak olursak, Türkiye bazi önlemleri almiştir; iyi tarım uygulamaları ve kırsal kalkınma için destekler 2007-2011 arası dört kat arttırılmıştır, sonuç itibariyle iyi tarımı yapan çiftçi sayısı da sürekli artmaktadır. Buğday üretimi için büyük önemi taşıyan, iyi tarım uygulamaları kuru tarımın verimliliği zamanla %64 kadar arttırabilir. Üretim maliyetlerin azalması ve su verimliliğinin artması ile beraber iyi tarım uygulamaları Türkiye'deki buğday üretiminin geleceğidir.

1. INTRODUCTION

1.1 Purpose Of The Thesis

Issues concerning agricultural policy effects on the overall welfare of the rural population and economic efficiency have grown in importance lately. Different methods have been used to evaluate the impact of agricultural policies on the economic efficiency of production, income distribution, comparative advantage of agricultural sector, price formation, rural poverty etc.

Agricultural policies in Turkey throughout the history are considered to be inefficient, impose heavy burden on state budget and have little or no effect on the efficiency of production or improvement of the farmers' standard of living. However studies that reflect on the impact of the agricultural policy undertaken by Turkish government are limited and provide no insight in the economic efficiency of these policies, or its impact on farmers' welfare. Agricultural sector in Turkey has undergone several reforms and policies employed both direct and indirect support instruments over the years. Since 2001 Turkey has shown a significant effort to align its agricultural policy with the Common Agricultural Policy of the European Union. However, most recent reform of agricultural policy in Turkey in 2010 reintroduced input subsidies and price supports, and paved the way back to the old protectionist policies. Although current Turkish agricultural policy diverges from CAP in terms of distorting support measures, it still retains important measures that are in line with CAP's intentions to focus more on rural development and environmental issues. Research related to the agricultural policy has been focused mostly on these divergences from CAP and the aspects of possible entrance of Turkey into the EU. However, there is a lack of research and empirical analysis related to the impact of the recent policy developments on specific crop production, competitiveness of specific sector and benefits for farmers' community.

Turkey is being under scrutiny for its distorting effects (Köse 2011, OECD 2013) mainly due to high price supports and input subsidies. Direct area-based production coupled support in Turkey is planned to rise from 29% of total budget for agriculture

in 2013 to 45% until 2018. According to OECD indicator Total Support Estimates is much higher than in EU-27 and USA, indicating the high level of domestic support, taxes and tariffs. Wheat as a major crop product in Turkey has been supported since the early days of Republic.

Considering both international criticism regarding Turkish agricultural policy as well as implications in the domestic agricultural market, it is necessary to understand the relationship between current agricultural policy and market conditions. With the overall spending for agriculture mostly in the form of the distorting support measures constantly rising (OECD, 2013), effects of such policy instruments need to be clearly presented in order for the policy to be justified or abolished. On the other hand, for the criticism to be acknowledged, it needs to be based on the facts and empirical analysis. Therefore this study aims to introduce the overview of the policy developments and its relation to the production and market implications for wheat, as the most strategic product in Turkey, which is the world's top consumer of wheat and respective products. Wheat represents a major cereal product in Turkey accounting for more than 60% of total cereals production[1]. Most of the time Turkey is self-sufficient in wheat production, despite the relatively low productivity, with average yields almost two time lower than yields of the world's top producers. However, for a semi-arid country, yields in Turkey are higher than in the peer countries such as Australia for example. Despite that, domestic production is sometimes insufficient to meet the high and increasing domestic demand for wheat and wheat products. Although prices of wheat are higher than the average world prices due to high tax rates in Turkey, wheat growers in Turkey are still not earning enough to recover the total costs of production (Alemdar et al., 2014). Despite the high level of support, wheat production efficiency stayed low, with average yields being almost two times lower than average wheat yields in major wheat producing countries. High input costs combined with relatively low yields leave Turkish farmers with low profits and wheat production not sustainable without price supports and input subsidies. Agricultural policymakers attempted to solve the problem by raising domestic prices, and thus cushion the effects of high production costs. In the end, Turkish consumers are the ones who bear the highest costs of agricultural policy.

[1] Data obtained from Turkish Statistical ınstitute, Author's own calculation, address: http://tuikapp.tuik.gov.tr/bitkiselapp/bitkisel.zul

There is a lack of research on assessment of the impact of latest policy instruments introduced in 2010 on wheat production and profitability in Turkey. Rationale for the increase in employment of distorting policy measures is analysed with respect to its impact on farmers and social welfare, and general profitability and competitiveness of wheat cultivation in Turkey. Considering both international criticism regarding Turkish agricultural policy as well as implications in the domestic agricultural market, it is necessary to understand the relationship between current agricultural policy and market conditions.

Therefore, in this study policy effects as well as competitiveness and comparative advantage of the wheat production sector is analysed using the analytical Policy Analysis Matrix (PAM) framework. Revenues and costs at private and social prices are evaluated in order to determine the divergence or distortion effects of the current Turkish agricultural support policy. For this purpose, domestic and trade policy for wheat is analysed using PAM. PAM is an analytical framework for agricultural policy assessment initially developed by Monke and Pearson in 1989 (Monke and Pearson, 1989). Approach is based on the cost-benefit analysis, and is mostly used for empirical analysis of agricultural price policy, assessment of policy effects on farmers income, technological advancement etc. PAM consists of three rows and four columns. Columns represent farmers product output, domestic factors, tradable inputs and profits. Rows represent private and social prices, policy transfers or policy distortion effects. Private prices represent the market prices at which inputs, factors and outputs were actually traded in the domestic market. Social prices, on the other hand represent the prices that would prevail in the market if no intervention or market failures existed. Policy transfers are calculated based on private and social profits and at the same time represent the government intervention effects. Using the divergence identity of PAM, distorting effects of the policy is analysed. Sensitivity analysis is performed varying the input parameters in order to simulate different policy scenarios and its impact on agricultural incomes, private and social profitability and competitive and comparative advantage of the wheat production in Turkey. By changing input parameters, different policy implications with respect to alignment with the European Union CAP will be assessed in order to understand the possible outcomes of introduction of less distorting policy instruments in Turkish agriculture.

1.2. Literature Review

Studies on evaluation of national agricultural policies have grown in importance in the last two decade, especially since the GATT agreement on trade and tariffs that significantly changed the agricultural policy settings in the world. Several micro and macro models for policy evaluations have been proposed and successfully employed in various studies on policy costs, welfare impacts, income distribution, economic efficiency etc. Models can generally be classified as General Equilibrium or Partial Equilibrium models, based on agriculture's relation to the economy as a whole (Gohin and Moschini, 2006). Both general and partial equilibrium models have been used to assess costs of different policies and their impacts on social welfare (Gohin and Moschini, 2006). Some of the models proposed by Gohin and Moschini are econometric partial and general equilibrium models, Computable General Equilibrium model (CGE), Social Accounting Matrix (SAM), Producer and consumer support estimates and Policy Evaluation Matrix developed by OECD, as well as Policy Analysis Matrix developed by Monke and Pearson in 1989 and recommended by FAO. Classification of agricultural models is given by F. van Tongeren et al. (2001) in their review of global models for agricultural policy assessment, based on their scope (partial or economy-wide), region (individual or multi-regional), methodology (market equilibrium or time series; dynamic or static models). However, since no model can serve all purposes, choice of a model depends on the theoretical framework and the particular aspect of the economy that is to be assessed.

Moreddu, C. (2011) in his study "Distribution of Support and Income in Agriculture" developed a model that provides performance evaluation of different policies based on support distribution and income by farm size, type and region in number of OECD countries. It has been demonstrated that in most countries support is concentrated on few products (mainly crops) and mostly on large farms.

Brooks J. et al. (2011) introduced The Development Policy Evaluation Model (DEVPEM). This is a rural economy model constructed by linking multiple farm household models in a general equilibrium framework, as to analyse the effects of different policies in developing countries. Interest is focused primarily in the ability of each policy to increase the welfare of rural households and how cost efficient each

policy is in terms of raising the welfare of the targeted population for every dollar spent on the policy.

Policy Analysis Matrix (PAM) model developed by Monke and Pearson (1989) is one of the important tools for policy assessment. This method offers both microeconomic level of analysis in terms of farm efficiency and profitability, as well as the evaluation of agricultural policy transfers and efficiency, and therefore provides a useful insight in the trade-offs that need to be faced by the policy makers. It was used by numerous researchers to determine the effects of agricultural policy on the sector competitiveness, its economic efficiency, level of distortions, comparative advantage etc.

Stoforos et al. (2000) developed a model for optimization of policy decisions combining PAM with partial equilibrium model, including elasticity estimates to reflect on the dynamic market changes in the future.

Fang and Beghin (2000) assessed the comparative advantage and protection of China's major agricultural crops using a modified PAM model. Using production and price data for several crops including rice, wheat, corn and cotton, they showed that China has a comparative advantage in labour-intensive crops, and a disadvantage in land-intensive crops. Findings of this study also suggested that even after becoming member of the WTO and reforming its support policy, China would still need to improve factor productivity to gain competitiveness in the grain sector.

Another study by Reig-Martinez et al. (2008) combined PAM with Data Envelopment Analysis (DEA) to evaluate profitability of rice production in Eastern Spain province Albufera. They found that farmers in this region would have to employ their resources more efficiently in the future if they are to cope with the strong import competition.

PAM framework was used by Finkelshtain et al. (2011) in their study on the government support effects on Israeli agriculture, its comparative advantage, social profit and trade. They proposed different scenarios of partial or complete removal of government support, and found that social net value of agricultural activities in most cases is negative. Results suggested that when subsidy for hired labour is relaxed the consumer burden is lowered considerably, while removal of the subsidy for

investment in capital does not create a considerable change in the gap between private and social profits.

De Souza & Revillion (2013) used PAM to evaluate economic efficiency of rice production in Brazil compared to other Mercour countries. Computing private and social costs of production the study evaluates the impact of direct and indirect taxes on rice production. The study suggests that reduction of taxes on rice producers in Brazil would have a positive impact on sector's profitability and increase the competitiveness compared to other countries of the selected region.

Khai & Yabe (2013) assessed the comparative advantage of soybean production in Vietnam using PAM. Aim of the study was to analyse the impact of government policy attempts to equalize the farmers income with the rest of the population. Results showed that government policy had almost no positive effect on soybean production in Vietnam; however the sector itself has a comparative advantage even with the scenarios negatively affecting costs of production.

Kanaka and Chinnadurai (2013) studied the impact of governmental policies on rice production profitability in India. The results showed that average farms are making losses in both private and social prices. However, they extended the concept of PAM by taking a non-static viewpoint on the current production system by assessing the effects of possible change in the farmers behaviour in the future.. They concluded that PAM can yield fruitful information about particular agricultural system after different efficiency-improving changes have been adopted by farmers.

In relation to agricultural policy in Turkey, several studies (Abay et al. 2001, Ataç 2011, İmrohoroğlu et al. 2012,) were made on general impact of agricultural policy on trade paths, welfare gains, rural poverty and other macroeconomic indicators.

Most comprehensive study on the Turkish agricultural policy was performed by Koç et al. (1998). In this study a country commodity model for Turkey TAPAM was developed and connected with CARD/FAPRI world agricultural commodity price projections. Demand and supply were projected based on the data on domestic and world supply, prices and price elasticity in order to assess the possible outcomes of the changes in the price/production at the world or domestic level. Schematic models for several commodities including wheat are introduced to comprehend the effects of

the world price changes, government price interventions and impact of the tariffs changes on supply and demand of livestock and crop products.

Brooks and Tanyeri (1999) examined the implications of switching from existing policy towards DIS payment scheme in Turkey using SAM. Concerns over DIS introduction in Turkey imply that direct income payments would significantly lower farmers' incomes. However, results of this study showed that the initial concern could be overcome by a proper method of compensations in short-term. They also conclude that low incomes in rural areas in Turkey are specific to all sectors, not only to agriculture. Therefore broader strategy is needed for fostering rural development.

Dogruel et al. (2002) utilized the dynamic general equilibrium model to assess the impact of the Turkish agricultural reforms in 2000 on the consumer welfare and rural economy. Results showed that elimination of traditional price support and introduction of the CAP instrument of Direct Income Support will have deflationary effects and would cause fall in agricultural output and capital investments expenditure.

Only a small portion of the studies has been devoted to a specific crop policy evaluation in terms of distortion effects, production efficiency and welfare gains.

Kızılaslan (2004) in his study "Wheat Production and Comparison of Applied Policies in Turkey and in the World" addresses issues related to the erratic wheat support policy and its impact on the growth and competitiveness of the agricultural sector. The study reveals some important differences in the structure of agricultural sector between Turkey and EU. Results also indicates that several reforms of the agricultural policy need to take place in order to bring Turkish agriculture closer to that of EU, and therefore make it more competitive once it enters the EU's free agricultural market.

Policy Analysis Matrix was used by Turkish Agricultural Economic and Policy Development Institute in its report on sugar production (Akbay, 2003). Results of the study showed low competitiveness of sugar production sector in Turkey, as well as negative impact on social welfare. One of the possible reasons is the technological underdevelopment of the sugar production, and therefore policy should address these issues in the future. In the study by B. Bahadır (2006) on cotton production in

Çukurova region in Turkey PAM was used to analyse profitability and policy impacts on economic efficiency. Results showed that despite profitability of cotton production in Çukurova region, high levels of support for wheat and corn as a second crop causes farmers to switch to the latter. Results obtained in this study may serve as an example of the agricultural policy inefficiency in resource and subsidy allocation.

However, not much research is performed on assessing the impact of the latest policy instruments introduced in 2010 on wheat production in Turkey. In Turkey, wheat has been protected and subsidized since 1932, and is one of the first crops being supported in the history of Turkish Republic. However, since 1947 price support and other subsidies expanded on the other important crops, and today support is still high, and has a tendency to increase in both real and nominal terms. Rationale for such an increase in support levels in Turkey should be assessed in terms of real impact on farmers' income, social welfare and overall sector competitiveness. Therefore this study aims at analysing the impact of the latest policy developments and reinforcement of the input subsidies and price support mechanisms since 2010 on the wheat production sector. Using Policy Analysis Matrix competitiveness of the sector is assessed together with the evaluation of the overall impact on the social welfare and resource allocation.

2. AGRICULTURAL POLICIES OVERVIEW

Growing world population together with climate changes eroding the available natural resources used as an input in agricultural production creates enormous pressure on the food and agricultural sector. Increase in population size implies higher demand for food and agricultural products that leads to the increase in the size of the planting area. Agricultural policy makers need to design effective long-term national policies to achieve multiple and contradictory goals such as:

- to meet consumers demand related to the nutrition requirements or referred as food security[2];
- provide regulatory framework for advancing food safety,
- decrease poverty levels in rural areas,
- efficiently employ available resources, in terms of sustainable development,
- preserve natural environment and rural landscapes.

Agriculture is one of the most dynamic sectors in every country's economy, and its vital national importance has been reflected trough protectionist policies all over the world. On one hand agricultural production is not only dependent on the efficient employment of factors of production; its levels depend highly on the unpredictable weather conditions and country's natural resources. On the other hand agricultural prices not only depend on the national production levels, but are highly conditioned by the world prices of commodities, petrol and inputs as well as on both domestic and international policies. With the demand being inelastic, changes in supply related to the weather conditions causes price fluctuations. Therefore, parties involved in the agricultural supply chain may suffer from extremely high food prices, insufficient quantity of some products and may be exposed to different types of financial risks in general. Governments across the world have been struggling to meet the demands of different stakeholders ranging from producers, input suppliers, consumers to

[2] The World Food Summit of 1996 defined food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" http://www.who.int/trade/glossary/story028/en/

landowners through variety of support programs, investments in infrastructure, R&D, organic farming, rural development etc. Clark and Thompson (2011) argue that the rationale behind the agricultural policy often stems from the policy makers pursue of political goals and demand of specific interest groups, and usually has little to do with the real economic reasoning.

Agricultural policies can be classified based on its scope as well as its effect on market distortions and social welfare, as:

1. Domestic support policy that includes direct and indirect support instruments. These instruments include price or production support (through price ceilings, variable input subsidies, output coupled subsidies, direct income supports etc.) or trade policy instruments that are manifested through restrictions on import or exports. These instruments have a distorting effect as it can directly affect the quantities of the commodity that are produced, consumed, and traded.

2. Macroeconomic policy that includes fiscal and monetary policy. Government needs to decide on taxes in agriculture as well as on the share of budget for the spending for agriculture. Policy makers need to bear in mind the policy implications on the domestic factors of production and exchange rates when creating policies and strategic plans.

3. Public investment policy that includes decisions on investments in infrastructure, education, research and development, technology etc.

Direct product based or indirect input based support schemes in combination with trade policy instruments remained major policy instrument in both developed and developing countries. While developed countries began to recede from distorting price policies and production-coupled support programs in recent years, most of the countries still maintain high level of protection, through price and input supports, export subsidies, import tariffs etc. Although in most OECD countries estimated total support to agriculture as a percentage of GDP fell from 3% in 1980s to only 1% in 2011-2013, share of budget for agricultural spending in terms of distorting support measures remains high in most of the countries in the world. In 2013, transfers based on output and variable input use was still at 51% of total support to agriculture (OECD, 2014). According to the European Commission report on Public Funding, In

European Union budget to preserve and manage natural resources for 2007-13 is about 43 % of the total EU budget with more than 79 % of the funding going to agriculture. Agricultural Common Policy (CAP) spent 39 % of the EU budget[3]. For 2014-2020 period CAP budget is estimated to EUR 362 787 billion with 75% of CAP budget available for direct payments to farmers subject to 'cross-compliance' and 24% for rural development. Remaining funds are used for interventions in the market and other types of support policy. In Turkey support to agricultural sector is higher than the OECD and EU average, and most distorting policies prevail. According to the 10th Development Plan (2014-2018) set out by Turkish Ministry of Development, direct area-based product support is planned to rise from 29% of the total budget for agriculture in 2013 to 45% until 2018. With the high level of spending for agriculture and its tendency to increase from year to year, it is crucial to understand the impact of policies undertaken by government on farmer's welfare, economic efficiency and competitiveness of agricultural sector.

2.1 Rationale For Support In Agriculture

Throughout the history most of the countries in the world have intervened in their agricultural sector in one way or another. Despite the efforts of world's major agricultural producers to reduce protectionism through bilateral or multilateral trade agreements, this type of policy with complex policy instruments is still present in not only in developing but in the developed countries as well. In order to decrease the effects of such policies, much of the effort of World Trade Organization is put into "establishing a system of market oriented agricultural exchanges while recognizing the importance of non-trade concerns, such as food security and environmental protection" (Abramovay R. 2002). There are contradictory opinions on the distortion effects of the support policies, however much of the evidence suggests that heavy protectionism and different support programs in agriculture distort prices and have negative impact on farmer's incomes (Abramovay, 2002; Hudson et al., 2009;). In his study on agricultural prices and trade policies in developing countries Anderson (2010) emphasizes that "for decades agricultural protection and subsidies in high-income (and some middle-income) countries have been depressing international

[3] http://ec.europa.eu/agriculture/cap-post-2013/graphs/graph1_en.pdf

prices of farm products, which lowers the earnings of farmers and associated rural businesses in developing countries".

There are several reasons for government interference in agriculture. Rationale of government interventions in agriculture is based on two main issues "(1) how (or if) government intervention can improve the performance of the private market economy (the so-called "efficiency" rationale); and (2) how (or if) government intervention can limit the biases of private market outcomes in providing individuals with minimum standards of well-being or fairness (the so called "equity" rationale)" (Clark &Thompson, 2011). Hudson et al. (2009) in their research on crop subsidies stated that rationale for agricultural market intervention stems from problems with some markets that are not efficient, markets that have externalities associated with them or any other social or political goals that governments may pursue through intervention. In developing countries rationale for intervention is usually non-efficiency reflected through income distribution or price stabilization.

While some authors argue that support programs are proved to distort prices and impose net losses on society, others think that intervention in the agricultural sector can correct market failures, stabilize prices and increase income; support programs have positive impact on growth through investments in infrastructure, new technologies or provision of public goods (Monke & Perason, 1989). Farm policies in most countries are argued to be inefficient and serve only the wealthiest farmers (Köse 2012).

2.2 Agricultural Support Policy's Instruments

According to WTO agricultural support represents "any domestic subsidy or other measure which acts to maintain producer prices at levels above those prevailing in international trade; direct payments to producers, including deficiency payments, and input and marketing cost reduction measures available only for agricultural production[4]". Instruments used for supporting farmers may be classified based on their effects in the supply chain. While direct support have immediate effect on the prices, output, growth and trade, indirect support measures affect secondary parts of the supply chain such as input producers and food processing industries.

[4] WTO Glossary term offers extensive definitions of each policy instrument that is a part of both domestic and trade policy, https://www.wto.org/english/thewto_e/glossary_e/glossary_e.htm

FAO introduced the general classification of policy instruments in the manual on multilateral trade negotiations in agriculture (FAO, 2000), based on their economic impact on the international level as:

1. *Direct interventions* that affect the international trade as well as domestic producers and consumers through price and quantity changes. These instruments usually create a difference between domestic and international prices of specific commodities, as follows:

- Quotas that limit the quantity imported, and therefore tend to raise domestic prices at the expense of domestic consumers.
- Tariffs that represent taxes imposed on the imports and therefore they raise the price of imported goods to home consumers. Tariffs are usually used to protect domestic producers from international competition by increasing domestic prices of imported goods.
- Export subsidies through tax reliefs and other instruments that makes the product more profitable if sold abroad, directly raising the prices for domestic consumers.
- Sanitary and phytosanitary restrictions, that are used as a hidden trade instrument, when tariffs and quotas are prohibited by bilateral or multilateral agreements.

2. Indirect instruments include both monetary policy (exchange rates) and domestic support policy (input and output subsidies and investment policy). Decisions on monetary policy are not in hands of the agricultural policymakers, therefore they need to consider all the possible scenarios of exchange rate variations when coming up with the new agricultural policies and ways to respond to its effects on agricultural market. Devaluation of domestic currency encourages exports, and indirectly raises the prices for domestic consumers, while the opposite is true for overvaluation of domestic currency. Domestic support policy instruments include: commodity programs that imply direct payments to farmers in form of production coupled price support such as deficiency payments that compensate farmers for the difference between the market price and the targeted price. Another type of domestic policy instruments are: input subsidies, credit and insurance support, tax exemptions, and investment in irrigation system and other agricultural infrastructure.

Nevertheless policies vary across countries and depend on the importance one country attaches to specific group of commodities. Evidence shows that government interventions are present throughout the history of the modern world, in wide range of market actions, from production, pricing, trade, export-import, financing etc. In order to decrease the distorting effects of the price policies, new arrangements took place in the early 1990s. In this period developed countries were highly subsidizing its agricultural sector, using production coupled and price policy instruments, causing the large crop surpluses that brought the world food prices down. With a global recession in place at the same time, developing countries could not compete with the highly subsidized and protected agriculture of the developed world. Eventually the world came up to an agreement that new arrangements through opening of the markets and trade liberalization are necessary for improvement of the economic conditions. This also meant that reforms of support policy were necessary. Therefore, new WTO Agreement on Agriculture was negotiated in the Uruguay Round (1986–1994) and domestic support for agricultural was restricted through new subsidy classification. This classification was again based on the effect that each policy instrument has on trade and production. Subsidies were classified as:

- Amber Box that includes all of the distorting support measures, such as price supports and production coupled subsidies. Restriction for this type of support were set as 5% of agricultural production for developed countries, 10% for developing countries
- Blue Box subsidies include all of the Amber Box subsidies but only if the production limits for farmers are required. There is no limit on spending for this type of subsidies.
- Green Box subsidies have little or no distortion effect on trade and production. This box includes direct income supports, support for rural development and other environmental protection programs. There are no limits for these subsidies, as long as they are in compliance with the criteria set out in the agreement.

Direct payments to producers that are not linked to production are now in use in EU, United States, New Zealand and Canada. Example of this type of production - decoupled support is Direct Income Support (DIS) in EU realized through Single

Area Scheme or simplified Single Area Payment Scheme for new member states in EU. Main purpose of this type of support is to keep income levels of farmers as high as in the industrial sector, and thus prevent farmers of exiting the agricultural sector. It has been argued that direct income support policies had no impact on farmer's welfare, since they were designed for medium sized farms and thus aimed at protecting the largest farmers and bypassing the ones most in need of the support (Abramovay, 2002; Köse 2012). According to Köse (2012) direct support negatively affects small subsistent and semi-subsistent farmers in EU since most of them are below the area threshold. However, this kind of support is considered to have less distorting effect and it does not influence the production level or prices of agricultural products. If we take Poland for example, introduction of DIS payments in 2004 has had a major impact on the rise of farmers' income. According to Potori et al. (2014) "the average monthly net income per capita in Polish households reached EUR 306 in 2011, gaining EUR 116 over 2004… the share of subsidies in agricultural incomes jumped from less than 9 per cent in the pre-accession years to around 50 per cent in 2011".

Therefore, most of the developed world has been moving away from distorting price policies, and switching to decoupled income supports leaving the agricultural sector to naturally adjust to the free-market conditions.

For assessment of the level of support, budgetary spending for agriculture and changes in the transfers to producers, as well as cross comparison between countries support policies, OECD developed a set of indicators known as Producer Support Estimate (PSE). Each indicator includes different transfers from budget, not only in the form of direct income payments area/animal based payments, but also tax reductions, investments, credit subsidies etc. It also includes support related to market price interventions through calculations of the market price differential that represents the gap between domestic and international prices. Indicators are used to capture broad aspects of agricultural policy and composition of support. However, indicators itself only show the degree at which each policy instrument is used, and does not provide the information of the impact of such policy.

3. AGRICULTURE AND ECONOMY IN TURKEY

3.1 Turkish Economy in Brief

Turkey is an upper-middle income country with the average annual growth of 6% in the period of 2010-2013, and slowing growth of 2,9% in 2014. According to The World Bank rankings, Turkey was 18th country in the world in 2013 based on its GDP volume. However recent policies supporting domestic consumption and downsizing of investment has slowed down economic growth and exports as indicated in Table 3.1. Turkish major trade partner is European Union that accounted for 43.5% of Turkish exports in 2014. Imports to Turkey comes from different range of countries, with 61,7% of imports coming from Turkey come from Russia, China, USA and EU in 2014.

Table 3.1 Indicators of Turkish economic growth. (Url-1)

		Exports of goods and services		Imports of goods and services		Total foreign trade value
Year	**GDP**	**Value (Thousands $)**	**% Change**	**Value (Thousands $)**	**% Change**	**Value (Thousands $)**
2002	6,2	36 059 089	15,1	51 553 797	24,5	87 612 886
2003	5,3	47 252 836	31,0	69 339 692	34,5	116 592 528
2004	9,4	63 167 153	33,7	97 539 766	40,7	160 706 919
2005	8,4	73 476 408	16,3	116 774 151	19,7	190 250 559
2006	6,9	85 534 676	16,4	139 576 174	19,5	225 110 850
2007	4,7	107 271 750	25,4	170 062 715	21,8	277 334 464
2008	0,7	132 027 196	23,1	201 963 574	18,8	333 990 770
2009	-4,8	102 142 613	-22,6	140 928 421	-30,2	243 071 034
2010	9,2	113 883 219	11,5	185 544 332	31,7	299 427 551
2011	8,8	134 906 869	18,5	240 841 676	29,8	375 748 545
2012	2,1	152 461 737	13,0	236 545 141	-1,8	389 006 877
2013	4,2	151 802 637	-0,4	251 661 250	6,4	403 463 887
2014	2,9	157 627 674	3,8	242 182 568	-3,8	399 810 242

Country is largely market oriented, with industry and service sectors composing more 90% of the value added to GDP (Figure 3.1)[5] . Contribution of agriculture to the country's GDP in the period 1990-2010 fell from 18.1% to 9.6% in 2010, and

[5] World Bank database (data.worldbank.org)

today accounts for 8.5% of the overall GDP in Turkey. According to Turkish Statistical Institute, in 2014 52,2% of labour force was employed in service sector, while 21,4% of labour force was employed in agriculture, 19,7% in Industry, 6,7% in construction. Even though the number of people working in agricultural sector is higher than that of industry, contribution of agriculture to country's overall GDP is much lower, that implies low production efficiency in the agricultural sector.

Next chapter gives historical overview of economic developments and government policies in order to better understand the structural problems of the Turkish economy.

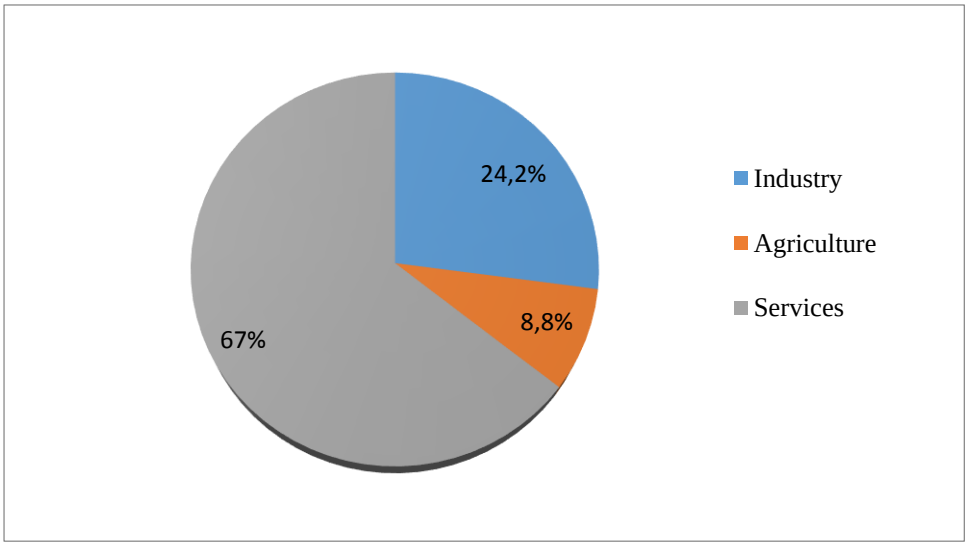


Figure 3.1 Turkish GDP composition breakdown in 2014. (Url-2)

3.1.1 Short overview of Turkey's economic development and state policies since 1950's onwards

Although Turkey, unlike other countries, did not suffer sever destructions during World War II as it maintained armed neutrality, still its growth was slow compared to other European countries. It was mostly due to agricultural orientation that was still in force since the Ottoman Empire, as well as different policies with strongly curtailed foreign trade and increased military expenditure, what caused Turkey to enter industrialization era late compared to the western countries. Turkey's labour force was still mainly participating in agricultural sector, so there was still a long way to go in terms of education and moving toward manufacturing and industrialization. So, the policy that was chosen in this period was strictly closed economy aiming to build the country and protect it from any kind of international influence or competition. The Democrat Party that was in power from 1950 to 1960,

initiated a more free-market oriented policy, under the influence of USA and aid provided under the Marshall plan. These policies were successful in the early 1950s, when exports were highly subsidized, but in the second half of the decade, foreign exchange dried up and economic growth has declined. With severe political crisis, in 1960 military staged the coup d'état that reinforced the industrially oriented economic development and state planning, with import substitution as a trade policy.

So, in this pre 1980's period, mostly in 1960's Turkish economy was focused mainly to domestic production-a so called inward oriented economy. As Turkey was entering the process of liberalization in 1980's, ending the macroeconomic and political instability with the military regime since 1980-1983, the government issued strong subsidies to promote exports that had a great impact on Turkey's economic growth in this period. This growth is also associated with the capital that the country accumulated in the previous periods of inward oriented strategy, and focus on the domestic production and manufacturing. So, not only that Turkey turned its economy towards internationalization, on national level it also turned from agriculture to manufacturing and infrastructure development of the country.

Unfortunately the liberalization process in 1980s was under the threat of the volatile economy and continuous political crisis and instability, therefore the country suffered repeated crises in the 1990's. Lack of fiscal discipline, dependence on the short-term capital inflows and reliance on the monetary financing left the country with high budget deficit of almost 7% of GDP in 1997. At the same time the crisis in Asia reflected on Turkey as well, with foreign investors withdrawing their money from the country, leaving it with deteriorated budget deficit and public dept. With the earthquake in 1999 that increased the public spending, country relied on the short-term borrowing from the banking sector. Expansionary monetary policy led to entrenched high inflation, and Turkey ended on the list of countries with high macroeconomic instability, that had a great impact on foreign investments and overall growth of the country as well. In December 1999, Turkey, under a three-party coalition signed a three-year IMF-based stand-by agreement, which was mainly aimed at solving the public sector imbalances.

On the other hand, already member of GATT, Turkey did take some major steps toward integration in world's economy, signing agreement establishing WTO (World Trade Organization) on 15.04.1994., joining the Custom Union in 01.01.1996 – it

opened the economy and switched to more outward oriented, focusing on trade and foreign exchange regime were evident. Unfortunately, it failed due to increased macroeconomic instability created mainly by inappropriate government policies. Macroeconomic instability was intertwined with structural weaknesses, in particular an inadequate regulatory and supervisory framework for the banking system. After the widespread monetization of budget deficits was interrupted in 1997, the banking sector became the main instrument of government financing, funnelling short-term borrowing from depositors and investors into government debt.

With the new reform package under the World Bank and IMF agreement, agriculture gain its importance through the Agricultural Reform Implementation Project (ARIP) that aimed at creating more market – oriented agriculture and introduction of Direct Income Support. Therefore this is an important milestone in bringing Turkish agriculture in line with the European Union and other developed countries.

3.2 Macroeconomic Indicators Of Turkish Agricultural Sector

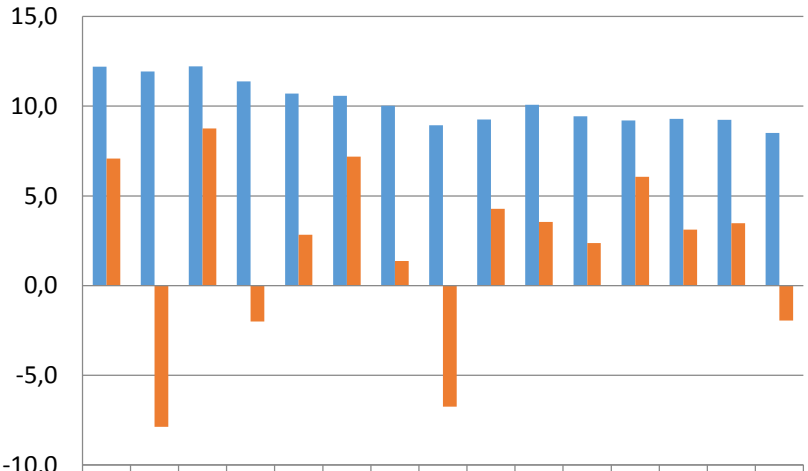
According to OECD report (2011) Turkey is estimated to be 7th largest agricultural producer in the world. Total value of agricultural sector increased from 8.8 billion TL in 2000 to 11 billion TL in 2014 (Table 3.2), however in terms of value added to GDP there is a downward trend in the agricultural growth (Figure 3.2). Despite the decrease in the percentage of agriculture in country's overall GDP, share of agriculture is still much higher than the EU average (1,7%), OECD member average (1,6%)[6].

Table 3.2 Gross Domestic Product in Constant Prices for Agriculture, forestry and fishing sector. (Url-2)

Year	GDP /Value (TL)
1998	8 756 882 539
2000	8 844 041 101
2010	9 998 744 725
2011	10 604 053 474
2012	10 935 277 208
2013	11 315 314 597
2014	11 095 102 191

[6] World Bank data, address: http://data.worldbank.org/indicator/NV.AGR.TOTL.ZS/countries/OE-PL?display=graph

In Poland, where agricultural sector is similar to Turkish agriculture in terms of structure and share of employment, percentage share of agriculture in GDP of 3,3% is almost three time lower than in Turkey.Even though negative growth rate of agricultural sector occurred in 2014, we may observe a slight improvement of agricultural productivity. While percentage growth rate fell by 9 percentage points, share of agricultural sector in GDP as a value added fell only by 3,7 percentage points from 2000 to 2014, indicating the increase in overall productivity of the sector.



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
% Share of Agriculture in GDP	12,2	11,9	12,2	11,4	10,7	10,6	10,0	8,9	9,3	10,1	9,4	9,2	9,3	9,2	8,5
% Growth rate of agricultural sector	7,1	-7,9	8,8	-2,0	2,8	7,2	1,4	-6,7	4,3	3,6	2,4	6,1	3,1	3,5	-1,9

Figure 3.2 Annual GDP share and growth rate of agricultural sector in Turkey. (Url-2)

Agriculture in Turkey is still the only source of income for the large portion of the rural population. Agriculture in Turkey provides employment for almost 1/5 of the population (Table 3.3). Rural population of 20.703.889 million people represent almost one fourth of the Turkish population, with agriculture being major generator of income. However, Turkey follows world trend of increase in the employment in service and industry sector, and more people exiting the agricultural sector.

As stated in Tenth Development Plan (2014-2018) prepared by Turkish Ministry of Development, it is expected that; the average annual growth rate of agriculture sector will reach 3.1 %, share of agricultural employment in total employment will decline to 21.9 %, and share of agriculture sector in GDP will be 6.8 % at the end of the Plan period. However, percentage of employment in agriculture in Turkey is still higher

than the EU average (5,1%), OECD average (5,2%)[7] indicating the importance of agriculture in terms of income generation in Turkey.

Table 3.3 Employment in agriculture as percentage of total employment. (Url-3)

Year	% of employment in agriculture	% change in employment in agriculture
2002	34,9	/
2003	33,9	-2,95
2004	29,1	-16,49
2005	25,7	-13,23
2006	24	-7,08
2007	23,5	-2,13
2008	23,7	0,84
2009	24,6	3,66
2010	25,2	2,38
2011	25,5	1,18
2012	24,6	-3,66
2013	23,6	-4,24
2014	21,4	-10,28

In terms of trade agriculture accounts for 3,65% of total volume of foreign trade. In agriculture as well major export partners are EU and USA, while EU also represents an important import source for Turkey. Turkey is a net exporter of fig and hazelnuts, while it mostly imports wheat, rice, corn, cotton and meat. Agricultural exports fell steadily from 2000 onwards to reach 3,83% of total exports in 2014 (Table 3.4). This downward trend can be explained by the policy pursued by the government since 2001 that boosted domestic consumption.

Table 3.4 Agricultural trade in Turkey. (Url-4)

Year	Total exports	Agri. exports	% of agr. exports	Total imports	Agri. imports	% of agr. imports
2000	27 774 906	1 659 092	5,97	54 502 821	2 123 187	3,90
2004	63 167 153	2 541 777	4,02	97 539 766	2 757 392	2,83
2009	102 142 613	4 347 483	4,26	140 928 421	4 593 839	3,26
2010	113 883 219	4 934 710	4,33	185 544 332	6 456 707	3,48
2011	134 906 869	5 166 596	3,83	240 841 676	8 895 184	3,69
2012	152 461 737	5 188 858	3,40	236 545 141	7 446 641	3,15
2013	151 802 637	6 030 846	3,97	251 661 250	7 718 045	3,07
2014	157 627 674	6 030 846	3,83	242 182 568	8 588 523	3,55

[7] World Bank data, address: http://data.worldbank.org/indicator/SL.AGR.EMPL.ZS/countries/1W-OE?display=graph

3.2.1 Agricultural structure

Turkey has a very favourable geographical position and climate that enables practicing of agriculture across the country. In Turkey 24.5% of the area is of I+II+III category, with 90% of agricultural land. Total utilized agricultural land is 38.560 thousands of hectares, with 62% of arable land, and 65% of arable land being used for cereals and other crop production (Table 3.5). According to OECD (2011) crops that dominate Turkish agricultural production are:

- Cereals: wheat, barley, maize;
- Other crops: sugar beet, cotton, potato and tobacco:
- Vegetables: tomato, cucumbers, dried onions and watermelons,
- Perennial crops (apples, citrus fruits, grapes, figs, hazelnuts, olives and tea).

Turkey is the world leader in the production of dried figs, hazelnuts, sultanas/raisins and dried apricots. It also has the largest milk and dairy production in its region. Degree of self-sufficiency in 2013/2014 planting season of major crops is illustrated in Figure 3.3, with only rice and maize being below the self-sufficiency level, and fig having the highest degree of self-sufficiency of 1 524.2%.

Table 3.5 Agricultural land and forest area (thousand hectares) 1988-2014. (Url-5)

Year	Total utilized agricultural land	Total arable land	Area of cereals and other crop products	
			Sown area	Fallow land
1988	41 940	24 786	18 995	5 179
1998	39 344	24 362	18 561	4 902
1999	39 179	24 213	18 260	5 039
2000	38 757	23 768	18 038	4 826
2001	40 967	23 740	17 917	4 914
2002	41 196	23 905	17 935	5 040
2003	40 644	23 310	17 408	4 991
2004	41 210	23 813	17 962	4 956
2005	41 223	23 775	18 005	4 876
2006	40 493	22 981	17 440	4 691
2007	39 505	21 979	16 945	4 219
2008	39 122	21 555	16 460	4 259
2009	38 911	21 351	16 217	4 323
2010	39 012	21 384	16 333	4 249
2011	38 231	20 523	15 692	4 017
2012	38 399	20 581	15 463	4 286
2013	38 423	20 573	15 613	4 148
2014	38 560	23 943	15 789	4 108

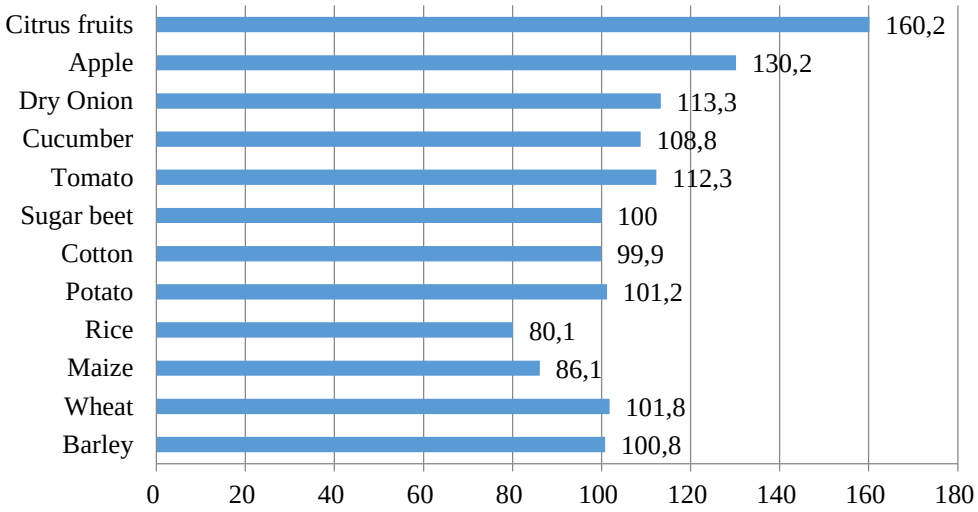


Figure 3.3 Degree of self-sufficiency of major crops in Turkey in 2013/2014. (Url-5)

Major problem of agricultural sector are small semi-subsistence and subsistence family farms, where agriculture is usually the only source of income. Small-scale agricultural enterprises combined with underdeveloped infrastructure in the remote rural areas, leaves farmers with no access to irrigation and road network. According to European Commission report there are approximately 3 million agricultural holdings in Turkey (compared to approximately 12 million in the EU-28), most of which are family farms employing family labour. The average farm size in Turkey is below 6 ha, which is less than half of the EU-27's average 14 ha in 2010 (Köse, 2012). To solve this problem several land consolidation programs have been issued since 1961, but only 330 000 hectares or 10% of land was consolidated so far.

Another persistent problem of Turkish agriculture is low agricultural income in rural areas, and lack of alternative income sources due to underdevelopment of industrial infrastructure in the remote areas. Table 3.6 indicates that there are significant differences in household disposable income between agricultural and non-agricultural sources of income in Turkey, were the difference is much higher in urban area[8]. Average income in rural area is 25% lower than the Turkish average,

[8] TurkStat, Income and Living Conditions Survey, (2012), p.18. Turkish Statistical Institute performed a detailed survey of income distribution in Turkey. The survey reveals income imbalances amongst urban and rural areas, as well as large differences between different regions and type of income.

and non-agricultural income in rural areas is more than 31% lower than the Turkish average, 37% lower than the urban area non-agricultural average income.

Table 3.6 Average annual equivalised household disposable incomes (TL), 2012.

Turkey	***24 503***
Agricultural	10 238
Non-agricultural	19 191
Urban area	***27 115***
Agricultural	9 048
Non-agricultural	20 823
Rural area	***18 314***
Agricultural	10 456
Non-agricultural	13 116

It is evident that throughout the history, government policies failed to provide higher income for farmers in rural areas, where agriculture is usually the only source of income.

4. AGRICULTURAL POLICY IN TURKEY: HISTORICAL OVERVIEW

Turkish agricultural sector has undergone several reforms, which in general have not yielded satisfactory results. Agricultural policies have gone a long way from experimenting with export-led policies, highly protected domestic production supported by import tariffs, price supports and input subsidies in 1980s, credit subsidies, deficiency payments, intervention purchases throughout 1990s, up to the more structural reforms and rural development oriented policies since 2000 that aimed to get Turkish agricultural policies in line with the Common Agricultural Policy of European Union.

4.1 Agricultural Policy Developments Between 1923-2000

Different policies have been introduced since the formation of the Republic in 1923. Government intervention has been present in the agriculture ever since. Historically, price supports in combination with input subsidies and border protection have been major policy instruments (Yeni and Dölekoğlu 2003, OECD, 2011, p.44; Köse M.A., 2012, p. 79,). A short overview of these policies is given in the Table 4.1. However focus of this study will be on the policy changes in the last 10-15 years, and relations with European Union's Common Agricultural Policy (CAP).

Table 4.1 Turkish agricultural policy development between 1950-2000.

Period	**Policy developments**	**Policy instruments**
Early years of Republic	Policy in early Republic was a mix of market economy and state planning, offering farmer-friendly solutions to increase production. Foundation of Turkish Grain Board.	Tax reductions for crops, credit subsidies, production oriented support programs.

1950s	Agricultural mechanization provided through the Marshall aid program took place in order to increase agricultural output. Mechanization increased yields and production efficiency, but forced people to move from rural to urban areas, industrialization took over the importance in public spending.	Agricultural subsidies and support through state enterprises, strong import controls, investments in irrigation systems
1960s	Period is known for import – substitute industrialization policy. State Planning Organization is established in order to develop economy-wide strategies and developments plans. 963 is known as the beginning of the State planning period that lasted until the 2005.	High protection of domestic agricultural production through tariffs, quotas and domestic support programs.
1970s	Strong government interventions continued to distort agricultural markets. More export oriented policy is pursued by government. Agricultural trade is performed through state enterprises.	Price supports, price ceiling, input subsidies, planned and controlled production, export subsidies, exchange rate controls
1980s	In this period a general economic reform is introduced in order to improve the fiscal deficit and acute inflation problems. Introduction of market-oriented policies is observed in the period to foster competitiveness through liberalization. Food price and exchange rate controls were removed, state enterprises were privatized, input production and trade was allowed for private enterprises. Less control over import and exports	Domestic support program included price support and input subsidies; land area control was introduced for several crops, tax reductions for capital investments; Intervention purchases and price floor announcements

1990s	Intervention in the agricultural sector and distorting price policies still prevail, but spending on agriculture was decreased due to several economic crisis.	Intervention purchases limited only for 3 strategic group of products and large enterprises.

4.2. Agricultural Policy Reforms Since 2000

The most important reform of the agricultural policy in Turkey started in the 2000, after the country began its recovery from one of the severest economic crisis in its history. With directives and financial aid from International Monetary Fund (IMF) and the World Bank, Turkey entered a process of general economic stabilization. Agricultural Reform Implementation project (ARIP) was launched in 2001 in under the same program, aiming at restructuring the agricultural sector in Turkey. This in particular implies the abolition of the production-coupled support together with reduction of the import tariffs and introduction of the Direct Income Support (DIS) to farmers and several other steps that would move the agricultural sector closer to the CAP. These reforms would also help release the heavy burdens on the budget caused by large and mostly inefficient agricultural support programs that created imbalances in the market and forced government into intervention purchases due to the excess supply of certain commodities. DIS payments were introduced in 2000 as a pilot project in four counties, and in 2001 this payment scheme was applied across the country. At the beginning area ceiling was set at 5 da, however small subsistence farms were left out, therefore the "lower limit" have been changed in the next period (Table 4.2)[9]. Basic DIS payment were introduced for farmers owning and cultivating their agricultural land, while additional DIS payments were granted to those farmers undertaking soil analysis, organic farming or use certified seeds. These payments aimed to compensate for the abolition of input subsidies and market price supports. However the steps indicated in the ARIP program were not implemented, the program was amended several times and ended in 2008 without successfully creating a solid ground for further reforms towards the more market-oriented agricultural sector in Turkey.

[9] Ministry of Agriculture and Rural Affairs, (2005), Agriculture in Turkey, (Original name: Turkiye'de Tarım), edited by F. Yavuz, pp.52

Table 4.2 DIS Payments indicators. (Url-6)

Indicators	2001	2002	2003	2004
Upper limit (da)	200	500	500	500
Lower limit (da)	5	1	0,1	0,1
Amount of payment (TL/daa)	10	13,5	16	16
Application period (months)	3	2	4	3,5
Requested information	farmer+land	farmer+land	farmer+ land+ product	farmer+land+ product+ entity+county basis yield and production
Data input	Off-line	On-line	On-line	On-line
Number of farmers (million)	2,18	2,58	2,75	2,75
Recorded area (million decares)	122	163	167	167
Area supported (million decares)	118	162	165	166

DIS system was criticized on several grounds (Köse, 2012, Yılmaz 2013) that it failed to provide the higher income to farmers mainly due to:

- Payments distribution inequality amongst small and large farms, with larger farms profiting from DIS scheme;

- High regional inequality in Turkey was not considered for the payment scheme, while in EU such a scheme existed (less-favoured areas received higher payments (Yılmaz 2013);

- No control mechanism on agricultural activity. It was not clear whether the payments provided to farmers were later used for the agricultural production or for other purpose.

In the meantime in 2006 the new agricultural policy was initiated. 2006-2010 Agricultural Strategy Paper paved the way back to the production coupled direct support as well as price supports for several commodities, and therefore as a result DIS payments were abolished by the end of 2009 and Turkish agricultural policy once again diverged from the developed countries' policies (Table 4.3). Current agricultural policy in Turkey includes high levels of commodity output based supports that are considered the most distorting agricultural policies.

Table 4.3 Level of DIS payments in Turkey (billions TL). (Url-6)

	2001	2002	2003	2006	2007	2008	2009	2010	2011
DIS	83,64	1876,6	2329,65	2690,1	1640,9	1137,91	1,17	1,32	0,32

According to World Bank report (2014) agricultural trade between Turkey and EU is subject to tariff quotas and price regulation, which have produced a high degree of protection in both the EU and Turkey. Lack of long term planning and frequent changes and modifications of agricultural policies with rather ad-hoc approaches to the structural problems of the agricultural sector in Turkey have caused Turkish agriculture to lag behind that of EU and other developed countries. Over the years these inefficient policies have "discouraged the production of products at which Turkey have competitive advantage" (Köse M.A., 2012, p. 79). In general, difficulties in agricultural sector in Turkey can be classified as:

a) **Structural problems** of infrastructural underdevelopment, small size of parcels with minimum farm size of 6 ha, low productivity, technological gap, high production costs etc.

b) **Management problems** such as lack of cooperative power, misdirected support schemes which favour large farmers, inefficiency, lack of qualified labour force etc.

Latest attempts of policymakers aim at consolidating cadastral parcels, investments in infrastructure, new technologies, support for organic farming and lower emissions tend to bring Turkish agriculture closer to the principles of EU. But still high levels of price supports, market interventions and input supports is being one of the main policy instruments. Table 4.4 shows that despite the downward trend, percentage of GDP used for support in agriculture is significantly higher than that of EU and USA as a major agricultural producer in the world. According to OECD indicator Consumer Support Estimates is negative and much higher than in EU-27 and USA, indicating the high level of transfer from consumers, or in other words high taxes on consumption is used to support agricultural sector. Therefore, Turkish consumers are the ones who bear the highest costs of agricultural policy. PSE indicator includes both implicit and explicit payments, such as price gaps on outputs or inputs, tax exemptions and budgetary payments, including those for remunerating non-marketed

goods and services. Since it is a gross concept, percentage PSE gives more valuable comparison of the countries' support measures. The percentage PSE is the ratio of the PSE to the value of total gross farm receipts, measured by the value of total farm production (at farm gate prices), plus budgetary support. It is almost equal in Turkey and EU-27, but Total Support Estimate (TSE) is much higher in Turkey as a percentage of GDP. Price received by farmers are expressed through Producer Nominal Protection Co-efficient (NPC)[10] that indicates that in 2013 prices were 16% higher than the world prices.

Table 4.4 OECD Support Estimates for Turkey, EU-27 and USA. (Url-6)

	Time		2010	2011	2012	2013
Country	**PSECSE indicator**	**Unit**				
Turkey	Producer Support Estimate (PSE)	USD mn	20826,96	16563,54	15301,57	15686,93
		EUR mn	15725,26	11911,81	11904,72	11816,93
	Percentage PSE (%)	%	25,37	19,78	18,88	19,18
	Producer NPC (coeff.)	Ratio	1,3	1,19	1,15	1,16
	Producer NAC (coeff.)		1,34	1,25	1,23	1,24
	Consumer Support Estimate (CSE)	USD mn	-16875,31	-10910,6	-7708,29	-7811,3
		EUR mn	-12741,6	-7846,45	-5997,09	-5884,24
	Percentage CSE (%)	%	-24,77	-17,08	-12,99	-13,15
	Total Support Estimate (TSE)	USD mn	21865,16	17993,34	15392,43	16507,82
		EUR mn	16509,15	12940,07	11975,41	12435,3
	Percentage TSE (% of GDP)	%	2,98	2,32	1,95	2,02
United States	Producer Support Estimate (PSE)	USD mn	28040,19	31037,96	33547,89	31021,86
		EUR mn	21171,57	22321,22	26100,46	23368,69
	Percentage PSE (%)	%	7,8	7,6	7,91	7,44
	Producer NPC (coeff.)	Ratio	1,01	1,01	1,02	1,01
	Producer NAC (coeff.)		1,08	1,08	1,09	1,08
	Consumer Support Estimate (CSE)	USD mn	32812,92	33927,46	31836,73	37378,89
		EUR mn	24775,19	24399,23	24769,18	28157,43
	Percentage CSE (%)	%	13,43	11,92	10,55	13,18
	Total Support Estimate (TSE)	USD mn	76904,28	74963,31	82048,83	83084,31
		EUR mn	58066,08	53910,52	63834,5	62587,22
	Percentage TSE (% of GDP)	%	0,51	0,48	0,51	0,5
European Union (27 countries)	Producer Support Estimate (PSE)	USD mn	104597,55	108331,4	110951,8	116257,05
		EUR mn	78975,7	77907,48	86321,19	87576,16
	Percentage PSE (%)	%	20,18	18,3	19,65	19,8
	Producer NPC (coeff.)	Ratio	1,05	1,03	1,05	1,06
	Producer NAC (coeff.)		1,25	1,22	1,24	1,25
	Consumer Support Estimate (CSE)	USD mn	-15973,95	-13227,42	-22540,3	-26944,99
		EUR mn	-12061,02	-9512,62	-17536,5	-20297,6

[10] NPC is an indicator of the nominal rate of protection for producers measuring the ratio between the average price received by producers (at farm gate), including payments per tonne of current output, and the border price (measured at farm gate level), (OECD)

	Percentage CSE (%)	%	-3,81	-2,74	-4,81	-5,58
	Total Support Estimate (TSE)	USD mn	120073,73	124531,4	125515,19	131171,04
		EUR mn	90660,89	89557,85	97651,6	98810,84
	Percentage TSE (% of GDP)	%	0,74	0,71	0,76	0,76

Despite the several reforms, agricultural policy undertaken by Turkish government is still criticized for using the most distorting instruments (OECD, 2013) and for being in breach of its commitments under the WTO international agreement (Konandreas and Mermigkas, 2014).

4.2.1 Institutional framework

Development of Turkish agricultural sector has been continuously defined in the Development Plans set out by the Turkish Ministry of Development for the four year periods. Agricultural Strategy Paper (2006-2010) and Agricultural Law from 2006 serve as a basis for strategic actions defined in the Development Plans. Actual Tenth Development Plan (2014-2018) sets out the new goals for agricultural sector, as an extension of the previous plan, as follows:

- Food security and safety
- Utilize resources
- Solve infrastructural problems
- Increase productivity.

Policies to achieve stated goals are also specified in the plan and refer to the general measures of: legislative and institutional arrangements, land consolidation activities, irrigation projects as to increase productivity, activities related to the increase of sanitary and health quality, increase in agricultural exports through support programs for export, closer interaction amongst agriculture and industry, and creating and integrated agricultural information system.

Within the scope of previous Ninth Development Plan (2010-2014), rural development strategy was introduced for the first time. Also, in 2010 agricultural basin model was introduced to help increase production and economic efficiency of agricultural sector, while preserving natural environment. Under the scope of the program 30 agricultural basins have been identified by The Ministry in order to determine “where agricultural production is to be concentrated, supported, organized

and specialized according to the regions' ecological conditions". The program includes the following[11] :

- For each basin, the strategic, specific, supply deficit and competitive products have been selected. The maps have been drawn according to agricultural basins;
- The agriculture inventory has been elaborated based on the Agricultural Basins;
- The products to be supported have been identified by determining the regions where the products are most efficiently produced using data for Agricultural Basins;
- Solve infrastructural problems;
- Increase productivity.

State Economic Enterprises (SEE) represent an institutional network through which the policy is actually implemented. SEEs are responsible for the production, marketing activities that are in line with the existing agricultural policy. SEEs therefore influence the market prices through settings of price floors, intervention purchases as well as domestic and foreign trade. SEEs exist for cereals (Turkish Grain Board), sugar (Turkish Sugar Authority), tea (Tea General Directorate). Financial institutions that provide credits and other financial services on behalf of the state are disseminated through Agricultural Sales Co-operative Unions (ASCU) and Agricultural Credit Co-operatives (ACC).

4.2.2 Current agricultural support in Turkey

Following the termination of implementation of direct income support in 2009, agricultural supports continued in the form of area and product based payments. As of 2010 input subsidies, price support and production coupled area-based payments are in force. Total agricultural support payments were 4.8 billion TL in 2006, and increased by approximately 88 percent to 9 billion TL at the 2013 budget[12]. According to another report by Ministry of Food, Agriculture and Livestock General

[11] Turkish Ministry of Food, Agriculture and Livestock at www.tarim.gov.tr provides detail information on the purpose of basin plan, as well as the list of basins and related products.
[12] The Tenth Development Plan (2014-2018), Chapter 2.2.15., p.98, available at http://www.kalkinma.gov.tr/Lists/Kalknma%20Planlar/Attachments/12/Onuncu%20Kalk%C4%B1nma%20Plan%C4%B1.pdf

Directorate of Crop Production (2014) on agricultural support amount of total support for crop production in 2013 was equal to 5,41 billion TL. In 2014, total of 5.519,7 million Turkish Lira was spent for domestic support scheme (Table 4.5). In five years from 2005 to 2010, total amount of payments for agriculture increased 21,53%, and it keeps growing each year, although under the slow pace, according to the same report. It is evident that Turkey employs large share of its budget for agricultural support, using the most distorting policy instruments.

Table 4.5 Total agricultural support for crop production (million TL). (Url-7)

	2005	**2010**	**2011**	**2012**	**2013**	**2014**
Area-based payments	2352,7	1858,7	1996,3	2157,9	2189,1	2406,4
Animal feed payments	280,9	252,9	292,8	293,5	311,4	334,4
Deficiency payments	928,5	2071,5	2503,4	2378,7	2641	2481,4
Compensatory payments*	35,3	76,7	82,2	98,8	111,7	120,8
Other agricultural subsidies	0,5	112,7	120,7	165	149,4	176,7
Total	**3597,9**	**4372,5**	**4995,4**	**5093,9**	**5402,6**	**5519,7**
% change	-	21,53	14,25	1,97	6,06	2,17

* Compensatory payments are offered for tea and tobacco producers as a compensation for costs incurred by implementing strict rules on production quantity and quality.

Agricultural policies, outlined in the Agriculture Law No. 5488, are structured as product, production and farmer oriented and regional based. However, Ministry of Development outlines in The Tenth Development Plan the need for designing agricultural subsidies so as to be allocated on agricultural basin and enterprise based structure and to ensure income stability of farmers.

For planting season 2013/2014 Turkish Ministry of Food and Agriculture announced its support program on 12 April 2014, with the level of payments under each policy instrument. It is obvious that the announcement came too late to help farmers during the planting decision making.

Main goal of this support scheme is to expand the agricultural production, provide the necessary support to farmers in coping with pests and plant disease, increase product quality and yield and provide sustainability of the agricultural sector. Policy instruments under the domestic support policy used in 2014 are as follows:

1. Diesel, fertilizers and soil analysis support for registered farmers is provided based on the area planted (Table 4.6). Soil support is announced as 2,5

TL/daa, Fertilizer support is provided only for registered parcels for which soil analysis was performed in the registered laboratories.

Table 4.6 Diesel and Fertilizers support in 2014. (Url-8)

Products	Diesel (TL/daa)	Fertilizer (TL/daa)
Landscape and ornamental plants, private meadow, pasture and forest	3,1	4,3
Cereals, fodder crops, legumes, tuber crops, vegetables and fruit fields	4,6	6
Oilseed crops and industrial plants	7,5	7,5

2. Deficiency payments for basins based production (Table 4.7). Deficiency payments is payment made by government directly to farmers, in case that domestic market prices are lower than the initial prices set by Turkish Grain Board (TGB); Deficiency payment is a production-coupled support scheme.

   Deficiency payments for oil sunflower, cotton seed and olive oil increased compared to 2013, while support for other products remained the same.

Table 4.7 Deficiency payments in 2014. (Url-8)

No	Supported products	Per unit Support (Krş/Kg)
1	Oil Sunflower	30
2	Cotton seed(for using the domestically produced certified seeds)	55
3	Soybean	50
4	Canola	40
5	Maize	4
6	Safflower	45
7	Olive oil	70
8	Wheat	5
9	Barley, Rye, Oats, Triticale	5
10	Rice, Beans, Chick Peas, Lentils	10
11	Tea	12

3. Livestock payments provided for registered animals that include both dairy and meat production, beekeeping, as well as animal feed producers.

4. Support for usage and production of domestically certified seeds (7,5 TL/daa for wheat)
5. Support for farmers participating in the Farm Accountancy Data Network that provides 375 TL for registered farmers' participation in the program.
6. Support for organic farming includes payments for cattle and sheep organic farming, beekeeping, fishery etc. It also provides support for Good Agricultural Practice of 50 TL/daa for fruits and vegetables, and 150 TL/daa for greenhouse production.
7. Support for farmers seeking for the services of agricultural consultancy
8. Support for farmers dealing with biological and biotechnological development.

Other domestic policy instruments include (OECD, 2011 and 2013):

- *Insurance support scheme* under which farmers get 50% of the premiums reimbursed by government;
- *Loans* in the form of interest concessions offered by Turkish Ziraat Bank and ACC for different activities such as: R&D, organic farming, good agricultural practices, irrigation and livestock breeding under subsidies between 25%-100% of the bank's current credit rate. Income loss arising from the difference between current rates and rates applied to farmers is paid by the Treasury through Ziraat Bank and ACCs.In 2013 14,3 million decares and 826 thousand livestock was under the insurance program.
- Investment and rural development support under the new National Rural Development Plan (2014-2020).

4.2.3 Trade policy instruments in Turkey

Protectionist policies throughout the Turkish history have been a strong obstacle for trade liberalization. Export subsidies, tariffs and quotas to protect domestic production or to boost exports have been in force since the formation of the Republic. However, this policy started to change when Turkey signed the agreement establishing WTO (World Trade Organization) in 1994 and joined the Custom Union in 1996. Turkey applies the Customs Union external tariff, and MFN tariff for non-agricultural goods are low at 5%. Roughly 80% of Turkish agricultural exports to the

EU enter duty free (EC, 2014). However, Turkey still applies quotas when needed, as well as sanitary restrictions. According to WTO Trade Policy Review (2012)[13], Turkey has left 66,5% of non-agricultural lines unbound, with only 17,4% of binding tariffs[14].Currently Turkey relies more on domestic taxes than on the customs duties to raise revenues, with almost 58% of government revenues coming from VAT and Special Consumption Taxes. For this reason domestic prices of goods and services are very high, with tax rates of 18% (8% and 1% for specific goods) (WTO, 2012). As a member of GATT and WTO, countries are to report domestic support levels, however Turkey has not notified domestic support spending to the WTO since 2002 (WTO, 2012). Lack of transparency in agricultural spending puts Turkey under the scrutiny of its international trade partners and is therefore a major obstacle for fostering international trade relationships.

4.3 Comparative Analysis Between Turkey's Agricultural Policy And Common Agricultural Policy of EU

4.3.1 Turkey and EU in brief

Turkey applied for membership in the European Communities in 11 July 1959, however official relations were initiated with Ankara (Association) Agreement four years later on 12 September 1963. However, it is only after forty years that the country was accepted as candidate to the European Union (EU) membership in 1999, three years after joining the Customs Union on 1 January 1996. Screening on the specific chapter of agriculture (Chapter 11 – Agriculture and Rural Development) started on 5 December 2005 and was completed on 26 January 2006, however the chapter had been frozen until Turkey meets the opening benchmarks, in order to open effective negotiations. Turkey failed to implement required reforms. Latest report in 2013 on progress on the chapter 11, reveals that protection is still present as support policy is still coupled to production with no intention for less interventionism[15].

[13] https://www.wto.org/english/tratop_e/tpr_e/s259_sum_e.pdf
[14] Binding tariffs implies the "commitment not to increase a rate of duty beyond an agreed level.", https://www.wto.org/english/thewto_e/glossary_e/tariff_binding_e.htm
[15] European Comission country files, http://ec.europa.eu/agriculture/bilateral-relations/pdf/turkey_en.pdf

In relation to European Union's CAP, Turkish policy seems to be oscillating from following EU directions to completely abandoning them and getting back to old practices such as high product coupled support programs, market interventions and tariffs. These frequent changes and vague development path have left farmers in poor conditions, confused and insecure about their future. Policy makers have been sending mixed signals over the years and thus increased the uncertainty in already volatile agricultural markets. After short introduction of DIS Payments within the ARIP Program in 2001, this instrument was abolished and support policy once again turned to the old path of distorting price policies. Unfortunately, in the latest policy development little was done to bring Turkish agricultural policy closer to that of EU, due to differences in opinions about the real impacts of DIS support scheme.

4.3.2 Common Agricultural Policy overview

European Union Common Agricultural Policy was established in 1962 as one of the main pillars of the European Community and first integrated common policy of the European Economic Community (former EU). One of the basic ideas that the policy is built on is free agricultural market and single prices amongst the member states. At the beginning the CAP was oriented towards rebuilding the agricultural sector after the World War II and to increase production. Therefore many production-oriented support measures were introduced such as intervention purchases under the guaranteed minimum prices and production-coupled support, that eventually resulted in high surpluses, known as "mountains" or "lakes" of milk and wine. On 30 May 1980 European Council therefore decided to introduce the structural reforms that would turn European agriculture into more market-oriented economy. First step was introduction of quotas to cut the surpluses. Reflection on CAP in green paper in 1985 resulted in further reforms and introduction of budget ceilings. Reduction in intervention prices and it paved the way for major overhaul of the policy that happened in 1992 under the MacSharry reform. In this most important reform of the CAP direct income support was introduced instead of production coupled support and price support. Farmers could receive direct payments only under the condition that they produce the specific product. Another important milestone in the development of CAP is Agenda 2000 that introduced second pillar on rural development. Wide range of social and environmental goals were set to increase

agricultural incomes, competitiveness, food safety and quality as well as several environmental issues and development of rural areas.

In 2003 new reform package was introduced and it brought 'decoupling' of income support payments to farmers or the introduction of the so called 'cross-compliance' or set of rules that farmers need to comply in order to receive the payment. Thus Single Payment Scheme established as new farmer support mechanism provided direct income support to farmers based on the land they own or manage, regardless of production. In order for farmer to receive direct payment, he/she needs to fulfil certain rules related o food safety, animal and plant health as well as rules related to environment and farmland general conditions. This way, farmers were given more freedom in deciding on production related to market demand. After a simplification of administration rules and procedures in 2005, three years later general inspection of the policy and its achievements known as "Health Check" has been performed and new regulations for further improvements were presented. EU Ministers have come to an agreement in November 2008 that CAP needed to be reformed in order to respond to the dynamic economic environment and social needs in the rural areas. In this period, direct payments were significantly lowered, and savings were transferred from pillar I (European Agricultural Guarantee Fund) to pillar 2 European Agricultural Fund for Rural Development). Figure 4.1 shows the decrease in the EU PSE expenditure over the years, while data on Turkey indicate rise in PSE expenditures from 1990s onward. Data from European Commission shows downward trend in share of budget for CAP expenditures over the last 25 years, from 73% in 1985 to 39% in 2013. Turkey however has increased the agricultural spending that is now higher than that of EU and OECD average. In 2010, European Commission presented a new CAP reform known as "The CAP towards 2020", as a part of general EU 2014-2020 strategy. In the future both direct support and rural development are the key objectives under the two pillars, however aim is to increase the link between them and create an integrated multifunctional agricultural environment.

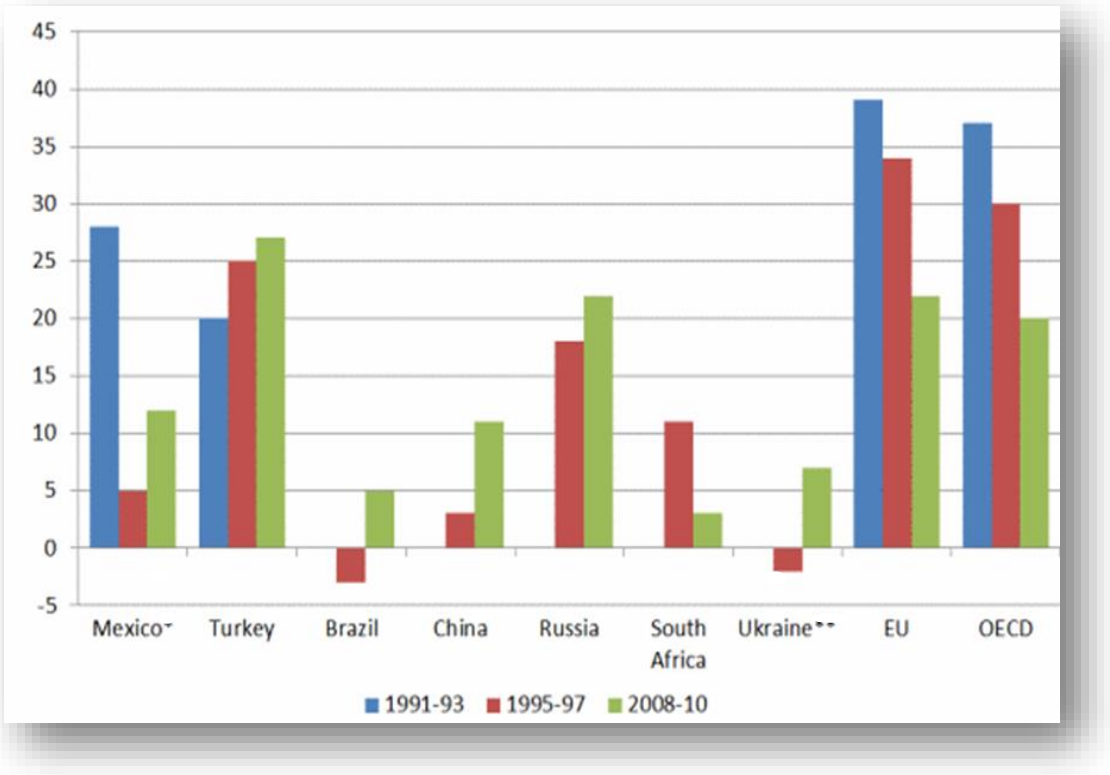


Figure 4.1 PSE by country, per cent. (Url-6)

This means that EU will maintain production of safe and quality food while preserving natural environment and providing sustainable development. For this purpose a total amount of EUR 362.787 billion for 2014-2020, of which EUR 277.851 billion is foreseen for Direct Payments and market-related expenditure (Pillar 1) and EUR 84.936 billion for Rural Development (Pillar 2) in 2011 prices. Figure 4.2 shows decrease in distorting support measures employed under the CAP, where exports and intervention purchases represented major market support scheme at the beginning of 1990s[16]. Over the years the decoupled payments have taken the primacy and accounted for 94% of total support. Since 2013 new direct payment system is being used known as The Basic Payment Scheme that replaced the former SPS. Payments are allocated on the basis of new payment entitlements to farmers in the first year of application of the scheme and activated each year by farmers.

[16] European Commission (2013), Overview of CAP Reform 2014-2020, European Commission No5

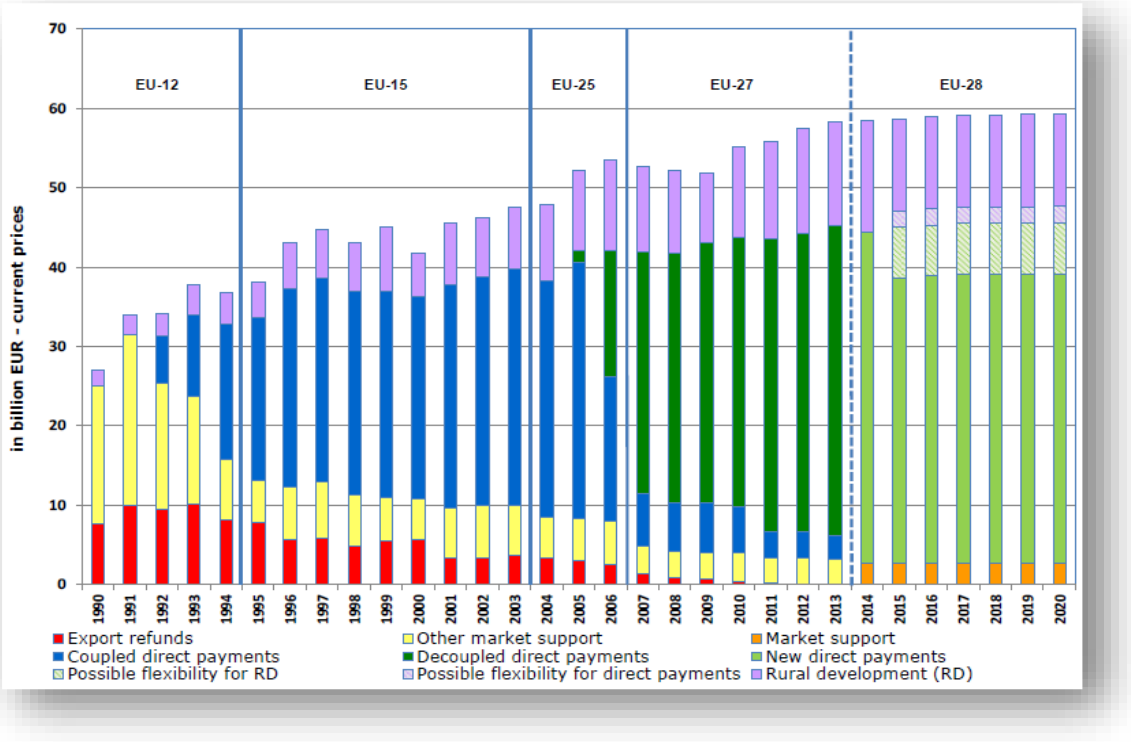


Figure 4.2 CAP overview 1990-2020 (EC, 2013).

4.3.2.1 DIS introduction in Poland

For better understanding of the impact of DIS payments on agricultural income and growth, example of Poland's introduction of DIS payments can be analysed. For a comparative analysis of Turkish agricultural sector, comparison with Poland is seen appropriate since agricultural sectors resemble very similar characteristics:

- Small farms, usually managed by a family in remote villages that cause high transaction costs and difficulties in marketing their products
- Subsistence and semi-subsistence farming where producers are as well consumers of agricultural products,
- Low levels of literacy,
- Technological gap with developed countries (for Poland before the accession to EU in 2004)
- Low farmers income (relevant for Poland before the accession to EU in 2004)

Although Polish agriculture accounts for 3.5% of GDP, and employs only 13% of the total population, structure of sector is very similar to the Turkish one. Agricultural

land in Poland is 15,9 millions of hectares and it represents the 12% of total arable land of EU-25. Crop production is a major contributor to total agricultural output, with cereals accounting for 30% of total value of agricultural output. Like in Turkey, small subsistence farms occupy most of the agricultural production, with 1-2 ha parcels accounting for 25% and 5-10 ha farms accounting for 22% of total arable land. Sector still accounts for 15-16% of total employment in Poland. Before the accession, direct support was four time less in Poland than of the average of the EU countries. Poland started receiving 25%, 30%, 35% of DIS budget in 2004, and reached full quota in 2013. Accordingly, 11fold increase in agricultural support occurred in the five years following accession (Kundera, 2013). Despite the fact that Polish farmers operated under worse conditions than the old member states, it still had positive impact on agricultural growth and farmers' income. However, negative impact of DIS payment scheme is that the simplified support system available for the new members helped small and ineffective farms, mostly crop producers to stay vivid, and DIS system became a social aid for this group of farmers. Therefore, lack of support for investment in new technologies and infrastructure, left Polish farmers unable to meet EU sanity standards and health requirements (Kowalski, 2010; Kundera 2013).

Despite that, Poland is an example of a successful transition to DIS payment that had positive effects on farmers' income. Accession to EU was a strong impulse for agricultural sector in Poland. In five years period since the accession in May 2004, income of Polish farmers grew significantly and increased 2 times per 1 full-time employee, exports increased 2,8 times, trade with EU grew fast with food deliveries from Poland to EU-25 increase of 248% (Kowalski et al. 2010). Subsidies received by farmers from non-market sources have had a fundamental impact on farmers' income, profitability and growth of agricultural sector.

5. WHEAT PRODUCTION ANALYSIS

5.1 Overview Of Wheat Production and Trade in the World

Wheat is a major crop in the world terms of area, production and trade volume. According to FAO wheat is 6th commodity in the world in terms of Net Production Value. Two major types of wheat can be distinguished: common or bread wheat and durum or macaroni wheat. It is estimated that 90% of the world wheat production is common wheat. Wheat as a major source of carbohydrate represents the important nourishment in most of the countries in the world. In 2014 total 2543,9 million tonnes of cereals was produced, with wheat accounting for almost 30% with 728,2 million of tonnes (Figure 5.1). Top producer of wheat according to the FAO Food Outlook Report (2014) is European Union.

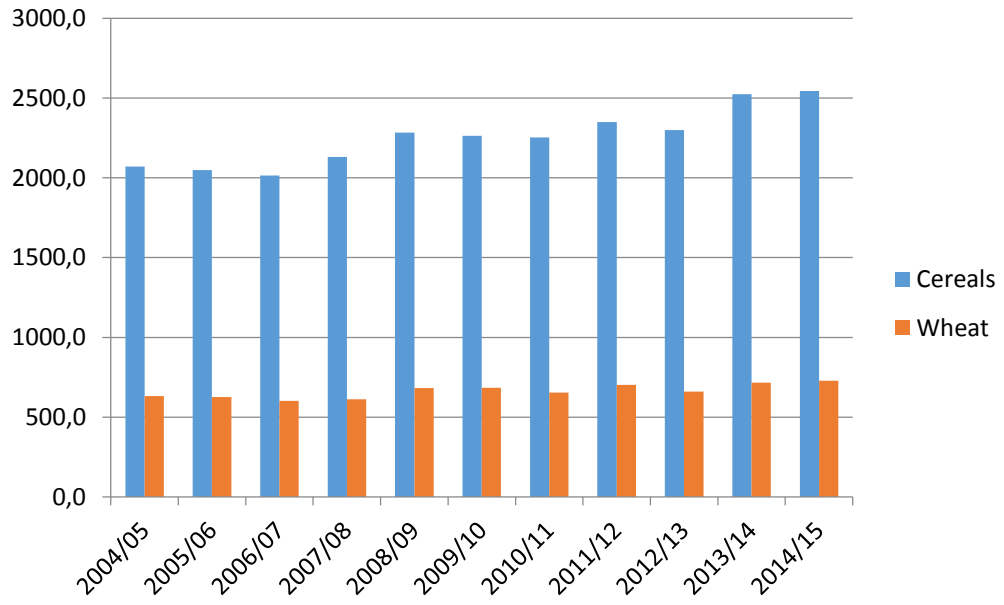


Figure 5.1 World cereals and wheat production (million tonnes). (Url-9)

Major producers of wheat by country in terms of quantity and value are given in the Table 5.1, where Turkey ranks as ninth top wheat producer in the world in terms of Net Production Value.

Table 5.1 Top wheat producers in the world. (Url-9)

Rank	Country	Production (Int $1000)	Production (Tonnes)
1	India	14318943	94880000
2	China, mainland	14183023	121023000
3	United States of America	8666590	61677387
4	France	5024356	40300800
5	Australia	4118269	29905009
6	Canada	3558757	27205200
7	Pakistan	3425066	23473000
8	Russian Federation	3063280	37719640
9	Turkey	2870735	20100000
10	Germany	1938825	22432000

Data in Table 5.2 on wheat consumption (OECD, 2014) indicates the increase in consumption until 2023 by 0,95% in developed countries and by 1,15% in developing world. In consumption per capita Turkey is amongst top consumers, with an average yearly consumption of 205,8 kg per capita Turkish citizens consume 3 times more than the world average, two times more than people in EU.

When we take a closer look at the production data, we may see that Australia, a country with similar climate as that of Turkey especially in terms of precipitation, is amongst the top wheat producers and top wheat exporters in the world. However, yields in Australia are almost 30% lower than in Turkey. In 2011 Australia produced only 203 kg/da while Turkey produced 269 kg/da of wheat, while area harvested was almost 60% larger in Australia[17]. Turkey produced 20 mil tonnes of wheat while Australia produces around 30 mil tonnes of wheat annually; Turkey consumes 205,8 kg of wheat per capita, while in Australia consumption of wheat per capita is only 82,2 kg, according to OECD and FAO reports. Also total population of Turkey is three times higher than that of Australia, which enables Australia to export most of its production. Despite low yields Australia manages to play a major role on the world wheat market thanks to the large quantity and lower production costs that enables its traders to compete with lower prices on the world market.

World trade of wheat accounted for 43% of total cereals trade in 2013. In 2011 in terms of quantity, wheat was most imported commodity with total of 147 million tonnes. It was at the same time most exported commodity in 2011 with 148 million tonnes and total value of 46 billion dollars.

[17] FAOSTAT database, data on crop production available at: http://faostat3.fao.org/compare/E

Table 5.2 Wheat projections: Consumption, food use, per capita 2011-2023. (Url-10)

	CONSUMPTION (kt)		FOOD USE (kt)		PER CAPITA (kg)		% growth
	Avg 2011-13	2023*	Avg 2011-13	2023*	Avg 2011-13	2023 *	2014-23
WORLD	**694222**	**773569**	**476426**	**524 299**	**67,4**	**66,2**	**-0,24**
Developed Countries	**269638**	**294644**	**132821**	**139 183**	**95,6**	**96,8**	**0,09**
Canada	10088	10745	2745	2 802	78,8	72,6	-0,77
United States	35009	34195	25728	28 009	81,0	81,0	0,08
EUROPE	**181628**	**199705**	**80692**	**82 208**	**108,6**	**110,6**	**0,13**
European Union	124799	131209	56183	58 888	110,5	113,9	0,25
Russian Federation	36387	46155	14133	13 530	98,7	97,9	-0,16
Ukraine	12560	14184	5351	4 893	117,5	115,9	-0,13
Australia	6312	6952	1897	2 319	82,2	88,0	0,03
New Zealand	821	781	375	384	84,1	77,7	-0,67
Developing Countries	**424584**	**478925**	**343606**	**385116**	**60,5**	**59,4**	**-0,26**
Turkey	20950	24095	15465	17467	205,8	208,2	0,18

*OECD prediction

Major exporters of wheat are Argentina, Australia, Canada, the EU (France and Germany as a major exporters), Kazakhstan, Russian Federation, Ukraine and the United States, (Figure 5.2).

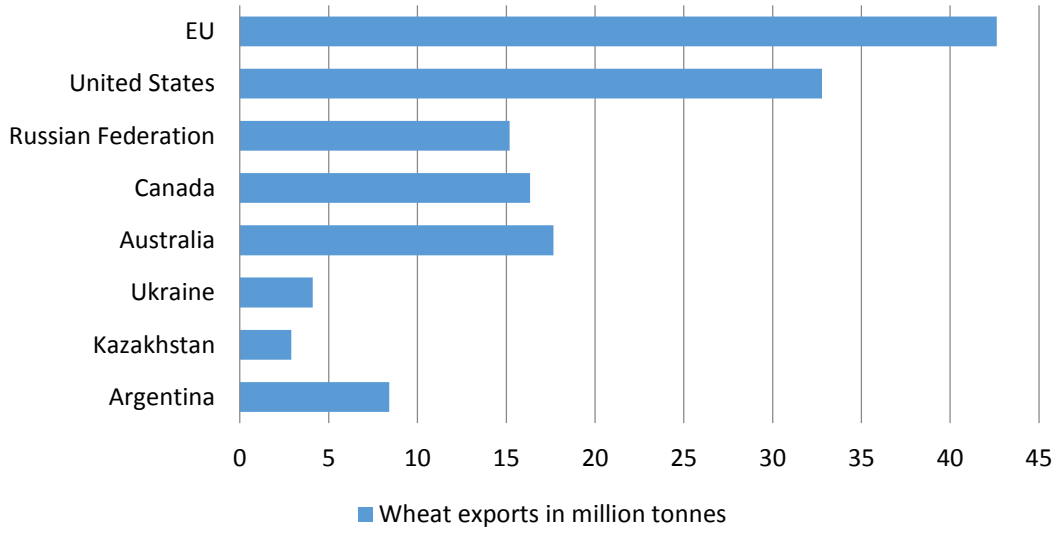


Figure 5.2 Major wheat exporters of wheat. (Url-11)

In terms of production efficiency EU is again a leading producer, with highest yield rates and product qualities. Figure 5.3 shows world's top five countries in terms of highest yields in wheat production.

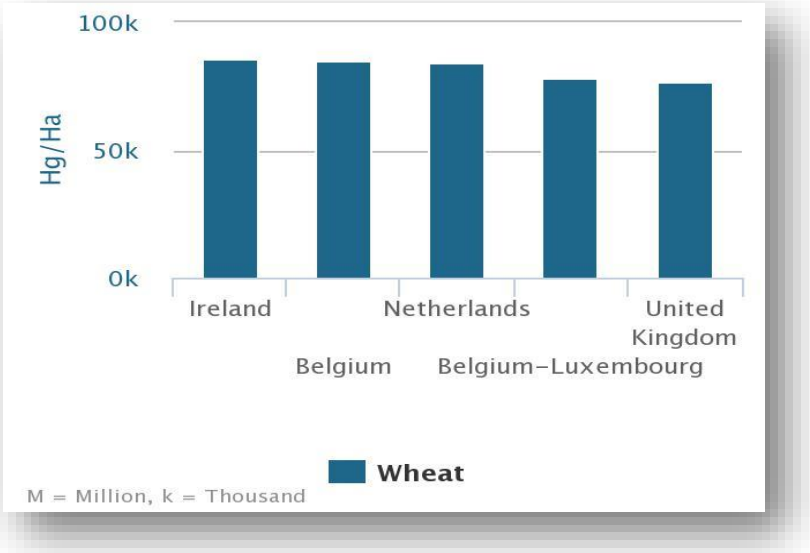


Figure 5.3 Top 5 countries in the world by yields in wheat production. (Url-12)

Wheat is most important cereal cultivated in EU in terms of quantity and area, accounting for almost 40% of total cereals production (EC Report, 2012).

5.2 Wheat Production and Trade in Turkey

Population growth together with climate changes and limited water resources create enormous pressure on the food and agricultural sector in Turkey. Wheat represents a most important commodity, as it serves as an input in production of several food products important for human nutrition. Turkey is one of the top per capita consumers of wheat, and this consumption tends to increase in the future. To meet such a demand Turkish farmers will have to maximize the production, as some studies reveal that Turkey does not have a comparative advantage in producing wheat, due to low yields that depend on rainfall and weather conditions (Koç et al., 1998).

However, despite the relatively low yields Turkey is amongst top ten wheat producers in terms of both value and quantity. Production of cereals in Turkey accounts for almost 66% of total value of agricultural output (OECD, 2011) with wheat production accounting for more than 60% of total cereals production. As

indicated in Table 5.3, more than 80% of area is dedicated to common or bread wheat production, while durum wheat is produced at less than 17% of total area planted for wheat production. Durum or macaroni wheat is of higher quality and requires irrigation in case weather conditions are not preferable. Since Turkey has a only about one fifth of the water per capita compared to water rich regions of North America and Western Europe[18], water consumption needs to be planned and scheduled in the most efficient manner increasing the water productivity in terms of higher yields per unit of water used.[19] Durum wheat contains more protein than the common wheat and is used in macaroni and dry pasta production. Usually prices of durum wheat are therefore higher than the common wheat prices due to complex production process. According to the Turkish Statistical Institute average prices at the farm gate for common and durum wheat are not extensively different (Table 5.3). However, Turkish Grain Board prices of durum and common wheat differ, with durum wheat prices being usually 5-10% higher than the common wheat, due to higher quality measured in terms of protein content, test weight, hardness, damage levels and other relevant indicators.

Table 5.3 Common and durum wheat area, prices. (Url-13)

	Planted area (da)				Prices at the farm gate (TL)	
Year	**Wheat total**	**Durum Wheat**	**Common Wheat**	**% of common wheat**	**Wheat (Durum)**	**Wheat (Other)**
2004	93 000 000	21 000 000	72 000 000	77,42	..	..
2005	92 500 000	20 000 000	72 500 000	78,38	0,36	0,35
2006	84 900 000	15 100 000	69 800 000	82,21	0,36	0,35
2007	80 977 000	13 545 000	67 432 000	83,27	0,43	0,41
2008	80 900 000	13 400 000	67 500 000	83,44	0,61	0,53
2009	81 000 000	13 350 000	67 650 000	83,52	0,54	0,48
2010	81 034 000	13 340 000	67 694 000	83,54	0,54	0,52
2011	80 960 000	13 380 000	67 580 000	83,47	0,59	0,58
2012	75 296 394	11 900 357	63 396 037	84,20	0,61	0,60
2013	77 726 000	12 786 000	64 940 000	83,55	0,67	0,66
2014	79 192 084	12 824 636	66 367 448	83,81	0,74	0,74

[18] Data available at Turkish Ministry of Foreign Affairs, address: http://www.mfa.gov.tr/turkey_s-policy-on-water-issues.en.mfa

[19] Total irrigable area economically in Turkey is 8,5 million hectares, and Turkey reached 65% of the total irrigation potential. Data obtained from the Ministry of Food, Agriculture and Livestock report 'Agricultural Water Use and Productivity in Turkey', address: http://www.comcec.org/UserFiles/File/WorkingGroups/Agriculture/Presentations%20made%20during%20the%20Meeting/%C3%9CLKE/Turkey.pdf

In 2014, total 22 million tonnes of wheat was produced, with 20 million tonnes of common and only 4 million tonnes of durum wheat. Main regions of wheat production are Marmara, Central and Southeast Anatolia accounting for 65% of total wheat production in Turkey, while least production occurs at Aegean and East Black Sea region. (Figure 5.4).

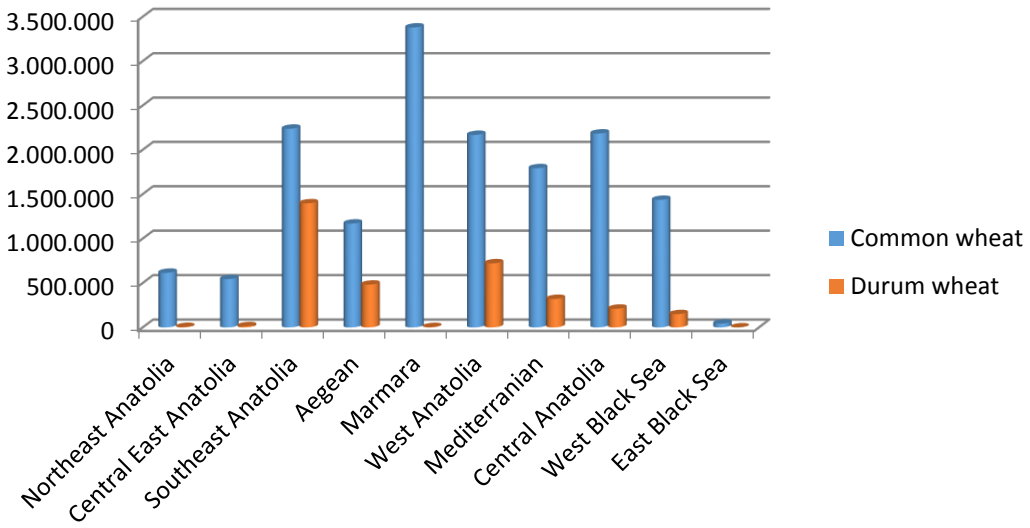
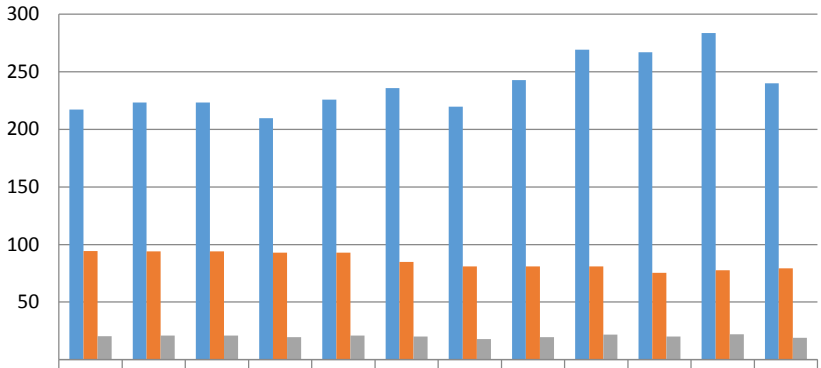


Figure 5.4 Wheat production (tonnes) in Turkey by main regions, 2014. (Url-13)

With the only 24,1% of agricultural land being irrigated, wheat production in Turkey depends on rainfall and general weather conditions. This is also the main reason for variation in yield and total production, as well as the overall import quantities. Data on wheat production in Figure 5.5 show decrease in the area planted since 1988, with yield and total production also not showing any significant increase. In 2014 there is significant drop in the production and yield compared to 2013, caused by severe drought and cold weather during the whole planting season. This leads to a conclusion that production efficiency is still very low, and did not change significantly during the last 25 years. Therefore changes in the policy are necessary if the wheat production is to become profitable choice for Turkish farmers. In 2014 maximum yield of wheat was achieved in Tekirdag, Kirklareli and Edirne (Marmara region) of 492 kg/daa for irrigated land and 419 kg/daa for not irrigated land[20].In the same year average wheat yield from irrigated land was 271 kg/daa, and for not

[20] Turkish Statistical Institute, address: http://tuikapp.tuik.gov.tr/bitkiselapp/bitkisel_ing.zul , date retrieved 15.02.2015, Author's own adaptation

irrigated land it was 268,68 kg/daa that is not much different when compared to the average wheat yield in Turkey. However on the regional basis there are large differences between wheat yields for irrigated and not irrigated land.



	1988	1998	2000	2002	2004	2006	2008	2010	2011	2012	2013	2014
Yield (kg/decare)	217	223	223	210	226	236	220	243	269	267	284	240
Planted area (milion decare)	94,35	94,00	94,00	93,00	93,00	84,90	80,90	81,03	80,96	75,30	77,73	79,19
Production (milion tonnes)	20,50	21,00	21,00	19,50	21,00	20,01	17,78	19,67	21,80	20,10	22,05	19,00

Figure 5.5 Wheat production, area and yield in Turkey, 1988-2014.(Url-13)

With respect to high volatility in production due to weather conditions, Turkey relies on wheat imports to meet domestic demands for both common and durum wheat. Data in Table 5.4 on wheat trade reveals high imports in 2011, due to changes in taxes on imported wheat that went from 130% to 0%; while high imports in 2014 occurred due to bad weather conditions that caused a supply shock. Most of the imported wheat comes from Russia, EU, Kazakhstan and Ukraine. In the same year exports are at high level, but it left very low stock levels for the next season. In general, data shows that except during the bad weather seasons Turkey is a net exporter of wheat. Domestic use has increased over the years, but together with the increase in population in Turkey, consumption per capita has not changed over the years. With estimated increase in consumption per capita in Turkey of 0,18% until 2023 (OECD, 2014), it is important to optimize production efficiency. Policies for rural development and environmental issues would not permit area increase for wheat or cereals in general; therefore yield maximization should be the driver of the production in future.

Table 5.4 Wheat balance sheet for Turkey 2001-2014. (Url-14)

	Domestic use (Tonne)	Imports (Tonne)	Exports (Tonne)	Change in stocks (Tonne)	Human consumption per capita (Kg)	Degree of self-sufficiency[21] (%)
2014	20 461 694	4 185 189	4 677 855	- 117 110	213,0	101,8
2013	19 375 457	4 029 699	3 700 742	- 52 000	225,3	98,0
2012	19 609 603	3 224 535	3 977 079	238 853	228,7	105,1
2011	18 187 098	4 174 105	3 228 101	1 350 836	213,9	102,2
2010	16 961 236	2 951 007	4 491 284	965 487	199,8	114,8
2009	17 780 964	3 628 102	2 342 827	308 301	216,1	94,5
2008	16 881 655	2 511 652	1 818 712	97 414	206,6	96,5
2007	18 942 900	1 596 000	2 396 700	- 834 200	...	99,8
2006	16 846 100	63 600	3 259 400	275 600	...	120,6
2005	19 402 319	447 764	2 262 710	- 595 265	214,1	106,3
2004	18 956 801	1 471 271	886 379	286 091	211,9	98,4
2003	19 857 496	1 467 336	876 412	- 117 572	227,3	96,4
2002	19 780 130	964 379	599 252	- 757 003	230,2	94,3
2001	19 362 092	421 299	1 632 594	48 613	225,4	106,5

Efficiency in wheat production can be assessed by reviewing the data on average yield in kg per decare in Table 5.5. It is obvious that Turkey has little comparative advantage in wheat production, as Turkish farmer employs the same amount of resources, but harvests two to three times lower quantity of wheat per decare than the farmers in EU. We may observe 11,6% increase in yield in Turkey from 2006-2012, while Poland improved its yield performance for 20% in the same period. Ireland has the highest wheat yields in EU zone that is almost four times higher than that of Turkey.

One of the explanations of low yield levels in wheat production in Turkey is certainly low production efficiency, as well as unbalanced fertilizers consumption and relatively low water productivity of irrigation facilities. In 2014, more than 77% of common wheat planted area was not irrigated, and only 33% of durum wheat area was irrigated. Wheat yields from the irrigated fields are almost 40% higher than the yields obtained from the not irrigated area. Therefore it is important to distinguish these two types of cultivation in cost and profitability analysis.

[21] Calculation based on the data on usable production and harvest losses available at www.turkstat.gov.tr as usable production = total production- harvest losses

Table 5.5 Average yield (kg/daa) in wheat production.(Url-9,13*)

Year	2006	2007	2008	2009	2010	2011	2012	2013
European Union	538	484	568	541	528	529	511	n/a
Turkey	236	213	220	n/a	245	269	267	278*
Poland	325	394	407	417	394	414	414	443
Belgium	819	784	868	935	898	814	845	n/a
Ireland	915	846	897	817	860	986	722	897
Netherlands	846	721	873	929	941	785	857	872

Fertilizers consumption is also one of the main drivers of higher yields in some countries. It is however under the scrutiny due to its negative effects on human health. Data in Figure 5.6 from World Bank reveals that Turkey has a very low level of fertilizers consumption in kg/hectare compared to major agricultural producers in the world with China being the world leader in fertilizers consumption. However when we compare the results of different studies on wheat production in Turkey, results show rather unbalanced usage of fertilizers. While in dry conditions recommended quantity of Ammonium Sulphate is 20-25 kg/daa, Urea 8-10 kg/daa and Ammonium Nitrate 14-15 kg/daa (Süzer, 2013), study performed in Çükürova region (Alemdar et al., 2014) revelas that farmers use total 9,6 kg/daa of A. Nitrate, 35,55 kg/daa of Urea while no information on A. Sulphate was provided. However, another study on wheat production in different regions in Turkey by Semerci et al. (2012) revealed that nitrogen and phosphorus based fertilizers consumption was within the recommended levels. Zencirci et al. (1998) also suggest that increase in fertilizers use and efficiency, together with using high yielding cultivars and supplemental irrigation could lead to significant increase in wheat yields. Pala et al. (2011) conducted an extensive study on yield gaps in main wheat growing regions in Turkey, using data from Central Research for Crops Institute to calculate the yield gaps from mean district/province yields compared to the highest yields of state farms and research stations. Results have shown that during 1990/91–2000/01 cropping seasons of research stations over farmers' fields had range of about 64–229%, indicating the great potential for improvements. However, as a result of climate in Turkey wheat is grown in dry marginal rainfed areas, yield improvements are possible through improved agronomic management practices (Pala et al., 2011).

According to FAOSTAT data on pesticide use, Turkey consumes more insecticides (8215,57 tonnes) than for example Poland (888,02 tonnes), or high yield producer The Netherlands (1634,90), but less than Ukraine or Argentina. However, usage of herbicides in Turkey of 7451,59 tonnes is higher than in The Netherlands, but much lower than Argentina (227185 tonnes), Ukraine (40910,60 tonnes) or Poland (10489 tonnes). With 17545,58 tonnes in 2010, Turkey consumed more fungicides and bactericides than most of its peer countries[22].

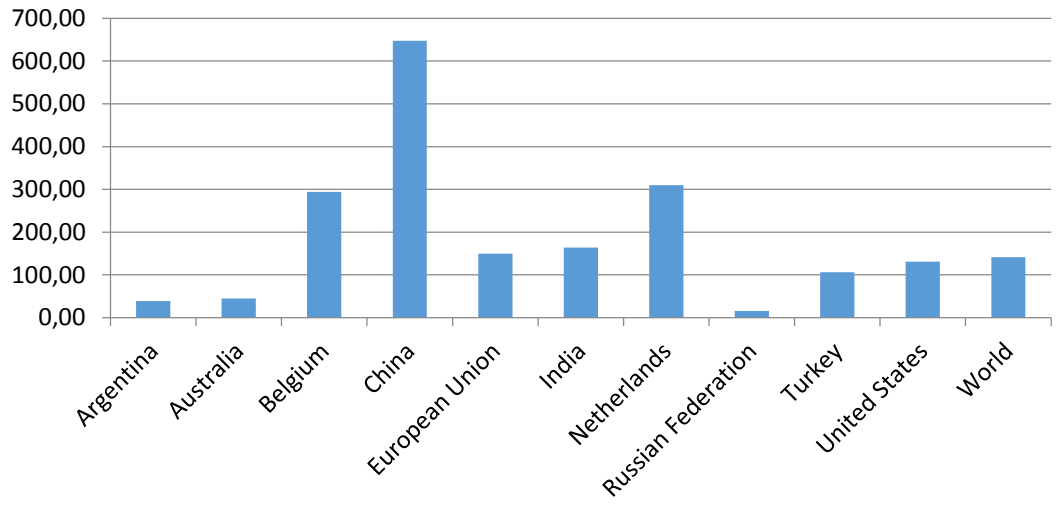


Figure 5.6 Fertilizers consumption (kg/hectare of arable land) of major agricultural producers in 2012. (Url-15)

5.2.1 Climate and soil requirements for wheat cultivation

Climate in Turkey is suitable for winter wheat cultivation. Winter wheat is a seasonal plant that can be cultivated in different climate regions, but favours mild climate. At the beginning of the planting season wheat prefers low temperature high humidity, especially during the germination and tillering it prefers the temperature between 5-10^{o}C and humidity of 60%. Later during the stem elongation it prefers temperatures between 10-15^{o}C and humidity above 65%. Wheat should be planted in the climate areas with annual precipitation between 350-1150 mm, since the average wheat water consumption varies between 450-650 mm per planting season[23]. Planting dates in Turkey vary across the region, however for winter wheat it is recommended to plant between October 15 - November 15 for Marmara, September 15-October 10 for

[22] Data available at FAOSTAT, address: http://faostat.fao.org/site/424/DesktopDefault.aspx?PageID=424#ancor
[23] Data taken from FAO Crop water information document, available at http://www.fao.org/nr/water/cropinfo_wheat.html

Central Anatolia and November 15-December 15 for Southeast Anatolia and Çukurova region, preferably when soil temperature is between 8-10ºC (Süzer, 2013). Therefore regions that are most suitable for wheat cultivation in Turkey are Marmara, Central and Southeast Anatolia where main production of wheat in terms of area planted and production quantity occurs (Table 5.6).

Table 5.6 Main wheat producing regions in Turkey in 2014. (Url-13)

	Southeast Anatolia	West Marmara	East Marmara	Central Anatolia
Area planted (daa)	8.023.179	6.457.861	3.822.189	11.608.712
Area harvested (daa)	7.973.801	6.447.861	3.670.178	11.251.581
Production (tonnes)	2.237.440	2.459.990	918.696	2.182.937
Yield (kg/daa)	281	382	250	194

Marmara region in general is characteristic for the transitional hybrid Mediterranean and terrestrial climate, with winters not as cold as terrestrial climate and not as rainy as the Black Sea region. In this region average temperature in winter (January) is 4.94 ºC, the warmest month July has average temperature of 23.7 ºC, and average annual temperature is 14.0 ºC. Average annual precipitation of 595.2 mm (with almost 90% of rainfall during the winter time) represents a very suitable climate for wheat cultivation. Irrigation is usually not necessary. However north part of Marmara region or Thrace region exhibits terrestrial climate characteristics that are also specific to Southeast and Central Anatolia. Terrestrial climate regions have hot summers, and rarely cold winters. It is a mild climate with characteristics indicated in the Table 5.7.

Table 5.7 Terrestrial climate characteristics. (Url-13,16)

	Avg. temp. in January (°C)	Avg. temp. in July (°C)	Avg. annual temp. (°C)	Avg. annual rainfall (mm)	Avg. annual humidity (%)	Avg. Wheat Yield (kg/daa)
Southeast Anatolia	3,7	29,8	16,4	565,7	53,6	298,6
Central Anatolia	-0,7	22	10,8	413,8	63,7	227,4
Thrace	2,8	23,9	13,2	559,7	69,6	352,4

In order to prevent the plant disease caused by the soil depletion when same plant is being cultivated continuously, it is necessary to implement the plant rotation. Some models for wheat plants alternation patterns can be as follows (Süzer, 2013):

a. Model: Chickpeas -Wheat - Lentils
b. Model: Safflower - Wheat - Chickpeas
c. Model: Sunflower - Wheat - Rape
d. Model: Sugar Beet - Wheat - Vetch
e. Model: Wheat - Melon - Egypt
f. Model: Cotton - Wheat - Onion-garlic
g. Model: Appetizers pumpkin - Wheat - Sorghum Wheat

Another model recommends the following crop rotation schedule:

1. In dry conditions:
   a. Wheat-fallow-wheat
   b. Wheat-lentil-wheat
   c. Wheat-Lentil-Barley
2. In irrigated conditions
   a. Wheat-second product-Cotton
   b. Wheat-second product-Vegetables
   c. Wheat-second product-fodder crops
   d. The second product-cotton-wheat-barley-second product
   e. Wheat-second product-Lentil-second product,

With second product chosen upon: peanuts, maize, sesame, sunflower.

According to the basins distribution, cultivation of wheat is supported in every of the 30 basins across Turkey. After wheat most common products are: maize (30 basins) barley (29), rye (26), sunflower (26), dry beans (24), chickpeas (24), oats (22) and triticale (22). These crops can be considered as an alternative for wheat cultivation. In Table 5.8 possible alternative crops for wheat are given based on their profitability in 2013. Most profitable alternative crop in terms of profit per kilogram is sunflower,

however in profit per decare most profitable crop is cotton, but it also has highest costs of production since irrigation is required.

Table 5.8 Potential alternative products. (Url-7)

	Yield (kg/daa)	**Costs (TL/kg)**	**Support (TL/kg)**	**Price (TL/kg)**	**Profit (TL/kg)**	**Profit (TL/daa)**
Wheat	284	0,52	0,123	0,66	0,263	74,692
Barley	290	0,51	0,116	0,62	0,226	65,54
Maize	894	0,45	0,055	0,61	0,215	192,21
Paddy	814	0,96	0,126	1,09	0,256	208,384
Red lentils	152	0,88	0,2525	1,26	0,633	96,14
Cotton	499	1,31	0,585	1,35	0,625	311,875
Sunflower	265	1,07	0,366	1,44	0,736	195,04
Soybean	416	1,03	0,59	0,99	0,550	228,8
Safflower	154	0,89	0,59	0,76	0,460	70,84

In Marmara region most produced crop in 2014 was maize (5.443.528 tonnes) and sugar beet (1.201.081 tonnes), in Central Anatolia it was sugar beet (4.501.158 tonnes) and clover (2.029.226 tonnes) and maize (1.238.346 tonnes); while in Southeast Anatolia second most produced product was maize (2.380.494 tonnes) barley (884.203 tonnes) and red lentils (315.446 tonnes).

6. AGRICULTURAL POLICY FOR WHEAT

6.1 Agricultural Support For Wheat In Turkey

Wheat is a product that has the longest history of government support in Turkey. It was only in the short period under the ARIP project that direct decoupled support was introduced, but for the majority of time product and price support prevailed. Unfortunately large payments to farmers did not yield the expected success in wheat production. Farmers were left with incomes significantly lower than the income in industry or service sector that could only push them to leave the production in the future.

From the support program published in the Official Journal of Republic of Turkey, wheat subsidies in 2014 can be summarized as indicated in the Table 6.1. Deficiency payment is announced as krs/kg, and is transformed to TL/daa using the average wheat yield obtained from TurkStat in 2014 of 240 kg/daa.

Table 6.1 Wheat subsidies in 2014. (Url-8)

Support	
Deficiency payment (TL/daa)	12
Soil analysis (TL/daa)	2,5
Certificated seed (TL/daa)	7,5
Fertilizer (TL/daa)	6
Diesel (TL/daa)	4,6
Total	32,6

As a part of support to grain producers, Turkish Grain Board is authorized for grain intervention purchases under the predetermined minimum price. Purchasing minimum prices are announced very late during the planting season, and it makes the planting decision making for farmers even harder. In 2014 TGB did not announce the purchasing prices, since the market prices were above the potential intervention prices. TGB is also authorized for sales, of both domestic wheat and imported wheat. In 2014 prices of domestic wheat ranged from 745 TL/tonne (for low quality wheat) to 870 TL/tonne (for high quality wheat); prices of imported wheat were

880TL/tonne for Russian wheat and 870 for Ukrainian wheat. History of purchase and sale quantities is shown in the Table 6.2.

Table 6.2 TGB wheat trade. (Url-17)

Years	Quantity purchased (tonnes)	Intervention price (TL/kg)*	Quantity sold(tonnes)
2000	2,959,105	110,000	2,311,296
2001	1,459,435	183,000	2,039,061
2002	332,811	253,000	1,278,984
2003	544,508	360,000	604,459
2004	2,023,000	377,000	1,021,609
2005	4,171,303	360,000	2,999,457
2006	1,456,571	0,375	3,014,347
2007	121,920	0,425	1,003,083
2008	62,934	*500 TL/tonne*	535,417
2009	3,771,343	0,530	731,527
2010	980,223	0,580	1,537,904
2011	823,988	0,620	1,059,583
2012	1,634,449	0,665**	814,754
2013	1,985,646	0,720**	1,303,520
2014	---	---	1,738,183

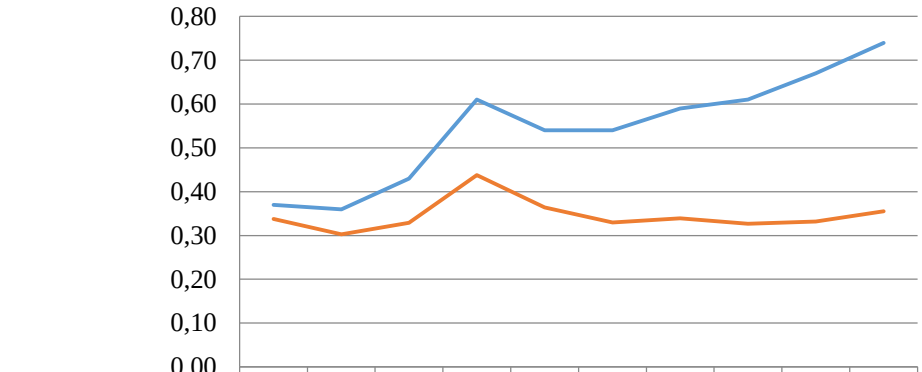
* Prices are taken at the end of each year for December.

** Price was fixed during the year

Prices of wheat at the farm gate are shown in the Figure 6.1, indicating the rise in real prices, however in nominal terms prices are rising at a much slower pace. Peak in 2008 was caused by global food crisis, with the prices stabilizing in 2010, where nominal wheat prices equalled the nominal prices in 2007, a year before crisis[24]. Despite the low rise in nominal terms, prices of wheat in Turkey are well above the world prices, and mainly due to protection policies.

Figure 6.2 gives an overview of the Price indicators (USD/tonne). Prices of wheat in Turkey were two times higher than the wheat producer prices in France or United States during the global crisis in 2008; however prices in 2012 were around 1,2 times higher in Turkey (335,20 USD/tonne) than France (289,80 USD/tonne) or USA (286,00 USD/tonne).

[24] Real prices were taken from the Ministry of Food, Agriculture and Livestock Annual report,2014 and CPI (2003=100) data available at www.turkstat.gov.tr was used to calculate the nominal prices.



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Nominal prices	0,37	0,36	0,43	0,61	0,54	0,54	0,59	0,61	0,67	0,74
Real prices	0,34	0,30	0,33	0,44	0,36	0,33	0,34	0,33	0,33	0,36

Figure 6.1 Wheat prices at farm gate (TL/kg). (Url-18)

Turkish Grain Board is authorized to import wheat and later sell it to meet the domestic demand. TGB mostly imports wheat from Russia or Ukraine under low prices and sell in domestic market under much higher prices.

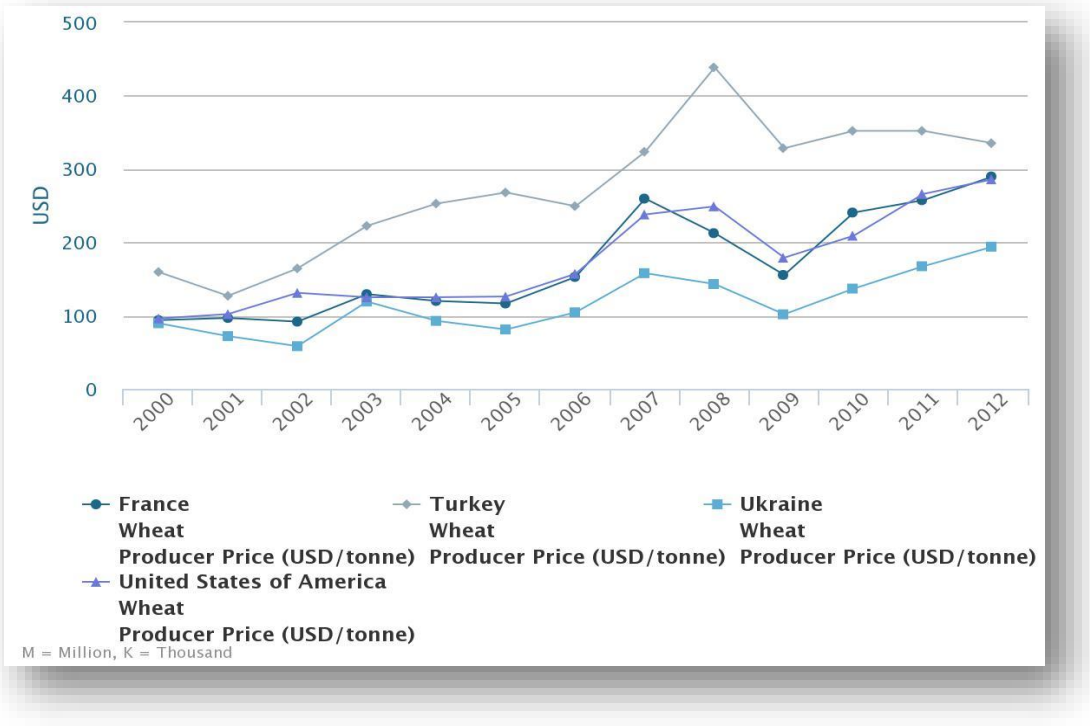


Figure 6.2 Wheat Producer Prices comparison (USD/tonne).(Url-9)

Despite the high levels of domestic prices and support for wheat production, results of latest study on the profitability of wheat production performed by performed by Agricultural Economic and Policy Development Institute of Turkish Ministry of

Food, Agriculture and Livestock (Alemdar et al., 2014), reveals that net profits for relatively small scale wheat farmers are negative, showing that farmers can't meet their opportunity costs due to high input prices and overall production costs.

It is also important to notice that support policies in Turkey managed to mitigate the effects of price volatility. If we take a look at the Figure 6.3 that compares prices of wheat in Turkey and in the world, we may see the smoother movement of prices in Turkey. When we compare the standard deviation as a indicator of price volatility, we get the standard deviation in Turkey 0,0536 lower than the standard deviation of 0,638 in the world prices time series. Therefore, we may conclude that the protectionist policies had a major impact in safeguarding the farmers from the negative effects and risks of the wheat price volatility.

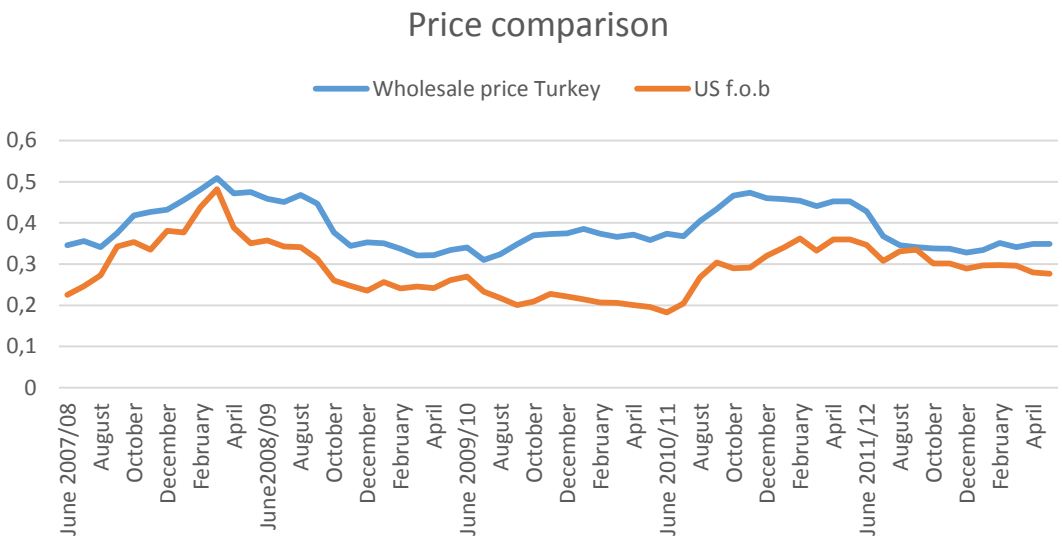


Figure 6.3 Wheat price volatility (USD/kg). (Url-19)

6.2 EU Policy For Cereals

Policy for wheat is implemented under general policy for cereals through different measures under the Single Common Market Organization of EU. Single CMO is the framework established in 2007 for new common market that integrated all of the separate markets that existed in the period 1967-2007. This new framework brought different products under the similar regulation and market measures. In the previous framework support measures for cereals included production coupled payments, supply control, public intervention through target prices and different trade measures.

Since the reforms in 2003, most of the payments were decoupled from production and new forms of direct support to farmer's income were introduced. In the period from 2005-2010 Coupled aids decreased from 32.3% in 2005 to only 5.9% in 2010, while decoupled payments accounted for 33.8% of total CAP expenditures. Current measures include:

- *Direct support* under the SPS (or SAPS for new member states) that grants direct payments to farmers regardless of the production type or output as long as they fulfil the requirements underlined in cross-compliance set of rules. Up to 15% of their direct payment budget (under the pillar 1) can be transferred to the budget for Rural Development (under the pillar 2).

- *Public intervention as a safety net*. Intervention for wheat has been performed by setting the target prices and selling to the publicly funded stocks, and later reselling for export or for internal market needs. Several CAP reforms in 2000s have set new criteria for intervention purchases that lowered the prices and put a limit on purchase quantities. In 2008 under the "Health Check" reform package, tendering for wheat was introduced in case the intervention sales exceeded 3 million tonnes[25]. Since 2010 wheat purchases are permitted under the fixed price of 101,31 EUR per tonne.

- *Trade measures*: *Common External Tariff, Tariff Rate Quotas and Export Refunds*. Trade measures undergone several reforms since the CAP establishment. However latest reforms were done in 2008 when EC modified the license system for import trade. EU applied variable import duties until 2003 on most cereals to protect domestic market from low-priced cereals. After the GATT agreement between US, Canada and EU, *Tariff Rate Quotas* were introduced for Wheat and other cereals. The duty applied to EU cereal imports is fixed on the basis of the difference between the EU intervention price (101.31 €/t) multiplied by 1.55 and a representative CIF (i.e. cost, insurance and freight) import price at the port of Rotterdam[26]. From 2012

[25] Evaluation of Measures Applied Under Common Agricultural Policy to the Cereals Sector, Final Report (2012) of European Commission offers detailed information on the evolution of different policy measures for cereals and their impact on changes in production, stock levels, competitiveness etc.

[26]The EU Cereals Regime, (2014), European Commission, Directorate-General for Agriculture and Rural Development, Unit C4

TRQ was set for 3 112 030 tonnes for wheat, with out-of-quota rates of 95 EUR per tonne. Exports are also performed through export licenses, where export subsidies in terms of *Exports refunds* can be distributed, however its use has fallen over the years.

- *Article 68 measures*. Improved framework of Article 69 that allowed member states to use 10% of their budget for payments that are not included in the SPS, but it now includes payments for crop risk management.

7. METHODOLOGY

7.1 Policy Analysis Matrix

In evaluation of policy impacts several factors need to be taken into account. It is recognized that agriculture does not only provides food, it also provides environmental benefits and contributes to the sustainability of natural resources (Kanaka and Chinnadurai, 2013). One of most important factors is certainly income distribution and welfare effect of the undertaken policy. Other important indicators of policy success are efficiency in resource allocation that and food security that implies provision of food for consumers at reasonable prices and appropriate quality level. It is also important to determine whether the agricultural sector, in this case wheat production is competitive and whether it has comparative advantage necessary to trade in the world. First of all difference between competitiveness and comparative advantage needs to be distinguished before any analysis can be performed. These two terms are often confused or wrongly interpreted. Comparative advantage is rather an economic theory in international trade that dates back to Adam Smith and David Ricardo, who explain comparative advantage as an ability of one country to produce and sell a commodity at a cheaper price than another country. Concept implies the efficiency and specialization of one country in production of certain commodity, and then through free trade mechanism selling it on the world market under lower prices than the country not having comparative advantage in that specific production activity. It means that the producer employs its resources in the way that brings its output closest to the maximum potential output obtainable. Competitiveness is a concept related to the high productivity (output to input ratio) of specific firm, sector or economy as a whole. In his study on competitiveness of US agriculture, Dunmore (1986) introduced very practical approach for distinguishing the two concepts as, “In the short-term, relative prices and competitiveness are influenced by policies, exchange rates, and stochastic events such as weather and production levels. Factors which determine comparative advantage or economic efficiency are technology, infrastructure, and basic resource endowments that are relatively fixed.” (p.24).

In this study private and social profit are calculated within the Policy Analysis Matrix framework for evaluation of wheat production in Turkey in terms of its economic efficiency, comparative advantage, competitiveness of the sector as well as the support policy effects on the social welfare.

PAM is an analytical framework developed by Monke and Pearson (1989) for policy assessment based on the cost-benefit analysis. This method offers both microeconomic level of analysis of the on-farm activities, as well as the macro-level of policy transfers and efficiency analysis, and therefore provides a useful insight in the trade-offs that need to be faced by the policy makers. Matrix consists of three rows and four columns and includes data on production, costs, revenues and profits rated at private and social prices (Table 7.1).

Matrix is a product of two accounting identities:

1. Profitability is measured horizontally as the difference between revenues and costs.
2. Effects of divergences (distorting policies and market failures) as the difference between observed parameters and parameters that would exist if the divergences were removed.

By filling in the elements of the PAM for an agricultural system, an analyst can measure both the extent of transfers occasioned by the set of policies acting on the system and the inherent economic efficiency of the system. (Monke and Pearson, 1989).

Table 7.1 The Policy Analysis Matrix.

	Revenues	**Costs**		**Profit**
		Tradable inputs	**Nontradable inputs**	
Private Prices	**A**	**B**	**C**	**D**
Social Prices	**E**	**F**	**G**	**H**
Divergences	**I**	**J**	**K**	**L**

Private prices represent the market prices at which inputs, factors and outputs were actually traded in the domestic market. Social prices, on the other hand represent the prices that would prevail in the market if no intervention or market failures existed. Social prices therefore represent the opportunity costs or shadow prices, and are calculated using the international prices for related items.

Data on revenues and costs at private and social prices serve as an input for calculation of (Monke ve Pearson, 1989):

1. **Private profits (D)** equal (A-B–C) are indicators of system competitiveness under existing policies. It represent a measure of profits that farmers earn at the actual market prices and therefore show the competitiveness of the particular agricultural production system. Private profits are therefore important at determining level of support (price, product or input subsidy) to farmers. If private profits decline, it will not be profitable to produce specific crop, and farmers may exit this production activity.
2. **Social profits (H)** equal (E-F–G) and reflect the impact of the policy intervention on social welfare, or in other words whether the resources owned by society are efficiently employed and profitable. Social profits are therefore indicators of the sector's comparative advantage
3. **Output transfers (I)** equal A- E and arise from the commodity specific policy measures, such as price support, production coupled support, input support, tariffs or import quotas,. Impact of the exchange policy can also be evaluated under the output transfers, since this policy has a direct impact on the commodity prices both domestically and internationally.
4. **Input transfers (J)** equal B-F, and when positive reflects policy that tends to keep domestic tradable input prices higher than the world prices. These transfers are also related to the trade and exchange rate policy that directly affect the tradable input prices. Input subsidies also affect the level of J.
5. **Factor transfers (K)** equal C-G and represent the policy towards domestic factors of labour, land and capital.
6. **Net transfers (L)** are calculated in two ways, vertically and horizontally as (D – H) (or I - J – K), and therefore reflects agricultural policy from two different perspectives: product and factor markets. It measures the transfers

caused by policy and market failures, and includes both commodity based and exchange rate policy effects. Ratios used for evaluation of net transfers are as follows (Monke and Pearson, 1989):

- **Private cost ratio (PCR)**: C/(A - B), measures the competitiveness of the commodity system. PCR is a ratio of domestic factor costs to the value added at private prices that is a difference between value of output and cost of tradable inputs at private prices. It shows how much a system can pay for domestic factors to stay competitive. PCR<1 represents a competitive system, otherwise it means that system needs a government intervention to survive.
- **Domestic resource cost ratio (DRC):** G/(E - F) is ratio of domestic factor but rated at social prices. It shows how a production of specific commodity is socially desirable. If social costs exceed the value added (DRC>1) production system is not desirable, and its opportunity costs are high. It also means that national resources are being employed inefficiently and are reducing social welfare.
- **Nominal protection coefficient (NPC)**:
    - On tradable outputs (NPCO): A/E compares domestic to world prices, and therefore NPCO>1 indicates that current policy increases domestic prices of commodity compared to world prices.
    - On tradable inputs (NPCI): B/F compares the prices for tradable inputs. NPCO therefore indicates the level of input costs at domestic market.
- **Effective protection coefficient (EPC)**: (A - B)/(E - F) is the ratio of the difference between revenues and tradable-input costs in private prices to that in social prices, where A - B, is value added in private prices and E - F is value added in world prices. The ratio thus shows by how much policies in the product markets cause observed value added to differ from what it would be in the absence of commodity price policies. EPC is an indicator of the net incentive or disincentive effect of all commodity policies affecting prices of tradable outputs and inputs. An EPC greater than 1 means that private profits are higher than they would be without commodity policies; the transfer from both output and tradable-input policies, taken together, is positive. An EPC

less than 1 indicates the opposite result; the net effect of policies that alter prices in product markets is to reduce private profits, and the combined transfer effect is thus negative.

- **Profitability coefficient (PC):** (A - B - C)/(E - F - G) or D/H measures the total incentive effects of all policies. If social and private profits are both negative, ratio is meaningless, it is therefore important to properly interpret all the signs in the table.
- **Subsidy ratio to producers (SRP)**: L/E or (D - H)/E measures the transfer effects or in other words to what extent are system revenues affected with transfers such as subsidies. SRP>1 indicates strongly subsidized policy.

7.2 Data Selection

Data for common and durum wheat production in planting season 2010/2011 are used in calculating costs, revenues and profits at private and social prices. As explained in the Chapter 4, Subchapter 4.2.2 on current agricultural policy in Turkey, after the abolishment of DIS payments scheme, Turkish government once again initiated the support scheme based on input subsidies and price supports in 2010. These policy measures and payment amounts were published in the Official Journal of Republic of Turkey[27] for the first time in March 2010 and are still in force, only with the slight adjustments of the payment amounts. For the PAM revenue calculations in 2010/2011, support payment amount from 2011 were used. Agricultural support scheme is usually published late, sometimes at the end of the planting season. Support scheme for 2010/2011 was published on 14 May 2011, prior to harvest, leaving farmers with no information for the proper planting decision making. Table 7.2 shows the amount of support payments for wheat producers in 2010/2011.

[27] Decisions on support measures in 2010 were published in the Official Journal Republic of Turkey, as follows:

1. Support for certified seeds, available at: http://www.resmigazete.gov.tr/eskiler/2010/03/20100304-3.htm
2. Support for diesel and fertilizers available at http://www.resmigazete.gov.tr/eskiler/2010/03/20100318-14.htm
3. Deficiency payments, available at: http://www.resmigazete.gov.tr/eskiler/2010/03/20100302-5.htm

Table 7.2 Wheat subsidies in 2011. (Url-20)

Support	
Deficiency payment (TL/kg)	0,05
Soil analysis (TL/daa)	2,50
Certificated seed (TL/daa)	6,00
Fertilizer (TL/daa)	4,75
Diesel (TL/daa)	3,75

To account for the differences in rainfed and irrigated wheat cultivation in Turkey, calculations are made for four different types of wheat cultivation, as follows:

1. Rainfed wheat cultivation for two different cases is considered:

a) Crop care activities in rainfed wheat cultivation, assuming that farmers perform all of the necessary activities to obtain maximum possible yield. It is assumed that farmers in this scenario perform agricultural activities from detailed land preparation with ploughing and up to six times harrowing, three times fertilization and proper pesticides application. Yields obtained within this case represent the average yield (322,5 kg/daa) for rainfed wheat cultivation from Çukurova, Aydin, Eskisehir, Tokat, Sivas, Yozgat ve Amasya region.

b) Second case of rainfed cultivation represents a very common case in Turkey, where farmers usually perform land preparation with only two times harrowing, planting and harvesting, without taking care of the crop on the regular basis. Under this scenario, farmers do not apply fertilizers nor pesticides, they leave the plant to naturally adjust to the weather condition, they reduce costs and obtain up to 30% lower yields of 225,75 kg/daa.

2. Irrigated wheat cultivation for both common and durum wheat is considered to account for the difference in wheat quality as an important factor in wheat pricing policy. Irrigation costs are added to the calculations, yield for common wheat is obtained from the average of Çukurova, Aydin, Eskisehir, Tokat, Sivas, Yozgat ve Amasya region; durum wheat yields are estimated from the study on comparison of common and durum wheat yield performances in Konya and Eskişehir (Gulmezoglu et al., 2010) as 422,6 kg/daa.

Deficiency payments received by farmers are calculated by multiplying 0,05 TL/kg by average yield for each of the categories described above.

Considering no changes in policy over time, data on wheat production costs and prices in 2010/2011, offer a solid ground for assessment of the policy effects on wheat growers in Turkey. Several studies on wheat production costs have been performed and significant differences exist in the share of variable and fixed costs in total costs of production.

In their research on wheat production costs in Erzurum province Birinci and Küçük (2004) found the share 84,11% of variable costs and 15,88% fixed costs in total production costs. Another study done on wheat production costs (Arısoy and Oguz, 2005) for Konya province reveals the lower share of variable costs of 62,59% of total production costs. Latest study on main crop production costs in Çukurova region performed by Agricultural Economic and Policy Development Institute of Turkish Ministry of Food, Agriculture and Livestock (Alemdar et al., 2014) shows that variable costs varies from 54,84 to 67,26% depending on the size of parcel. The study also reveals that net profits are negative for small wheat producers due to high production costs and low marketing possibilities. Results of the study by Alemdar et. al (2014) have been officially accepted as a representative indicators of wheat production costs in Turkey, and were published in The Ministry Annual Report (2014) on agricultural production and support. Wheat production costs and input usage in Tokat, Sivas, Amasya and Yozgat provinces calculated in the research performed by Agricultural Economics And Policy Development Institute (Altıntaş, 2014) together with the wheat production costs and input estimation for Eskisehir region (Polat et al., 2011) and Aydin region for 2010/11 season[28] was used as a basis in production costs estimation. Therefore, data for quantity of inputs and their respective unit prices for wheat production system for the 2010/11 season estimated in the above mentioned studies are used as a basis for estimation of private and social profits in PAM matrix in the next chapters.

7.2.1 Private prices for wheat production system

Marketing channels available for Turkish farmers are represented in Figure 7.1[29]. In order to estimate revenues earned by farmers from wheat production in this study,

[28] Aydin Chamber of Agriculture
http://www.ayzo.org.tr/uploads/2010BugdayMaliyeti.jpeg%20[800x600].jpeg

[29] Union of Turkish Chambers of Agriculture (2010), Agricultural Economics Report (2007- 2010), Ankara, P. 139; address: http://www.tzob.org.tr/Yay%C4%B1nlar/Raporlar/Zirai-%C4%B0ktisadi-Raporlar

prices at farm-gate provided by TurkStat were used. Farm-gate prices represent the first sales point, and the price does not include transport or delivery charges. It is therefore direct revenue earned by farmers. Consumers of final goods that include wheat for their production, increase largely due to high profit margins of traders, TGB and dealers at the stock market. While average price at the farm gate received by farmers in 2011 was 0,58 TL/da, however price of 0,6 TL/kg in June 2011 was taken as a basis for profit calculations. TGB sales price of common wheat went from 0,655 TL/kg in January 2011 to 0,725 TL/kg in December 2011. Average wheat stock price at Konya Stock Exchange in 2011 was 0,6114 TL/kg[30].

- ***Revenues***

Revenues at private prices are calculated by multiplying the average yield (kg/daa) for wheat in Turkey in 2010/2011 with the average farm-gate price for 2011. Average wheat yield in Turkey in 2010/2011 according to TurkStat was 269 kg/daa, however this data is obtained by dividing the total value of production (obtained from the stock exchange across Turkey) by total planted area (obtained from the Farmers Registration System) and does not represent the real parcel based yield data. Therefore, data on average rainfed and irrigated wheat yield in Çukurova, Aydin, Eskisehir, Tokat, Sivas, Yozgat ve Amasya is used for the cost and profit calculations as it represents the real parcel based average yield, obtained in direct contact with farmers. Therefore, average yield price at a farm-gate was 0,60TL/kg[31]; according to TMO durum wheat prices are usually 5-10% higher than common wheat prices. Therefore price for durum wheat is estimated to be 0,65 TL/kg. Total support received by farmer in 2010 was 28,28 TL/daa for rainfed minimum yield, 33,13 TL/daa for rainfed maximum yield, 38,55 TL/daa for irrigated common and 37 TL/daa for the durum wheat cultivation[32]. Around 7% of wheat usable production in 2011 was used as an animal feed. This represents the lower quality wheat that is not suitable for milling and is sold as animal feed at the farm-gate price of 0,24 TL/kg. Animal feed represents the secondary product revenue for farmers, and amounts for 12,98 TL/daa (Alemdar et al., 2014). Deficiency payment for wheat and support for

[30] Data retrieved from Konya Stock Exchange on 25.04.2015, address: http://www.ktb.org.tr/?cat=48

[31] Data on average yields and farm-gate prices were taken from TURKSTAT, date retrieved 08.04.2015, address: http://tuikapp.tuik.gov.tr/tarimsalfiyatapp/tarimsalfiyat_ing.zul

[32] Total support represents the sum of deficiency payments, support for soil analysis, certified seed, fertilizers and diesel payments. Deficiency payment in TL/daa was calculated by multiplying

soil analysis are added to the revenue of the farmers. Other types of support (fertilizers, seed and diesel) are just summed up and added to the total revenues.

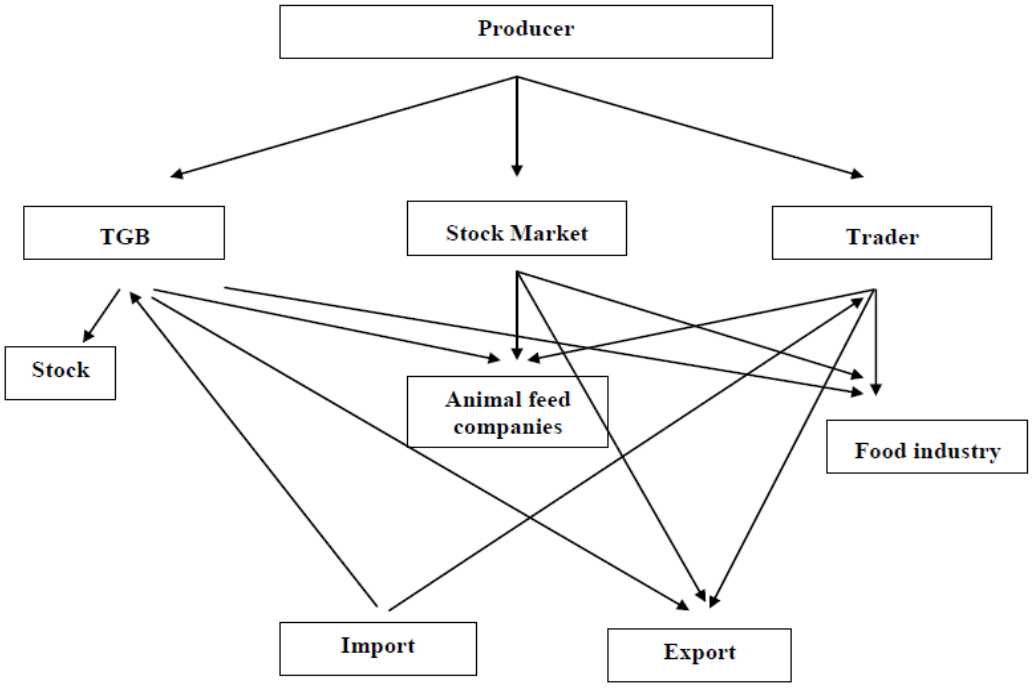


Figure 7.1 Wheat marketing channels in Turkey.

- ***Costs***

General approach for costs calculation is based on a single commodity budget analysis, as only costs related to wheat production were taken into account. Costs of wheat production are separated into variable and fixed costs. Fixed costs include land and administrative cost, while variable costs include: seeds, fertilizers, pesticides, seasonal labour force and machinery costs as well as the interest fee on working capital. For calculation of the costs of wheat production, several activities and machinery used for each activity needs to be considered (Table 7.3)[33].

Average physical inputs and output for wheat production are shown in the Table 7.2. Calculations based on the data on production costs in several regions (Çukurova, Amasya, Eskisehir, Yozgat, Aydın, Tokat and Sivas) indicate that on average 1,81

[33] Alemdar T., Seçer A., Demirdoğen A. Öztornacı B. and Aykanat S., (2014), Main Crop Production Costs and Marketing Structures in Çukurova Region, Agricultural Economic and Policy Development Institute Publication No: 230, P.64

hours per decare of labour force and 1 hour per decare of machinery is necessary for wheat production; farmers on average use 23,74 kg/daa of seed which is higher than the recommended 18 kg/daa (Süzer, 2013).

Table 7.3 Wheat Cultivation Schedule.

I Land preparation	**Timing**	**Machinery used**
Ploughing	September	Plow
1.Harrowing	September	Discs
2.-6. Harrowing	Sept.-Oct.	Discs
Sowing + fertilization	Oct.-Nov.	Tractor & plow (or seeder)
Other		
II Crop Care		
Fertilizers application	March-April	Fertilizer and spreader
Pesticides application	February-April	Rotery atomiser
III Harvest and Threshing		
Harvest	June-July	Harvester
Marketing and transport	August	Trailer

During wheat cultivation farmers usually apply fertilizers in several stages: phosphorus based fertilizers are usually applied before sowing (20-20-0), while nitrogen fertilizers are applied at three-stages during the planting season (after sowing, tillering and jointing). Data on fertilizers consumption in Table 7.4 indicates that fertilizers consumption per decare is also well below the recommended values for Ammonium Nitrate (14-15 kg/daa), within recommended levels for 20-20-0 (20-25 kg/daa), and well above the recommended level for Urea (8-10 kg) for common wheat. For durum wheat Ammonium Nitrate is used two times more to achieve the required level of protein and increase the quality of durum wheat. (Table 7.4) Data for pesticides consumption are not provided in the research done by Alemdar et. al (2014). Therefore another study on the pesticides consumption in wheat production in Konya province performed Özbek and Fidan (2014) reveals that the average active ingredients consumption was 0,48kg/ha which is close to Turkish average (0,47 kg/ha). Pesticides are usually categorized as: herbicides (for crop protection from unwanted plants in the field), fungicides (for crop protection against moulds, rots and pest diseases), and insecticides (for crop protection from damage causing insects). Also, available data on pesticide price in different regions (Çukurova, Amasya, Eskisehir, Yozgat, Aydın, Tokat and Sivas) is taken into consideration for the calculation of the average pesticide costs. Detailed data on pesticides consumption is shown in Table 7.4.

Per unit price of 1,01 TL/kg for seeds is obtained from The Ministry's annual report (2015) on agricultural data. Table 7.5 shows the private prices or costs per unit of inputs and factors employed in wheat production in 2010/11.

Table 7.4 Physical Input-Output

I-O	Quantities	Min Rainfed	Max Rainfed	Irrigated	Durum Wheat
Tradables	**Fertilizer (kg/da)**	**25,95**	**71,1**	**71,1**	**80,7**
	A. Nitrate 26%	0	5,62	5,62	11,24
	A. Nitrate 33%	0	3,98	3,98	7,96
	Urea	0	35,55	35,55	35,55
	20-20-0	0	25,95	25,95	25,95
	Chemicals (kg/da)	**0**	**0,149**	**0,149**	**0,149**
	Herbicides	0	0,09	0,09	0,09
	Insecticides	0	0,039	0,039	0,039
	Fungicides	0	0,02	0,02	0,02
	Seed (kg/da)	**26,4**	**26,4**	**20**	**20**
	Irrigation	**1**	**1**	**1**	**1**
Factors	**Labor (hr/da)**	**1,03**	**1,99**	**3,66**	**3,66**
	Land preparation	0,49	0,91	0,91	0,91
	Sowing + fertilization	0,2	0,2	0,2	0,2
	Fertilizers application	0	0,29	0,29	0,29
	Pesticides application	0	0,25	0,25	0,25
	Irrigation			1,67	1,67
	Harvest and Threshing	0,29	0,29	0,29	0,29
	Transport	0,05	0,05	0,05	0,05
	Capital (Machinery power usage hr/da)	**0,42**	**0,82**	**0,82**	**0,82**
	Land preparation	0,22	0,4	0,4	0,4
	Sowing + fertilization	0,07	0,07	0,07	0,07
	Fertilizers application	0	0,12	0,12	0,12
	Pesticides application	0	0,1	0,1	0,1
	Harvest and Threshing	0,09	0,09	0,09	0,09
	Transport	0,04	0,04	0,04	0,04
	Land	1	1	1	1
Output	(kg/da)	225,75	322,5	446	400

For irrigated common and durum wheat, costs of irrigation are estimated based on the data published at the Republic of Turkey Official Journal for irrigation costs in 2011.[34] Due to complexity of pesticide pricing, total costs for pesticides of 35 kg/daa[35] were taken for computation of total costs.

[34] Data available at http://www.resmigazete.gov.tr/eskiler/2011/10/20111024-10-1.pdf

[35] Wheat production costs and input usage in Tokat, Sivas, Amasya and Yozgat provinces calculated in the research performed by Agricultural Economics And Policy Development Institute (Altıntaş,.

Table 7.5 Private prices

I-O	Quantities	Min Rainfed	Max Rainfed	Irrigated	Durum Wheat
Tradables	**Fertilizer (TL/kg)**				
	A. Nitrate 26%		0,69	0,69	0,69
	A. Nitrate 33%		1,01	1,01	1,01
	Urea		0,81	0,81	0,81
	20-20-0	0,83	0,83	0,83	0,83
	Chemicals (TL/kg)		**35**	**35**	**35**
	Herbicides				
	Insecticides				
	Fungicides				
	Seed (TL/kg)	**1,01**	**1,01**	**1,01**	**1,01**
	Irrigation (TL/daa)			**20,00**	**20,00**
Factors	**Labor (TL/hr)**				
	Land preparation	2,88	3,04	3,04	3,04
	Sowing + fertilization	3,20	3,20	3,20	3,20
	Fertilizers application		3,28	3,28	3,28
	Pesticides application		2,96	2,96	2,96
	Irrigation			4,58	4,58
	Harvest and Threshing	3,97	3,97	3,97	3,97
	Transport	0,80	0,80	0,80	0,80
	Capital (Machinery power usage (TL/hr))				
	Land preparation	116,45	111,03	111,03	111,03
	Sowing + fertilization	85,43	85,43	85,43	85,43
	Fertilizers application		69,83	69,83	69,83
	Pesticides application		78,00	78,00	78,00
	Harvest and Threshing	119,89	119,89	119,89	119,89
	Transport	61,25	61,25	61,25	61,25
	Interest on working capital (%)	**5**	**5**	**5**	**5**
	Land (TL/da)	**27,77**	**27,77**	**62**	**62**
	Administrative costs (%)	**3**	**3**	**3**	**3**
Output	Wheat Price at Farm-Gate (TL/kg)	0,6	0,6	0,6	0,65

For estimation of total costs of production, opportunity costs of working capital need to be considered. Opportunity costs of working capital represent the expected rate of return that would have been earned if the capital was used for any other production activity or investment. Since all of the entries in PAM reflect effects of inflation, by using real interest rates for capital costs estimation these effects would be removed, but only for this item. To reflect the nominal prices of each item in the PAM tables, nominal interest rates are used for determining costs of working capital. Data on nominal interest rate offered by Ziraat Bank of 10% in 2010 was used in calculation.

However, Ministry of Food, Agriculture and livestock supported 50% of the interest rates on credit for crop production, what lowers the interest on working capital to 5%[36].

First raw of the PAM is obtained from Table 7.6 and 7.7 that shows average total costs, revenues and profit at private prices for wheat cultivation in Turkey, for the planting season 2010/2011. Machinery and land represent the most expensive input in the production in both cases of rainfed wheat, while fertilizers contribute for 26,67% of total production costs in case farmers apply necessary crop care activities. Second most expensive input is seed, as Turkey imports most of the seed for wheat cultivation. However, there are significant efforts visible from the support scheme where Ministry tends to increase the domestic production of seeds and consumption of locally produced wheat cultivars. In case the crop care is not performed farmers produce 225,75 kg/daa of wheat with unit costs of 0,58 TL/kg, and in case crop care is performed costs are increased to 0,68 TL/kg; and the increase in costs is compensated by higher wheat yields of 322,5 kg/daa. However it is also obvious that in the case that no support is provided for the farmers maximizing their yields, their profits would be negative. Therefore, fertilizers usage optimization together with lower prices could significantly improve the profitability for this group of farmers. However, if we take a look at the Table7.7, it is observed that costs for durum wheat cultivation are significantly higher due to increase in fertilizers usage to obtain the desired level of quality. Again, in both cases of common and durum irrigated wheat cultivation fertilizers account for more than 20% of total production costs indicating that optimization of fertilizers consumption combined with lower prices could significantly improve the profitability of this type of production. Durum wheat cultivation is also not profitable without a support, while common irrigated wheat production brings a positive income for the farmers engaged in this type of wheat production.

[36] Decision on credit support No 2010/6 published in Official Journal of Republic of Turkey 27477, available at http://www.resmigazete.gov.tr/main.aspx?home=http://www.resmigazete.gov.tr/eskiler/2010/01/20100129.htm&main=http://www.resmigazete.gov.tr/eskiler/2010/01/20100129.htm

Table 7.6 Private prices budget for rainfed wheat

I-O	Quantities	Costs for min yield	% in total costs	Costs for max yield	% in total costs
Tradables	**Fertilizer (TL/da)**	**21,54**	**16,33**	**58,23**	**26,67**
87,424	A. Nitrate 26%	0,00	0,00	3,88	1,78
	A. Nitrate 33%	0,00	0,00	4,02	1,84
	Urea	0,00	0,00	28,80	13,19
	20-20-0	21,54	16,33	21,54	9,86
	Chemicals(TL/da)	**0,00**	**0,00**	**5,22**	**2,39**
	Herbicides		0,00		0,00
	Insecticides		0,00		0,00
	Fungicides		0,00		0,00
	Seed (TL/da)	**26,66**	**20,22**	**26,66**	**12,21**
Factors	**Labor (TL/da)**	**3,24**	**2,46**	**6,29**	**2,88**
143,276	Land preparation	1,41	1,07	2,77	1,27
	Sowing + fertilization	0,64	0,49	0,64	0,29
	Fertilizers application	0,00	0,00	0,95	0,44
	Pesticides application	0,00	0,00	0,74	0,34
	Harvest and Threshing	1,15	0,87	1,15	0,53
	Transport	0,04	0,03	0,04	0,02
	Capital (Machinery power usage (TL/da))	**44,84**	**34,00**	**79,81**	**36,55**
	Land preparation	25,62	19,42	44,41	20,34
	Sowing + fertilization	5,98	4,53	5,98	2,74
	Fertilizers application	0,00	0,00	8,38	3,84
	Pesticides application	0,00	0,00	7,80	3,57
	Harvest and Threshing	10,79	8,18	10,79	4,94
	Transport	2,45	1,86	2,45	1,12
	Interest on working capital (TL/da)	**4,81**	**3,65**	**8,81**	**4,04**
	Administrative costs (TL/da)	**3,03**	**2,30**	**5,55**	**2,54**
	Land (TL/da)	**27,77**	**21,05**	**27,77**	**12,72**
Output	Total revenue from wheat(TL/da)	135,45		193,50	
	Total revenue from animal feed (TL/da)	12,98		12,98	
	Total support for wheat (TL/da)	28,28		33,13	
	Total revenue (TL/da)	176,71		239,61	
	Total costs (excluding land) (TL/da)	104,13		190,57	
	Total costs (including land) (TL/da)	131,90	**100,00**	218,34	**100,00**
	Profit (excluding land) (TL/da)	72,58		49,04	
	Profit (including land) (TL/da)	44,81		21,27	
	Costs (TL/kg)	0,58		**0,68**	

Table 7.7 Private prices budget for irrigated common and durum wheat

I-O	Quantities	Costs for common wheat	% in total costs	Costs for durum wheat	% in total costs
Tradables	**Fertilizer (TL/da)**	**58,23**	**21,14**	**66,13**	**23,28**
95,3216	A. Nitrate 26%	3,88	1,41	7,76	2,73
	A. Nitrate 33%	4,02	1,46	8,04	2,83
	Urea	28,80	10,45	28,80	10,14
	20-20-0	21,54	7,82	21,54	7,58
	Chemicals(TL/da)	**5,22**	**1,89**	**5,22**	**1,84**
	Herbicides		0,00		0,00
	Insecticides		0,00		0,00
	Fungicides		0,00		0,00
	Seed (TL/da)	**20,20**	**7,33**	**20,20**	**7,11**
	Irrigation (TL/da)	**20,00**	**7,26**	**20,00**	**7,04**
Factors	**Labor (TL/da)**	**13,94**	**5,06**	**13,94**	**4,91**
158,792	Land preparation	2,77	1,01	2,77	0,98
	Sowing + fertilization	0,64	0,23	0,64	0,23
	Fertilizers application	0,95	0,34	0,95	0,33
	Pesticides application	0,74	0,27	0,74	0,26
	Irrigation	7,65	2,78	7,65	2,69
	Harvest and Threshing	1,15	0,42	1,15	0,40
	Transport	0,04	0,01	0,04	0,01
	Capital (Machinery power usage (TL/da))	**79,81**	**28,97**	**79,81**	**28,10**
	Land preparation	44,41	16,12	44,41	15,64
	Sowing + fertilization	5,98	2,17	5,98	2,11
	Fertilizers application	8,38	3,04	8,38	2,95
	Pesticides application	7,80	2,83	7,80	2,75
	Harvest and Threshing	10,79	3,92	10,79	3,80
	Transport	2,45	0,89	2,45	0,86
	Interest on working capital (TL/da)	**9,87**	**3,58**	**10,26**	**3,61**
	Administrative costs (TL/da)	**6,22**	**2,26**	**6,47**	**2,28**
	Land (TL/da)	**62,00**	**22,51**	**62,00**	**21,83**
Output	Total revenue from wheat(TL/da)	267,60		260,00	
	Total revenue from animal feed (TL/da)	12,98		12,98	
	Total support for wheat (TL/da)	38,55		37,00	
	Total revenue (TL/da)	319,13		309,98	
	Total costs (excluding land) (TL/da)	213,48		222,02	
	Total costs (including land) (TL/da)	275,48	**100**	284,02	**100**
	Profit (excluding land) (TL/da)	105,65		87,96	
	Profit (including land) (TL/da)	43,65		25,96	
	Costs (TL/kg)	**0,62**		**0,71**	

7.2.2 Social prices for wheat

7.2.2.1 Social prices of production inputs and output

Since Turkey is a net importer of production inputs[37] social prices of these inputs are estimated based on the world prices. For tradable inputs and outputs, unit social prices calculation is based on the CIF[38] (Cost, Insurance and Freight) prices for goods and services that are imported (Monke and Pearson, 1989). Importer bears the costs of customs duty (licence, permission and other administrative costs), unloading and handling of goods at the arrival, and shipping and allocation of goods within the country. The exporter bares the costs of production, packaging, shipping, export duties, delivery to the ship, freight and insurance costs. However CIF prices need to be adjusted to the farm-gate levels, adding the transport and handling costs at the arrival as well as transportation costs during the allocation of goods at the domestic market. Exchange rate used for price adjustment is an annual average exchange rate in 2010 published by Turkish Central Bank. Exchange rate risk premium of 5% estimated in IMF report (Kannan, 2008) was used for adjustment due to risk of exchange rate volatility. Social prices are estimated in order to understand to which extent are domestic prices affected by different government interventions. Adjustment of social prices for tradables (seed, wheat, fertilizers, pesticides and diesel) is given in the APPENDIX 1.

- ***Seeds***

According to General Directorate of Agricultural Enterprises (TIGEM, 2011) report on seed industry in Turkey, domestic seed production meets only 66% of the wheat production demand. Turkey imported 3.434 tonnes of wheat seeds in 2010 (KUDAKA, 2013). Total value of wheat seed imports in 2010 was 1.348.000 USD. By dividing the import value by total import quantity, boarder price was estimated. Import of seeds is free of tariff, only VAT tax of 1% applied in 2010. That is why the private and social prices of seeds differ only for 0,06 TL/kg.

[37] Data on value of agricultural inputs imports and exports is available at FAOSTAT, address: http://faostat.fao.org/site/405/default.aspx

[38] According to OECD Glossary of statistical terms "The c.i.f. price (i.e. cost, insurance and freight price) is the price of a good delivered at the frontier of the importing country, including any insurance and freight charges incurred to that point, or the price of a service delivered to a resident, before the payment of any import duties or other taxes on imports or trade and transport margins within the country.", https://stats.oecd.org/glossary/detail.asp?ID=332

- ***Fertlizers***

Turkey is a net importer of fertilizers, with total value of fertilizer imports of more than 1 bilion USD and exports of 200 million USD in 2010. In 2012 fertilizers import reached 1,4 billion USD, with Ukraine, Russia, Romania, Lithuania and Tunisia as a top five countries of import origins (Deloitte, 2014). CIF price for fertilizers in 2010 was calculated based on data provided by Republic of Turkey State Planning Organization, Ninth Development Plan (2007-2013), Chemicals Industry Special Commission, Fertilizers Working Group report. Social prices were estimated only for Urea and A. Nitrate 33%, as data for other type of fertilizers were not available. In 2010, customs duty applied for fertilizers was 6.5%[39] and VAT tax was 18% which significantly increased the private prices.

- ***Pesticides***

Social prices of different group of pesticides were not calculated due to complex pricing strategy. Due to lack of data on pesticide prices, total amount and value of imports in 2009 were used as a basis for estimation (Union of Turkish Chambers of Agriculture, 2010). Boarder price is thus calculated as 8866,67 USD/tonne. Import is free from customs, however VAT rate applied to pesticides was 8%[40] in 2010. Social prices of pesticides are more than two times lower than the private prices, what probably stems from the high profit margins of the distributors.

- ***Wheat***

Social prices for wheat are calculated based on the average CIF Marmara price for wheat imported from Russia in 2010. Wheat imports are free from customs taxes, only 1% VAT is applied. However import quota of 2.5 million tonnes was in force in 2010.

7.2.2.2 Social prices of factors of production

Estimation of social prices of non-tradable inputs, such as labour, capital and land is the hardest part of the PAM computation. Since non-tradable inputs do not have their world prices, opportunity costs are used for non-tradable inputs' social price estimations. For irrigated farming, social price of water is calculated by multiplying

[39] Historical data available at http://www.gumruk.com.tr/3102.10.10.00.00/detay/----kuru-anhidrit-urun-uz
[40] http://www.gumrukleme.com.tr/sektorel-bilgiler/zirai-ilac-ithalati/

the private costs by two according to Akbay (2003), since no relevant research exists on this matter.

- ***Labour***

Minimum wages can serve as an estimation of the labour opportunity costs. For labour social price estimations, various gender, age and skill groups need to be considered together with possible distortions in labour market caused by government intervention (Monke and Pearson, 1989). One of the main causes of such a distortion is minimum wage. In Turkey, however practice of setting up the minimum wages for agricultural workers is not widespread and most of the agricultural employer does not pay for the employees' social security. Labour in agriculture in Turkey is mostly self-employed subsistent farming (Köse, 2012) and usually no other job alternative due to lack of industrial development in rural areas. In the calculation of social prices of labour conversion factor for shadow wages is used. Opportunity costs of labour vary amongst different occupational groups and geographical regions. In general, opportunity costs of skilled labour or shadow wages are equal to the marginal output of labour under current market wages due to lack of supply (Cengiz and Baydur, 2009). On the contrary, excessive supply of unskilled labour causes the opportunity costs to fall below the market price. Usually the only alternative employment for unskilled labour is unemployment, causing opportunity costs to fall almost to zero. However, due to social security system these opportunity costs rise above the zero levels. Therefore in a system with intervention or market distortions, shadow wages are not represented by market wages. According to Cengiz and Bayduır (2009), in case of perfect competition, alternative cost (shadow wage) of employing one extra person in rural area marginally equals to urban wage. Therefore, if labour is distributed effectively same applies for the marginal cost of labour in urban area. However, labour supply elasticity is not infinite, and in case of deviation from perfect competition, there will not be a market clearing wage, therefore shadow wages will differ from market prices of labour. Shadow wage rate factor is used for estimation of labour social costs. Factor is calculated by dividing shadow wage by the amount of current wage. In practice, this value varies between 0,5-0,8; however Mashayekhi (1980) estimated the conversion factor for social wage in rural areas in Turkey as 0,56; another study done by Ministry of Agriculture and Forestry of Turkey estimated ratio at 0,60 (Bahadır, 2006). In this study the average rate of 0,64

estimated by Bahadır (2006) is used for calculation of labour social costs. It is also worth noting that agriculture accounted for 25,5% of employment with 6.143.000 people employed in agriculture [41]. If each person works 8 hours per day, total 49.144.000 man-hours is employed in agricultural activity. Under the minimum wage of 3,92 TL/hr and total planted area of 81,03 million decares, opportunity costs of working in agriculture instead of any other sector would be 2,38 TL/daa. However, since labour social costs account for 5% of total social costs, the conversion factor of 0,64 is used in the calculations.

- ***Land***

The social cost of land is found by estimation of the net income forgone because the factor is not employed in its best alternative use (Monke and Pearson, 1989). This implies the that if land is used for wheat, it cannot grow any other product during the season; therefore social opportunity cost of the land for the wheat system is thus the net income lost because the land cannot produce other crops (Monke and Pearson, 1989). If farmer can grow crop, and if the prices of that crop were higher, value of land would increase ultimately. Therefore, in estimation of social costs of land, most profitable alternative product is considered. As indicated in Subchapter 5.2.1, most profitable alternative products are: cotton, sunflower, soybean, maize and paddy. Since only dryland farming is considered in this case, cotton does not represent the appropriate alternative crop, as it requires irrigation. Sunflower is more suitable for growing during the summer wet seasons, and is therefore not an alternative for winter wheat. Best possible alternatives would be barley, poppy seeds or canola.

Profits for alternative crops are calculated by multiplying the average price at farm-gate with average yield in 2011 for each crop, for irrigated and rainfed cultivation. (Polat et al., 2013). Calculated profits for rainfed barley, poppy seeds and canola respectively are: 20,25 TL/daa, 7,5 TL/daa and 16 TL/daa. Therefore average net profit forgone by planting wheat in 2010/2011 of 14,6 TL/daa is used as a social cost for rainfed land in PAM computations. Calculated profits for irrigated barley, poppy seeds and canola respectively are: 72 TL/daa, 101,6 TL/daa and 59,5 TL/daa.

[41] The Union of Chambers and Commodity Exchanges of Turkey (TOBB). (2013), Turkey Agricultural Sector Report 2013, ISBN: 978-605-137-388-1, pp.2

Average net profit forgone by planting wheat in 2010/2011 of 77,7 TL/daa is used as a social cost for rainfed land in PAM computations

- ***Capital***

Social prices for capital are represented by its marginal yield. For marginal yield estimation current interest rates and inflation may serve as a basis. However, capital markets are not operating properly in most of the developing countries; therefore instead of current interest rates, international interest rates may serve as an indicator of capital marginal yields. Shadow interest rates for developing countries vary between 10-15% (Monke and Pearson). Social prices of capital in this study are calculated based on the shadow interest rate of 12% estimated by Mashayekhi (1989). Social discount rate for working capital of 5,06 % estimated by Halicioglu and Karatas (2011) was used for estimation of interest rate on working capital.

Calculated unit social prices are presented in Table 7.8. Once the unit price are estimated, total costs of production valued at social prices are calculated multiplying the social unit prices by amount of input quantities used in the wheat production indicated in the previous subchapter (Table 7.4). Total costs and revenues for wheat production system under social prices are shown in Table 7.9 and 7.10. Results show that under social prices land and capital account for more than 60% of the total cost of production for the rainfed cultivation, and 50% for irrigated production. In other words, costs of inputs would decrease for more than 10% if world prices of inputs would prevail. It is important to notice that fertilizers, pesticides and seeds participation in total production costs would be lower under social prices for all cases except the rainfed cultivation with minimum yields. Irrigation now accounts for more than 10% of total costs, due to high value of water in Turkey. In case of irrigated cultivation, due to higher production costs, farmers are earning negative profits under social prices, indicating that the sector cannot survive without government intervention. With the water being precious resource in Turkey, the proper policy could also be to encourage Good Agricultural Practices that could lead to higher yields in rainfed cultivation that also has positive social profits.

Table 7.8 Social prices

I-O	Quantities	Min Rainfed	Max Rainfed	Irrigated	Durum Wheat
Tradables	**Fertilizer (TL/kg)**				
	A. Nitrate 26%		0,66	0,66	0,66
	A. Nitrate 33%		0,57	0,57	0,57
	Urea		0,70	0,70	0,70
	20-20-0	0,83	0,83	0,83	0,83
	Chemicals (TL/kg)		**14,63**	**14,63**	**14,63**
	Seed (TL/kg)	**0,95**	**0,95**	**0,95**	**0,95**
	Irrigation (TL/daa)				
Factors	**Labor (TL/hr)**				
	Land preparation	1,84	1,95	1,95	3,04
	Sowing + fertilization	2,05	2,05	2,05	3,20
	Fertilizers application	0,00	2,10	2,10	3,28
	Pesticides application	0,00	1,89	1,89	2,96
	Irrigation			2,93	2,93
	Harvest and Threshing	2,54	2,54	2,54	3,97
	Transport	0,51	0,51	0,51	0,80
	Capital (Machinery power usage (TL/hr))				
	Land preparation	130,43	124,35	124,35	111,03
	Sowing + fertilization	95,68	95,68	95,68	85,43
	Fertilizers application	0,00	78,21	78,21	69,83
	Pesticides application	0,00	87,36	87,36	78,00
	Harvest and Threshing	134,28	134,28	134,28	119,89
	Transport	68,60	68,60	68,60	61,25
	Land (TL/da)	**14,60**	14,60	77,70	77,70
	Interest on working capital (%)	**5,06**	**5,06**	**5,06**	**5,06**
	Administrative costs (%)	**3**	**3**	**3**	**3**
Output	Wheat Price at Farm-Gate (TL/kg)	0,62	0,62	0,62	0,62

Table 7.9 Social Prices budget for rainfed wheat

I-O	Quantities	Costs for min yield	% in total costs	Costs for max yield	% in total costs
Tradables	**Fertilizer (TL/da)**	**21,54**	**20,73**	**52,40**	**25,96**
77,30	A. Nitrate 26%	0,00	0,00	3,71	1,84
	A. Nitrate 33%	0,00	0,00	2,27	1,12
	Urea	0,00	0,00	24,89	12,33
	20-20-0	21,54	20,73	21,54	10,67
	Chemicals(TL/da)	**0,00**	**0,00**	**2,18**	**1,08**
	Seed (TL/da)	**25,08**	**24,13**	**25,08**	**12,42**
Factors	**Labor (TL/da)**	**2,07**	**2,00**	**4,03**	**1,99**
261,50	Land preparation	0,90	0,87	1,77	0,88
	Sowing + fertilization	0,41	0,39	0,41	0,20
	Fertilizers application	0,00	0,00	0,61	0,30
	Pesticides application	0,00	0,00	0,47	0,23
	Harvest and Threshing	0,74	0,71	0,74	0,36
	Transport	0,03	0,02	0,03	0,01
	Capital (Machinery power usage (TL/da))	**50,22**	**48,33**	**89,39**	**44,28**
	Land preparation	28,69	27,61	49,74	24,64
	Sowing + fertilization	6,70	6,45	6,70	3,32
	Fertilizers application	0,00	0,00	9,39	4,65
	Pesticides application	0,00	0,00	8,74	4,33
	Harvest and Threshing	12,08	11,63	12,08	5,99
	Transport	2,74	2,64	2,74	1,36
	Interest on working capital (TL/da)	**5,00**	**4,82**	**8,76**	**4,01**
	Administrative costs (TL/da)	**3,12**	**2,36**	**5,45**	**2,50**
	Land (TL/da)	**14,60**	**14,05**	**14,60**	**7,23**
Output	Total revenue from wheat (TL/da)	139,97		199,95	
	Total revenue from animal feed (TL/da)	12,98		12,98	
	Total revenue (TL/da)	152,95		212,93	
	Total costs (excluding land) (TL/da)	98,91		187,29	
	Total costs (including land) (TL/da)	103,92	100	201,89	100
	Profit (excluding land) (TL/da)	54,03		25,64	
	Profit (including land) (TL/da)	49,03		11,04	
	Costs (TL/kg)	0,46		0,63	

Table 7.10 Social Prices budget for irrigated wheat

I-O	Quantities	Costs for common wheat	% in total costs	Costs for durum wheat	% in total costs
Tradables	**Fertilizer (TL/da)**	**52,40**	**17,07**	**58,38**	**18,62**
77,30	A. Nitrate 26%	3,71	1,21	7,42	2,37
	A. Nitrate 33%	2,27	0,74	4,54	1,45
	Urea	24,89	8,11	24,89	7,94
	20-20-0	21,54	7,02	21,54	6,87
	Chemicals(TL/da)	**2,18**	**0,71**	**2,18**	**0,70**
	Seed (TL/da)	**19,00**	**6,19**	**19,00**	**6,06**
	Irrigation	**40,00**	**13,03**	**40,00**	**12,76**
Factors	**Labor (TL/da)**	**8,92**	**2,91**	**8,92**	**2,85**
261,50	Land preparation	1,77	0,58	1,77	0,57
	Sowing + fertilization	0,41	0,13	0,41	0,13
	Fertilizers application	0,61	0,20	0,61	0,19
	Pesticides application	0,47	0,15	0,47	0,15
	Irrigation	4,90		4,89	1,56
	Harvest and Threshing	0,74	0,24	0,74	0,23
	Transport	0,03	0,01	0,03	0,01
	Capital (Machinery power usage (TL/da))	**89,39**	**29,12**	**89,39**	**28,52**
	Land preparation	49,74	16,20	49,74	15,87
	Sowing + fertilization	6,70	2,18	6,70	2,14
	Fertilizers application	9,39	3,06	9,39	2,99
	Pesticides application	8,74	2,85	8,74	2,79
	Harvest and Threshing	12,08	3,94	12,08	3,86
	Transport	2,74	0,89	2,74	0,88
	Interest on working capital (TL/da)	**10,72**	**3,89**	**11,02**	**3,88**
	Administrative costs (TL/da)	**6,68**	**2,42**	**6,87**	**2,42**
	Land (TL/da)	**77,70**	**25,31**	**77,70**	**24,79**
Output	Total revenue from wheat(TL/da)	276,52		248,00	
	Total revenue from animal feed (TL/da)	12,98		12,98	
	Total revenue (TL/da)	289,50		260,98	
	Total costs (excluding land) (TL/da)	229,29		235,76	
	Total costs (including land) (TL/da)	306,99	100	313,46	100
	Profit (excluding land) (TL/da)	60,21		25,22	
	Profit (including land) (TL/da)	-17,49		-52,48	
	Costs (TL/kg)	0,69		0,65	

7.2.3 Shortcomings of data

It is important to notice that there are several shortcomings of the data used in this study. There are significant differences between yield data obtained from Turkish Statistical Institute and different studies on wheat production. For example, data on wheat yield in Cukurova region obtained by Alemdar et al. (2014) was 506,29 kg/daa in 2010/2011, data provided by Turkish Statistical Institute for the same season and region was only 302 kg/daa. Major difference stems from the way the data is being collected; TurkStat data represents so called commercial yield data obtained by dividing the total annual production (tonnes) by total area planted (daa), while studies performed by research institute obtain yield data through direct questionnaires and are parcel based and more precise. Reliable data regarding the cost structure (variable inputs, land, labour, capital, and per unit prices of each component) for main wheat growing regions of Southeast and Thrace are not available. Another important distinction should be made based on the size of the farm and parcels. Production costs and quantities differs among small and large farmers, simply because large farmers are able to utilize the economies of scale, and thus reduce the costs per unit of output. Therefore, results obtained in this study are not similarly applicable to each farmer or each region, they rather represent an average approximation in order to reflect on the policy implications on the average farmer in Turkey.

However, Turkish Ministry of Food, Agriculture and Livestock has initiated the Agricultural Monitoring and Information System (TARBIL) that aims to overcome the above stated issues. TARBIL represents one of the most comprehensive agricultural information systems in the world. Project aims at modernizing Turkish agricultural sector, providing real time data and decision support based on data collected from 1200 agro-meteorological stations installed on agricultural fields across Turkey. Within the scope of the project, data on each agricultural production activity and related costs are collected for various crops across all of the 30 agricultural basins. In order to improve the results of this study, data from this project could be utilized, once the TARBIL database on agricultural production costs is formed.

7.3 Policy Analysis Matrix Indicators and Results

Comparison between private and social profitability of wheat cultivation in Turkey is shown in the Table 7.11. Output transfers (I) clearly indicate the distorting domestic policy, as revenues at social prices are lower than the revenues at private prices indicating the strong domestic price supports through deficiency payments, input subsidies as well as trade instruments (quota on wheat in 2010 was 2,5 million tonnes). Obviously, current policy keeps domestic wheat prices above the world prices and thus imposes welfare losses, and together with higher domestic prices of inputs to production makes it difficult for farmers to recover the costs of production. Revenues and profits at private prices include price support and subsidy payments. In case these were subtracted, only first and third case would provide positive profits for farmers under private prices. Only in the case of rainfed cultivation with minimum yields are the social profits higher than the private ones, as no irrigation costs are considered, and fertilizers as a largest contributor to production costs is minimised in this case. For the irrigated cultivation, total costs at private prices are lower mainly due to high social costs of irrigation, as water resources in Turkey are scarce, and opportunity costs of water consumption are high having direct impact on negative social profits for irrigated wheat cultivation. Positive values of divergences for tradable inputs indicate the amount by which specific input was taxed, or by what extent did the levy or import tariff increased the average domestic price for these inputs. Net transfer (L) indicates that the rainfed cultivation may succeed without the subsidy, however irrigated cultivation could not have operated profitably without subsidy, as indicated by negative social profits (H) that also signals inefficient resource allocation. It is therefore concluded that rainfed cultivation with yield maximization through proper crop care is most desirable wheat cultivation in Turkey. However, for this type of production, profitability needs to be increased, as currently the sector is not sustainable without the support.

As shown in Table 7.12, NPC on tradable outputs has shown that in each case policy increased domestic prices of wheat for 3%, 13%, 10% and 19% respectively compared to world wheat prices. PCR ratio is lowest for the first and third case, indicating that farmers are able to afford to pay domestic factors and remain competitive, thanks to the lowest production costs. The same is true for the factors social profitability, as DRC ratio is showing. DRC of durum wheat cultivation

indicates that this case is least socially desirable type of production, as domestic resources are not efficiently allocated and production is not efficient. NPC on tradable inputs indicates that domestic input prices are much higher than the world prices (3%, 13%, 14% and 15% for each case respectively). Negative transfers related to tradable inputs stems mostly from high domestic taxes.

EPC ratio as well explains the effects of policy transfers; in other words value added in private prices is higher than the value added without policy transfers (as measured in world prices). SRP ratio shows level of transfers from divergences as a proportion of the undistorted value of system revenues; distorting policies have increased the revenues of the system by 5%, 21% and 30% for the last three cases; in the first case policy had a positive impact and private profits are lower than the social profits, meaning that policy distortions are minimized. PC ratio indicates that the most profitable choice for farmers is irrigated common wheat cultivation. The results evidenced that the most profitable choice would be to cultivate the irrigated common wheat, however this type of production increases domestic prices of wheat by 13% and domestic prices of inputs by 14%, but is also second most socially desirable type of wheat production in terms of resource allocation. Therefore, the policy supporting wheat production in Turkey should account for the profitability as well as resource allocation efficiency in determining the support levels and type of instruments that causes prices to be higher than the world prices of inputs and outputs of production.

There is also a potential for improvements in the rainfed wheat cultivation. Depending on the rainfall estimation, the policy should encourage the switch from the irrigated to rainfed cultivation, in order to minimize the scarce water resource consumption. However, for the farmers to earn profits from rainfed cultivation, it is necessary to apply Good Agricultural Practices, through fertilizers consumption optimization and other crop care measurements. Next chapter offers a scenario analysis for the rainfed wheat cultivation with yield maximization through variation of different inputs in PAM, with respect to support policy, fertilizers consumption and input prices.

Table 7.11 Policy Analysis Matrix for wheat production in Turkey in 2010/2011.

		Tradable inputs				Domestic Factors					
	Revenues	**Fertilizer**	**Pesticides**	**Seeds**	**Total**	**Labor**	**Capital**	**Land**	**Total**	**Total costs**	**Profit**
Rainfed Min yields											
	A	B				C					D
Private Prices	176,71	21,54	0,00	26,66	48,20	3,24	49,65	27,77	80,66	131,90	44,81
	E	F				G					H
Social Prices	152,95	21,54	0,00	25,08	46,62	2,07	50,22	14,60	66,89	103,92	49,03
	I	J				K					L
Divergences	23,77	0,00	0,00	1,58	1,59	1,17	-0,57	13,17	13,77	27,98	-4,22
Rainfed Max yields											
	A	B				C					D
Private Prices	239,61	58,23	5,22	26,66	90,11	6,29	88,62	27,77	122,68	218,34	21,27
	E	F				G					H
Social Prices	212,93	52,40	2,18	25,08	79,66	4,03	89,39	14,60	108,01	201,89	11,04
	I	J				K					L
Divergences	26,68	5,83	3,04	1,58	10,45	2,26	-0,77	13,17	14,67	16,46	10,22
Irrigated Common											
	A	B				C					D
Private Prices	319,13	58,23	5,22	20,20	83,65	13,94	89,68	62,00	165,62	275,48	43,65
	E	F				G					H
Social Prices	289,50	52,40	2,18	19,00	73,58	8,92	89,39	77,70	176,01	306,99	-17,49
	I	J				K					L
Divergences	29,63	5,83	3,04	1,20	10,07	5,02	0,29	-15,70	-10,39	-31,51	61,14
Irrigated Durum											
	A	B				C					D
Private Prices	309,98	66,13	5,22	20,20	91,54	13,94	90,07	62,00	166,01	284,02	25,96
	E	F				G					H
Social Prices	260,98	58,38	2,18	19,00	79,56	8,92	89,39	77,70	176,01	313,46	-52,48
	I	J				K					L
Divergences	49,00	7,75	3,04	1,20	11,99	5,02	0,69	-15,70	-9,99	-29,43	78,43

Table 7.12 Policy Analysis Matrix Indicators.

Indicator	Rainfed Min Yields	Rainfed Max Yields	Irrigated	Durum
Private cost ratio (PCR): C/(A - B)	0,69	0,92	0,77	0,84
Domestic resource cost ratio (DRC): G/(E - F)	0,71	0,92	0,90	1,07
Nominal protection coefficient on tradable outputs (NPCO): A/E	1,16	1,13	1,10	1,19
Nominal protection coefficient (NPC) on tradable inputs (NPCI): B/F	1,03	1,13	1,14	1,15
Effective protection coefficient (EPC): (A - B)/(E - F)	1,21	1,12	1,09	1,20
Profitability coefficient (PC): (A - B - C)/(E - F - G)	1,28	1,13	2,39	-2,86
Subsidy ratio to producers (SRP): L/E	-0,03	0,05	0,21	0,30

7.4 Sensitivity Analysis

Sensitivity analysis is performed through variation of the inputs in PAM matrix for rainfed wheat cultivation with maximum yield, since almost 80% of wheat in Turkey is cultivated without irrigation. Since prices of tradable inputs are obviously higher than the world prices, as an effect of subsidy, it is interesting to examine the effect of lowering the prices of production inputs on the profitability and competitiveness. Decreasing the prices of output, ceteris paribus, would negatively affect the already low profit levels, therefore changes of output prices were not considered. Since in the case of rainfed wheat cultivation with maximum yield, profits without subsidy turn to be negative, it is important to analyse the impact of different types of agricultural support measures. Three different scenarios were considered:

a) Lower input prices

b) Increase in production output caused by higher fertilizers consumption

c) Removal of price support and input subsidies and introduction of decoupled area payments

Calculations for each scenario are given in APPENDIX B.

7.4.1 Effects of input price change

In order to increase the profitability of wheat cultivation, prices of production inputs should be significantly lower. In this scenario 20% decrease in variable input costs (fertilizers, pesticides, seed) was considered. Table 7.13 illustrates the effect of a variation of prices on profitability. Excluding land, farmers would earn positive profits of 65,41 TL/daa (Table B.2), farmers earn profits even if the support is deducted from the total revenues; however competitiveness of sector is decreased to some extent, as indicated by PCR ratio. As expected, positive results are obtained for NPC on tradable inputs. Positive divergence effects for fertilizers and seeds are noticed, however no improvement in comparative advantage was observed. In this case subsidy ratio increased, indicating that this policy would have increased the revenues of the system by 14%.

Table 7.13 PAM indicators for decrease in costs of tradables.

Indicator	Value
Private cost ratio (PCR): C/(A - B)	0,82
Domestic resource cost ratio (DRC): G/(E - F)	0,94
Nominal protection coefficient on tradable outputs (NPCO): A/E	1,13
Nominal protection coefficient (NPC) on tradable inputs (NPCI): B/F	0,90
Effective protection coefficient (EPC): (A - B)/(E - F)	1,27
Profitability coefficient (PC): (A - B - C)/(E - F - G)	4,01
Subsidy ratio to producers (SRP): L/E	0,14

7.4.2 Effects of increase in production output

Wheat production in Turkey yields very low outputs, compared to the top producers in the world, and yet somehow Turkey manages to be self-sufficient in wheat production. If Turkish farmers could increase the average output per decare of land employed in production, domestic needs for wheat could be met. Apart from that exports could be increased or more efficient resource allocation could be introduced. Turkey could reduce the area for wheat cultivation and allocate the resources to more profitable crops. In order to increase the output, Turkey could encourage wheat cultivation in places with more favourable climate, or on the irrigated land. Another possible solution would be to optimize fertilizer consumption since fertilizers are responsible for 30-50% of agricultural yields (Roberts, 2009). Fertilizers consumption in Turkey is still below the average consumption in the world and amongst major wheat producer countries. However, as already stated in Chapter 5, Subchapter 5.2 of this study, unbalanced usage of fertilizers in wheat production exists. While in dry conditions recommended quantity of Ammonium Sulphate is 20-25 kg/daa, Urea 8-10 kg/daa and Ammonium Nitrate 14-15 kg/daa (Süzer, 2013), study performed in Çükürova region (Alemdar et al., 2014) revelas that farmers use total 9,6 kg/daa of A. Nitrate, 35,55 kg/daa of Urea while no information on A. Sulphate was provided. According to World Bank fertilizers consumption database[42], Turkey consumed around 33% less fertilizers per hectare than the world's average. Therefore in this scenario, 30% increase in Amonium Nitrate and 20-20-0 complex fertilizers and 30% decrease in Urea consumption is introduced together with respective 20% increase in wheat yields. Average wheat yields would therefore go from 322,5 kg/daa to 419,25 kg/daa. Under this scenario, assuming the same support

[42] http://data.worldbank.org/indicator/AG.CON.FERT.ZS/countries/1W-TR?display=graph

program, farmers would start earning much higher profits of 75,21 TL/daa, and 42 TL/daa without the support. Fertilizers now participate in total production costs with high 26,26% (Table B.6). PAM indicators are summarized in Table 7.14. Prices of output would now be 9% higher than the social prices of wheat, and NPC on tradable inputs also falls by 1% indicating that policy would decrease the prices of inputs, mainly due to lower demand for Urea fertilizer consumption. Distorting policies' effects on revenue is decreased to 3% as indicated by SRP ratio. Net impact of government policy influencing product markets-that is, output price policy and tradable-input price policy-is to allow the wheat system depicted to have a value added in private prices fell from 12% in the original scenario to 8% greater than the value added without policy transfers (as measured in world prices). Negative effects of distorting policies are therefore reduced under this scenario.

Table 7.14 PAM indicators for increase of wheat yields.

Indicator	**Value**
Private cost ratio (PCR): C/(A - B)	0,68
Domestic resource cost ratio (DRC): G/(E - F)	0,65
Nominal protection coefficient on tradable outputs (NPCO): A/E	1,09
Nominal protection coefficient (NPC) on tradable inputs (NPCI): B/F	1,12
Effective protection coefficient (EPC): (A - B)/(E - F)	1,08
Profitability coefficient (PC): (A - B - C)/(E - F - G)	1,00
Subsidy ratio to producers (SRP): L/E	0,03

7.4.3 Effects of input subsidies and price support removal

Turkish agricultural policy has been criticized for its inefficiency and distorting effects (Köse, 2012). Reforms undertaken by Turkish government have not yield fruitful results, at least for wheat cultivating farmers. DIS introduction between 2001-2008 have not been the brightest period in the agricultural history of Turkey, and it was abandoned as if it was never introduced. There was a radical shift from price supports to direct payments, and system's structure itself was not clear with respect to amount and timeline of payments (Çetin, 2010). However, Turkey will have to eventually introduce direct income payments if it aims to fulfil its commitments to WTO and harmonization with EU's CAP requirements. Hopefully, this time lessons learned from 2001-2008 would serve in future policy designs and management. For this purpose a simple scenario of DIS introduction is simulated by

introducing the decoupled area payment. Data on area payment under the old Single Area Payment Scheme for new members is used. Average payment in EUR/hectare under new Basic Payment Scheme in EU will be reformed in order to close the gap between farmers who receive more than 400 Euros per hectare and those below 200 Euros, to reach a national or regional average between 200 and 400 EUR/ha by 2019[43]. If we assume that average payment in 2010 was 300 EUR/ha, and given the examples of Poland or Bulgaria, in the first phase only 25% of DIS payments would be received by new member states. For the purpose of the DIS introduction scenario analysis, approximation of 25% of average per hectare area payment is used. However, this time complete abolishment of input subsidies and price support is not applied; instead 30% reduction of price supports and input subsidies is introduced, together with area payments of 15TL/daa. Percentage decrease is calculated based on the support amounts indicated in Table 7.2 and is equal to 23,2 TL/daa. Therefore total amount of support received by farmers under this scenario equals 38,2 TL/daa. Results are summarized in the Table 7.15. Under this scenario farmers are earning profits of 27,58 TL/daa that represents improvement compared to original 21,27 TL/daa, however sector still cannot survive without the support. Profitability and competitiveness of sector is slightly decreased compared to the original case, However, since the analysis covers single commodity system, in case farmers would produce any other commodity as a second product, it should be added to the costs of production and see how it would affect net profits. DRC is increased, and indicates higher social losses than the original case.

Table 7.15 Effects of Direct Income Support introduction.

Indicator	**Value**
Private cost ratio (PCR): C/(A - B)	0,88
Domestic resource cost ratio (DRC): G/(E - F)	0,94
Nominal protection coefficient on tradable outputs (NPCO): A/E	1,15
Nominal protection coefficient (NPC) on tradable inputs (NPCI): B/F	1,07
Effective protection coefficient (EPC): (A - B)/(E - F)	1,20
Profitability coefficient (PC): (A - B - C)/(E - F - G)	2,55
Subsidy ratio to producers (SRP): L/E	0,09

[43] http://www.arc2020.eu/wp-content/uploads/2013/09/ARC-Toolkit-21.pdf

Domestic wheat prices would be 15% higher than the world prices, what represents a 2 percentage point increase in prices compared to the original case, indicating that higher prices would compensate the cuts in the input subsidies. Domestic prices of inputs would be 7% higher than the world prices, what represents a significant improvement compared to the 13% in the original case of rainfed wheat cultivation with maximum yield.

According to data on agricultural support provided by The Ministry[44] Turkey spent 4.959,7 million TL on crop support program through price support and production coupled payments in 2010/2011. Under the estimation that 50% of area sown[45] is under wheat cultivation, we may roughly approximate total support for wheat in 2010/2011 to 2.500,00 million TL. If we assume the 30% cut in the distorting policy scheme, it would fall down to 1.250,00 million TL. In case the production decoupled average area payment of 15 TL/daa is introduced, it would require additional 1.215,51 million TL[46] for new support scheme. Total support would now be 2465,51 million TL, with 35,49 million TL saved in the annual budget.

[44] Republic of Turkey Ministry of Food, Agriculture and Livestock General Directorate of Crop Production (2014), Annual Report

[45] Author's calculation based on data provided by TURKSTAT on total area sown in crop production and area sown for wheat.

[46] Value is obtained by multiplying average area payment by total area planted for wheat cultivation in 2010/2011

8. CONCLUSION

Studies on policy evaluation with respect to specific crops have gain the importance in the world, in order to justify high public spending on the agricultural sector. However, studies evaluating current agricultural policy for wheat and other cereals as a major crop products in Turkey, especially after the latest reform in 2010 and reintroduction of input subsidies and price supports are few in number. The thesis addresses important issues related to current agricultural policy efficiency and its effects on competitiveness of wheat production sector in Turkey. Relatively low productivity together with high prices of production inputs negatively affects Turkish farmers, especially small undeveloped farms in remote areas. Need for agricultural reform is evident from the data presented in the study. Hence, frequent ad hoc changes need to be replaced with long-term strategy that would consider removal of distorting policy instruments and allow for resource allocation driven by market forces. Increase in agricultural spending by means of most distorting policy – price supports and input subsidies- did not yield any fruitful results throughout the history. Agricultural output in wheat production in Turkey has not changed significantly in the last twenty years; with yields almost two times lower than the EU's average. Yet, Turkey manages to be amongst world's top ten wheat producers in terms of net value and is self-sufficient despite its low productivity. This implies that there is a huge potential in agricultural sector in Turkey, only if the resources are allocated efficiently.

In Turkey with only 24,1% of agricultural land being irrigated and reaching almost 65% of irrigation potential, wheat production depends on rainfall and general weather conditions. This is also the main reason for variation in yield and total production, as well as the overall import quantities. In case of bad weather conditions government tries to cushion the effects by increasing prices, therefore creating a large gap between domestic and world prices. Usually food processing industry and consequently consumers in the end of supply chain bear the costs of such policy.

However, despite input subsidies and high prices, farmers are earning low profits, indicating that the sector can not survive without the government intervention. Since only single commodity budget was considered in this study, profit generation and costs incurred from producing second or third commodity were not included in the analysis.

Data used in this study is based on estimated average parameters on wheat production in Turkey in general. Therefore production costs and revenues represent average value for Turkey, without considering regional disparities, and are accordingly not representing equally low and high yield areas, or areas with production costs lower or higher than the average in the study. Since there are large disparities amongst different regions with respect to input prices, transportation costs, production, climate and soil characteristics, more detailed study that would take these factors into consideration is needed in the future. It is important to note that results are not intended to be used for official policy settings, but rather to point out the implications of current wheat support policy in Turkey on farmers and social welfare and should be regarded accordingly. Four different cases of wheat cultivation are considered in the study: rainfed with minimum and maximum yield, depending on the levels of crop care activities, irrigated common and durum wheat production.

Results obtained within Policy Analysis Matrix analysis of wheat production indicate competitiveness of rainfed wheat with low yields due to lower production costs that stems from the low employement of resources for the crop care. Relatively low comparative advantage of wheat production in Turkey stems mainly from input costs and output prices higher than in the major wheat producers in the world. Amongst the four different types of wheat cultivation, rainfed cultivation with minimum yields is most competitive due to lowest production costs; however best performer is certainly irrigated common wheat cultivation with high private profits, but negative social profitability due to high opportunity costs of scarce water resources in Turkey. Depending on the estimated weather conditions, especially estimated rainfall, agricultural policymakers need to adjust the policy measurements to obtain the most profitable solution that would establish the balance between the area dedicated for rainfed and irrigated wheat production. Durum wheat cultivation in Turkey under the conditions prevailing in 2010/11 season had negative social profitability, again due to high costs of irrigation. Support is necessary for farmers to recover the costs of

production. Improvements in durum wheat cultivation could be reached by fertilizers usage optimization and water productivity to reach the maximum quality levels that would immediately yield higher output prices, and enable farmers to earn higher margins.

Scenario analysis is performed for the rainfed wheat with maximum yield performance, since this type of cultivation is most common in Turkey. Results indicate that most significant improvements can be achieved by increasing the agricultural yields and lowering the domestic input prices. This would imply tax reliefs in forms of lower tax rates and import tariffs for major inputs in agricultural production. If distorting policies were to be removed, prices would naturally converge to the world price levels, therefore decreasing the costs of production and prices paid by consumers of agricultural outputs.

Results of the study are in line with the argument of inefficient resource allocation that imposes welfare losses to society. Wheat cultivation is supported in every region in Turkey even though neither climate nor soil characteristics allow for efficient production in each of the 30 agricultural basin, what is also reflected through large variations in yield performances across the country. However, as a result of climate in Turkey wheat is grown in dry marginal rainfed areas, yield improvements are possible through improved agronomic management practices that imply fertilizer usage efficiency and irrigation optimization. Another possibility could be production of more efficient crops; less water consuming crops such as barley, soybean or maize[47] could be produced as an alternative to wheat production.

Scenarios simulated in PAM sensitivity analysis in the study have shown that by lowering the production input costs by 20% would yield positive results, and farmers would start earning much higher margins, sector could survive without the government intervention. In the second scenario case yields would increase through fertilizer usage optimization, and under this scenario farmers would be best off, with profits increased more than 3 times compared to the original case. Sector's competitiveness and comparative advantage is also significantly improved. Second scenario also yields positive results regarding the prices of output that would now be

[47] According to FAO barley, maize and soybean have respectively 450-650, 500-800 and 450-700 mm/total growing period water needs, that is lower than the high quality wheat water needs of 800-1600 mm. Data is available at http://www.fao.org/docrep/s2022e/s2022e02.htm

9% higher than the social prices of wheat, and NPC on tradable inputs also falls by 1%. Distorting policies' effects on revenue is decreased by 2% as indicated by SRP ratio.

Third scenario on introduction of DIS payments together with cuts in input subsidies and price supports, does not have any impact on production efficiency and competitiveness of the sector in the short run. However, it does provide budget savings of 35,5 million TL, that could be channelled to investments into infrastructure, education system or rural development, and yield positive results in the long run. Introduction of direct income support instead of distorting policy instrument would have to take place eventually if Turkey is to fulfil its commitments to WTO and harmonization with EU's CAP requirements. However, with respect to the mistakes made and lessons learned during the ARIP program, Turkey would have to consider smoother transition to new support scheme. Slow departure from old support scheme would imply the reduction of price supports and input subsidies in the first phase, together with direct income support to cushion the effects of the reduced subsidies. In general, if farmers are to stay in the agriculture, agricultural policymakers need to establish a sector able to provide higher incomes in rural areas in order to close the gap between agriculture, industrial and service sector, and thus prevent farmers from exiting. Eventually, abolishment of distorting policy instruments and introduction of direct income payments could be preferred to accomplish both higher incomes in the country, and to strengthen its international trade relationships by reducing distortions and moving to more transparent agricultural policy. Main conclusions derived from the study can be summarized as follows:

- Turkey represents a semi-arid region where wheat cultivation is mostly rainfed, therefore production depends on weather conditions, especially rainfall. However, with the climate changes negatively affecting wheat production, it is expected that general agricultural yields would decrease by 15-25%[48] due to global climate changes. Since Turkey already utilises 65%

[48] ÇŞB, 2012.Türkiye'de İklim Değişikliğinin Tarım ve Gıda Güvencesine Etkileri. Türkiye'nin İklim Değişikliği II. Ulusal Bildiriminin Hazırlanması Projesi Yayını, 34 sf. http://www.tr.undp.org/content/dam/turkey/docs/projectdocuments/EnvSust/UNDP-TR-SNC-Tarim%20ve%20Gida%20Guvencesi.pdf

of its economically irrigable land, it will therefore be necessary to increase the water productivity in terms of higher yields per unit of water consumed.

- It is therefore necessary to increase the productivity of the rainfedwheat cultivation through optimized fertilizers consumption and improved managerial practices.
- Applying the good agricultural practices should be preferred, as it is proven that sustainable agricultural practices (efficient water use, reduced pesticide use, improvement in organic matter accumulation and carbon sequestration, fertilizers usage optimization etc) have substantial impact on increased yield performances[49].
- Decrease in costs of production inputs is necessary to enable farmers to earn higher profit margins, and to reduce their dependency on price supports and input subsidies. In case of unfavourable weather conditions, effects of lowering the levels of distorting measures could be cushioned through DIS.

However, scenario analysis indicates the huge potential for improvements in both cost and productivity optimization. It is worth mentioning that Turkey does put an effort in strengthening its agricultural sector through infrastructural investments, however largest part of agricultural spending is still in form of most distorting policy instruments that obviously did not foster growth agricultural output. Low profitability especially in crop production is a negative incentive that may only force farmers to exit the sector. Hence, if Turkey is to move closer to integration to EU and its agricultural policy, a noteworthy transformation of agricultural sector needs to be accomplished. Otherwise, European taxpayers would bear the costs of Turkish agricultural inefficiency, and that is a compromise that EU is not willing to meet. Therefore, first and most important goal of Turkish agriculture has to be higher productivity, measured as output per unit of area employed in agricultural production. Higher agricultural yields can be achieved through investments in new technologies, encouraging more efficient usage of fertilizers and educating its farmers on more efficient production processes and managerial practices. Statistical data on fertilizers consumption show that Turkish farmers use more than three time lower amount of fertilizers, measured by kg/daa compared to major agricultural

[49] http://ec.europa.eu/environment/integration/research/newsalert/pdf/8na3_en.pdf

producers in the World. However, in case fertilizers consumption in Turkey increases, if prices do not fall or at least equal to the world prices, input costs would increase dramatically, and any increase in yield performance would not be able to cushion such effects. Therefore, means to lower the input prices through tax and tariff reliefs should be put in force if production efficiency is to be achieved.

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APPENDICES

APPENDIX A: Adjustment of international prices to farm-gate level

Table A.1 Adjustment of International Prices of Wheat to Farm-gate Level.

CIF Marmara ($/ton)*	191,6
Exchange rate (TL/$)	1,5376
Exchange rate premium (%)	5%
Equilibrium exchange rate (TL/$)	1,61448
CIF Marmara in domestic currency (TL/ton)	309,3343
Weight conversion factor (kg/ton)	1000
CIF Marmara in dom. curr. and weigh units (TL/kg)	0,3093
Transportation and handling costs to wholesale market (TL/kg)	0,28
Import parity value (TL/kg)	0,59
Distribution costs to farm (TL/kg)	0,033
Import parity value at farm gate (TL/kg)	0,62

* CIF price of imported wheat from Russia (Url-21)

Table A.2 Adjustment of International Prices of Fertilizer to Farm-gate Level*.

	A. Nitrate 33%	**Urea**
CIF Marmara ($/ton)**	162,2	238,56
Exchange rate (TL/$)	1,5376	1,5376
Exchange rate premium (%)	5%	5%
Equilibrium exchange rate (TL/$)	1,61448	1,61448
CIF Marmara in domestic currency (TL/ton)	261,87	385,15035
Weight conversion factor (kg/ton)	1000	1000
CIF Marmara in dom. curr. and weigh units (TL/kg)	0,2619	0,3852
Transportation and handling costs to wholesale market (TL/kg)	0,28	0,28
Import parity value (TL/kg)	0,54	0,67
Distribution costs to farm (TL/kg)	0,033	0,033
Import parity value at farm gate (TL/kg)	0,57	0,70

* Prices for A. Nitrate 26% and 20-20-0 were not available

** Price estimated in report on chemicals industry published by Republic of Turkey State Planning Organization, Ninth Development Plan (2007-2013), Chemicals Industry Special Commission, Fertilizers Working Group

Table A.3 Adjustment of International Prices of Seed to Farm-gate Level.

CIF Marmara ($/ton)*	392,5
Exchange rate (TL/$)	1,5376
Exchange rate premium (%)	5%
Equilibrium exchange rate (TL/$)	1,61448
CIF Marmara in domestic currency (TL/ton)	633,6834
Weight conversion factor (kg/ton)	1000
CIF Marmara in dom. curr. and weigh units (TL/kg)	0,6337
Transportation and handling costs to wholesale market (TL/kg)	0,28
Import parity value (TL/kg)	0,91
Distribution costs to farm (TL/kg)	0,033
Import parity value at farm gate (TL/kg)	0,95

*Northeast Anatolia Development Agency,(2013) Seeds Industry Report

Table A.4 Adjustment of International Prices of Pesticides to Farm-gate Level.

CIF Boarder Price ($/ton)	8866,67
Exchange rate (TL/$)	1,5376
Exchange rate premium (%)	5%
Equilibrium exchange rate (TL/$)	1,61448
CIF Marmara in domestic currency (TL/ton)	14315,06
Weight conversion factor (kg/ton)	1000
CIF Marmara in dom. curr. and weigh units (TL/kg)	14,3151
Transportation and handling costs to wholesale market (TL/kg)	0,28
Import parity value (TL/kg)	14,60
Distribution costs to farm (TL/kg)	0,033
Import parity value at farm gate (TL/kg)	14,63

Table A.5 Estimated transportation costs at domestic market.

Transportation and handling costs:		TL	KDV %18	TL/ton	TL/kg	TL/l
100km	12USD+KDV	15,38	2,77	18,14	0,02	0,02
200km	20USD+KDV	30,75	5,54	36,29	0,04	0,03
300km	25USD+KDV	38,44	6,92	45,36	0,05	0,034
			Average	33,26	0,03	0,03

Author's own calculations based on interviews with transport companies in Turkey, data retrieved between 05.-10.04.2015

Table A.6 Estimated transportation and handling costs at the port*.

	USD	TL
Local costs at the port (based on quantity of 10m^3)	230	353,648
Documents fee	200	307,52
Transportation	220	338,272
Total	650	999,44
$10m^3$=3,5314 tonnes = 3531,4 kg		
Transportation and handling costs (TL/kg)		0,28

*Author's own calculations based on interviews with transport companies in Turkey, data retrieved between 05.-10.04.2015

APPENDIX B: PAM Scenario Analysis

Table B.1 Scenario 1: Decrease in input price of tradables by 20%, private prices.

I-O	Quantities	
Tradables	**Fertilizer (TL/kg)**	
	A. Nitrate 26%	0,552
	A. Nitrate 33%	0,808
	Urea	0,648
	20-20-0	0,664
	Chemicals (TL/kg)	**28**
	Herbicides	0
	Insecticides	0
	Fungicides	0
	Seed (TL/kg)	**0,808**
Factors	**Labor (TL/hr)**	
	Land preparation	3,04
	Sowing + fertilization	3,20
	Fertilizers application	3,28
	Pesticides application	2,96
	Harvest and Threshing	3,97
	Transport	0,80
	Capital (Machinery power usage (TL/hr))	
	Land preparation	111,03
	Sowing + fertilization	85,43
	Fertilizers application	69,83
	Pesticides application	78,00
	Harvest and Threshing	119,89
	Transport	61,25
	Interest on working capital (%)	**5**
	Land (TL/da)	**27,77**
	Administrative costs (%)	**3**
Output	Wheat Price at Farm-Gate (TL/kg)	0,6

Table B.2 Scenario 1: Decrease in input price of tradables by 20%, private prices budget.

I-O	Quantities	Costs	% in total costs
Tradables	**Fertilizer (TL/da)**	**46,59**	**23,07**
74,973	A. Nitrate 26%	3,10	1,54
	A. Nitrate 33%	3,22	1,59
	Urea	23,04	11,41
	20-20-0	17,23	8,53
	Chemicals(TL/da)	**4,17**	**2,07**
	Herbicides		0,00
	Insecticides		0,00
	Fungicides		0,00
	Seed (TL/da)	**24,22**	**11,99**
Factors	**Labor (TL/da)**	**6,29**	**3,11**
126,997	Land preparation	2,77	1,37
	Sowing + fertilization	0,64	0,32
	Fertilizers application	0,95	0,47
	Pesticides application	0,74	0,37
	Harvest and Threshing	1,15	0,57
	Transport	0,04	0,02
	Capital (Machinery power usage (TL/da))	**79,81**	**39,52**
	Land preparation	44,41	21,99
	Sowing + fertilization	5,98	2,96
	Fertilizers application	8,38	4,15
	Pesticides application	7,80	3,86
	Harvest and Threshing	10,79	5,34
	Transport	2,45	1,21
	Interest on working capital (TL/da)	**8,05**	**3,99**
	Administrative costs (TL/da)	**5,07**	**2,51**
	Land (TL/da)	**27,77**	**13,75**
Output	Total revenue from wheat(TL/da)	193,50	
	Total revenue from animal feed (TL/da)	12,98	
	Total support for wheat (TL/da)	33,13	
	Total revenue (TL/da)	239,61	
	Total costs (excluding land) (TL/da)	174,20	
	Total costs (including land) (TL/da)	201,97	**100,00**
	Profit (excluding land) (TL/da)	65,41	
	Profit (including land) (TL/da)	37,64	
	Profit excluding land and support	**32,28**	

Table B.3 Scenario 1: Decrease in input price of tradables by 20%, PAM.

	Revenues	Tradable inputs				Domestic Factors				Total costs	Profit
		Fertilizer	Pesticides	Seeds	Total	Labor	Capital	Land	Total		
Private Prices	A	B				C					D
	239,61	46,59	4,17	24,22	74,97	6,29	87,86	27,77	121,92	201,97	37,64
Social Prices	E	F				G					H
	212,93	52,40	2,18	28,47	83,05	4,03	89,39	14,60	108,01	205,56	7,37
Divergences	I	J				K					L
	26,68	-5,82	1,99	-4,26	-8,08	2,26	-1,52	13,17	13,91	-3,59	30,27

Table B.4 Scenario 2: Increase in fertilizers consumption by 30% and wheat yields by 20%, physical input-output.

I-O	Quantities	
Tradables	**Fertilizer (kg/da)**	**71,1**
	A. Nitrate 26%	7,306
	A. Nitrate 33%	5,174
	Urea	24,885
	20-20-0	33,735
	Chemicals (kg/da)	**0,149**
	Herbicides	0,09
	Insecticides	0,039
	Fungicides	0,02
	Seed (kg/da)	**29,97**
Factors	**Labor (hr/da)**	**1,99**
	Land preparation	0,91
	Sowing + fertilization	0,2
	Fertilizers application	0,29
	Pesticides application	0,25
	Harvest and Threshing	0,29
	Transport	0,05
	Capital (Machinery power usage hr/da)	**0,82**
	Land preparation	0,4
	Sowing + fertilization	0,07
	Fertilizers application	0,12
	Pesticides application	0,1
	Harvest and Threshing	0,09
	Transport	0,04
	Land	1
Output	(kg/da)	419,25

Table B.5 Scenario 2: Increase in fertilizers consumption by 30% and wheat yields by 20%, private unit prices.

I-O	Quantities	
Tradables	**Fertilizer (TL/kg)**	
	A. Nitrate 26%	0,69
	A. Nitrate 33%	1,01
	Urea	0,81
	20-20-0	0,83
	Chemicals (TL/kg)	**35**
	Herbicides	
	Insecticides	
	Fungicides	
	Seed (TL/kg)	**1,01**
Factors	**Labor (TL/hr)**	
	Land preparation	3,04
	Sowing + fertilization	3,20
	Fertilizers application	3,28
	Pesticides application	2,96
	Harvest and Threshing	3,97
	Transport	0,80
	Capital (Machinery power usage (TL/hr))	
	Land preparation	111,03
	Sowing + fertilization	85,43
	Fertilizers application	69,83
	Pesticides application	78,00
	Harvest and Threshing	119,89
	Transport	61,25
	Interest on working capital (%)	**5**
	Land (TL/da)	**27,77**
	Administrative costs (%)	**3**
Output	Wheat Price at Farm-Gate (TL/kg)	0,6

Table B.6 Scenario 2: Increase in fertilizers consumption by 30% and wheat yields by 20%, private prices budget.

I-O	Quantities	Costs	% in total costs
Tradables	**Fertilizer (TL/da)**	**58,42**	**26,26**
93,9085	A. Nitrate 26%	5,04	2,27
	A. Nitrate 33%	5,23	2,35
	Urea	20,16	9,06
	20-20-0	28,00	12,59
	Chemicals(TL/da)	**5,22**	**2,34**
	Herbicides		0,00
	Insecticides		0,00
	Fungicides		0,00
	Seed (TL/da)	**30,27**	**13,61**
Factors	**Labor (TL/da)**	**6,29**	**2,83**
128,541	Land preparation	2,77	1,25
	Sowing + fertilization	0,64	0,29
	Fertilizers application	0,95	0,43
	Pesticides application	0,74	0,33
	Harvest and Threshing	1,15	0,52
	Transport	0,04	0,02
	Capital (Machinery power usage (TL/da))	**79,81**	**35,88**
	Land preparation	44,41	19,96
	Sowing + fertilization	5,98	2,69
	Fertilizers application	8,38	3,77
	Pesticides application	7,80	3,51
	Harvest and Threshing	10,79	4,85
	Transport	2,45	1,10
	Interest on working capital (TL/da)	**9,00**	**4,05**
	Administrative costs (TL/da)	**5,67**	**2,55**
	Land (TL/da)	**27,77**	**12,48**
Output	Total revenue from wheat(TL/da)	251,55	
	Total revenue from animal feed (TL/da)	12,98	
	Total support for wheat (TL/da)	33,13	
	Total revenue (TL/da)	297,66	
	Total costs (excluding land) (TL/da)	194,68	
	Total costs (including land) (TL/da)	222,45	**100,00**
	Profit (excluding land) (TL/da)	102,98	
	Profit (including land) (TL/da)	75,21	
	Profit excluding land and support	**69,85**	

Table B.7 Scenario 2: Increase in fertilizers consumption by 30% and wheat yields by 20%, PAM.

	Revenues	Tradable inputs				Domestic Factors				Total costs	Profit
		Fertilizer	Pesticides	Seeds	Total	Labor	Capital	Land	Total		
Private Prices	A	B				C					D
	297,66	58,42	5,22	30,27	93,91	6,29	88,81	27,77	122,87	222,45	75,21
Social Prices	E	F				G					H
	272,92	53,19	2,18	28,47	83,84	4,03	89,39	14,60	108,01	206,41	66,50
Divergences	I	J				K					L
	24,74	5,23	3,04	1,80	10,07	2,26	-0,58	13,17	14,86	16,04	8,71

Table B.8 Scenario 3: Introduction of DIS Payments, private prices budget.

I-O	Quantities	Costs	% in total costs
Tradables	**Fertilizer (TL/da)**	**53,48**	**24,63**
88,9647	A. Nitrate 26%	3,88	1,79
	A. Nitrate 33%	4,02	1,85
	Urea	28,80	13,26
	20-20-0	21,54	9,92
	Chemicals(TL/da)	**5,22**	**2,40**
	Herbicides		0,00
	Insecticides		0,00
	Fungicides		0,00
	Seed (TL/da)	**30,27**	**13,94**
Factors	**Labor (TL/da)**	**6,29**	**2,90**
128,138	Land preparation	2,77	1,28
	Sowing + fertilization	0,64	0,29
	Fertilizers application	0,95	0,44
	Pesticides application	0,74	0,34
	Harvest and Threshing	1,15	0,53
	Transport	0,04	0,02
	Capital (Machinery power usage (TL/da))	**79,81**	**36,76**
	Land preparation	44,41	20,46
	Sowing + fertilization	5,98	2,75
	Fertilizers application	8,38	3,86
	Pesticides application	7,80	3,59
	Harvest and Threshing	10,79	4,97
	Transport	2,45	1,13
	Interest on working capital (TL/da)	**8,75**	**4,03**
	Administrative costs (TL/da)	**5,51**	**2,54**
	Land (TL/da)	**27,77**	**12,79**
Output	Total revenue from wheat(TL/da)	193,50	
	Total revenue from animal feed (TL/da)	12,98	
	Total support for wheat (TL/da)	38,20	
	Total revenue (TL/da)	244,68	
	Total costs (excluding land) (TL/da)	189,33	
	Total costs (including land) (TL/da)	217,10	**100,00**
	Profit (excluding land) (TL/da)	55,35	
	Profit (including land) (TL/da)	27,58	
	Profit excluding land and support	**17,15**	

Table B.9 Scenario 3: Introduction of DIS Payments, PAM.

	Revenues	Tradable inputs				Domestic Factors				Total costs	Profit
		Fertilizer	Pesticides	Seeds	Total	Labor	Capital	Land	Total		
Private Prices	A	B				C					D
	244,68	53,48	5,22	30,27	88,96	6,29	88,56	27,77	122,62	217,10	27,58
Social Prices	E	F				G					H
	212,93	52,40	2,18	28,47	83,05	4,03	89,39	14,60	108,01	205,56	7,37
Divergences	I	J				K					L
	31,75	1,08	3,04	1,80	5,91	2,26	-0,82	13,17	14,61	11,55	20,20

CURRICULUM VITAE

Name Surname: Sanda Macic

Place and Date of Birth: Bosnia and Herzegovina, 15.04.1984

E-Mail: macic@itu.edu.tr

EDUCATION: University of Sarajevo, Faculty for traffic and communications, Department of telecommunications

B.Sc.: Communication Engineer

PROFESSIONAL EXPERIENCE AND REWARDS:

July - August, 2006

BH Telecom d.d.,Mostar, Konjic department, Bosnia and Herzegovina

INTERNSHIP at BH Telecom - Transmission and switching department

BH Telecom is Bosnian Major Telecom operator. I have worked here at summer internship program arranged by the Faculty for traffic and communications Sarajevo. I worked in Sector for transmissions and switching, and on a project of reconstruction of an access network in Konjic area.

March, 2008-August 2008

D.D. za osiguranje VGT, Visoko, Bosnia and Herzegovina

System administrator

I have worked as System administrator in the Sector for IT, Organization and Quality management. I have also worked as an intern during the company's summer internship programs (October, 2004, 2005, 2006, 2007).

August 2008 – September 2010

ASA Auto – General importer of the Audi, VW, Skoda, Seat and Porsche Sarajevo, Bosnia and Herzegovina

Customer Relations Representative

I have worked in the Aftersales department as a Customer Relations Representative for Audi, VW, Skoda, Seat and Porsche. I was handling all types of customer claims and queries, and providing them both technical and nontechnical support. During this period of time I also participated in numerous seminars, trainings provided by VW AG, Audi AG, Skoda, Seat, as well as the ASA Auto's internal technical and nontechnical trainings. I was also the Skoda Mobility and extended warranty project coordinator, as well as the Coordinator for the Audi Training Online implementation in the Bosnian market.

August 2013 – Present

TARBIL – Agricultural Monitoring and Information System Project

System operator at TARBIL Operation control centre

TARBIL represents an Agricultural Monitoring and Information System Project and is one of the most comprehensive agricultural information systems in the world. Project is initiated by Istanbul Technical University and supported by Turkish Ministry of Food and Agriculture. As a student who works here I have a chance to grow both in my professional and academic career. Apart from working as a System operator, I also work as a researcher in the field of agricultural decision making. This research program is a part of my thesis at ITU Management Engineering Master program.

June 2014 - Present

TARBIL – Agricultural Monitoring and Information System Project

Operation Control Centre Manager

Since June 2014 I work as TARBİL Operation Control Centre Manager.

Evaluation and control related to agro-meteorological stations instalment and performance including QoS and data control; Managing onsite as well as on field processes; responsible for review of the stuff performance and work; evaluation, planning and implementation of short-term and long-term project goals.

EDUCATION:

October 14th – 17th 2008

SEAT International Customer Care Training, Barcelona Spain

June 15th – 17th 2009

Volkswagen International Customer Care Conference, Hannover Germany

Mart 15th – 19th 2010

Audi Training Online (ATO) Nontechnical Training, Ingolstadt Germany

August 2008 – September 2010

As an employee of ASA Auto, I participated in the organization of yearly Aftersales Conferences, as well as numerous other seminars, trainings, conferences, competitions for the retailers and service partners. I also participated in the aftersales conferences as a trainer for Customer relations.

September 2010 – July 2011

Ankara University TÖMER

Turkish language

05- 09 April 2012

Balkan Youth Forum 2012 - International conference on regional integration and cooperation between Balkan countries.

SCHOLARSHIPS:

October 2004-MARCH 2008

VGT Insurance Scholarship Program, Sarajevo, Bosnia and Herzegovina

September 2010 – Present

Turkish Government Scholarship Program for Foreign Students, Turkey