K. GÜNAY

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THE COMPETITIVENESS OF THE TURKISH IRON AND STEEL INDUSTRY IN THE PROCESS OF MEMBERSHIP TO THE EUROPEAN UNION

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Abstract

The iron and steel industry is one of the leading industries in Turkey. By means of capacity and volume in international trade, Turkey is among the leading countries in the world. Therefore sustaining the competitiveness of the Turkish iron and steel industry has an utmost importance.

This thesis investigates several issues related to the competitiveness of the Turkish steel industry especially while Turkey is on the way to be a member of the European Union. The main aim of this thesis is to develop a competitiveness model and to prove the relations between the factors of the model and competitiveness. Further than that, the importance of each factor of the model is tried to be find out. Another aim of the thesis is to find ways and means to increase the competitiveness of the Turkish steel industry.

Based on the literature survey on competitiveness, a competitiveness model for the steel industry in general is developed. The factors are: Cost; Quality; Technology; Accessibility to Markets; Location; Role of Government; Domestic Market and Firm Characteristics. The relation of these factors and the competitiveness is investigated through a 21 question-questionnaire, that the executives of the Turkish steel industry have attended.

According to the findings, all eight factors are find to be in positive relation with the competitiveness of the Turkish steel industry. In addition to that the importance of each factor for the crude steel producers and Re-rollers are found. It is also found, that the Turkish steel industry has to focus more on the higher value-added products, invest to balance the long-flat production ratio, reduce energy costs, and focus on vertical integration to supply its own raw materials for Re-rollers and integrated mills.

AVRUPA BİRLİĞİNE ÜYELİK SÜRECİNDE

TÜRK DEMİR ÇELİK SEKTÖRÜNÜN REKABETÇİLİĞİ

Özet

Demir çelik sektörü Türkiye'nin önde gelen sektörleri arasındadır.Gerek kapasite gerekse de uluslarası pazarlardaki ticaret hacmi ile dünyanın sayılı demir çelik endüstrileri arasında yer almaktadır. Bu yüzden Demir Çelik sektörünün rekabetçiliğini koruması aşırı önem arz etmektedir.

Bu tez, Demir Çelik endüstrisinin, özellikle Avrupa Birliğine giriş sürecinde, rekabetçiliğini incelemektedir. Tezin esas amacı rekabet gücünü etkileyen faktörleri bularak bunlardan bir model oluşturmak, aralarındaki pozitif ilişkiyi ispatlamak ve daha da önemlisi her bi faktörün rekabetçiliği ne oranda etkilediğini bulmaktır. Tezin diğer bir amacı ise Türkiye'nin sektörel rekabetçiliğini arttırmak için olası çözümler getirmektir.

Literatür araştırması sonucunda rekabet modeli oluşturulmuştur. Modeli oluşturan faktörler Maliyet, kalite, Teknoloji, Pazarlara Erişim, Lokasyon, Devletin Rolü, İç Pazar, ve Firma Karakteristikleridir. Bu faktörlerle rekabet gücü arasındaki ilişki, sektörün üst düzey yöneticilerine gönderilen 21 soruluk bir anket yardımı ile araştırılmıştır.

Araştırmanın sonuçları tüm faktörlerin Türk Demir Çelik sektörünün rekabet gücünü pozitif yönde etkilediğini göstermiş olup, her bir faktörün çelik üreticileri ve haddeciler açısından etkisi saptanmıştır. Bunun yanısıra sektörün rekabet gücünü arttırmak için daha katma değerli ürünler üretilmesi, uzun-yassı ürün dengesizliğini giderecek yatırımlar yapılması, eneji maliyetlerini düşürecek değişiklikler yaptırılması ve özellikle haddeciler ve entegre fabrikalar için kendi hammaddelerini tedarik edebilecekleri yatırımlara gidilmesini gerektiği ortaya çıkmıştır.

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List of Abbreviations

(AFCAB)	Association Française de Certification des Armatures de Béton
(ASW)	Allied Steel and Wire
(BAT)	Best Available Techniques
(BOF)	Basic Oxygen Furnace
(BORÇELİK)	Borcelik Çelik Sanayi Ticaret A.Ş
(CEEMET)	The Council of European Employers of the Metal, Engineering and Technology-based Industries
(CEP)	Comparative Export Performance
(CET)	EU Common External Tariff
(CIS)	Common Wealth of Independent States
(CTB)	Contribution to the Trade Balance
(ÇED)	Çevresel Etki Değerlendirilmesi
(ÇOLAKOĞLU)	Çolakoğlu Metalurji A.Ş.
(DCUD)	Turkish Iron and Steel Producers Association
(DRI)	Direct Reduced Iron
(EAF)	Electric Arc Furnace
(ECSC)	European Coal and Steel Community
(EESC)	European Economic and Social Committee
(EFILWC)	European Foundation for the Improvement of Living and Working
(EMF)	European Metalworkers' Federation
(ERDEMİR)	Ereğli Iron and Steel Works
(ES)	Export Similarities
(ESTEP)	European Steel Technology Platform
(EU ETS)	Emission Trading Scheme
(EU)	European Union

(Eurofer)	European Confederation of Iron and Steel Industries
(GCC)	Gulf Corporation Council
(HBI)	Hot Briquette Iron
(IGQ)	Instituto Italiano de Garanzia della Qualità per i Prodotti Metallurgici
(IISI)	International Iron & Steel Institute
(IIT)	Intra-Industry Trade
(IMMIB)	Istanbul Mine and Metal Exporters Union
(IPPC)	Integrated Pollution Prevention and Control
(ISDEMIR)	İskenderun Iron and Steel Works
(ITC)	U.S. International Trade Commission
(KARDEMIR)	Karabük Demir Çelik Sanayi ve Ticaret A.Ş.
(KOSGEB)	Small and Medium Industry Development Organisation
(MKEK)	Makina Kimya Endüstrisi Kurumu
(NAP)	National Allocation Plan
(NRP)	National Restructuring Plan
(OCAB)	Organisation pour le Contrôle des Aciers pour Béton Armé
(OHC)	Open Hearth Furnace
(PA)	Privatization Administration
(PHC)	Privatization High Council
(RC)	Revealed Competitiveness
(RCA)	Revealed Comparative Advantage
(RMA)	Relative Import Advantage
(RTA)	Relative Trade Advantage
(RTD)	Research and Technological Developments
(RULC)	Relative Unit Labor Cost
(RXA)	Relative Export Advantage
(SAC)	Steel Aid Code
(SAW)	Simple Additive Weight Method
(SBS)	Svensk Bygestalkontoll Stiftelse
(SEE)	State Economic Enterprises
(SPO)	State Planning Organization
(TDCI)	Türkiye Demir ve Çelik İşletmeleri Genel Müdürlüğü A.Ş.
(TESK)	Confederation of Turkish Craftsmen and Tradesmen

(TFP)	Total Factor Productivity
(TSE)	Turkish Standards Institution
(TÜBİTAK)	The Scientific and Technical Research Council of Turkey
(TÜSİAD)	Turkish Industrialists' and Businessmen's Association
(UKCARES)	UK Certification Authority for Reinforcing Steels
(ULC)	Unit Labor Cost
(VAT)	Value Added Tax

Chapter

1. Introduction

Iron and Steel industries have always played vital roles on the industrial and economic development of each country. The relationship between economic development and the iron and steel industry comes from the fact that steel products are used as inputs in almost all industrial areas. In addition to its own share in the economy, the iron & steel industry stands at the hub of many industrial sectors, such as construction, automotive, railways, naval construction, agricultural tooling, home appliance manufacturing, tubes, metalware and to the production of many appliances and goods.

Iron and Steel industry has not only been regarded as a key element in industrial development, but it has also made an important contribution to the establishment of the European Integration, which started as sectoral cooperation with the promise of creating cost advantages and scale economies. The European Union grew out of the European Coal and Steel Community (ECSC), which was founded in 1951 (Treaty of Paris), by France, West Germany, Italy, Belgium, Luxembourg and the Netherlands to pool the steel and coal resources of its member-states, thus preventing another European war. The ECSC served as the foundation for the later development of the European Economic Community (later renamed the European Community by the Maastricht Treaty), and then the European Union.

The iron & steel industry has also been playing an important role in the acceleration of Turkey's industrial development. The foundations of Turkish industrialization were laid in the 1930s in parallel with the establishment of first the integrated Iron and Steel Works. Also today, the iron and steel industry has a big share in Turkish economy. Beginning from 1930's with the developments on its iron & steel industry,

Turkey is ranking today as the 11th country on crude steel production among the world and is among the top three in Europe.

While Turkey is aiming to be a member of the European Union, its Iron & Steel Industry must be harmonized with the European Steel Industry according to the legislations of the Union. The basic principles of free trade on European Coal and Steel Community (ECSC) products between Turkey and ECSC were established by Turkey-ECSC Free Trade Agreement, which was signed in July 25, 1996. The ECSC Treaty has been expired in July 2002, but provisions of the Turkey-ECSC Free Trade Agreement are still under implementation as no new decision has been taken.

The objective of this thesis is to find the competitiveness of the Turkish Steel Industry on the way to be a member of the European Union (EU). The main idea is to find out the factors affecting the competitiveness in the steel industry in general, highlight the advantages and disadvantages of Turkish and European Steel Industries in particular, to find out whether the Turkish steel industry has comparative advantage or not. In this study the scope of the steel industry is kept limited to the definition in the ECSC Treaty, which involved the production of crude steel, semi-products, hot-rolled finished products, continuously cast products, cold-rolled sheets and plates, and coated sheets.

This thesis is composed of five chapters. The first chapter details the elements of competitiveness in the steel industry. The competitiveness theories, factors affecting the competitiveness of the steel industry and the methods to measure the competitiveness of the related industry are investigated.

The second chapter is devoted to the state of steel industry in EU. This chapter aims to give the historical background of the establishment of the cooperation among the steel industries of the member states. The current situation in main steel producing countries of EU, accessibility to the European Union, main challenges for the European steel industry in general, necessary planned actions to enhance a sustainable competitiveness, long-term vision of the European steel sector and even the position of the substitute materials are also examined in this chapter.

The third chapter investigates the state of the iron and steel industry in Turkey and the Turkish national restructuring plan of the industry. The main objective is to find

out the factors where Turkish Steel Industry has competitive advantages for today and also in the near future.

The fourth chapter tries to find out the factors affecting the competitiveness of the Turkish steel industry through a survey. In the survey, a 21 question-questionnaire was given to the members of the Iron and Steel Producers Association and to the re-rollers as the sampling frame.

The fifth and final chapter is devoted to the conclusion. The advantages and disadvantages of the Turkish Steel Industry in comparison with the European Steel Industry are highlighted. The other aim is to find out the challenges and the opportunities on the harmonization phase with European Steel Industry.

1.1. Research Question

1. What are the factors affecting the steel industry competitiveness of the steel industry in Turkey?
2. How can the Turkish Steel Industry increase its competitiveness?

1.2. Hypothesis

H1: There is a positive relationship between cost and steel industry competitiveness in Turkey

H2: There is a positive relationship between quality and steel industry competitiveness in Turkey

H3: There is a positive relationship between technology and steel industry competitiveness in Turkey

H4: There is a positive relationship between accessibility to markets and steel industry competitiveness in Turkey

H5: There is a positive relationship between location and steel industry competitiveness in Turkey

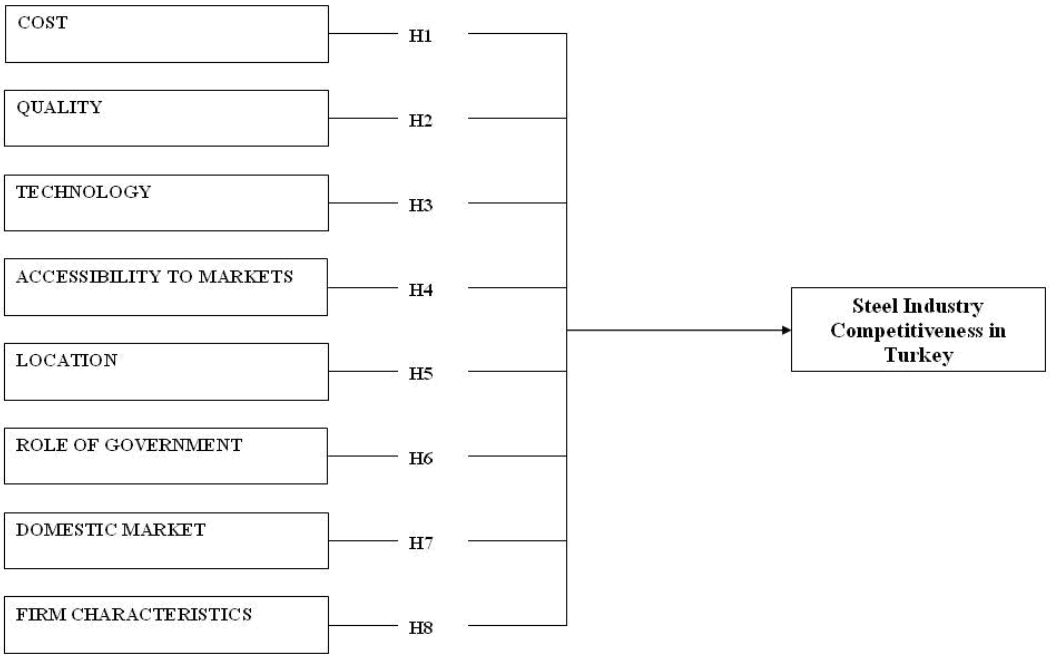
H6: There is a positive relationship between role of government and steel industry competitiveness in Turkey

H7: There is a positive relationship between domestic market and steel industry competitiveness in Turkey

H8: There is a positive relationship between firm characteristics and steel industry competitiveness in Turkey

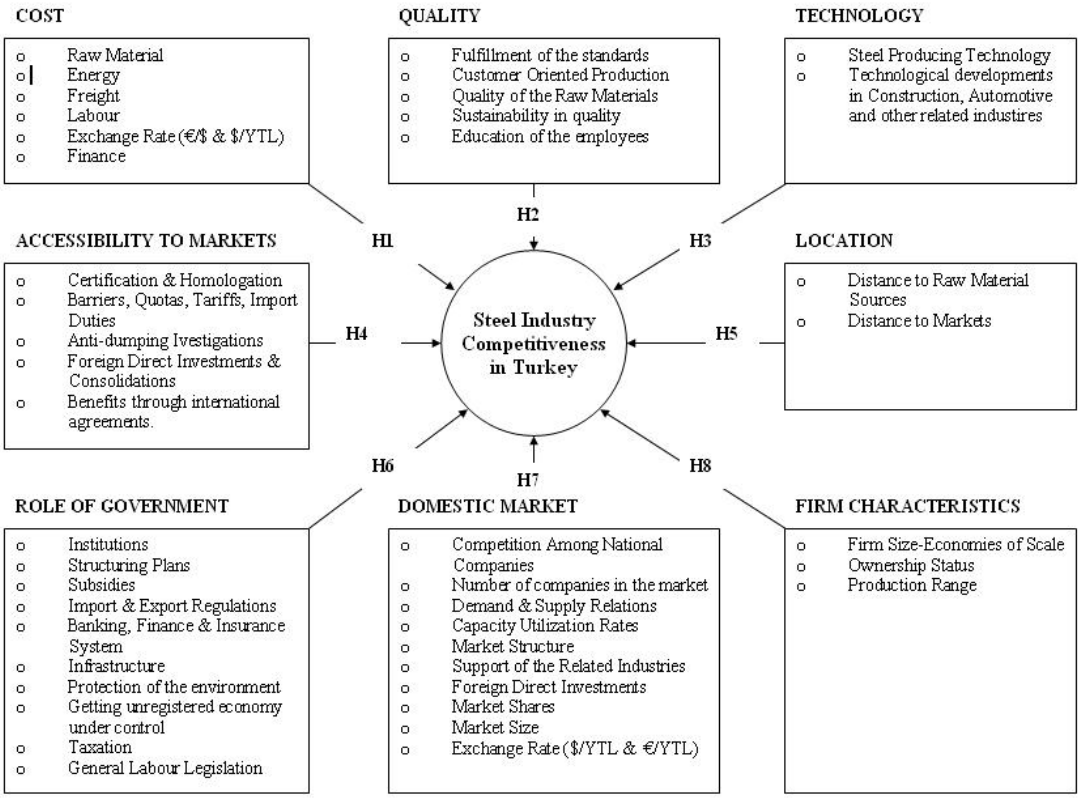
1.3. Model

Figure 1.1 Competitiveness Model of the Turkish Steel Industry



Source: Compiled by the author

Figure 1.2 Competitiveness Model of the Turkish Steel Industry in detail



Source: Compiled by the author

Chapter

2. Theories and Approaches of Competitiveness

2.1. Competitiveness in General

The competitiveness is the key factor of the market economy system. National companies no longer only compete in their own domestic markets with each other. Due to the outward orientation and globalisation, national companies now compete with their global counterparts. As the volume of the international trade increases, each country must try to increase its share in international markets. Therefore the concept of competition among the companies is spilled over the national level, which creates the concept of national competitiveness. At national level competition among companies are highly affected by regulations of the governments. Countries which have the necessary resources and better conditions for their companies have better chance for competitiveness in global arena.

The concept of competitiveness can be investigated at three levels: National, Sectoral and Company.

Globalization has generated an intensified competition between countries. Countries must strive to be more competitive than their rivals in order to survive in the global marketplace. As Krugman mentioned, “a nation’s competitiveness is the degree to which it can, under free and fair market conditions, produce goods and services that meet the test of international markets while simultaneously expanding the real incomes of its citizens, usually reflected as “prosperity” of the country”. Therefore, national competitiveness is an intermediate goal towards a more fundamental aim for socio-economic well-being for residents of a country. Competitiveness is associated with rising living standards, expanding employment opportunities, and the ability of a nation to maintain its international obligations. It is not just a measure of the nation’s ability to sell abroad, and to maintain trade equilibrium. “Growth rate in

living standards is essentially determined by the growth rate of productivity." *(Martin, p.2)*

The same argument is also valid for industries or companies. The competitiveness of the individual companies in a local or regional market can be assessed by a comparison with local or regional rivals. The competitiveness of an industry can be assessed by a comparison with their regional and international counterparts. Thus, a competitive industry can be defined as a collection of interregionally or internationally competitive companies. *(McFetridge, 1995, p.11)*

Competitiveness is achieved when individual companies within an industry have the ability to produce and sell their products at a price and quality better than their local, national and global counterparts. Competitiveness at industry level is therefore taken to be synonymous with the broad economic performance of the companies comprising that industry. Therefore, competitiveness should be viewed in terms of economic efficiency or productivity. Porter states that "the only meaningful concept of competitiveness is productivity" *(Porter, 1990, p.84)*. Productivity is defined as the output per unit of input, including both capital and labour inputs. In Porter's terminology, productivity in the internationally traded goods and services sector determines national competitiveness.

In a homogeneous-product industry, the lower a firm's marginal or incremental cost relative to those of its competitors, the larger is its market share, and, other things being equal, the more profitable it is. Thus, market share reflects input cost and (or) productivity advantages. At the firm level, profitability, cost, productivity and market share are all indicators of competitiveness. And most of the measures of competitiveness that can be calculated at the company level can also be calculated at the industry level. *(McFetridge, 1995, p.4)*

2.2. Theories about the National Competitiveness

2.2.1. Comparative Advantage Theory – by David Ricardo (1817)

The theory of comparative advantage was first explained by David Riccardo in 1817 in his book "Principles of Political Economy and Taxation". Until that time the main

accepted theory was Adam Smith's "Absolute Advantage Theory". Absolute Advantage Theory was focusing on the type of products to be traded between two countries. Each country should focus and specialise on the production of the goods, on which it has the absolute advantage. In that sense each country should trade those products for goods produced in other countries when it is less efficient than any other country in producing it. The main obstacle of this theory is that it does not explain what will happen if a country has an absolute advantage in the production of all goods. According to this theory, that particular country might drive no benefit from international trade.

According to David Ricardo's theory of comparative advantage, countries must specialise in the production of those goods that it produces most efficiently and to buy the goods that it produces less efficiently from other countries. This international trade makes sense even if the production in the importing country is more efficient than the exporting country for all products. The rudimentary thought before Ricardo was that the free trade could be advantageous for countries was based on the concept of absolute advantages in production. Ricardo's theory of comparative advantage offers an explanation in terms of international differences in labour productivity. Ricardo assumed that the resources move freely from the production of one good to another within a country, constant returns to specialisation and trade does not change a country's stock of resources or the efficiency with which those resources are utilised.

According to David Ricardo customers in all nations can consume more if there are no restrictions on trade. This might occur even in countries that lack an absolute advantage in the production of any good. The theory of comparative advantage suggests that trade is a positive-sum game and all participants in trade benefit from economic gains. "It is the principle of comparative advantage that underlies the advantages of labor, whether between individuals, regions, or nations" *(Cho and Moon, 2000, p.8)*. Therefore the theory of comparative advantage became perhaps the most important theory in international trade theories. Even though Ricardo failed to produce a consistent mechanism to show how trade between two countries is formed and how the alleged benefits of trade are distributed, he persuasively pointed out the possibility of trade between two countries, even where one of them produces both capital and labor commodities cheaper than the other. *(Subasat, 2002, p. 149)*

As mentioned above the theory of comparative advantage has some missing points. One of the main concerns is that the theory is based on the differences in productivity levels, but it does not explain why these differences exist. Only the labour productivity is mentioned as the source of these differences, whereas especially the labour cost has a very low percentage on the steel production nowadays.

According to Dong-Sung Cho and Hwy Chang Moon the major problem in David Ricardo's Comparative Advantage Theory is that it predicts an extreme degree of specialisation *(Cho and Moon, 2000, p.9)*. But in practice countries produce not one but many different products including import-competing products and in fact constant returns to specialisation does not happen in practice. As resources are shifted from one sector to another, the opportunity cost of each additional unit of another sector changes. Therefore in practice diminishing returns to scale occur and increasing return is also a possibility. Such changing costs may arise because factors of production vary in quality and in suitability for producing different commodities *(Cho and Moon, 2000, p.9)*. Therefore each country may specialise up to the point where the gains from specialisation will be equal to the increasing costs of specialisation. Due to that reason countries doe not specialise their production completely.

2.2.2. Factor Endowments Theory – by Heckscher & Ohlin (1933)

In the middle of the twentieth century another important international trade theory is developed by two Swedish Economists and it is known as the Heckscher–Ohlin (H-O) Model. H-O argued that the comparative advantage arises from differences in factor endowments of countries. There are two basic characteristics of countries and products. Countries differ from each other according to the relative physical factors of production they possess. Goods differ from each other according to the factors of production that are required in their production *(Cho and Moon, 2000, p.9)*.

Like Ricardo's comparative advantage model, the H-O Model is also based on some assumptions. (1) commodities are freely mobile internationally, (2) all countries use the same technology in production, (3) factors of production are mobile domestically but immobile internationally, (4) tastes are the same in all countries, (5) there are no economies of scale, (6) there is perfect competition in all markets, (7) there are no

transportation costs, (8) all resources are fully employed, and (9) countries have different factor endowments and thus factor prices. *(Subasat, 2002, p. 150)*

Based on those assumptions, the theory asserts that a nation will export the commodity that makes intensive use of the country's relatively abundant and cheap factor and import the commodity whose production requires the intensive use of relatively scarce and expensive factor. The logic is that the more abundant a factor, the lower is its cost. Therefore, differences in the factor endowments of various countries explain differences in factor costs, which result in different comparative advantages *(Cho and Moon, 2000, p.10)*.

There are two main factors of production, capital and labour in the H-O Model. According to the theory, in labor-abundant countries, where the wage rates are low, labor-intensive goods can be produced relatively cheaply and these products could be exported to countries, where goods are produced with more capital content. And these labor-abundant countries will import capital-intensive commodities. The theory assumes that the relative prices of these two particular commodities (capital and labor) are determined by their relative factor endowments. The supplies of factors of production lie in the analysis of endowments. All countries are endowed with different quantities of factors of production. Since these endowments are naturally determined, countries employ the best combination of these factors to produce commodities in the most efficient way. To determine if a country is capital or labor endowed (or abundant), we need to look at the comparative physical availability in each country, namely, capital-labor ratios. If one country has a higher capital-labor ratio than another, that country is endowed with capital, or is capital abundant *(Subasat, 2002, p. 150)*. In addition to factor endowments and innovative actions, Ghosal emphasizes that "capital-labor ratio of a country has a significantly inverse relationship between demand uncertainty and in positive relationship with firm size". He emphasizes that larger firm size counteracts the negative influence of demand uncertainty. *(Ghosal, 1991, p.158)*

Steel is a capital-intensive product. It is also mainly produced in developed countries with a few exceptions. According to the annual report of Iron Steel Producers Association the top ten steel producing countries in 2006 were China, Japan, United States of America, Germany, South Korea, Russia, Ukraine, Brazil, India and Italy. As it could be seen some of the developing countries like China, India, Brazil and

Russian Federation are also taking place among the top ten steel producing countries. The main reason for that is the high demand in their domestic markets due to their high populations and the large firm sizes in their markets.

The Heckscher-Ohlin model is seen as an improvement on the Ricardian model with its alleged ability to predict the pattern of trade between low- and high-income countries. Since low-income countries are capital scarce, under free trade they find it more profitable to export labor-intensive commodities and import capital-intensive commodities *(Subasat, 2002, p. 150)*.Relative prices of the labor-intensive commodities are lower in low-income countries, and this, in turn, means they have a comparative advantage in labor-intensive commodities.

Both Ricardo's Comparative Advantage Theory and Heckscher–Ohlin's Factor Endowment Theory are based on the comparative advantage among countries which is either due to labor productivity or due to factor endowments, so that there could be a difference on the prices among two countries before the international trade. And the commodities flow from the low-cost country to the high-cost one. According to both theories prices of the goods before the trade must be compared to find out the relative comparative advantage among those countries. But practically this is not possible for all the goods and all the countries. Furthermore there are also many different prices among companies in the same market for the same product.

2.2.3. Leontief Paradox – by Wassily Leontief (1953)

According to the factor endowment theory of Heckscher & Ohlin it is expected that the labour-abundant countries export labour intensive commodities, while the capital-abundant countries export capital intensive ones to import labour intensive products in return. Contrary to this expectation, with the studies of Leontief in 1953 it was observed that a in a capital abundant country like United States import-competing goods required 30 percent more capital per worker than U.S. export goods *(Cho and Moon, 2000, p.12)*. This observation is known as the Leontief Paradox. Many economists including Leontief himself tried to explain this paradox by means of productivity levels of workers, natural resources or factor intensity reversals. But none of those explanations was significant enough to find out the reason of this paradox. Some economists have developed alternative theories of international trade

because the H-O Model does not explain the trade in the real world sufficiently. Recognizing the increasing diversity of international trade, new theories are useful in explaining some special cases of international trade. These theories include Revealed Comparative Advantage, Product Cycle, Country Similarity, and Trade Based on Economies of Scale *(Cho and Moon, 2000, p.14)*.

2.2.4. Revealed Comparative Advantage – by Bela Balassa (1965)

Ideally, measures of comparative advantage should reflect regional or cross country differences in a hypothetical pre-trade environment, known as autarky. Autarky is the condition where equilibrium prices are unaffected by influences external to an economy *(Leishmann and et all, 1999, p.4)*. In reality all countries engage in some level of international trade. Therefore true comparative advantages cannot be directly observed. In 1965, Bela Balassa introduced the concept of "Revealed Comparative Advantage" (RCA) as a way to approximate comparative advantage in autarky. According to Balassa, "the concept of Revealed Comparative Advantage pertains to the relative trade performances of individual countries in particular commodities. On the assumption that the commodity pattern of trade reflects inter-country differences in relative costs as well as in non-price factors, this is assumed to reveal the comparative advantage of trading countries" *(Balassa, 1977, p. 128)*. As long as the trade pattern is determined by comparative advantage, then direct observations of trade performance should reveal the comparative advantage. The stronger a country's relative trade performance in a certain commodity, the greater the comparative advantage in the production of that commodity.

The comparison between export performances of Turkey and major European Union countries show that Turkey has the major revealed comparative advantage on raw-material intensive goods and labor intensive goods. For the capital intensive goods including also the steel products Turkey has a lower export volume than the above mentioned sectors. (Appendix A, Table.1) (Erlat, 2001, p.5)

Although the concept of RCA is known as the Balassa theory, the first empirical study on this subject was done by Liesner in 1958. The measuring of the RCA was based on the simple comparison among the exports of countries. In 1965 the original RCA index was formulated by Balassa himself, which measures a country's exports

of a commodity (or industry) relative to its total exports and to the corresponding exports of a set of countries, e.g. the EU. *(Utkulu and Seymen, 2004, p.9)*. The proposed simple measure of RCA by Liesner is the following: *RCA = Xij / Xnj* where *X* represents exports, *i* is a country, *j* is a commodity (or industry), and *n* is a set of countries (e.g. the EU).

A value of less than unity implies that the country has a revealed comparative disadvantage in the product. Similarly, if the index exceeds unity, the country is said to have a revealed comparative advantage in the product. The RCA indicates whether a country is in the process of extending the products in which it has a trade potential. It can also provide useful information about potential trade prospects with new partners. Countries with similar RCA profiles are unlikely to have high bilateral trade intensities unless intra industry trade is involved.

The concept of Revealed Comparative Advantage (RCA) is grounded in traditional international trade theory and based on export specialisation. Although variations have been propounded and tested in the literature, the original RCA index was formulated by Balassa in 1965. The studies of Balassa evaluate the measurement of RCA as bilateral trade between two countries or trading partners. He emphasized four formulas for the comparison of comparative advantages among countries. The first one is RCA = (Xij / Xit) / (Xnj / Xnt) = (Xij / Xnj) / (Xit / Xnt) where X represents exports, i is a country, j is a commodity (or industry), t is a set of commodities (or industries) and n is a set of countries. This formula measures a country's exports of a product relative to its total exports and to the corresponding exports of a set of countries. Balassa's second formula is aiming to make reference to the own country trade performance only. *RCA*= (*Xij - Mij) / (Xij + Mij)*. The third equation is *RCA* = (*Xij* / *Xit*) / (*Mij* / *Mit*) = (*Xij* / *Mij*) / (*Xit* / *Mit*) where *X* and *M* represents exports and imports respectively. *i* is a country, *j* is a commodity (or industry), *t* is a set of commodities (or industries). But the most common version of Balassa equation is the fourth one as given below.

$$RCA = \ln\left[X_i / M_i\right]\left(\sum_{i=1}^{n} X_i / \sum_{i=1}^{n} M_i\right) \times 100.$$

There are four equations derived by Balassa to measure the RCA including the equation to measure the "own" country trade performance only. The studies of

Balassa evaluate the measurement of RCA as bilateral trade between two countries or trading partners.

Three additional versions of the RCA were offered by Vollrath. In 1991 Vollrath also made studies on revealed comparative advantages and offered mainly three alternative ways of measurement of a country's RCA. These alternative specifications of the RCA are called the relative trade advantage (RTA), the logarithm of the relative export advantage (ln RXA), and the revealed competitiveness (RC) (Utkulu and Seymen, 2004, p.9). These studies of Vollrath measure the RCA at the global level.

- $RTA = RXA - RMA$ where RXA = (Xij/ Xit) / (Xnj/ Xnt) and RMA = (Mij/ Mit) / (Mnj/ Mnt).
- $ln\ RXA = ln\ ((Xij/\ Xit) / (Xnj/\ Xnt))$
- $RC = ln\ RXA - ln\ RMA$

The first formula of Balassa and the formulas of Vollrath are to measure the competitiveness on global level, whereas the other formulas are to measure it on bilateral level. On the global level, the global competitiveness of Turkey and the EU are compared assuming that both Turkey and the EU are exporting to and importing from the world. On the bilateral level, however, trade between Turkey and the EU are taken into account only. The import and export figures are likely to be affected from the government policies and interventions like import–export duties, anti-dumping duties, quotas, barriers and tariffs. Therefore RCA indices may misrepresent underlying comparative advantages.

2.2.5. Product Cycle Theory – by Raymond Vernon (1966)

Raymond Vernon argued that many manufacturing goods go through a product cycle of introduction, growth, maturity and decline. Thus, comparative advantages of these goods shift over time from one country to another *(Cho and Moon, 2000, p.14)*. Innovative companies in developed countries scan their domestic markets and create products mainly according to the demand in their domestic market. The demand in the domestic market has a very big influence on the decisions and innovations of

companies. The effect of the Demand Conditions on the competitive advantage plays also an important role on Michael Porter's Diamond Model.

New products shaped by the demand of the domestic market are sold in the market with relatively high prices in the introduction stage. As the new product passes through the path of product cycle, its price declines while it reaches to a bigger portion of the target group. As the market in the developed countries matures, the product becomes more standardised, and price becomes the main competitive item. Eventually, competition in the high income markets forces firms to look for ways to strengthen their competitive positions internationally. The desire to gain an advantage over producers based in high income countries leads to the outsourcing of component production in developing countries, followed eventually by larger and larger shares of overall production in developing country markets. *(Gerber and Carrillo, 2002, p.3)*

As Vernon mentioned in his study, the innovative companies in developed countries aim not only to reduce the costs but also to gain competitive advantage due to the low production costs in developing countries. They also transfer the technology by establishing overseas subsidiaries to other regions of the world to be able to reach easily to target markets by reducing their disadvantage due to the location.

"To begin with, the U.S.-controlled enterprises generate new products and processes in response to the high per capita income and the relative availability of productive factors in the United States; they introduce these products or processes abroad through exports; when their export position is threatened they establish overseas subsidiaries to exploit what remains of their advantage; they retain their oligopolistic advantage for a period of time, then lose it as the basis for the original lead is completely eroded." *(Vernon, 1971, p.66)*

If we look at the steel producing industry, we observe that the percentage of the world steel production has shifted in the last fifty years from developed countries like the European countries and the US to emerging countries like China, Ukraine, Brazil & India. But still the main difference is that the developed countries are mainly concentrated on the high value added products whereas the developing countries are focusing on the production volume with low value added products. What is more important than the performance of countries is the power and performance of

international companies like Arcelor-Mittal, which is growing globally through consolidations. As mentioned above the main aim is to reach as many countries as possible to strengthen their positions globally with an increased product range and to eliminate their disadvantage due to location.

All of the above mentioned theories focus mainly on the production side. In 1961 Stafan Linder emphasized the importance of demand by his Country Similarity Theory. This theory explains international trade among countries that have similar characteristics.

2.2.6. Country Similarity Theory – by Stefan Linder (1961)

Stefan Linder focuses on the trade of the manufacturing sector and bases his theory on two assumptions: First, he supposes that a country exports products which are driven mainly by the local demand. The domestic demand must be significant enough in order to utilize the existing economies of scale; to reduce costs and to improve new products with the already known local customers. The situation in the steel industry is in parallel with this situation. The major steel producing countries have also a very high demand in their domestic markets. But at this point we have to separate the situation in developed and developing countries. In major steel producing developed countries like Japan, United States, Germany and Italy the steel demand is mainly driven by the domestic demand for high value added products, which could be used in industry. Whereas in developing countries like China, India, Ukraine and the Russian Federation the steel demand is mainly driven by domestic demand for low value added products, which can be used in construction. Although this is the case, we are observing that the developed European Union countries are also exporting low value added products. The main reason for that is their already established steel production capacity on those products, when they were in need of raising their construction industry. The common point in all of these countries is that steel industry in those countries is mainly dominated by the players with high production capacities, so that they can use the advantage of economies of scale to reduce their costs.

The second assumption of Linder is that importing and exporting countries have similar tastes and income levels, one of the main criticisms of the comparative

advantage model and the key variable for explaining intra-industry trade *(Jahir, 2006, p.14)*. Linder believed that countries with similar income levels would have similar tastes. Each country will produce primarily for its domestic market, but part of the output will be exported to other countries with similar tastes and income levels. *(Cho and Moon, 2000, p.16)*.

In the steel industry the situation does not match purely with the above mentioned assumption of Linder. As an example if we observe the export – import trade patterns of Turkey then we observe than the major markets in 2006 for the export are the countries in the Persian Gulf (4,801,100 mt), European Union 25 countries (3,309,375 mt) and United States (1,736,546 mt) (*Turkish Iron and Steel Producers Association, May 2007, p. 25*). On the import side for the Turkish Steel Market the main sources are the Common Wealth of Independent States (CIS) countries (6,459,615 mt) and European Union 25 countries (2,405,478 mt) (*Turkish Iron and Steel Producers Association, May 2007, p. 26*). As it could be seen from the above mentioned figures, the major export markets for Turkey consist of developed countries like the European Union countries and the US, whereas on the import side the developed European Union countries still have a significant contribution on Turkey's import figures, although Turkey is a developing country compared to the US and European Union Countries and although there is a significant difference between their income levels. It looks like there is intra-industry trade among them, but there is a difference on the nature of the traded products. As mentioned above Turkey exports mainly low-value added long products, whereas European Union countries are mainly exporting high-value added flat products to Turkey. The Table 2.1 explains the trade pattern between Turkey and European Union in a better way.

Table 2.1 International Trade Figures of Turkey with EU(25) Countries

International Trade Figures of Turkey with EU (25) countries	Exports (mt)	Imports (mt)
Long Products	2,654,356	1,115,583
Flat Products	465,238	1,289,895

Source: Turkish Iron and Steel Producers Association, May 2007, p.8

These figures even show that countries do not fully trade with countries with similar income levels in practice. To be able to explain this situation another theory of economies of scale by Krugman & Lancester might be useful in addition to the first assumption of Lindser regarding the powerful domestic demand.

2.2.7. The Economies of Scale Theory – by Krugman & Lancaster (1979)

In a traditional, Heckscher-Ohlin model of international trade, trade is driven by differing factor endowments between regions. Countries specialize in the production of goods that use the most abundant factor most intensively, allowing them to capture comparative advantage through trade. "The Heckscher-Ohlin model cannot adequately explain the large degree of trade taking place among similar economies, and the increasing domination of intra-industry trade in particular." (Munroe and et all, 2000, p.7).

"For a traditional H-O framework, one must assume a perfectly competitive market structure with constant returns to scale. This assumption is too restrictive for more complex economies where scale economies are important and market imperfections are rampant." *(Darla and et all, 2000, p.9)*. In the Economies of Scale Model the main difference is the increasing rate of returns. According to Dong-Sung Cho and Hwy Chang Moon countries or firms would benefit if they specialize in the production of a limited range of goods.

According to Marius Brülhart, the new trade theory suggests that all countries manufacture a number of product varieties which are proportional to the size of their total factor endowment (labour force), and that the international exchange of such similar goods shows up as Intra-Industry Trade (IIT). "In the standard model, the relationship between scale economies and IIT is discontinuous, since very *high* levels of scale economies are associated with *low* levels of IIT. This is not academic nit-picking, since via scale economies IIT has come to be interpreted as an indicator of imperfectly competitive market structure." *(Brülhart, 1995, p.2)*. The main reason for that is that the Heckscher Ohlin Model assumes that there is perfect competition in all markets and there are no scale economies. Although the link between intra industry trade and scale economies is ambiguous, intra industry trade shows us the similarity of industrial structures and preferences among countries. By taking all

other variables constant, the higher the level of intra industry trade, the more similar is the composition of industry in two trading countries. In other words, "if certain sectors exhibit high IIT in a group of countries, then these sectors are likely to be relatively dispersed over the whole area of this group." *(Brülhart, 1995, p.3)*. The intra industry trade is also to be associated with relatively smooth trade-induced industrial adjustments when applied to changes in the trade patterns.

The Models of the New Trade Theory make a range of other restrictive assumptions. There is only one factor of production, usually called labour, and all goods are produced with the same (increasing returns) technology. Therefore there can be no comparative advantage difference among countries. All consumers share the same utility function and they have symmetric preferences for all goods. According to Brühlhart monopolistic competition eliminates supernormal profits and under these assumptions the number of dependent variables on the model reduces to one, which is the number of goods produced. "While its restrictive hypotheses move the model far away from economic reality, such algebraic constructs manage to show formally that scale economies can give rise to international trade even where all countries share the same tastes, relative factor endowments and technologies." *(Brülhart, 1995, p.5)*

Brühlhart examined the effect of changes in three parameters on intra-industry trade. These are relative market sizes (L/L^*), equilibrium scale economies (θ) and transport costs ($1-\tau$). He found a positive relationship between relative market sizes and the IIT. As the sizes of both markets become equal, then the IIT increases. (Appendix A - Figure.1) But the IIT is related negatively to the equilibrium scale economies (θ). (Appendix A- Figure.2) "An increase in the elasticity of demand works in the same manner as in increase in trade costs, since, in both cases, foreign demand will fall, thus creating an increase in the protection of the domestic market. Since in equilibrium, elasticity of demand relates negatively to scale economies, it is easy to understand that an increase in scale economies works in an opposite direction to an increase in trade costs." *(Brülhart, 1996, p.11)*. "In equilibrium, equilibrium scale economies is related strictly negatively to (the potential for) scale economies, because equilibrium scale economies is an inverse indicator of consumers' taste for variety." *(Brülhart, 1995, p.8)*. Transport costs are also negatively related to the IIT. (Appendix A - Figure.3)

The Economies of Scale can explain some trade patterns which are not explained by the H-O Model. The main reason for that is that according to the Economies of Scale Model there are different types of increasing returns. Increasing returns are due to internal economies (increasing returns at the firm level) and increasing returns due to external economies (at the industry level). Increasing returns at the firm level do not lead to increases in IIT. Increasing returns at the industry level is a more important factor in IIT. At the industry level "increasing returns arise due to market concentration, larger markets, or decreased transportation and information costs. Trade in intermediate inputs, or vertically integrated trade, also becomes possible with external economies of scale" *(Darla and et all, 2000, p.9)*.

The effect of the scale economies on IIT depends on industry characteristics. Some industries more than others would have scale economies leading to IIT. Darla K. Munroe and Geoffrey J. D. Hewings emphasized that industries with a small number of firms are most likely oligopolistic in nature. On the other hand, industries with a large number of firms likely to exhibit increasing returns to scale. In industries with large number of firms, product differentiation is more likely to occur, leading to increases in IIT. "Lancaster stresses that monopolistic competition is the most competitive market structure in industries characterized by diverse consumer preferences and production specifications, but not in all cases does the presence of scale economies imply IIT." *(Darla and et all, 2000, p.10)*.

"While trade in the H-O model is based on comparative advantage or differences in factor endowments (labor, capital, natural resources, and technology) among nations, intra industry trade is based on product differentiation and economies of scale. Thus, while trade based on comparative advantage is likely to be larger the greater is the difference in factor endowments among nations, intra-industry trade is likely to be larger among economies of similar size and factor proportions." *(Salvatore, 1997, p.158).* Therefore the comparative advantage seems to determine the pattern of inter-industry trade while economies of scale in differentiated products give rise to intra-industry trade.

As mentioned above transportation costs has also a significant contribution to the volume of the trade. Therefore the location of the industry is very important. Some economists make their studies on this subject to clarify the role of the location on trade.

2.2.8. Location Theory – by Alfred Weber (1909)

The theory about the industrial location was formulated first by Alfred Weber in 1909. With the publication of "über den Standort der Industrie" (Theory of the Location of Industries) Weber put forth the first developed general theory of industrial location. This theory carries the assumptions that population and resources are uniformly distributed over a homogeneous plane, firms have free entry into the market, all firms have constant returns to scale, and perfect competition exists. According to Weber an industry is located where it can minimize its costs, and therefore maximize its profits. Weber's least cost theory accounted for the location of a manufacturing plant in terms of the owner's desire to minimize three categories of costs. These are: Transportation; Labor, and Agglomeration costs.

According to Weber an industry must be located where the transportation costs of raw materials and final product is a minimum. In that sense the industry must be located close to the raw material sources, energy and also to the markets. If there is no weight loss or weight gain in production then the industry could be established anywhere between both locations. But if there is weight difference between raw material and final product weights, then the industry must be located in such a place to minimise the total transport costs. Weber distinguished this situation into two different cases. In one the weight of the final product is less than the weight of the raw material going into making the product. This is the weight losing case. In the other case the final product is heavier than the raw material. This is the weight gaining case. To be able to identify both cases Weber used a material index, whereby the relative weight gain or loss is calculated.

$$\text{Material index} = \frac{\text{total weight of materials used to manufacture the product}}{\text{Total weight of the finished product}}$$

If the product is a pure material its index will be 1. If the index is less than 1 the final product has gain weight in manufacture, thus favouring the industry to be located near the market place. But most products lose weight in manufacture, such as a metal being extracted from an ore. Thus their material index will be more than 1, thus favouring the industry to be located near the raw material site.

Transportation costs have an important effect on the total costs of the international steel trade. Therefore the location of the industry is very important. Steel is produced

with two different techniques. Either out of iron ore & coke or out of scrap. In both cases the material index is more than one in the favour of the raw materials. Due to this situation it is favoured to locate the steel industries near raw material sources.

According to Weber, the second important cost item which has to be minimised is the labor cost. Higher labor costs reduce profits. Depending on the share of the labor costs among total costs, a company might do better farther from raw materials and markets if cheap labor is available. This is the case for the labor intensive industries. As steel industry is a capital intensive industry, the share of labor costs are lower than transportation costs.

The last important cost item which has to be minimised is the agglomeration costs. Companies benefit from shared facilities, labour force, infrastructure, services and raw materials if they are sited in the same place as existing factories. This process of agglomeration concentrates many factories into industrial regions or zones, so that they can provide assistance to each other through shared talents, services, and facilities. For example in Germany the steel industry is located mainly in the states of Nordrhein-Westfalen and Saarland. The reason for both cases is to reduce the transport costs by establishing the industry near to raw material sources and also to agglomerate the sector in some regions to reduce the agglomeration costs.

In Turkey we observe that most of the steel industry is located around Marmara, Ege, Karadeniz and Akdeniz regions as given in Appendix A Figure 4. As it could be seen most of the industry is located concentrated in a couple of regions and almost all of them are close to the seaside. The main reason for that is to establish the industry close to the domestic and international raw material sources. As mentioned above there are two different methods to produce the steel. The first one is the production on integrated mills by using iron ore and coke coal. According to the 2006 Annual Report of Iron and Steel Producers Association the imported quantity of iron ore is 6,690,906 mt and 20,286,056 mt for coal (All of this coal is not used for steel industry). The production of crude steel with this technique is 6,177,000 mt. The second method is to produce the steel with Electric Arc Furnaces out of scrap. In 2006, the quantity of the imported scrap is 14,771,928 mt and the production of crude steel with this technique is 17,131,000 mt. (*Turkish Iron and Steel Producers Association, May 2007,* p. 18 & 38). The locations of the steel industries are also developed by means of other industries. Scrap is mainly collected from industrial

areas. In that sense the transportation of scrap out of domestic market is also very easy and cost effective.

Richard Hartshorne proposed ten hypotheses regarding the factors influencing the general location of the industry. As he has only concentrated on the integrated steel production he did not comment on scrap. According to Hardstone the minor factors are limestone sources, water, land, labor, capital & taxes, and fixed investments. Whereas the major factors are the relative location of areas producing iron ore, coaking coal and the markets, transportation from the raw material sources and to the markets, usage of high grade or low grade iron ores and usage of coal according to the grades. *(Hartshorne, 1928, pp.248 – 249)*

As alternatives to central place theory, Krugman offers four explanations of firm location: First, firms will locate at points of high market potential, where the computation of market potential is some measure of market access divided by distance (the gravity model). Secondly, cumulative causation suggests a circular relationship, whereby a region attracts firms whose presence attracts other firms. Third, positive local externalities "promote concentration of production," and analysis of these externalities can provide insights into optimum city size. Finally, the land rents theory of von Thünen assumes a gradient of land values as one move away from an urban centre. This model explains "centrifugal" forces quite well, but it has little explanatory power with respect to the existence of economic centres *(Krugman, 1995, pp. 42)*.

These theories are further developed in the latter half of the 20th century by alternative theories. Most noteworthy theories among them are localization, urbanization, and dispersal theories. This contrasts with the neo classical theories, in which firm location occurs more or less as a response to economic conditions in a region. According to these new theories the location of the industry depends on the capitalist industrialisation but not on the placements of resources and consumers.

- "Localization asserts that similar industries will tend to grow together in particular regions.
- Urbanization, contrasted with localization, says that firms of different types will cluster together in an urban region.

- Another alternative location theory is that of dispersal economies, which postulates that firms may relocate and decentralize in order to separate from the "dwindling profits" of an over-invested core and to "extend into new growth peripheries"" *(Storper & Walker, 1989, p. 88)*.

2.2.9. The Diamond Model – by Michael Porter (1990)

According to Porter countries do not compete. Companies are the only ones, which compete. Therefore competition strategies of the firms are very important. Porter suggested 3 strategies to the companies to be successful.

- Cost Leadership
- Differentiation
- Market Segmentation

Companies which do not choose one of those strategies will reduce their chance to be competitive in the market. As well as choosing a strategy, also the opportunities, which will be provided by the base country has a big influence on the competitiveness of the company in the global arena. Countries with suitable conditions are increasing the productivity and it is also influencing the related sub-sectors. So it is increasing the national competitiveness.

According to Porter national prosperity is created, not inherited. It does not grow out of a country's natural endowments, its labor pool, its interest rates, or its currency's value, as classical economics insists *(Cho and Moon, 2000, p.57)*. The main aim of Porter was to find out why some nations succeed and others fail in international competition. Porter theorizes that four attributes of a nation shape the environment in which local firms compete and these attributes promote or impede the creation of competitive advantage. These attributes are: Factor endowments; Demand conditions; Relating & Supporting Industries; and Firm strategy, structure, and rivalry. These attributes constitute the diamond. The above mentioned attributes create the national environment in which companies are born to and learn how to compete in. Each factor on the diamond and the diamond as a system affects essential ingredients for achieving international competitive success. In addition to

these attributes Porter maintains that there two additional variables can influence the national diamond. These additional variables are government and chance.

Factor Conditions: "The nation's position in factors of production, such as skilled labor or infrastructure, necessary to compete in a given industry" *(Cho and Moon, 2000, p.62)*. Demand conditions show the availability of resources and skills necessary for competitive advantage in an industry. As previously mentioned the factor endowments lay at the center of Heckscher Ohlin's factor endowment theory. Although Porter does not propose anything radically new, he analyzed the characteristics of factors of production. He distinguished factors between basic factors and advanced factors. Basic factors are constituted out of natural resources, climate, location and demographics, whereas the advanced factors are communication infrastructure, sophisticated and skilled labor, research facilities, and technological know-how. Unlike the naturally endowed basic factors, advanced factors are a product of investment by individuals, companies, and governments. Although basic factors provide an initial advantage, the advanced factors are the most significant for competitive advantage.

Demand conditions. "The nature of domestic demand for the industry's product and service" *(Cho and Moon, 2000, p.62)*. Demand conditions show the information that shapes the opportunities that companies perceive and the directions in which they deploy their resources and skills. Firms are most sensitive to the needs of their closest customers. Therefore the characteristics of domestic demand are very important in shaping the attributes of domestically made products and in creating pressures for innovation and quality. Companies may gain advantage against their international competitors, because of this pressure and challenge. Porter argues that a nation's firms gain competitive advantage if their domestic consumers are sophisticated and demanding.

Related and supporting industries. "The presence or absence in the nation of supplier industries and related industries that are internationally competitive" *(Cho and Moon, 2000, p.62)*. In the presence of related and supporting industries in the nation, the home-based suppliers gain competitive advantage through these downstream and upstream industries. In addition to the cost reduction on the raw material side, these supporting and related industries provide innovation and upgrading.

Firm strategy, structure, and rivalry. "The conditions in the nation governing, how companies are created, organized, and managed, and the nature of domestic rivalry" *(Cho and Moon, 2000, p.62)*. According to Porter different nations are characterised by different management ideologies, which either help them or do not help them to build national competitive advantage. The other point related with this attribute is the contribution of rivalry to the competitiveness. Strong domestic rivalry forces firms to find ways to improve efficiency, which makes them better international competitors. Strong domestic rivalry forces firms to innovate, improve quality, reduce costs, and to invest in upgrading advanced factors.

Government & Chance. Those are the exogenous factors affecting the national competitiveness. Chance events, such as major investments may change all the structure of the industry. On the other hand by its choise of policies governments affect the national competitiveness of industries and firms by applying anti-dumping duties, quotas, exchange rates, regulations, anti-trust policies or by government investments in education to change factor endowments.

According to Porter each country passes through some stages to reach competitiveness. These are:

- Factor-driven
- Investment-driven
- Innovation-driven
- Wealth-driven

The first 3 stages are improvement stages whereas the last stage is the recession stage. There are 3 strategies to reach to wealth-driven stage. The first one is to improve step by step from 1 to 4 through industrialisation and innovations afterwards. The second one is directly from 1 to 4. This method is only suitable for countries with rich natural resources. And the third strategy is to move from 1 to 3. The latter strategy is applicable for countries with a strong position on educated people. According to the basic or advanced level factor endowments of the country, one of those strategies has to be chosen.

2.3. Factors Affecting National Competitiveness

Since Smith and Ricardo, there have been many studies on competitiveness to find out the factors affecting it. As mentioned in the previous part of this study, some economists supported the idea that competitiveness is directly related with the labor productivity and abundance, whereas other economists considered different factors and conditions. And a group of economists studied on the relation between competitiveness and the economic conditions of the countries. There are also studies about the effect of the locations of industries, the support of related industries and the role of government on competitiveness. As it can be seen, the competitiveness can only be achieved by the contribution of different factors. Under the scope of the theories mentioned above, in this study the competitiveness will be investigated on the following factors;

- Cost
    - Raw Material
    - Energy
    - Freight
    - Labour
    - Exchange Rate (€/$ & $/YTL)
    - Finance
- Quality
    - Fulfillment of the standards
    - Customer Oriented Production
    - Quality of the raw materials
    - Sustainability in quality
    - Education of the employees
- Technology
    - Steel Producing Technology
    - Technological development in Construction, Automotive and other related industries
- Accessibility to markets
    - Certification & Homologation
    - Barriers, Quotas, Tariffs, Import Duties

    - Anti-dumping Investigations
    - Foreign Direct Investments & Consolidations
    - Benefits through International Agreements
- Location
    - Distance to Raw Material Sources
    - Distance to Markets
- Role of Government
    - Institutions
    - Structuring Plans
    - Subsidies
    - Import & Export Regulations
    - Banking, Finance & Insurance System
    - Infrastructure
    - Protection of the environment
    - Getting unregistered economy under control
    - Taxation
    - General Labour Legislation
- Domestic Market
    - Competition Among National Companies
    - Number of companies in the market
    - Demand & Supply Relations
    - Capacity Utilization Rates
    - Market Structure
    - Support of the Related Industries
    - Foreign Direct Investments
    - Market Shares
    - Market Size
    - Exchange Rate ($/YTL & €/YTL)
- Firm Characteristics
    - Firm Size & Economies of Scale
    - Ownership Status
    - Production Range

2.4. Methods to Measure the National Competitiveness

There are two main ways to measure competitiveness. The first method is to concentrate on the trade and international market-share indicators; And the second method is to check the productivity and the cost indicators. The methods to measure the trade and international market-share indicators are Revealed Comparative Advantage (RCA); The Michaely Index; Contribution to the Trade Balance (CTB); Comparative Export Performance (CEP); Trade Overlap and Export Similarities (ES); whereas the methods to measure the productivity and the cost indicators are Total Factor Productivity (TFP); Unit Labor Cost (ULC); and Relative Unit Labor Cost (RULC).

2.4.1. Trade and International Market-Share Indicators

International market shares and trade balances are frequently used as industry-level indicators of competitiveness. Markusen suggested the following "positive, trade-based" definition of industry competitiveness:

In a free-trade environment: (1) An industry loses competitiveness if it has a declining share of total domestic exports or a rising share of total domestic imports deflated by the share of that good in total domestic production or consumption. (2) An industry loses competitiveness if it has a declining share of total world exports or [a] rising share of total world imports of that good deflated (divided by) the country's share of world trade. (Markusen, 1992, p.8)

The following indexes are usually employed for measurement:

2.4.1.1. Revealed Comparative Advantage (RCA)

Measures of revealed comparative advantage (RCA) have been used to help assess a country's export potential. By considering exports and imports together, RCA's describe comparative advantages and disadvantages in international trade. Emprical studies have been done by Liesner, Balassa, and Vollrath and they had proposed equations to measure the RCA. The scope and the formulas of these equations were detailed in the part 1.2.4.

A value of less than unity implies that the country has a revealed comparative disadvantage in the product. Similarly, if the index exceeds unity, the country is said to have a revealed comparative advantage in the product. The RCA indicates whether a country is in the process of extending the products in which it has a trade potential. It can also provide useful information about potential trade prospects with new partners. Countries with similar RCA profiles are unlikely to have high bilateral trade intensities unless intra-industry trade is involved.

2.4.1.2. The Michaely Index

The indicator developed by Michael Michaely in 1962 is an 'index of dissimilarity' for a country. The formula developed by Michael Michaely is as follows.

$$MI_{ij} = X_{ij} / \sum_i X_{ij} - M_{ij} / \sum_i M_{ij},$$

where X represents exports of sector i from country j, and M represents imports for sector i to country j. The formula represents the percentage share of a given sector in national exports over the percentage share of a given sector in national imports. If the Michaely Index value is greater than 1 then it represents that the country is specialised in that sector, whereas the negative values represents an under-specialisation in that sector. By taking all sectors into consideration, the larger the value of the index, the less similar is the commodity composition of the country's exports and imports. In case of perfect similarity the index takes the value of zero.

2.4.1.3. Contribution to the Trade Balance (CTB)

$$CTB_{ij} = \frac{X_{ij} - M_{ij}}{(\sum_i X_{ij} + \sum_i M_{ij})/2} * 100 - \frac{\sum_i X_{ij} - \sum_i M_{ij}}{(\sum_i X_{ij} + \sum_i M_{ij})/2} * \frac{X_{ij} + M_{ij}}{\sum_i X_{ij} + \sum_i M_{ij}} * 100,$$

Results with positive value of the CTB index identify those sectors show a higher contribution than their percentage share in the country's total trade. Contribution to

the Trade Balance Index and Michaely Index differ only, if very large trade unbalances are present for a given country.

2.4.1.4. Comparative Export Performance (CEP)

Since the RCA indices are based on actual export and imports flows, trade policy interventions in the form of tariff and non-tariff barriers on imports can distort their calculation. The CEP- index is based only export shares and allows for comparison of findings between the two measures.

$$CEP = \left(x_{ij} / X_{iw}\right) / \left(\sum x_{ij} / \sum X_{iw}\right).$$

where the subscript *j* refers to the country in question and subscript w to the main country respectively. CEP index values above (or below) unity mean that the particular sectors have a greater (lower) share in total exports of the individual country than they have in the main country as a whole. Thus, the country in question possesses a relative advantage (or disadvantage) in the export of these products.

2.4.1.5. Trade Overlap (Intra- and Inter-Industry Trade)

Under monopolistic competition there exists two-way trade within the manufacturing sector. This exchange of manufactures for manufactures is called intra-industry trade and an exchange of manufactures for food, for example, is called inter-industry trade. The intra-industry trade suggests how and to what extent the economy in question is already integrated into the world market and the degree of liberalization that the economy has already realized throughout the economic development process

$$TO = 2\sum_{i=1}^{n} min\left(X_i, M_i\right) / \sum_{i=1}^{n} \left(X_i + M_i\right).$$

where *Xi* and *Mi* refer to exports and imports, respectively, of each of the SITC 0-9 production sectors *i, and "min"* defines the magnitude of the total trade that overlaps in dollar terms. The coefficient can vary between 0 and +1. The closer it comes to unity, the more intra-industry specialization exists. A lower coefficient implies that trade takes the form of inter-industry specialization.

2.4.1.6. Export Similarities (ES)

Coefficients of "export similarity" (ES) using the formula of Finger and Kreinin (1979) which measures the proportion of a country's exports matched by its competitor's exports in the same product category. The ES coefficient can vary between 0 and 1. The closer it comes to unity; there is a greatest degree of similarity between two countries. On the other hand, 0 indicates no export similarity between the countries in question and no overlap at all.

$$\Sigma dxy = \Sigma |X_i - Y_i| / \Sigma (X_i + Y_i)$$

Where X_i is the share of i^{th} commodity exports (imports) in the total exports (imports) of country A. Y_i is the share of i^{th} commodity exports (imports) in the total exports (imports) of country B. The result of this equation is the cumulative total share differentials of exports as percentage exports similarity index. Another way to calculate the export similarities is as follows:

$$ES(ab,c) = \sum_i \left[EX_i(ac) - \frac{EX_i(ac) + EX_i(bc)}{2} \right]$$

This formula measures the difference in the export patterns of countries *a* and *b* to market c. If the commodity distribution of the exports of (*a*) and (*b*) are identical, then the index will take on a value of 0. Exi (*ac)* is the share of commodity *i in a's* exports to *c*.

2.4.2. Productivity and Cost Indicators

Markusen suggested the following “positive, efficiency-based” definition of industry competitiveness:

(1) An industry is competitive if it has a level of total factor productivity equal to or higher than that of its foreign competitors. (2) An industry is competitive if it has a level of unit (average) costs equal to or lower than its foreign competitors. (Markusen, 1992, p.8)

2.4.2.1. Total Factor Productivity (TFP)

Total Factor Productivity measures the synergy and efficiency of the utilisation of both capital and human resources. It is also regarded as a measure of the degree of technological advancement associated with economic growth. Higher TFP growth indicates efficient utilisation and management of resources, materials and inputs necessary for the production of goods and services. TFP also refers to the additional output generated through enhancements in efficiency arising from advancements in worker education, skills and expertise, acquisition of efficient management techniques and know-how, improvements in an organisation, gains from specialisation, introduction of new technology and innovation or upgrading of existing technology and enhancement in information technology as well as the shift towards higher value-added processes and industries.

$$Y = AK^{\alpha}L^{1-\alpha},\ 0<\alpha<1, \qquad \dot{TFP} = \dot{LP} - \hat{\alpha}\cdot\dot{k}$$

Where Y is output, K is capital input, L is labour input and A is TFP.

2.4.2.2. Unit Labour Cost (ULC)

A measure of international competitiveness of the manufacturing sector focuses on the differences in unit labour costs (ULC) among countries. ULC is defined as the cost of a worker's compensation per unit of output produced. In other words, ULC is the ratio of workers' compensation to labor productivity. Lower ULC means that one country's manufacturing sector is more competitive than another country's manufacturing sector. Unit labour cost (ULC) may be an adequate representation of average cost if labour cost constitutes a large fraction of total cost.

2.4.2.3. Relative Unit Labour Cost (RULC)

When it comes to international competitiveness, relative unit labour costs are the decisive factor. The basic idea is that relative unit labor cost is influenced both by sector-specific variables (productivity and wages) as well as the real exchange rate.

Chapter

3 The EU Steel Industry

3.1 The EU Steel Industry in General

The steel industry is organised into sets of regional blocks or clusters, for production and also for trade. One of the best examples of this type of clustering is the European steel industry. This industry has its roots in the development of manufacturing industry in the late nineteenth century. Iron and steel production and consumption played a vital role on the economies of the European countries throughout the twentieth century.

The relationship between economic development and the iron and steel industry comes from the fact that steel products are used as inputs in almost all industrial areas. In addition to its own share in the economy, the iron & steel industry stands at the hub of many industrial sectors, such as construction, automotive, railways, naval construction, agricultural tooling, home appliance manufacturing, tubes, metalware and to the production of many appliances and goods.

The historical basis of the European clustering of iron and steel lies in the establishment of the European Coal and Steel Community (ECSC), which was founded in 1951 (Treaty of Paris), by France, West Germany, Italy, Belgium, Luxembourg and the Netherlands to pool the steel and coal resources of its member-states, thus preventing another European war. The ECSC was the practical follow-up to the Schuman Declaration of 9 May 1950. “The Schuman Plan was designed to alleviate concerns that Germany’s dominance in coal and steel could be used to harm European reconstruction efforts or to build another war machine.” *(Alter and Steinberg, 2006, p. 2)* Therefore it is proposed placing Franco- German production of coal and steel under a common High Authority. “Jean Monnet, the Plan’s chief architect, also wanted to shore up the French planning process for reconstruction by

Europeanizing the technocratic planning approach. Most supporters of the ECSC project expected integration to expand beyond Coal and Steel, and hoped that it would serve as a first step toward deeper European integration." *(Alter and Steinberg, 2006, p. 2)*

Subsequently, the membership of the ECSC was expanded as the EU evolved and developed. This Treaty was the forerunner of the subsequent treaties and served as the foundation for the later development of the European Economic Community (later renamed the European Community by the Maastricht Treaty), and then the European Union. The ECSC was viewed as a success by its supporters. This high authority enabled increased output and facilitated the labour retraining when excess capacity became a problem after 1959. The ECSC has been a cornerstone of the European industry for fifty years, until the expiry of the Treaty in 2002.

The Treaty created a framework of rules that could be used to support the competitive nature of the market. Elements of this framework included:

- *Transparency with respect to prices*: firms were obliged to publish prices, and price discrimination was forbidden.
- *Management of investment*: the High Authority could help fund or prohibit investments to avoid illegal subsidization of industry.
- *Banning cartels*: cartels were generally forbidden and the High Authority had to approve that mergers were aimed at increasing efficiency and not at market dominance.
- *Eliminating subsidies*: subsidies were generally illegal, though exceptions were permitted so long as they were gradually reduced.
- *Labor Policy*: information provisions aimed to create transparency in labor practices.
- *Transportation*: the same transport rates had to be applied to all steel firms, regardless of nationality, and rates had to be published.
- *Foreign Relations*: under the supervision of the Council of Ministers, the High Authority could negotiate and establish diplomatic relations with foreign governments regarding matters related to coal and steel.

• *Crisis Measures*: in the event of a "manifest crisis," production quotas would be established by the High Authority. *(Alter and Steinberg, 2006, p. 4)*

The foundation for the EU steel industry as a regional industry was laid in the 1980s and 1990s as a result of the introduction of market-oriented policies (deregulation, privatisation, strict state aid discipline and removal of trade barriers). It has associated moves toward the establishment of a more internationally focused industry. "The restructuring of the industry resulted in increased emphasis on productivity, technological innovation and development, an emphasis on down-stream activity and a recomposition of the industry via mergers and acquisitions. Such developments are likely to have major consequences for the organisation of labour, the skills profile, and training." *(Fairbrother and et. al., 2004, p. 4)*

Radical changes in the steel industry since the 1980s may be accounted for by two principal factors:

■ "the radical transformation of the industry as a result of technological innovation. Steelmaking today is a high-technology industry. More efficient production of new, lighter steel means that less raw material is required in each finished product and hence less workers to produce it; and

■ the withdrawal of the state from its long-standing ownership and control of the iron and steel industry in most countries and the sector's consequent privatisation. In western European countries, the process is virtually complete and it is accelerating elsewhere." (EFILWC, 2005, p.1)

During the end of twentieth century the framework in which the EU steel industry operates has changed Industry operations in view of increased public awareness for the environment. These developments pushed the industry towards environmentally "friendly" products and technologies. Moreover, "client requirements have induced production of innovative quality products in combination with a high "service" component. For their part, steel employees have obtained improved working conditions, in return for higher qualifications and productivity." *(European Commission, 1999, p.1)*

As in the global steel business there are also threats for the existing players in European Steel business. The main threat is the excess capacity and the increasing global concentration of client industries. The accelerating technological changes and the permanent cost/price squeeze for steel products are challenging the existing players in addition to the competition due to new competitors. Steel business will remain volatile under these circumstances. But the conditions for facing future challenges in European Steel Industry are good. "This is due to the considerable efforts made by the EU steel industry to reshape its production structure, improve its technological performance and better employ the skills of its human resources. Moreover, via strategic alliances, the industry has transcended national boundaries and developed a truly European production and market base. With the expiry of the ECSC Treaty in 2002, the regulatory framework under which the industry operates will be changed from mainly sector-oriented into the EU policy applied to the whole of the manufacturing industry." *(European Commission, 1999, p.1)*

From the establishment of the ECSC 'till the late twentieth century, the iron and steel industry was either state owned, seen as one of the strategic industries or highly regulated, but the structure of the European steel industry has changed considerably following several phases of restructuring and the privatisation of practically all the publicly owned steel companies. A consequence of privatisation has been the internationalisation of the industry and the crossborder mergers and acquisitions that have accompanied it. "The European steel industry is on a cusp, moving from a largely nationally-based industry to one where the major companies are transforming into major steel multinationals, with a strong regional focus." *(Fairbrother and et. al., 2004, p. 4)*. On one side the national governments that make up the EU still see steel as a major national industry, but on the other hand the reality is that the principal companies in Europe are no longer reliant on national economic policy and support. As these changes proceed the industry is likely to remain at the centre stage of government policy concerned with economic restructuring as the labour mobility and employability.

"Rationalisation of production structures and substantial investments in modern steelmaking processes and technologies has drastically improved performance of steel facilities. Labour productivity has increased substantially, illustrated by the fact that total crude steel output has increased by 20% over the last ten years, whilst the

total workforce has been reduced by 40%. The competitiveness of the industry has been further enhanced through cross-border strategic alliances, especially in the field of high value-added steels, or consolidation between one or more former European competitors. Today, over 60% of steel output is produced by 5 groups, against 23% in 1993. At the end of 1998, the steel industry employed about 290 000 people and total production value is estimated at € 75 billion." *(European Commission, 1999, p.2)*

As mentioned on the above mentioned figures, the privatisation caused increased competition, usage of high technology, increased efficiency, improvement of lighter steel products, usage of less raw material and requirement of less workforce. While European Steel Companies were increasing their competitive power, the industry faced crisis due to dramatic job losses in the European Union. Some portion of the job losses occurred because of the usage of high technology and advanced machinery, whereas the remaining part is because of the closure of plants due to inefficiency and regional excess capacity.

"For many years, the European Commission has been concerned about the crisis in the European steel industry. The Commission has aimed at stabilising the intra-Community steel market and boosting competitiveness. Furthermore, other EU institutions see it as vital to face up to restructuring and its negative effects. In February 2003, the European Parliament adopted a resolution (EU0303202N)[1] calling for measures to be taken at Community level to address this crisis, including:

■ use of EU funds for the vocational training and reorientation of steelworkers affected by restructuring;

■ regulation of unfair competition from outside the EU;

■ promotion of innovation and development of new actions aimed at specialisation and quality in the sector, and the provision of appropriate plans for retraining. The aim is to ensure that the EU maintains a strong, modern steel industry that is in a position to meet the needs of sustainable development and job creation, while enhancing employee and consumer protection;

■ adoption of a more proactive strategy in response to industrial restructuring measures and their social impact, with a view to preventing their negative effects on jobs, working conditions and regional planning; and

■ promotion and strengthening of social dialogue in compliance with national and European legislation on informing and consulting workers, and adoption of effective measures to protect trade union representatives." (EFILWC, 2005, p.2)

"In terms of EU-level social dialogue, the 1951 European Coal and Steel Community Treaty set up an ECSC Consultative Committee to provide technical assistance to the then High Authority, a body which has since merged with the European Commission. The members of the ECSC Consultative Committee were appointed by the Council of Ministers and divided equally between producers, workers and consumers/dealers in the two sectors covered by the ECSC Treaty: coal and steel. The general consensus was that the ECSC Consultative Committee performed well, playing an active role in the construction of the EU. However, the ECSC Treaty expired on 23 July 2002. Subsequently, it was decided that the ECSC Consultative Committee's activities be wound up and its role taken over by the European Economic and Social Committee (EESC).

There had also, for some years, been a 'mixed committee for the harmonisation of working conditions in the steel industry', set up by the European Commission, and made up of representatives of employer and worker organisations at national and European level. The EU level social partners in the industry – the European Metalworkers' Federation (EMF) and the European Confederation of Iron and Steel Industries (Eurofer) – have applied to develop the mixed committee into a full-blown official sectoral social dialogue committee, in order to continue the close cooperation and relationship between the social partners in steel established over a period of 50 years. On this point, the general secretary of EMF stated in 2002 his wish to 'pursue a substantial industrial and social dialogue and constructive consultations with Eurofer and the European institutions'. In order to create a social dialogue committee, Eurofer needs to be recognised as a representative partner by the European Commission, as EMF already is." (EFILWC, 2005, p.2)

3.2 Current State of the EU Steel Industry

This section is devoted to the investigation of current situation of the European Steel Industry. "The steel industry corresponds to NACE code (Product Code) 27.10 and the definition in the ECSC Treaty, which involved the production of crude steel,

semi-products, hot-rolled finished products, continuously cast products, cold-rolled sheets and plates, and coated sheets. According to this definition, the steel industry does not include the manufacture of steel tubes, which are included under NACE code 27.20, nor the initial cold processing of steel (mainly wire drawing, but also cold drawing, laminating, profiling and shaping), which are covered by NACE code 27.30. The ECSC Treaty excludes these processes, along with cast-iron foundry products and forged, pressed, deep-drawn and cup-packed products. Together, these three subsectors, represented by NACE 27.10, 27.20 and 27.30, constitute the 'ferrous metal sector'" (EFILWC, 2005, p.1)

As mentioned in the first part, the steel industry in this study covers the production and trade of crude steel; semi-products; hot-rolled finished products; continuous cast products; cold-rolled sheets and plates, and coated sheets.

Steel industry has an important contribution to the European Union economy. The European steel industry with 186 million metric ton of production generated 16.5 % of 1,129 million mt world production in 2005. (IISI Figures) With these figures European Steel Industry is the second largest producer in the world after China and generates more than € 100 bn in annual turnover. In addition to its production capacity, The EU steel industry is also a major player in international trade with an export volume of more than 20 million mt to third countries and with an import volume of more than 21 million mt in 2002. In addition to being a key player in international market, the EU steel industries also have an important contribution to the European economy by the trade of more than 68 million mt in 2002 through internal trade between countries of the European Union.

In addition to its direct effect on the economy, steel industries in EU also generates great job opportunities for labour. European Steel Industry "provides direct employment for around 350,000 European Union citizens, and several times this number is employed indirectly in its processing, in the user and in the recycling industries. The steel industry is the source of millions of indirect jobs, in many industrial activities, as steel is a key material for many of them (road, rail, maritime and air transportation, construction, energy, chemical industry, household appliances, etc.). For example, the European construction steel industry and the automotive sector represent more than 1,300,000 jobs (EU-15). It is vital for the future of Europe

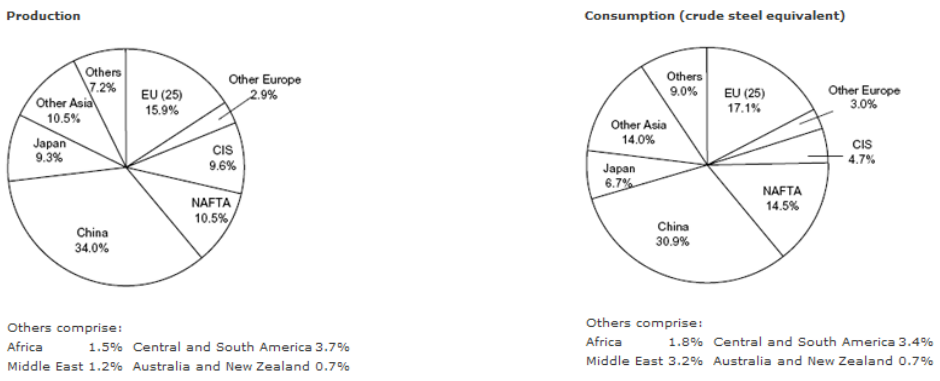
and its citizens to maintain an active and competitive steel industry." *(European Steel Technology Platform, 2005, p. 12)*

In this part, the Steel Industry in EU is investigated in terms of Position of the European Steel Industry on Global Perspective; Production and Consumption; Employment; Factors Affecting the Cost of Production; Company Structure; Role of Government; and in addition to these, the enlargement of the European Union and the effect of new members on the existing situation of the European Steel Industry will be scrutinized.

3.2.1 Position of the European Union Steel Industries from Global Perspective

To be able to understand the global position of the European Steel Industry we have to focus on the global situation and also to the global trends in the steel industry. The EU27 is the world's second largest steel producer after China, with total production of crude steel of 207million tones in 2006 (16.67 % of world production). In 2006 the production of China has reached to 422.7 million tones (34.04 % of world production) according to the IISI figures. With these figures, China continues to drive world production developments. According to the figures of IISI EU27 is followed by NAFTA (130.3 million tones), Other Asia (129.7 million tones), CIS (120.7 million tones), and Japan (116.2 million tones). The quantities of crude steel produced in each country with 2006 figures are given as detailed in the Appendix part. The distribution of crude steel production and consumption among geographical regions are shown on the Figure 3.1.

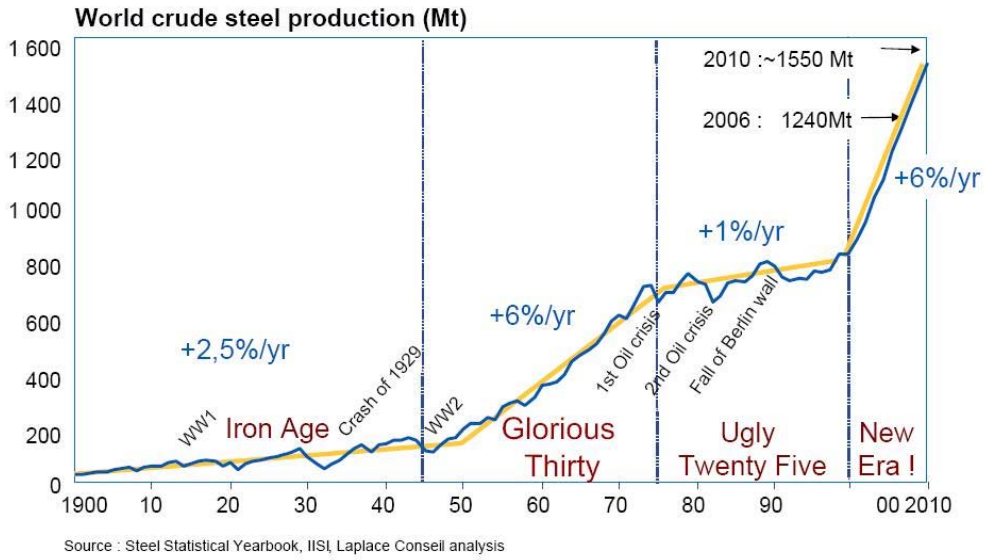
Figure 3.1 Geographical Distribution of Steel Production and Consumption, 2006



Source: International Iron and Steel Institute

The global steel market is enjoying its sixth consecutive year of strong output and demand growth. The below illustration shows the eras on the crude steel production in the last century until today. As it is illustrated on the Figure 3.2, the world steel industry has entered into a new Era since the beginning of this century. Beginning from the 21ST Century we faced with a yearly average of 6% increase on the global crude steel production.

Figure 3.2 World crude steel production (mt)



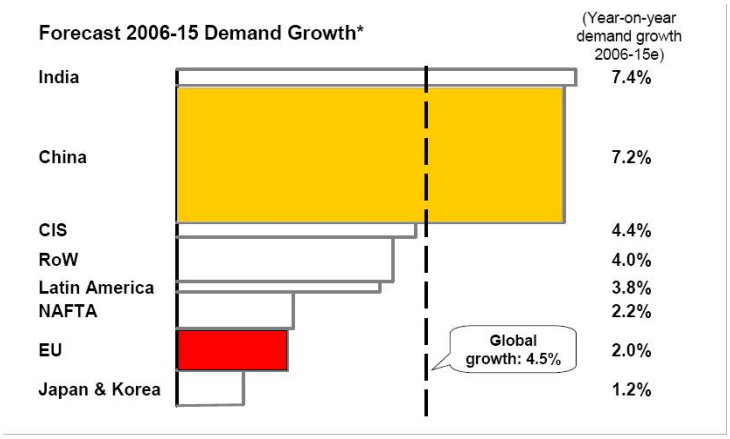
Source: "View on the Future of the Global Steel Industry", Laplace Conseil, 2007, p.3

Global demand growth accelerated in 2006, in line with the strengthening pace of world economic activity and the need of infrastructures and other investments in rapidly growing developing economies. The International Iron & Steel Institute (IISI) reported global steel demand growth at 9% during 2006. In the same time period the steel demand growth was 14% in China. The shipbuilding, auto, and industrial machinery industries are boosting steel use in Japan and South Korea. In the European Union, robust export demand and recovering domestic demand for goods manufactured in key steel-using industries will raise apparent steel consumption. Within the CIS, the Russian consumption is being bolstered by strong growth in mechanical engineering, construction, and railroad transport. In North America, Canada and Mexico consumption is also expected to rise. In addition to their consumption rates especially the United States and Canada will continue to be in the market as net importers of steel products. In the Middle East, especially in United

Arab Emirates, Qatar and Bahrain, there are many big construction projects increasing the demand in that region.

Looking ahead to 2015, global demand for steel products is expected to grow any further at an average of around 4.5% per year. China will continue to play an important role in the iron and steel market as it represents a large portion of the global market and it is forecasted that it will grow around 7.2% year-on-year up to 2015. The current crude steel production of India was 44 million tonnes in 2006, but the highest growth rate is expected in India. India is forecasted to grow with a year on year average of 7.4% between 2006 and 2015. For the same period the demand growth expectation for European Union is 2.0 %, much lower than the global average. The forecast for each geographical region is illustrated on the Figure 3.3.

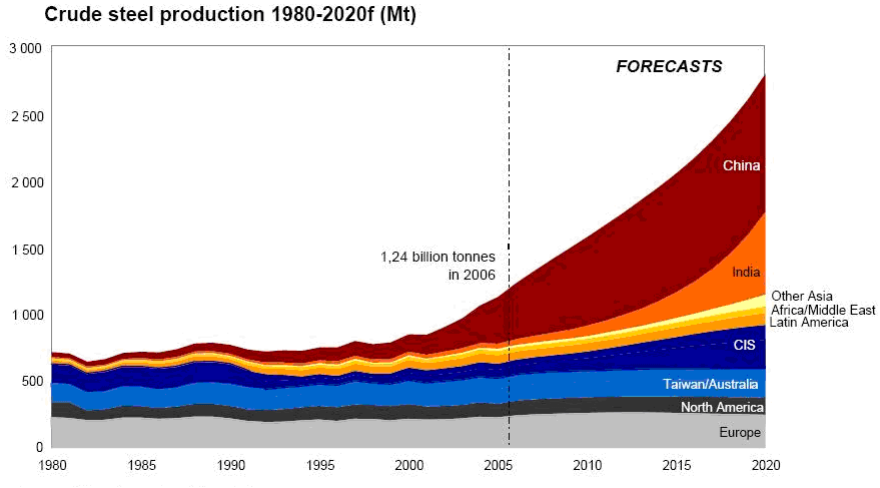
Figure 3.3 Demand growth in steel - Forecast 2006 – 2015



Source: "Globalisation in the Steel Industry", Welsh Affairs Committee Publications, Session 2006-07, UK Parliament, p.2

As it can be seen on the above graph, the highest growth rates in the steel demand are expected to be in the developing countries and especially in the so-called BRIC countries, including Brazil, Russia, India and China. They have high growth rates in production and also in demand. "The BRIC countries, which accounted for about 41% of global steel demand in 2006, will again be leading the growth with an expected increase of 12.8% for 2007 and 11.1% for 2008. Overall, 77% of world growth in 2007 and 71% in 2008 will take place in BRIC" *(IISI, 2007, p.1)*. By 2010, more than half of the global steel production is expected to be in BRIC countries. The forecasts of Laplace Conseil base on IISI data showing the global production trends up to 2020 is given below in the Figure 3.4.

Figure 3.4 Crude Steel production 1980 – 2020f (mt)



Source: "View on the Future of the Global Steel Industry", Laplace Conseil, 2007, p.9

By means of the international trade, the EU looks like the leading single market. As of 2005, the EU exported 135.3 million tones of steel, while importing 124.6 million tones. But, 99.9 million out of these quantities are traded within the EU. Therefore the net-exports of EU was 35.4m tones and the net imports was 24.7m tones respectively. Even with those figures, EU is still maintaining its leading position on exports. On the other hand for the imports, EU was in the 4th position among regions after Other Asia, North America, and China. The distribution of exports and imports among regions in world steel trade is given in the Table 3.1.

Table 3.1 World Steel Trade by Area (million metric tones), 2005

Exporting region / Destination	European Union (25)	Other Europe	CIS	North America	South America	Africa & Middle East	China	Japan	Other Asia	Oceania	Total Imports	of which: extra-regional imports
European Union (25)	99.9	7.9	9.2	0.5	1.4	2.2	1.5	0.4	1.7	0.0	124.6	24.7
Other Europe	10.6	0.6	7.7	0.1	0.1	0.1	0.1	0.2	0.1	0.0	19.6	19.0
CIS	1.4	0.2	7.6	0.1	0.0	0.0	0.2	0.1	0.3	0.0	10.0	2.3
North America	7.9	3.5	3.2	18.8	4.4	0.7	3.2	2.3	4.3	0.3	48.7	29.9
South America	1.0	0.1	1.3	0.4	2.5	0.1	0.1	0.2	0.2	0.0	5.9	3.4
Africa	3.1	1.6	6.0	0.1	0.6	3.3	0.4	0.3	0.9	0.0	16.4	13.1
Middle East	4.0	4.8	10.0	0.1	0.0	1.4	0.7	1.3	2.3	0.0	24.7	23.3
China	1.8	0.6	4.9	0.5	5.1	0.5	-	5.7	8.2	0.0	27.3	27.3
Japan	0.1	0.0	0.0	0.1	0.0	0.0	1.1	-	3.9	0.0	5.2	5.2
Other Asia	5.3	3.5	11.7	0.8	3.0	2.2	19.6	20.8	11.4	0.3	78.6	67.2
Oceania	0.3	0.2	0.1	0.1	0.0	0.1	0.5	0.7	1.8	0.2	3.9	3.7
Total exports	135.3	23.1	61.7	21.6	17.2	10.5	27.4	32.0	35.1	0.9	364.8	219.2
of which: extra-regional exports*	35.4	22.5	54.1	2.8	14.7	5.8	27.4	32.0	23.7	0.7	219.2	
Net exports (exports-imports)	10.7	3.5	51.8	-27.1	11.3	-30.6	0.1	26.8	-43.5	-3.0		

* excluding intra-regional trade marked

Source : International Iron and Steel Institute

By means of global iron ore trade the EU has also a major role. As of 2006, the EU exported 44.1 million tones of iron ore, while importing 182.5 million tones. Contrarily to its net exporter position on steel products, the EU is the one of the main importers of iron ore globally. 38.6 million tones out of this quantity is traded between the European Union member states. The EU is the second largest importer of iron ore after China with 143.8 million tones of extra regional imports. China is the leading country with 326.3 million tones iron ore imports in 2006. The distribution of exports and imports among regions in world iron ore trade is given in the Table 3.2.

Table 3.2 World Iron Ore Trade by Area (million metric tones), 2006

Exporting Region / Destination	European Union (25)	Other Europe	CIS	NAFTA	Central and South America	Africa and Middle East	Asia	Oceania	Total Imports	of which: extra-regional imports*
European Union (25)	38.6	1.5	30.3	11.1	73.1	18.3	1.0	8.6	182.5	143.8
Other Europe	1.8	0.8	6.6	0.3	4.8	-	0.7	0.4	15.2	14.5
CIS	0.0	-	12.8	-	0.1	-	0.0	-	12.9	0.1
NAFTA	0.0	0.0	-	14.1	8.6	-	0.0	0.0	22.7	8.6
Central and South America	0.0	-	-	1.0	9.9	-	0.0	-	10.9	1.0
Africa and Middle East	3.7	-	0.1	1.6	11.6	0.5	0.4	0.1	18.0	17.5
China	0.0	-	9.1	5.2	91.4	16.1	75.5	128.9	326.3	250.7
Japan	0.0	-	-	1.4	34.9	5.3	18.0	74.7	134.3	116.3
Other Asia	0.0	-	0.0	1.1	24.8	0.7	4.5	36.3	67.4	62.9
Oceania	0.0	-	-	1.2	0.5	-	0.2	0.0	1.9	1.9
Total Exports	44.1	2.2	58.9	37.0	259.8	40.7	100.2	249.1	792.1	617.4
of which: extra-regional imports*	5.5	1.5	46.1	22.9	249.9	40.2	2.2	249.1	617.4	
Net Exports (exports - imports)	-138.4	-13.0	46.1	14.3	248.9	22.7	32.8	247.2		

* - excluding intra-regional trade marked

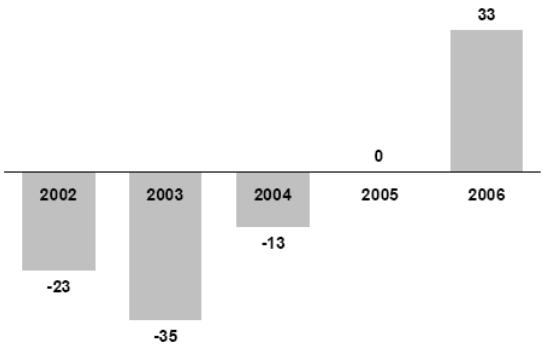
Source : International Iron and Steel Institute, 2008, p.22

European steel producers have always pursued a policy of liberal policies, so long as the trading conditions are free and fair. This has led to steel being one of the most internationally traded of all manufactured products and European steel producers benefited from a significant trade surplus in steel for many years. Today, price levels in the EU are largely determined by the decisions of steel producers and traders located far away and although the trade balance is still positive in terms of value, it is now increasingly negative in terms of volume.

BRIC countries, have an increasing influence on the international steel markets. Global production is increasingly concentrated in the emerging countries, particularly in the so-called BRIC countries. In addition to the high growth rates they also have access to low cost on raw materials, energy and labour. The role of Russian, Brazilian and Indian producers on acquisition and mergers in developed countries is also not negligible. As a result BRIC producers are directly transforming the European industry landscape in addition to their 'global trends' impact and developing structural commercial access to the European market in addition to the large import trade flows. They are producing final products close to the final end-users and the semi products are produced on facilities close to the raw material resources. Therefore, they are reducing the disadvantage of being far away from raw material resources while enjoying the benefits of being close to the end-users.

Traditionally China used to be a net importer of steel, soaking up large quantities of steel from exporters such as Japan and South Korea. Since 2003 China's net steel trade balance shifted from a 35mt per annum net import position to a 33mt per annum net export position in 2006 as shown in the Figure 3.5. It is expected to increase any further. The rapid increase in the Chinese capacity has resulted in domestic oversupply, while Chinese steel producers are enhancing production facilities to enable production of higher grade products which traditionally were imported from Europe.

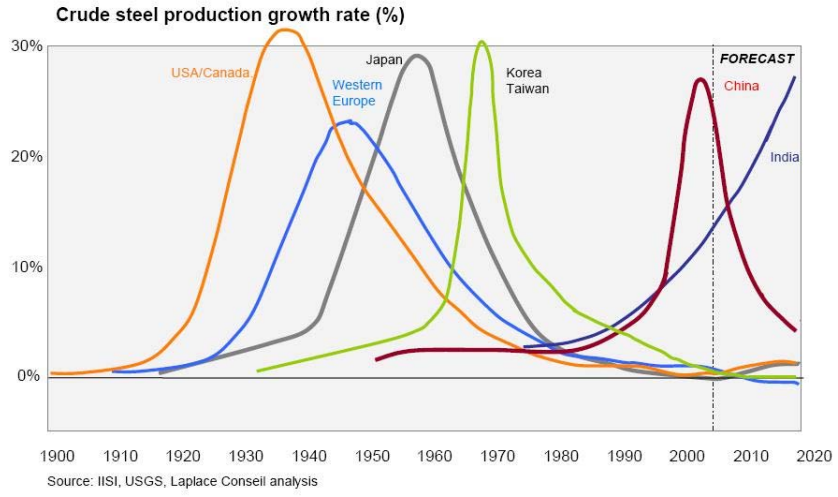
Figure 3.5 Net Export Position of China (mt)



Source : International Iron and Steel Institute

China's current evolution is similar to the one, which was experienced by the developed economies in the past. North America, Western Europe and Japan are in the Post Industrialization Era, whereas China is now in the Industrialization Era. India, another potentially powerful country of BRIC is even in the Pre-industrialisation Era as shown on the Figure 3.6.

Figure 3.6 Crude Steel Production Growth Rate (%)



Source: "View on the Future of the Global Steel Industry", Laplace Conseil, 2007, p.14

Another effect on the global iron and steel markets is the consolidations. The steel industry has gone through many phases of development. In the recent past, the issues for the European industry were mainly local in nature, such as elimination of state intervention and restructuring of the industry following the collapse of Eastern Block and enlargement of the European Union. Today, the issues are different,

globalisation and climate change become the main issues. Therefore with the help of consolidations there occurred a new trend that “regional becomes global”.

A major feature of recent years has been an increase in consolidation. While the customer and supply base for steelmakers has seen significant changes throughout the last 20 years, steelmaking remained a largely national-based industry until the mid-1990s. After, which consolidation has become the ongoing trend.

“Since 1995, the pace of consolidation speeded up both regionally (for example with the creation of Corus in 1999 and Arcelor in 2001 in Europe and the formation of JFE in Japan in 2002) and globally, with the expansion of Mittal Steel, culminating in the creation of Arcelor-Mittal in 2006 and now, in 2007, Tata Steel taking over Corus.” *(CORUS, 2007, p.3)* This begins to offer the possibility of more equal market power throughout the steel supply chain.

Up until now the steel industry was squeezed between a consolidated supply bases. The top 5 steel producers in 2006 (Arcelor-Mittal (117.2m tonnes), Nippon Steel (32.7 m tonnes), JFE (32 m tonnes), Posco (30.1 m tonnes), and Baosteel (22.5 m tonnes)) now represents 18.88% of global production according to the IISI figures. After Tata Steel taking over Corus in 2007 this number will be close to 20%. Whereas, Top 3 producers control over 80% of the global seaborne supply of iron ore and the top 5 producers in automotive or metal packaging industry cover some 80% of demand. Even after seen a number of examples where steel companies are beginning to consolidate into larger groupings, the global market share of the top 5 steel producer’s remains relatively low compared also with a number of other metals and mining sectors, such as Nickel and Alumina.

Though consolidation will strengthen steel companies’ influence in world markets, concern was expressed that steel producers in various parts of the world have increased capacity significantly or intend to do so in the years to come by extending existing capacities and/or creating new capacities, whilst most forecasts for demand over the years to come suggest that worldwide steel capacities are largely sufficient to satisfy demand requirements in the future. “Governments of Member economies of the Steel Committee should ensure that their steel industries be aware of the concern over world-wide increases in steel making capacities and their responsibility for the longer-term health of the world's steel market.” *(Nezu, 2006, p. 1)*

3.2.2 Production in the EU steel Industry

3.2.2.1 Production Techniques (Technology Base)

Steel is produced mainly by two different steel-making processes: the integrated route (blast furnace – basic oxygen furnace) and the electric arc furnace (EAF) route. Integrated steelworks produce liquid iron from iron ore, coke and limestone. The liquid iron is subsequently transformed into steel in an oxygen converter – a Basic Oxygen Furnace (BOF process). The liquid steel coming out of the BOF is continuously cast into semi-finished products (slabs, blooms or billets) which are further rolled into the various steel products. This process is called the primary route and it requires a high capital intensity. The minimum economic scale is high, and the investments in this sector are very specific. As a result, there are very high entry barriers. Due to the high quality of steel made, this technology accounts for most of the production of flat sheets and plates.

The Electric Arc Furnace (EAF) mini-mills produce steel from recycled scrap and reduced iron substitutes in an Electric Arc Furnace (EAF process). This process is called the secondary route. It requires lower capital intensity and provides a greater operational flexibility. In the past this method was primarily aimed to produce long products and even today EAF technology is used to produce lower quality long products such as those in the construction industry. But with the new technological developments, it has started to be used also for flat steel production. This requires generally high quality scrap or the addition of "virgin" materials like sponge iron (DRI), hot briquette iron (HBI), cold pig iron or hot metal from blast furnaces or smelting reduction plants. “Scrap based EAF steel production is a cost-effective and mature technology to produce steel. EAF technology has also environmental benefits: the CO_2 emission is significantly lower than for blast furnace steel technology.” *(Gielen and Van Dril, 1997, pp9)*.

Important to steel's future competitiveness also is the competition among manufacturing methods in the steel industry itself. According to the *European Parliament and the ECSC Consultative Committee Report* in 1999 the share of steel produced by the EAF route amounts to 37% in the EU, which is comparable to the situation world-wide. The rest of the steel is produced mainly by integrated mills

through the primary route. According to the figures of year 2000, the share of Basic Oxygen Furnace (BOF) technology in the world steel production is 58%. It is followed by the Electric Arc Furnace (EAF) technology with 34% and the third technology, which is the Open Hearth Furnace (OHC) technology, has 5% share. And the remaining 3% belongs to other processes. *(OECD Report, 2003, p. 11)*

Both methods have their own limitations. Mini-mills using the EAF technology are limited by the availability and cost of high-quality, low residual scrap and purchased electricity as well as by restrictions on the types and qualities of steel it can produce without access to virgin iron units at an acceptable cost. The integrated mills can produce high quality steel, but they are highly capital intensive, the minimum economic scale is high and they must be close to the iron ore and coal resources and even control them. Vertical integration is, with few exceptions, the rule. Many producers control an important part of the raw material production chain.

Therefore the decision for choosing one of those methods depends highly on the availability of raw material types, energy types and market conditions. The EAF route fed by scrap is favoured where scrap is cheap and readily available in quantity, cost and quality desired. In addition to that the scale and range of products to be produced is also an important criterion. To be able to use EAF method to produce higher quality steels, especially for flat products, direct reduced iron and hot briquette iron (DRI/HBI) or iron carbide must be used in the EAF. This method is favoured where scrap is not readily available, or at least not at the right price or quality, and iron ore and low price gas for DRI production are readily available. EAF using DRI/HBI consumes more power compared to one using scrap. Therefore low power costs are also an advantage. As a result, this route is mainly found in gas rich developing countries. On the other hand, despite the high capital costs, the BF/BOF route can still be the route of choice where the demand is large, scrap is not available, iron ore and coal are available and electric power is not cheap.

Both techniques have their advantages and disadvantages compared with the other method. The main advantage is its flexibility in production rates depending on demand and their ability to be designed to make specific product qualities for particular end markets. In the integrated mills the minimum quantities to be produced for each quality is generally much higher than the EAF mini-mills. In that sense the niche markets with lower quantities demanded are out of their scope.

The Integrated mills are big units employing thousands of labour force and they are highly capital intensive. As the Electric Arc Furnace mini-mills are usually small units, supplied by scrap, they can be located near the end-user markets. On the other hand, the integrated mills are generally located away from end-user markets, near large port or rail facilities due to their large raw material requirements.

Today, EAF technology is primarily used to produce lower quality long products such as those in the construction industry. These plants have largely been unable to produce high quality flat products, due partly to technology limitations and partly to limited availability of scrap with low enough residual impurities. Recent advances in casting technology and the availability of low residual scrap alternatives, however, have enabled some mini-mill producers to expand their product range into higher quality steel products suitable for flat applications. "The advent of thin slab casting technology compatible with the EAF and the emergence of mini-mills has begun to seriously challenge conventional BF/BOF steelmaking for carbon steels. Except for heavy sections such as rotor forgings and heavy beams, most, if not all, shapes currently used can be made by mini-mills." *(Eurofer, 1999, p. 66)*

"Technological developments, aiming at improvement of processes and products, as well as the reduction of raw material and energy consumption, have become continuous, with the time horizon for selecting, implementing and amortising investments in new technology significantly compressed. Moreover, the results of RTD (Research and Technological Developments) are rapidly becoming available on the market, also offering competitors the possibility of obtaining state of the art technology. In order to keep a competitive edge on technology and to achieve financial returns from it, the EU industry strongly depends on its ability to innovate." (European Parliament Committee Report, 1999, p.2).

The RTD Programmes were supported under the ECSC Treaty, but after the expiry of the European Coal and Steel Community (ECSC) on 23 July 2002, the ECSC funds were transferred to the European Community to create a common fund dedicated for research in the coal and steel area. At the same time, some of the coal research activities related to solid fuel combustion and gasification are incorporated into the 5th framework programme. Both research programmes will run in parallel under the co-ordination of the European Commission.

3.2.2.2 Quantities produced

Steel Industry in Europe is the second largest producer in the world after China with it's production of 198.462 million metric ton in 2006. The distribution of crude steel production among countries for Europe and World in total is given in the Table 3.3, 3.4 and 3.5.

Table 3.3 Crude Steel Production in EU 25 1997 – 2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	5.181	5.282	5.202	5.707	5.869	6.189	6.261	6.530	7.031	7.129
Belgium	10.739	11.425	10.931	11.636	10.762	11.343	11.135	11.698	10.318	11.631
Denmark	786	790	729	801	751	392	0	0	0	0
Finland	3.734	3.952	3.956	4.096	3.938	4.003	4.766	4.832	4.739	5.054
France	19.767	20.126	20.200	20.954	19.343	20.258	19.758	20.770	19.481	19.852
F.R. Germany	45.007	44.046	42.062	46.376	44.803	45.015	44.809	46.374	44.513	47.224
Greece	1.016	1.109	951	1.088	1.281	1.835	1.701	1.967	2.313	2.416
Ireland	337	358	335	360	150	0	0	0	0	0
Italy	25.842	25.714	24.878	26.759	26.545	26.066	26.832	28.477	29.112	31.624
Luxembourg	2.580	2.477	2.600	2.571	2.725	2.719	2.675	2.684	2.194	2.802
Netherlands	6.641	6.377	6.075	5.666	6.037	6.117	6.571	6.848	6.919	6.372
Portugal	905	936	1.044	1.088	728	920	730	730	730	1.400
Spain	13.683	14.827	14.882	15.874	16.504	16.408	16.472	17.684	17.827	18.391
Sweden	5.148	5.153	5.066	5.227	5.518	5.754	5.707	5.978	5.713	5.466
United Kingdom	18.501	17.315	16.298	15.155	13.543	11.667	13.268	13.766	13.205	13.871
EU (15)	**159.867**	**159.888**	**155.209**	**163.358**	**158.497**	**158.686**	**160.685**	**168.338**	**164.097**	**173.233**
Czech Republic	6.750	6.498	5.616	6.216	6.316	6.512	6.783	7.033	6.189	6.862
Estonia	3	2	1	1	1	1	1	1	1	0
Hungary	1.690	1.816	1.813	1.871	1.956	2.053	1.984	1.952	1.963	2.089
Latvia	465	472	482	498	515	520	520	520	520	550
Poland	11.585	9.915	8.848	10.498	8.809	8.368	9.107	10.593	8.608	10.008
Slovakia	3.835	3.428	3.569	3.733	3.989	4.275	4.588	4.439	4.492	5.093
Slovenia	373	405	405	519	462	481	541	565	583	628
Other E.U. (10)	**24.701**	**22.536**	**20.734**	**23.336**	**22.048**	**22.210**	**23.524**	**25.103**	**22.356**	**25.229**
E.U. (25)	**184.568**	**182.424**	**175.943**	**186.694**	**180.546**	**180.896**	**184.209**	**193.442**	**186.453**	**198.462**

Source: International Iron and Steel Institute

Table 3.4 Crude Steel Production in Europe except EU 1997 – 2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Albania	22	22	16	5	5	0	0	0	0	0
Bosnia-Herzeg.	72	75	60	77	84	70	80	120	150	490
Bulgaria	2.628	2.242	1.889	2.022	1.972	1.860	2.317	2.106	1.940	2.124
Croatia	69	101	74	71	58	34	41	80	69	81
Macedonia	19	45	45	161	260	260	305	309	310	354
Norway	585	637	610	679	640	698	703	725	705	684
Romania	6.674	6.393	4.354	4.672	4.935	5.493	5.691	6.042	5.706	6.263
Serbia and Monte.	1.025	980	230	696	595	591	711	1.167	1.285	1.823
Switzerland	789	800	800	1.000	1.000	1.000	1.000	1.000	1.000	1.252
Turkey	14.475	14.144	14.313	14.325	14.981	16.467	18.298	20.478	20.961	23.437
Other Europe	**26.357**	**25.439**	**22.391**	**23.708**	**24.529**	**26.473**	**29.146**	**32.026**	**32.126**	**36.508**

Source: International Iron and Steel Institute

Table 3.5 Crude Steel Production in World 1997 – 2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
World	798.923	777.306	788.986	847.622	850.252	903.785	969.330	1.066.478	1.129.365	1.250.170

Source: International Iron and Steel Institute

3.2.2.3 Capacity Utilization Rates

According to the figures of the Eurostat in the Table 3.6, the capacity utilisation rate of the European steel industry was 78% in 2001. Although the official capacity of the sector is 203.129 m mt, only 158.519 m mt out of it is used as productive capacity. This situation is parallel to the global situation of the world. Although the European Union is trying to maintain its production level, investments in the steel production is on the rise especially in developing countries, which results in a global steel making capacity increase consistently well-above global steel production over the long term. Excess capacity is a problem challenging the existing companies and new players trying to enter the sector. In the case of steel, excess capacity may be attributed to the fact that less than perfect market forces dominate the industry. Government subsidies contribute to uneconomic capacity and production.

The excess capacity is not only the problem for the European steel industry. "The ISSB calculated 100 million MT of excess capacity in Eastern Europe and countries of the former Soviet Union, 70 million MT in Asia, 50 million MT in the European Union (mainly in Italy and Spain), and 15 million MT in the United States. The United Nations estimated that excess capacity in Russia and Ukraine was between 20 million and 30 million MT. Comparing with the Japanese steel industry, a 1999 report by a committee sponsored by the Ministry of International Trade and Industry, which took into account domestic and global demand over the long term, estimated that 15 percent of Japanese steelmaking capacity, about 17 million MT, was "surplus."" *(International Trade Administration, 2000, p.3)*

Table 3.6 Capacity Utilisation in crude steel production plants in EU (15) 1993 – 2002

	EU-15	EU-12	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK
Capacity [1] *(1000 t)*																	
1993	190 524	:	14 705	850	53 135	3 788	19 292	24 338	500	40 415	5 150	6 490	:	990	:	:	20 871
1994	187 857	:	13 826	850	50 924	3 812	19 672	23 614	500	41 235	5 150	6 490	:	930	:	:	20 855
1995	205 134	174 134	14 396	850	51 298	3 812	20 835	22 961	500	42 220	4 500	6 790	5 555	960	4 120	5 241	21 097
1996	200 131	168 331	14 200	850	51 937	3 812	17 570	24 634	500	37 405	4 500	6 790	5 555	970	4 270	5 920	21 218
1997	199 967	167 943	14 031	850	52 736	3 812	18 321	24 666	500	35 585	4 500	6 790	5 562	970	4 282	6 091	21 271
1998	200 168	168 235	14 007	850	52 366	4 412	18 644	24 935	500	35 606	4 500	6 890	5 587	970	4 330	5 620	21 051
1999	200 218	168 285	14 007	850	52 366	4 412	18 644	24 935	500	35 506	4 500	6 890	5 637	1 120	4 330	5 620	21 051
2000	198 140	166 841	14 000	850	51 319	4 412	19 025	24 420	500	35 585	4 500	6 600	5 790	1 120	4 300	5 446	20 591
2001	203 129	170 772	13 205	850	54 559	4 412	19 531	23 906	500	36 378	4 500	6 600	5 893	1 350	4 350	6 569	20 526
2002	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Actual production *(1000 t)*																	
1993	132 249	:	10 178	603	37 625	980	12 960	17 110	326	25 720	3 293	6 000	:	775	:	:	16 679
1994	138 976	:	11 331	722	40 837	848	13 445	18 025	283	26 151	3 073	6 171	:	748	:	:	17 342
1995	155 752	132 538	11 558	654	42 051	939	13 802	18 107	310	27 766	2 613	6 409	5 003	828	3 152	4 898	17 662
1996	146 612	122 891	10 772	739	39 793	847	12 154	17 642	340	23 910	2 502	6 326	4 464	870	3 281	4 888	18 094
1997	159 836	135 383	10 738	786	45 007	1 016	13 683	19 774	336	25 798	2 580	6 641	5 196	904	3 711	5 105	18 562
1998	159 525	136 577	11 426	792	44 046	1 108	14 827	20 153	359	25 642	2 477	6 377	5 298	936	3 928	5 122	17 034
1999	155 081	132 958	10 931	730	42 061	951	14 888	20 225	337	24 701	2 600	6 075	5 211	1 044	3 934	4 985	16 407
2000	163 210	141 915	11 637	800	46 376	1 088	15 840	21 001	359	26 475	2 571	5 666	5 723	1 088	4 091	5 190	15 305
2001	158 519	138 708	10 763	751	44 775	1 281	16 500	19 431	150	26 504	2 725	6 037	5 887	728	3 927	5 450	13 610
2002	:	144 334	11 392	:	44 990	1 840	16 393	20 502	-	26 259	2 736	6 117	6 208	896	4 001	5 722	11 719
Utilization 2/1																	
1993	69.4	:	69.2	70.9	70.8	25.9	67.2	70.3	65.2	63.6	63.9	92.4	:	78.3	:	:	79.9
1994	74.0	:	82.0	84.9	80.2	22.2	68.3	76.3	56.6	63.4	59.7	95.1	:	80.4	:	:	83.2
1995	75.9	76.1	80.3	76.9	82.0	24.6	66.2	78.9	62.0	65.8	58.1	94.4	90.1	86.3	76.5	93.5	83.7
1996	73.3	73.0	75.9	86.9	76.6	22.2	69.2	71.6	68.0	63.9	55.6	93.2	80.2	89.7	76.8	82.6	85.3
1997	79.9	80.6	76.5	92.5	85.3	26.7	74.7	80.2	67.2	72.5	57.3	97.8	93.4	93.2	86.7	83.8	87.3
1998	79.7	81.2	81.6	93.2	84.1	25.1	79.5	80.8	71.8	72.2	55.0	92.6	94.8	96.5	90.7	91.1	80.9
1999	77.5	79.0	78.0	85.9	80.3	21.6	79.9	81.1	67.4	69.6	57.8	88.2	92.4	93.2	90.9	88.7	77.9
2000	82.4	85.1	83.1	94.1	90.4	24.7	83.3	86.0	71.8	74.4	57.1	85.8	98.8	97.1	95.1	95.3	74.3
2001	78.0	81.2	81.5	88.4	82.1	29.0	84.5	81.3	30.0	72.9	60.6	91.5	99.9	53.9	90.3	83.0	66.3
2002	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:

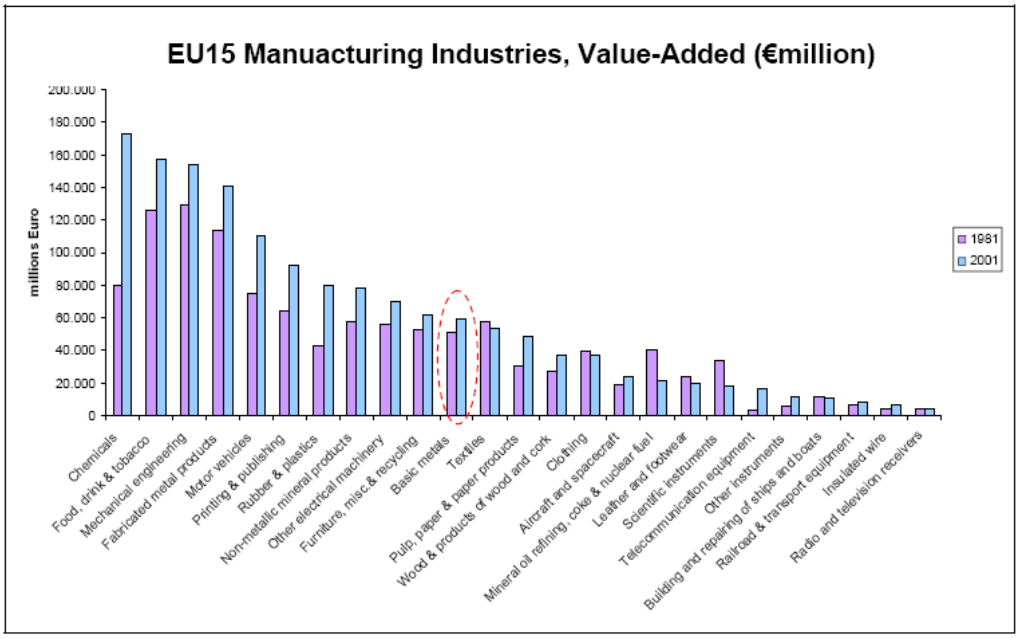
(1) Capacity = Maximum possible production in normal economic conditions (see detailed definition in the questionnaires of the ECSC investment inquiry)
(2) Including independent steel foundries

Source: EUROSTAT, Iron and Steel Yearly Statistics, 2003, p.46

3.2.2.4 Productivity levels

EU steel industry passed through a long restructuring period between 1980 and 1995. After this period the industry was fully privatised, providing conditions necessary for rationalisation and mergers. Today EU Steel Market is mature and therefore no capacity expansion is scheduled. Investments are oriented towards improving product quality and complying with Environmental standards. The value added of the basic metals industry in Europe grew over 1981 – 2001 period.

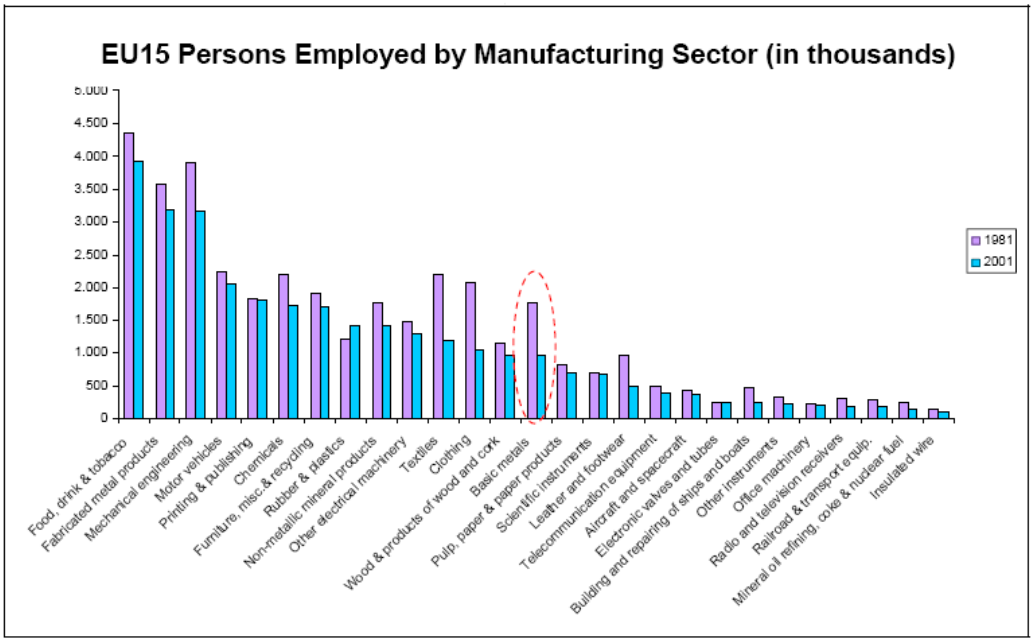
Figure 3.7 EU15 Manufacturing Industries, Value Added (€ million) 1981&2001



Source: European Commission Staff Working Document, 2006, p. 25

Like all other manufacturing sectors also the basic metals sector faced a long-term decrease in the number of persons employed. The number of persons employed decreased by more than 45% over this period.

Figure 3.8 EU15 Persons Employed by Manufacturing Sector (in thousands) 1981&2001



Source: European Commission Staff Working Document, 2006, p. 25

The situation in the iron and steel industry was much severe. According to the Iron and Steel Yearly Statistics – 2003 report of Eurostat there were 335,434 employees working in the ECSC- defined steel industry in EU-15 countries in the year 1993. This number reduced 61,75 % to 273,678 employees in 2001.

In addition to the above mentioned conditions, the crude steel production has also increased more than 20% in the last 20 years.

As a result of the growth on the value-add, increase in the crude steel production and the reduction on the number of persons employed, the productivity of the European Steel Industry has increased substantially.

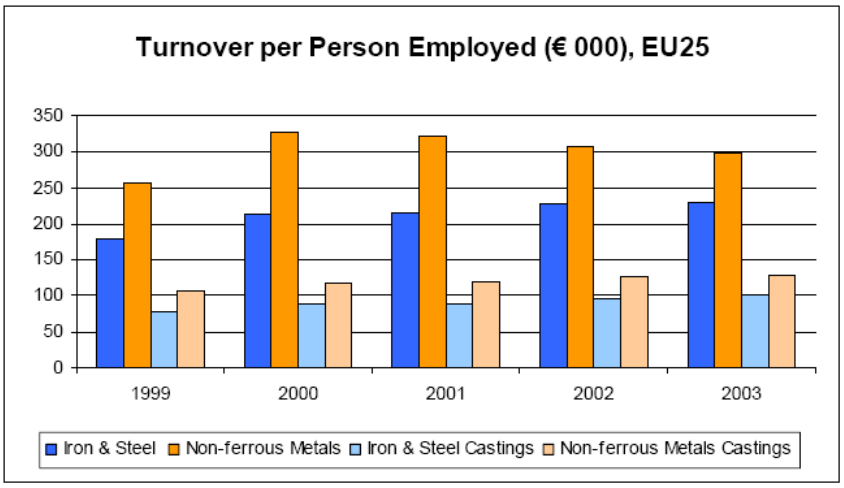
"The European Commission's Panorama of European industry 1995–6 describes productivity levels as follows:

'In 1993, Japan was the largest producer of ferrous metals, with a production value of more than 109 billion ECU. The next largest was the European Union with 74 billion ECU, and then the United States with 65 billion ECU. From 1984 to 1993, the European Union and the United States reduced their output while Japan increased theirs by 27%. In this sector, the output per Japanese employee was 421,243 ECU, that of the European Union employee was 140,759 ECU and that of the United States employee was of the order of 183,000 ECU.'

These production differences per employee highlight the poor position of the European steel industry, from the outset, compared with its international competitors. They help explain why the European industry is in perpetual reconstruction, in the search for higher productivity, particularly among those companies that have not developed a specialisation in high value-added products." (EFILWC, 2005, p.3)

While European Commission was claiming in 1995, due to the poor position of the European Steel Industry on productivity, the Industry has increased its productivity in the last ten years. It reached to a turnover(per person employed) more than €250,000 for EU-15 countries and around €230,000 for EU-25 countries. But the increase in the turnover per employee is not reflecting the increase in the productivity by itself, due to the fact that the cost of the raw materials, energy and freight has also increased in the same period.

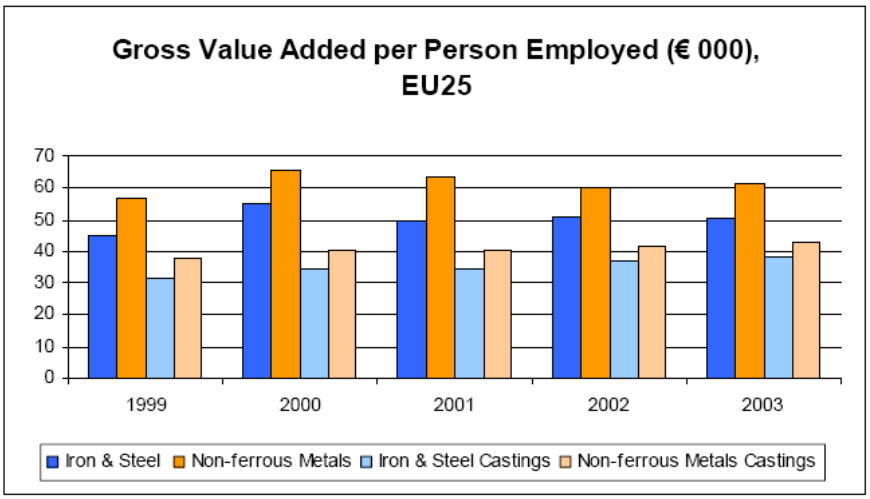
Figure 3.9 Turnover per Person Employed (€ 000) – EU25 1999 - 2003



Source: European Commission Staff Working Document, 2006, p. 39

The Gross Value Added per employee, which is used to measure the labor productivity, helps us to understand the change in the productivity in a better way. According to the definition of the United Nations Statistics Division, "The gross value added of an establishment, enterprise, industry or sector is measured by the amount by which the value of the outputs produced by that establishment, enterprise, industry or sector exceeds the value of the intermediate inputs consumed, the goods and services produced and consumed being valued using the same vector of prices." (http://unstats.un.org/unsd/sna1993/tocLev8.asp?L1=16&L2=5). The Gross Value Added per Person Employed followed an increasing path and reached to €50,000 in 2003 *(European Commission Staff Working Document, 2006, p. 36).*

Figure 3.10 Gross Value Added per Person Employed (€ 000) – EU25 1999-2003



Source: European Commission Staff Working Document, 2006, p. 36

3.2.2.5 Area of Focus on the Steel Production in EU

Steel products and especially the long products are mainly homogeneous in quality and the limits of each standard and its quality is well defined in the international standards. Furthermore, price transparency for ordinary steel products and special products with standard dimensions, is almost perfect because of regular publications of market prices by specialised agencies, resulting a highly elastic relation between steel demand and prices. Therefore being cost competitive is very important. European Steel Industry has been investing in the technological developments and also reducing the number of employees in the sector to increase their efficiency.

Investments in crude steel production in all developing countries and especially in China has increased the oversupply and caused a much more competitive environment. Therefore, "in order to reduce the impact of sheer price competition characterising the trade in ordinary steels, the EU industry has been increasingly focusing on the production of high value-added steel products, and the provision of related services, tailor-made to the needs of those (key) clients that are prepared to pay a "quality" premium." (European Commission, 1999, p.5)

European Steel industry is mainly producing and also exporting high value-added products like flat products and special steel products. And they are importing mainly low-value added long products from third countries.

3.2.3 Consumption in the EU

The demand for the steel is a derived demand. It is produced as a by-product of demand for another item or service. The demand for new houses, cars, white goods, infrastructures, industrial areas, ships etc. are driving the demand for steel. It is mainly triggered by the increased standards of living. Cox, Anthony and et. al. in "Factors Influencing World Demand for Metals - 1990" have indicated the independent variables of derived demand for steel as:

- economic activity, or 'income level' (in market economies);
- steel prices;
- prices of substitutes; and

- time (a proxy for technological change).

In their research they analyzed the period between 1964 and 1986 and they found out an equation indicating that the steel consumption is directly proportional with the economic activity or income level and inversely proportional with the metal prices and time.

log ST, = -3.563 + 2.732 log GDP, - 0.076 T- 0.254 log STP

(Cox, Anthony and et. al, 1990, p.35)

Where,

ST Steel consumption

GDP Real world GDP excluding centrally planned economies (1980 = 100)

STP Steel price

T Time (years)

There was no statistical evidence that prices of substitutes significantly affected consumption of individual metals. They indicated that this could be attributed, however, to the difficulty of determining the appropriate substitutes for metals and to the lack of reliable price data. Although substitutes for steel exist in a number of areas, their effects on total demand for steel have been limited due to the price advantages offered by most steels. Substitutes such as aluminium and plastics have generally been used only in small scale, specialised applications.

Although the prices of the steel has increased in the last years, and although less material is getting used due to technological developments over time, the steel consumption is still increasing as a result of economic developments. The consumption of steel in developed countries is driven by the real GDP growth, whereas in developing countries like China, the consumption is much more due to lack of infrastructures, industries and increasing demand of citizens due to improved living conditions and globalization.

Consumption of steel is a basic indicator of industrial development. As it could be seen on the Table 3.7, the developed and industrializes countries have a higher consumption of steel per person compared with the developing ones. Austria, Italy, Spain, Sweden & Germany are the leading ones.

Table 3.7 Crude Steel Consumption (kg/person) in EU (15) 1999 – 2003

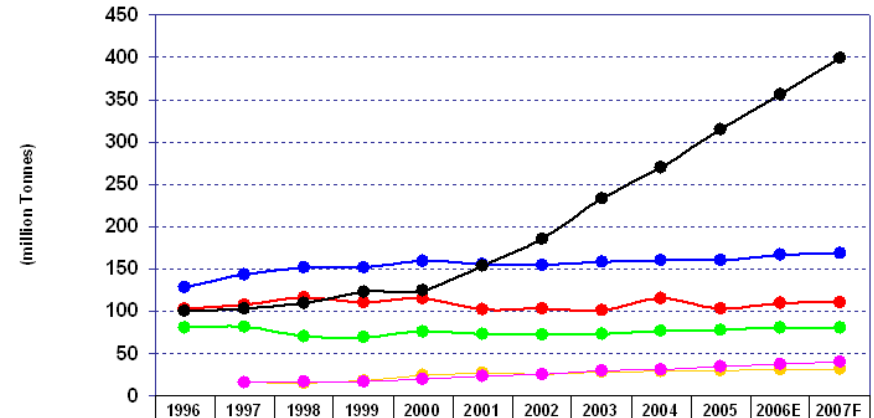
	1999	2000	2001	2002	2003		1999	2000	2001	2002	2003
Austria	619	675	635	566	701	*Czech Republic*	377	434	453	479	494
Belgium & Luxembourg	315	469	322	339	335	*Estonia*	159	229	232	233	270
Denmark	338	364	366	412	382	*Letonia*	50	71	73	76	100
Finland	393	483	443	414	384	*Latvia*	61	66	70	70	74
France	325	352	313	306	280	*Slovakia*	244	209	251	510	237
F.R. Germany	468	506	479	453	454	*Slovenia*	480	548	575	613	538
Greece	274	363	345	314	316	*Hungary*	193	207	214	229	241
Ireland	233	245	225	255	242	*Cyprus*			330	417	550
Italy	549	562	562	554	590	*Poland*	201	212	190	196	230
Luxembourg						*Malta*	122	159	178	200	331
Netherlands	370	317	314	279	244	***EU (25)***					
Portugal	322	336	327	368	336						
Spain	469	466	494	495	537	*Bulgaria*	87	90	133	117	140
Sweden	509	523	448	455	474	*Romania*	115	138	147	154	167
United Kingdom	262	257	255	241	238	*Turkey*	187	211	169	185	217
EU (15)	**407**	**429**	**411**	**399**	**404**	***World***	**144**	**155**	**154**	**162**	**166**

Source: International Iron and Steel Institute (IISI) - Steel Statistical Yearbook

The Apparent steel consumption figures for European Union and the main steel consuming regions are given in the Figure 3.11. Apparent steel consumption quantities are found with the following formula :

Apparent Steel Consumption = Steel Production + Imports – Exports.

Figure 3.11 Apparent Steel Consumption (million tones) 1996 – 2007



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006E	2007F
EU-25	128	143	152	152	159	156	155	158	160	160	167	169
USA	103	108	116	111	115	102	103	101	116	104	110	111
JAPAN	81	82	70	69	76	73	72	73	77	78	81	81
CHINA	100	103	110	123	125	154	186	233	270	315	356	399
RUSSIA		16	15	18	24	27	25	28	29	30	31	32
MIDDLE EAST		16	17	17	20	23	25	30	31	35	38	41

Source: IISI – Short Range Outlook, Spring 2006

Apparent Steel Consumption of the main steel producing and consuming countries within European Union are given in the Table 3.8. Apparent steel consumption figures give us the opportunity to compare the production and consumption figures and to find out the oversupply, if there is any. As it could be seen from the figures Italy and Spain are consuming more than their production, whereas all other countries especially Germany, Belgium and Austria are crating an excess capacity within European Union.

Table 3.8 Production and Apparent Steel Consumption (million mt) in EU-2005

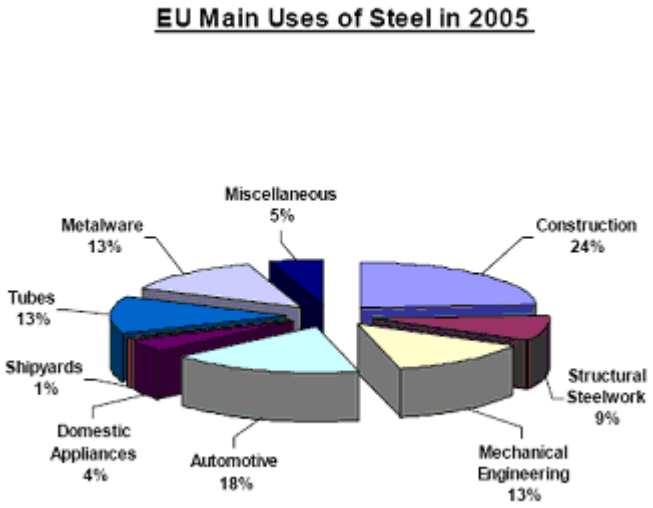
2005	Production (million mt)	Apparent Steel Consumption (million mt)
Austria	7,8	3,2
Belgium & Luxembourg	12,6	5,1
France	19,5	15,1
F.R. Germany	44,5	35,5
Italy	29,3	32,0
Netherlands	6,9	3,6
Spain	17,8	20,9
Sweden	5,7	3,9
United Kingdom	13,2	10,3
EU (15)	***164,1***	***140,9***
Czech Republic	6,2	5,1
Poland	8,4	8,1
Other E.U. (10)	22,4	19,4
E.U. (25)	***186,5***	***160,4***

Source: IISI, "World Steel in 2006", 2006 pp.3&20

3.2.3.1 Customer Base in the EU Steel Industry

Steel is an essential input for the whole of economic activity and therefore the iron & steel industry stands at the hub of many industrial sectors. Steel is consumed in both the investment goods industry (construction, machinery, heavy transport) and in the consumer goods industry (automotive, household appliances, packaging). "Only 60% of steel products are shipped directly to the main consumer enterprises (automotive, shipbuilding, heavy mechanical industry, appliances, etc), 40% being routed by stockists and service centres to make it ready for final consumption." *(European Commission Staff Working Document, 2006, p. 15)*

Figure 3.12 Main Uses of steel in the EU - 2005



Source: European Commission Staff Working Document, 2006, p. 15

According to the steel consumption figures of EUROFER, construction sector is the leader sector in 2005 with its 24% share and it is followed by the automotive sector with its 18% share. All industrial sectors are dependent on steel to some extent. Those which are heavily dependent are the transport, construction, infra-structure, mechanical engineering and household goods.

3.2.4 Employment in the EU Steel Industry

3.2.4.1 Structure and volume of employment

According to the report of the European Foundation for the Improvement of Living and Working Conditions, "Industrial relations in the steel industry" in 2001 there were working 273,678 employees in the ECSC defined steel sector in the European Union as mentioned on the Table 3.9. The first column of the same table shows the national figures obtained from each country in EU for the same period. We are observing a great difference on the number of employees especially for France, United Kingdom and Greece. The reason is that the national data especially on those

countries cover a sector much larger than the steel industry as defined by the ECSC Treaty.

Table 3.9 Employment in European Steel Sector - 2005

Employment in the European steel sector, latest figures

Country	Employment volume	% of total sectoral employment in Europe	% of manual workers in sectoral employment	% of women in sectoral employment	No. of employees in ECSC-defined steel industry in 2001
Germany	95,000	24.0%	73%	7.7%	76,454
France	60,219	15.2%	nd	nd	37,174
UK	50,000	12.6%	nd	nd	24,122
Italy	38,000	9.6%	nd	nd	38,433
Spain	26,670	6.7%	nd	nd	22,600
Poland	23,000	5.8%	nd	nd	nd
Sweden	18,600	4.7%	nd	nd	9,494
Greece	18,204	4.6%	nd	15%	2,242
Belgium	17,857	4.5%	71%	5.0%	20,678
Austria	13,100	3.3%	62%	7.6%	11,670
Hungary	12,000	3.0%	80%	nd	nd
Finland	10,600	2.7%	nd	15%	13,156
Netherlands	9,900	2.5%	nd	nd	11,310
Luxembourg	nd	nd	nd	nd	4,182
Norway	1,600	0.4%	nd	nd	nd
Portugal	nd	nd	nd	nd	905
Denmark	608	0.2%	nd	nd	1,079
Ireland	0	0.0%	nd	nd	179
Total	**395,358**	**100%**			**273,678**

nd = data not available for these countries/topics

Sources: EIRO national reports; Eurostat.

Source: EFILWC, 2005, p. 6

"The steel industry is a predominantly male and blue-collar sector; in the countries for which data are available, around two-thirds or more of employees are manual workers, and almost all of them are men. The main reason for the low percentage of female workers is presumably the heavy and dangerous nature of the production work (in certain countries, such as Austria, the accident rate is higher than the average across all industries). Where information is available, women occupy less than 10% of positions and these are mainly in administrative jobs." (EFILWC, 2005, p.5) In addition to the heavy and dangerous nature of the production work, working hours including the night shifts are also one of the main reasons of low percentage of jobs occupied by women.

European Steel Industry is investing on higher technology and automated systems to increase the efficiency and to produce higher value-added products. While the manual labour nature of the sector has tended to diminish, automated systems will reduce the number of persons employed. These developments will change the nature of the work. This new system will require a higher level of qualification and flexibility for the employees and improve the working conditions. This may also create the necessary environment to increase the number of women working in the sector. "For example, in Austria, the consequences of privatisation and restructuring have included the re-examination of social security and services for workers, the co-determination rights of works councils and effective equality of treatment of men and women, along with the introduction of more flexible working schedules." (EFILWC, 2005, p.9)

Steel is a sector where open-ended employment contracts and full-time employment have remained the norm. There are not many part-time workers. Only in some countries like Belgium part-time working has also been used as a means of redistributing work, in order to save jobs. Fixed-term contracts and temporary agency work seem also relatively rare. But in some mills in Spain recourse to subcontracting has become a common practice for internal activities, and some workers employed by these subcontractors have the status of temporary agency workers. Because of the open-ended employment contracts and the need for experience, steel is not a sector with a young workforce. The turn-over rate of the employment is quite high.

Steel is a sector where weekly working time is often relatively short, standing at 33.6 to 36 hours in many countries, although in Greece the working week is still 40 hours. In Germany, the working week is currently 35 hours in the west and 38 hours in the east, but a collective agreement provides for progressive reduction of the working week in the east to 35 hours by April 2009. (EFILWC, 2005, p.7)

3.2.4.2 Job Losses in the Industry

The European Steel Industry faced employment reductions over the last two decades. The steel industry provided 450,000 jobs in 1984 in 10 then member states excluding east Germany. This number has diminished to 273,678 in 2001 for EU 15. The reduction of the employees between 1993 and 2001 are given in the Table 3.10. All

of these countries lost steel jobs in that period except Sweden. More than 250,000 people have lost their jobs during the last two decades.

Table 3.10 Employment Change in the EU15 Steel Sector between 1993 and 2001

Employment change in the EU15 steel sector, 1993–2001, Eurostat figures

Country	No. of employees in ECSC-defined steel industry			Change	
	1993	1995	2001	1993–2001	1995–2001
Germany	118,937	92,509	76,454	-42,483	-16,055
France	41,215	39,324	37,174	-4,041	-2,150
UK	40,190	37,930	24,122	-16,068	-13,808
Italy	50,360	42,090	38,433	-11,927	-3,657
Spain	30,117	25,297	22,600	-7,517	-2,697
Sweden	nd	7,163	9,494	-	2,331
Greece	2,939	2,486	2,242	-697	-244
Belgium	24,980	23,703	20,678	-4,302	-3,025
Austria	nd	13,245	11,670	-	-1,575
Finland	nd	14,483	13,156	-	-1,327
Netherlands	14,580	12,643	11,310	-3,270	-1,333
Luxembourg	7,162	6,116	4,182	-2,980	-1,934
Portugal	3,162	2,659	905	-2,257	-1,754
Denmark	1,178	nd	1,079	-99	-45
Ireland	614	404	179	-435	-225
Total	335,434	321,176	273,678	-61,756	-47,498

nd = data not available for these countries/dates.

Source: European Commission, 2003, Steel industry – Yearly statistics – concluding edition – Data 1993–2002.

Source: EFILWC, 2005, p. 7

Between 1993 and 2001, 61,756 jobs were lost represented 18,4% of the employment in the European steel sector in 1993. The main job losses occurred in Germany, United Kingdom, Italy and Spain. Between 1993 and 2001 42,483 employees lost their jobs in Germany and mainly in the eastern part at the same time as the sector were privatised. This number corresponds to 35% of the sector in Germany. "In the UK, the job losses mainly took place in the 1980s, when the Conservative government decided to reduce subsidies to British Steel and to privatise it. During the 1980s, approximately 100,000 jobs disappeared." (EFILWC, 2005, p.8) This reduction continued also on 90's and 39% (16,608 employees) of the employees lost their jobs in 1993 – 2001 period. According to the national figures Italian Steel Industry was employing 100,000 persons in 1980, but during 80's they also reduced

the number of employees to 50,360 in 1993. Until 2001 additional 11,927 jobs were lost represented 23% of the employment in total. The situation in Spain was almost the same with 25% loss of jobs corresponding 7,517 employees.

The rates of job loss were also high in Luxembourg (-32%), Portugal (-66%) and Ireland (-56%), but the number of workers concerned in these countries was significantly lower.

In addition to the effect of privatisation, some part of the job losses occurred due to the mergers and acquisitions between groups. “In west Germany, the merger between Krupp-Hoesch AG and Thyssen AG in 1998 resulted in the cessation of steel production in the city of Dortmund, with the loss of 10,000 jobs. In Belgium’s Wallonia region, the steel companies were bought out by foreign-owned groups during the 1990s and this resulted in the loss of several thousand jobs and in Denmark, the closure of the mixed-ownership enterprise Dansteel in June 2002 led to the redundancy of 1,100 workers” (EFILWC, 2005, p.9)

The new member states of the European Union like Poland and Hungary also faced the same problems in that period. Especially Poland has experienced most significant job losses in central eastern Europe. “An initial rationalisation plan presented by the government led to 48,000 job losses between 1992 and 1993. Over the following 10 years a further 77,000 jobs were lost before the privatisations of 2003.” (EFILWC, 2005, p.9) According to the national figures given in the report of “European Foundation for the Improvement of Living and Working Conditions, 2005” there were 147,000 employees in Polish Steel Industry in 1990. This number has reduced to 23,000 in 2002. Hungary is another country, where significant job losses have taken place to a lesser extend. According to national figures, sectoral employment of 60,000 persons diminished to 31,000 in 1990. After the crisis in 1992 almost all steel companies except Dunaferr were closed and a lot of employees lost their jobs. Other job losses of less significance also occurred at the time of privatisation. In 2002 the number of employees working in the steel sector reduced to 12,000.

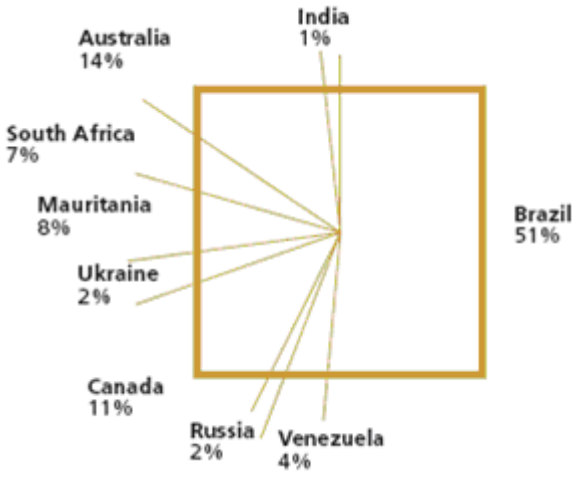
3.2.5 Factors Affecting the Cost of the Product in the European Steel Industry

There are five main factors affecting the cost of the product in steel industry. These are cost of the raw material, energy, freight, labour and exchange rate. As mentioned before, steel products and mainly the long products are mainly homogeneous in quality and therefore being cost competitive is very important on those products. All of these factors will be investigated in detail in the following sections.

3.2.5.1 Raw Material

A Raw Material cost has the biggest share among the other costs in steel making. Integrated steel mills are using iron ore and coking coal as raw materials. The integrated steel industry in the EU depends on overseas markets for a substantial part of its raw materials. The industry is consuming around 234 million tonne of iron ore. According to the 2005 Annual Report of Eurofer 92.8 million out of this quantity is supplied by the production within the EU, whereas the remaining 141 million tonnes is imported by seaborne traded iron ore. The main sources of iron ore imports for 2003 were Brazil, Australia, Canada, Mauritania and South Africa as shown in the Figure 3.13.

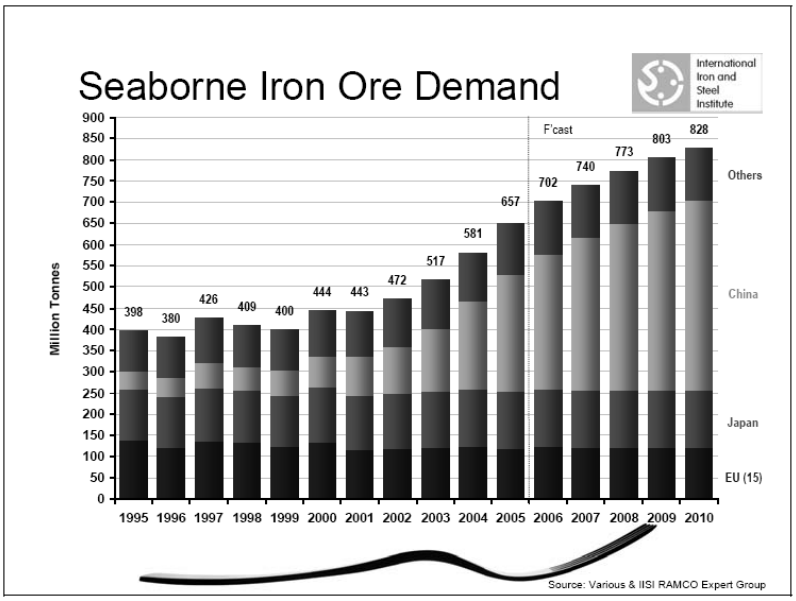
Figure 3.13 EU Receipts of Imported Iron Ore



Source : EUROFER, 2003, p.31

The price of the iron ore increased with a high pace beginning from 2003. According to the annual reports of Eurofer, the FOB price of the iron ore has increased 9% in 2003, 18.62% in 2004 and much higher in 2005. The main reason of these increases is the high demand of China, which is indicated on the graph of the international iron and steel institute (IISI) in the Figure 3.14. China has increased its share in the global seaborne iron ore market from 28% in 2003 to 40% in 2005. But despite of the increase on the global demand side for the iron ore, the supply with 670 million ton (representing technical utilisation of abt 97% capacity) is still slightly above the demand. And according to the forecasts of Eurofer, the gap will even increase until 2010 on the favour of the supply side.

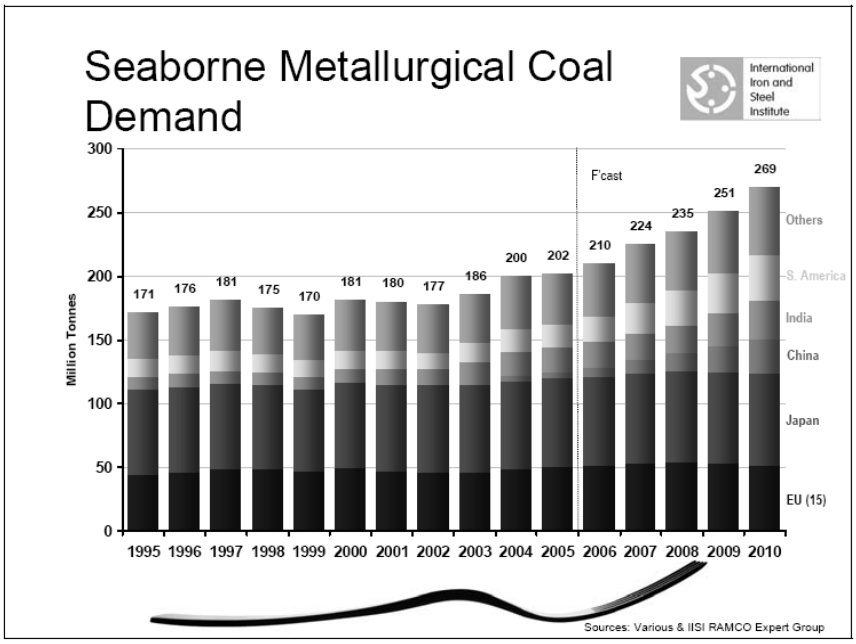
Figure 3.14 Seaborne Iron Ore Demand



Source: OECD, 2006, p.5

The other important raw materials for the integrated steel mills are coal and coke. The consumption coaking coal in EU was 51.7 million ton. 41.4 million ton out of it was imported. "Australia (48%), the United States (21%) and Canada (13%) together represent 82% of the imports into the EU." *(EUROFER, 2005, p.25)*. The seaborne metallurgical coal demand for global markets is illustrated on the graph of the international iron and steel institute (IISI) in the Figure 3.15.

Figure 3.15 Seaborne Metallurgical Coal Demand



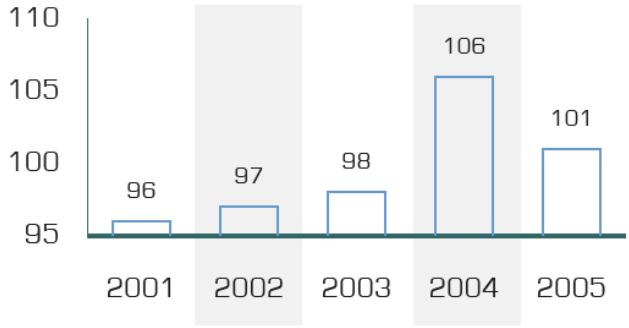
Source: OECD, 2006, p.9

The increase on the coal demand is mainly due to the increase on the production of crude steel in China and India. The forecasts of IISI show that there would not be a shortage on the seaborne metallurgical coal until 2010. Only in 2010 the demand and supply will meet around 270 million tonnes.

Due to the relative abundance of these materials no major supply bottlenecks are expected. EU steel companies are therefore less involved, compared especially with Asian steel producers, in upstream mining investments. Instead of the upstream investments, EU steel industry is mainly focused on environmental performances in the preparation of coking coal.

Ferrous scrap is the principal raw material for the secondary route (EAF) steelmaking. Consumption of scrap in 2003 for European Union was 86 million tones in EU15. *(EUROFER, 2003, p.32)*. After the enlargement of the European Union in May 2004, the consumption of EU25 has reached to 104 million tones in 2004 and 101 million tones in 2005. Figures for the last five years are given on the graph of EUROFER in the Figure 3.16.

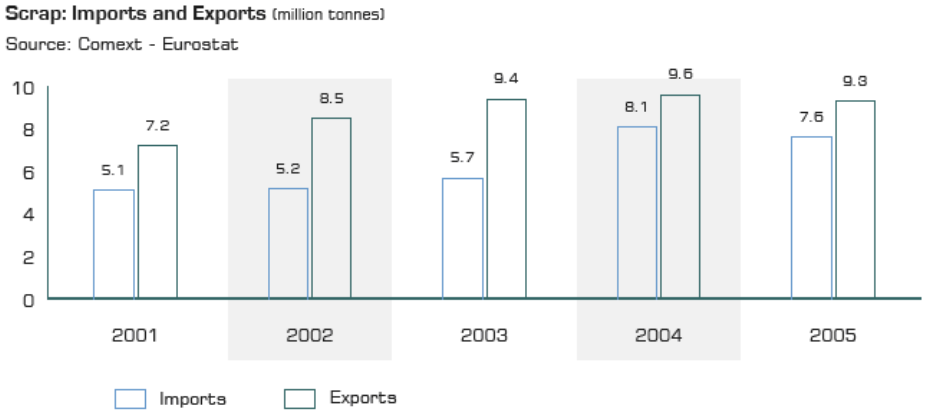
Figure 3.16 EU Scrap Consumption (million tones)



Source : EUROFER, Annual Report 2005, 2005, p.26

Until 2002 European Union was a net importer of scrap with its 15 member states. In 2003 the import and export quantities were both 8.6 million tones. The enlargement of the EU to 25 members in 2004 changed the external trade picture of the community. Since the 10 new members export more scrap outside the EU than they import, the enlarged European Union became a clear net exporter of scrap with its 25 member states.

Figure 3.17 Scrap Imports and Exports (million tones)



Source : EUROFER, Annual Report 2005, 2005, p.26

Parallel to the increase on the demand of the iron ore, coal and coke, the global markets also experienced an increase on the demand of the scrap beginning from 2003. The main reason of that increase was the emergence of China onto international commodity markets and the huge expansion of its steel production. This

situation led to a rapid escalation of the demand for scrap in China and Asia. Direct exports of scrap from the EU to this region did not expand significantly, but prices in Europe were influenced by the strong conditions on the steel market worldwide towards the end of 2003. The former sources of the scrap for European Union (e.g. Russia and Ukraine) restricted their exports by applying export taxes and diverted their scrap exports to that region.

Tension on the scrap market was coming from strong demand levels from electric arc furnace producers but also from integrated producers. Due to the rising prices of raw materials (iron ore, coal and coke) and with tightness in supplies they increased their consumption of scrap in converters. "Consumption of scrap in the EU15 in 2004 rose to 92,9 Mio t up from 86,6 Mio t in the previous year, an increase of 7.3%. With the addition of the 10 new members of the Community in 2004 scrap consumption in the enlarged community rose to 104,3 Mio t from 95,8 Mio t in 2003, an increase of 8.9%." *(EUROFER, 2004, p.28)*

In the past scrap was a commodity, which was essentially traded locally. The main reason for that were the transport costs, which were a significant portion of the total price and therefore a limiting factor in the trading of scrap. Due to the global situation in the last few years, as explained above, the prices of the scrap has increased and come to such levels that the collection of it from international sources became feasible and the volume of the internationally traded scrap has increased. The collection and arising of the scrap is very price sensitive. The higher the price, the greater the incentive to collect and to process scrap. Therefore although the demand for the scrap is increasing globally, it is not expected to have shortage on the scrap side especially on the developed countries. Availability of scrap is related to levels of economic development and therefore it is expected EU to be a net-exporter for the scrap also in the future.

In order to extend their raw materials base, and following the drive towards higher value added products, EAF steel producers increasingly combine scrap with DRI/HBI and/or other virgin iron. A further group of raw materials, essential for the production of special steels, are ferroalloys. These materials are for the biggest part imported and constitute an important and increasing part of production costs.

3.2.5.2 Energy

Electricity and natural gas make up a significant part of steel production costs. “Gas and electricity account for about 6% of the total cost in steel making.” *(EUROFER, 25 April 2006, p.1)*. However, the European Steel Industry is facing with some problems due to structural problems in European Union and these problems are affecting its competitiveness in the global arena.

The gas and electricity bill for the EU steel industry has dramatically increased over the last few years, most of all in 2005, weakening its international competitiveness. Furthermore, electricity and natural gas prices show important differences within the EU. This is because of the taxation but also because of different structures and regulation of the supply industries. In addition, energy prices in Europe have become more volatile and energy supply less secure than before the start of the liberalisation of the European energy market. The concerns of the European Steel Industry are the needs for predictability, availability and competitiveness.

Iron & Steel is a capital intensive industry and the decision to invest is a decision for more than 20 years. The investors need an environment that delivers predictable energy prices to decide on long term investments. Unfortunately, this environment doesn’t exist today. The volatility of the gas and electricity prices is too high. “The volatility of electricity prices was in 2005, four times larger than in 2004.” *(EUROFER, 25 April 2006, p.2)*. Under these circumstances it is very hard to enter into long term contracts.

The steel industry’s operations need a continuous supply of energy. Especially the production on the integrated mills continues full time and any discontinuity on the production is resulting huge losses. Therefore in addition to its importance on the cost, the availability of the energy sources is a major issue. In that sense the European Steel Industry has particular concerns over gas supply.

The consumption of natural gas in EU-25 member countries is 12.5 million TJ. 8.9 million TJ of natural gas is produced within EU and the remaining quantity is balanced through international suppliers. The main natural gas suppliers to the European Union are Russia, Norway, Algeria and Nigeria. The net imports of EU-25 member countries are 10,6 million TJ. Russia is the major supplier with 4 million TJ. Norway supplies 2.75 million TJ, Algeria 2 million TJ and Nigeria 0.25 million TJ.

Information regarding the imports of natural gas to the European Union are detailed in the Table 3.11.

Table 3.11 Main Natural Gas suppliers to the European Union, 2004 (in TJ-GCV)

Main natural gas suppliers* to the European Union, 2004 (in TJ-GCV)

Producer	Quantity	Destination country	% of total imports of destination country	% of total inland consumption of natural gas of the destination country
Russia	3 989 679	all EU countries		
	1 466 679	Germany	43.3%	52.3%
	900 074	Italy	34.8%	47.6%
	384 911	France	21.2%	25.6%
	264 166	Slovakia	100.0%	>100%
	246 182	Czech Republic	73.9%	85.5%
	236 370	Poland	62.3%	68.5%
	183 779	Finland	100.0%	>100%
	110 335	Lithuania	100.0%	>100%
	80 880	Latvia	100.0%	>100%
	40 037	Croatia	100.0%	73.6%
	36 032	Estonia	100.0%	>100%
	24 912	Slovenia	59.9%	80.4%
	15 322	Belgium	2.3%	3.3%
Norway	2 745 951	all EU countries		
	1 038 277	Germany	30.6%	37.0%
	484 274	France	26.7%	32.2%
	343 323	United Kingdom	71.7%	14.6%
	251 582	Belgium	37.1%	54.3%
	230 012	Netherlands	36.6%	23.4%
	197 739	Italy	7.6%	10.5%
	93 200	Spain	8.1%	12.2%
	88 168	Czech Republic	26.4%	30.6%
	19 376	Poland	5.1%	5.6%
Algeria	2 035 924	all EU countries		
	976 579	Italy	37.7%	51.7%
	587 007	Spain	51.3%	77.1%
	226 428	France	12.5%	15.0%
	113 551	Belgium	16.8%	24.5%
	97 138	Portugal	63.2%	>100%
	18 601	Greece	18.4%	86.7%
	16 620	Slovenia	39.9%	53.7%
Nigeria	259 308	all EU countries		
	202 713	Spain	17.7%	26.6%
	56 595	Portugal	36.8%	95.1%

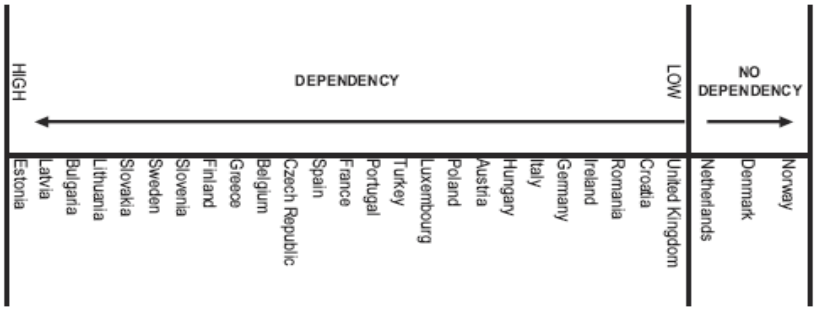
* Incomplete data; some information is not available or claimed to be commercially confidential.

Source: Eurostat

Source : EUROSTAT, 2006, "Gas and Electricity market statistics", p. 56

The actions of Russia restricting the supply of the natural gas during the winter time in the last two years has resulted with inconfidence in the market, because the imports of natural gas from Russia has a substantial percentage on the imports of major steel producing countries like Germany, Italy, France and Poland. 52.3% of the total consumption in Germany depends on Russian natural gas. And this ratio is 47.6% for Italy, 25.6% for France and 68.5% for Poland. *(EUROSTAT, 2006, "Gas and Electricity market statistics", p. 56)*. The degree of dependency of the member states are illustrated in the Figure 3.18.

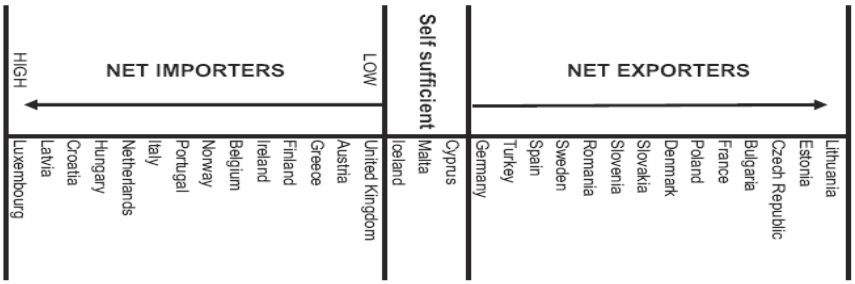
Figure 3.18 Dependency of Countries on Natural Gas, 2005



Source : EUROSTAT, 2006, "Gas and Electricity market statistics", p. 57

There is not a bottleneck on the supply side of the electricity. European Union was generating 3.2 million GWh of Electricity in 2004, whereas the consumption was 2.6 million GWh. The imports and exports are almost balanced within the member states. The net exporters of electricity within the union are France, Czech Republic and Poland, whereas the main importers are Italy and Netherlands. The type and level of dependency of the member states are illustrated in the Figure 3.19.

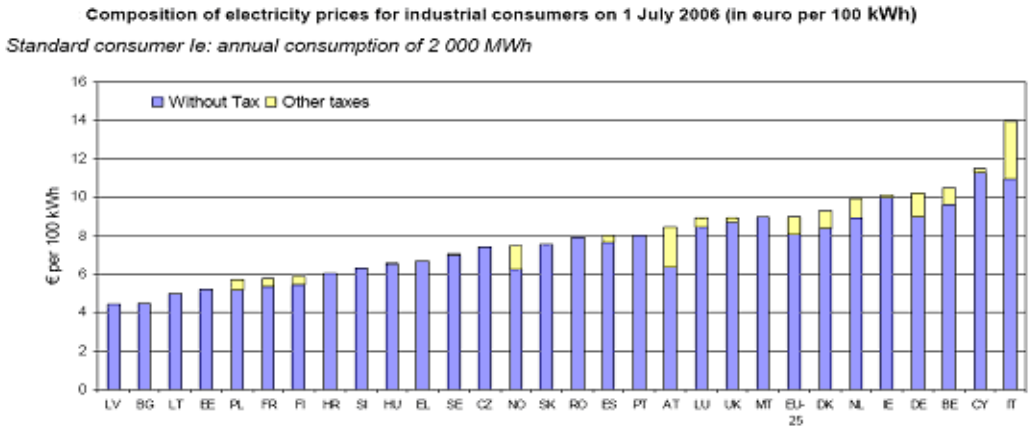
Figure 3.19 Dependency of Countries on Electricity, 2005



Source : EUROSTAT, 2006, "Gas and Electricity market statistics", p. 52

Within the last years the oil prices were increasing globally. Gas-based electricity producers in Europe benefit from strongly increased margins, which increase price differences across the Internal Market. Furthermore, the increased prices are making EU prices generally less competitive on a global basis. According to the figures of Eurostat, the gas price has increased around 29% for industrial consumers btw July 2005 and July 2006. At the same period the electricity prices increased 15% for the same group. Absence of cross-border competitiveness and shortage of inter-connector capacity led to significant price differences between Member States. The Figure 3.20 shows the price differences and taxation differences among member states for the industrial consumers.

Figure 3.20 Composition of Electricity Prices for Industrial Consumers on 1 July 2006

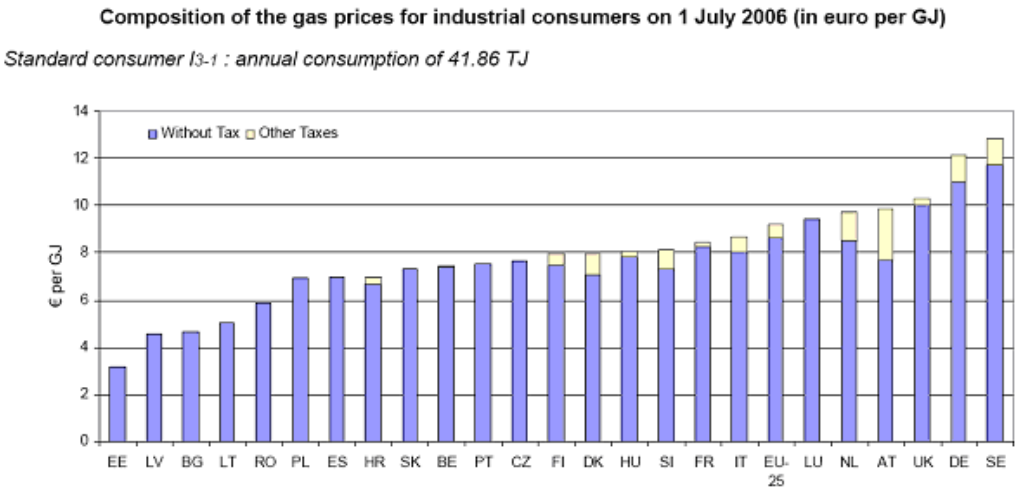


Source : EUROSTAT, Nov 2006, Statistics in Focus – "Electricity prices for EU households and industrial consumers on 1 July 2006", p.3

Another problem is the CO2 emissions trading system. This has structurally led to additional and significant increases in electricity prices. "Of these three reasons, oil prices, market structure and the price effects of the EU Emission Trading System - the latter two are an exclusively European phenomenon, and place our industry in Europe at a significant, competitive disadvantage." *(EUROFER, 2006, "An Energy Policy for Europe", p.2)*

The price of the natural gas is also differing on a significant level among member states. The differences on prices levels indicating taxes among member states for the industrial consumers are given in the Figure 3.21.

Figure 3.21 Composition of the gas prices for industrial consumers on 1 July 2006



Source: EUROSTAT, Nov 2006, Statistics in Focus – "Gas prices for EU households and industrial consumers on 1 July 2006", p.3

The European Steel Industry has to solve the above mentioned problems to be able to increase its competitiveness. An EU energy regulator has to be established European Commission to regulate the market and to create the competitive environment for the industry.

3.2.5.3 Freight

The steel sector is very transport intensive. As mentioned on the raw material part of factors affecting the cost of the production, a substantial part of raw materials are supplied through sea-borne trade. "Depending upon the quality of the steel product, the distance to be covered and the transport means to be employed, transport constitutes between 5 and 15% of the selling price." *(European Commission, 1999, p.4)* Therefore the freight has also a remarkable contribution to the cost of the production.

Although the steel market is fully globalised, due to increasing transport costs and the need for a close technical and service relationship with clients, regional markets are the core business for steel producers. To be able to get the advantage on the freight, also the integrated steel production facilities were initially located near to the EU iron ore and coal mines. Traditional production clusters were the Saar, the Ruhr, Lorraine, the Midlands, Wallonie and Silesia.

This situation has changed since 1970's with the development of cheaper iron ore and coal production in developing countries and low overseas transport costs. Local primary raw materials have become rapidly non-competitive and mines have been progressively closed. As a result of this new situation, new steel plants are located along the coast near to harbours to handle imported primary raw materials and energy. Today the non-coastal steel facilities in the middle of the mainland are facing additional transport costs affecting their competitiveness.

The Electric Arc Furnace steel making facilities are consuming the scrap. As the scrap is mainly supplied from the domestic market within European Union, the mini-mills are not located on coastal sides. They have located themselves near to industrial basins, where scrap is generated and the downstream sectors are located.

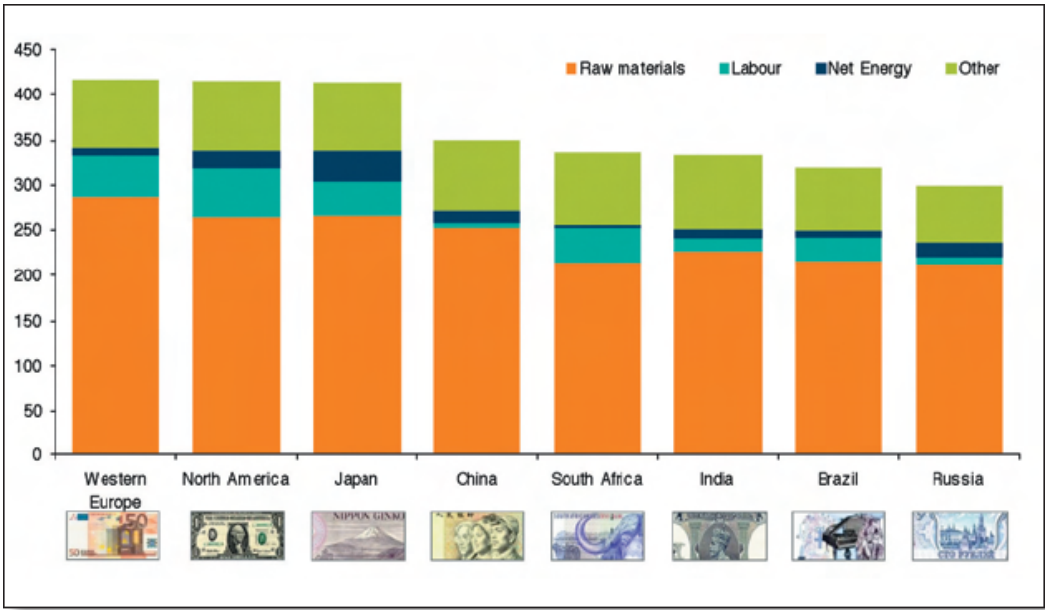
Furthermore, almost 260 million tonnes (25% of all finished steel products) are crossing borders world-wide in international markets in 2006. *(European Commission Staff Working Document, 2006, p. 13)* European Union is a net exporter for most of the steel products and therefore the transport costs have double importance for them to compete in global markets.

"Several initiatives have been carried out by the Commission in the field of transport, focussed for example on the improvement of the functioning of the Single Market, particularly through the harmonisation of technical standards and broadening the external dimension by improving transport links between the EU and third countries. However, an improved and more harmonised regulatory and competitive framework for rail freight, important for transporting bulk materials, still needs to be achieved for both economic and environmental reasons." *(European Commission, 1999, p.4)*

3.2.5.4 Labour

Compared to countries outside Europe, especially the developing countries, The European steel industry faces high wages in addition to the high prices of energy. Figure 3.22 shows the differences of costs among main steel producing countries for hot rolled coil production.

Figure 3.22 Differences of costs among main steel producing countries for hot rolled coil production

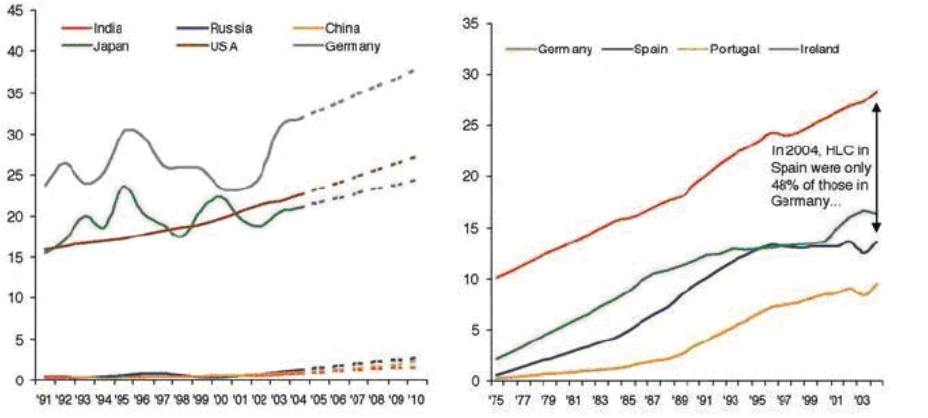


Source : Gilles, 2005, p.18

As shown on the above graph, the labour cost has a high pace among the cost figures especially in developed countries. In order to support the need to reduce production costs, employee redundancies have been accompanied among all European countries. Today, especially in Europe, the steelmaker's objective can be summarised as "achieving the most cost-effective production and selling of high-quality products with the smallest possible highly skilled, committed and integrated workforce" *(European Commission, 1999, p.4)*. Through the introduction of advanced technologies, empowerment of employees, efficiency and rationalisation measures and employment reduction the operating costs have been reduced. As a result, manpower productivity in the EU industry is amongst the highest achieved in the steel business *(European Commission, 1999, p.4)*.

Although cost reduction has been achieved through improved productivity levels, the high hourly labour costs are limiting the European producers to reduce the costs any further. A comparison of hourly labour costs among the European producers and their rivals are illustrated on the below graph of Steel Consult International in the Figure 3.23. "In 2005, hourly labour costs (in manufacturing) amounted to USD 1.0 in India and the Ukraine, USD 1.1 in China and USD 1.6 in Russia. By comparison, labour costs in the developed economies of the USA and Japan stood around USD 22/hr, while they amounted to USD 33/hr in the welfare state of Germany." *(Gilles, 2005, p. 20)*. As it could be seen there is a big difference among the hourly labour costs between Germany and developed countries and even a bigger difference between Germany and the developing countries like Russia, India and China.

Figure 3.23: Hourly labour costs manufacturing (US$)/(Euros)



Source : Gilles, 2005, pp.20 & 21

According to the report of steel consult international, their forecast is that the labour costs in Russia China and India will double in the coming five years. But "the difference with wages in developed countries is so large that even a doubling of wages in the near future will leave hourly labour costs in China, India and Russia at only a fraction of those in mature economies." *(Gilles, 2005, p. 20)* Although the wages in developed countries increase much more slowly than the developing countries, they grow faster in USD / hour terms, as they increase from a higher base. Spain on the second graph is a very good example for that. 21 years after being a member of the European Union, there is still a 48% difference on the wages between Spain and Germany. Therefore low wages will remain a competitive advantage for steel producers in developing countries. In addition to that, "China and India have the additional advantage of holding huge untapped reserves of manpower in their agricultural sectors" *(Gilles, 2005, p. 20)*.

By comparing the share of labour on cost figures and the hourly labour cost differences among those countries, we are observing that the difference of the share of labour costs are not so high as the hourly labour cost differences. The main reason for that is the affect of labour productivity. Countries with low wages also have much lower labour productivity than mills in developed countries.

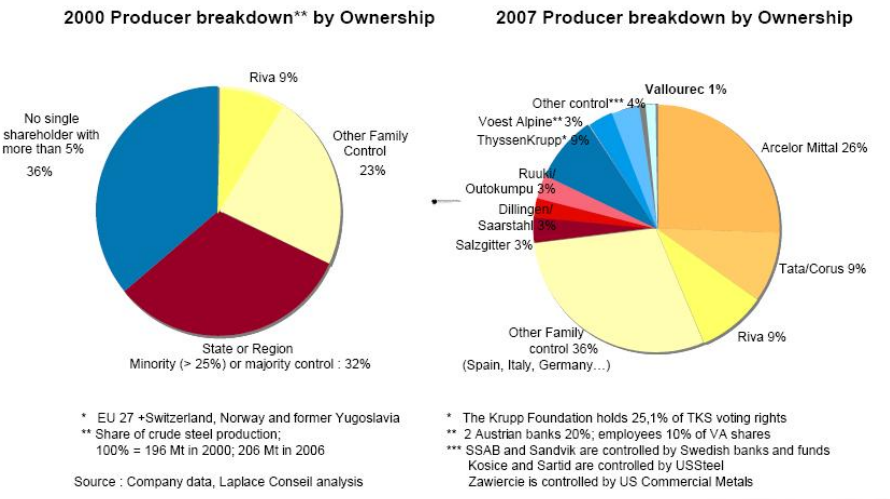
3.2.5.5 Exchange Rate

European Union is still a net exporter of steel, because their steel production is still higher than steel consumption This success makes European producers dependent to export their products and vulnerable to competition from abroad. If the export declines, serious restructuring of the European industry is required. Cost competitiveness is strongly influenced by exchange rate fluctuations. Therefore fluctuations on exchange rates have a high importance on the competitiveness of the steel industry.

3.2.6 Company structure

European steel ownership has completely changed between 2000 and 2007. In 2000, 32% of the steel industry was under the state or regional control. After the restructuring of the European Steel Industry, the share of the state has almost reached to zero by privatisation. The previously state owned steel facilities are bought either by family-owned companies, European corporate steel companies or foreign direct investors like Mittal and Tata. The major changes in the ownership structure in Europe are Arcelor-Mittal consolidation and the take over of Corus by Tata group. The ownership structure of European crude steel producers in year 2000 and 2007 are illustrated on the Figure 3.24.

Figure 3.24 Producer Breakdown by Ownership – 2000 & 2007



Source: Laplace Conseil, 2007, p.9

Although majority of the industry is owned by regional or international corporate companies, the contribution of the family-owned companies is absolutely not negligible. Crude steel production has high market entry barriers due to the cost of investments required. Despite of this fact, the share of the family-owned companies is 36%. Their contribution to the sector is even more than that if we add also the re-rollers.

3.2.7 Role of the Government

3.2.7.1 Deregulation

Developing and administering a "workable" competition policy is one of the most important government activities in supporting the competitiveness of industries, both in domestic and export markets. For the steel industry, with its relatively homogeneous products and large number of suppliers, free and fair competition constitutes an essential element in securing a future. Therefore restructuring the industry is one of the major roles of the governments. The main aim is to balance the demand and supply in the market by hindering excess capacity and also to dispose of non-profitable and inefficient production facilities, which has out of date production set-up's and employing too many employees. On global perspective privatisation is increasing the competition among the producers within the market and keep only the successful companies alive. Privatisation is frequently undertaken as a part of a broad programme of economic reform.

The globalisation of the steel market requires from companies particular efforts to strengthen their competitiveness and to adapt to fast changing conditions of competition. The foundation for the EU steel industry as a regional industry was laid in the 1980s and 1990s when the deregulation of the industry began, involving privatisation of the industry and the associated moves toward the establishment of a more internationally focused industry.

In several countries, part or all of the industry was still in the public sector in the 1980s, but has since been privatised. At present, governments in all countries examined consider that steel production is the responsibility of the private sector. The privatisation of the steel sector began in 1980's with the privatisation of British Steel in the UK. This is not only the case in European Union but the whole global steel market is under the influence of privatisation and consolidations following the privatisation.

The first privatisation took place in 1980s for British Steel in the UK, in the 1980s. It then merged with the Dutch Hoogovens in 1999 to become Corus. The east German steel industry was totally in the public sector until the German reunification in 1990. Afterwards it was privatised completely. In Italy 40% of the steel industry was state

controlled up until 1992. Then they were sold to various national (Ilva and Riva) and foreign (ThyssenKrupp and Arcelor) groups. Privatisation was completed in 1996. In Spain, there were two most important steel groups in the public sector up until 1997. Then with the privatisation Aceralia group was set up. Then they merged with Arbed and Usinor to form Arcelor. The Austrian state holding company ÖIAG formerly held shares in steel companies that it controlled, at least partially. In Finland, the state has had a majority, or prominent minority, share of ownership in the industry. In Sweden, Norway and the Netherlands, the steel sector has been completely privatised for a long time, with none or only minor participation by the public authorities in the company's capital. In Belgium, the sector has long been privatised, but the state retains a minority interest.

Since autumn 2003 the whole sector has been in private hands. In Hungary some of the inefficient mills were closed down and the largest Hungarian company, Dunaferr, was acquired by Donbass, a major Ukrainian firm, in 2004. So the industry became completely privatised. In Poland, the four largest enterprises, accounting together 70% of the sector's output, were regrouped into one company, Polskie Huty Stali SA, in 2001 and 2002. In 2003, the government decided to sell this company to LNM Holdings NV, by maintaining 25% shareholding in this company and the right to influence certain important management decisions up to the end of 2009. In Ireland, the state-owned Irish Steel was sold in 1995 to Ispat International. Then it is closed down in 2001. In Denmark, Dansteel A/S, was in mixed private/public ownership before it was closed down in June 2002. In Greece, many large steel companies operate still under state control. (Source : EFILWC, 2005, p.5)

Most of the state owned companies in the European Steel Industry are already deregulated and owned by the private sector. However there remains only Greece where the sector is still state controlled. In addition to Greece there are still several countries where the state still holds minority shareholdings in steel companies.

Some German federal states like Bavaria, Bremen and the Saarland still hold minor shareholdings in some steel companies or holding companies. In Poland, the state maintains a shareholding of 25% in the main steel producer, and the right to influence certain important management decisions, up until the end of 2009. In Belgium, the state has taken and maintains minority shareholdings in certain companies. "This is the case both in the Flanders region, where the government

retains a 2.7% shareholding in Arcelor, and in the Wallonia region, where the regional government retains a shareholding of 25% in two companies." (EFILWC, 2005, p.21). In Finland the privatisation process is still continuing. State ownership has reduced under 50% both in Outokumpu and Rautaruukki, but there is further authorisation to reduce the share of state ownership.

One additional beneficial effect of privatisation is the participation of strategic foreign direct investors bringing with them an inflow of capital, know how and the necessary management skills. In that sense privatisation and cross-border mergers improved the competitive performance of European Steel Industry. Now the industry is exporting high quality products worldwide.

3.2.7.2 Support Measures During Restructuring (Subsidies)

To support the competitiveness of the industry, another tool of the governments during the restructuring phase is the state aids. In the event of restructuring, many governments play a role in seeking to ensure that this causes the least social hardship possible. The last Steel Aid Code (SAC), in compliance with Article 95 of the ECSC (European Coal and Steel Community) Treaty, allowed certain aids in the case of plant closures. Readjustment aids, such as for early retirement, redeployment and unemployment, were granted.

Old member states of the European Union were facing with the same excess capacity problem in 80's and 90's like the new member and candidate countries in these days. An intensified restructuring has taken place and it was complemented by privatisation and consolidation of former state owned companies. A reduction of excess capacity was only achieved after the Steel Aid Code made capacity reduction a precondition for State Aid in 1996.

The Commission reports prepared at the request of the Cardiff European Council of June 1998 recommend that Member States should set precise objectives for a reduction in state aid and redirect them away from ad-hoc and sectorial aid towards measures designed to correct market distortions

In June 2002, after the expiry of ECSC Treaty, the EC Treaty have implemented sector specific rules prohibiting any kind of rescue and restructuring aid, covering

any kind of significant investment aid in the sector. The commission has in recent years only authorised a very limited amount of aid for objectives such as environmental protection and research and development.

However, there is a common understanding that these rules cannot be applied to acceding member states. They should also have the opportunity to restructure and privatise their own industry before being subject to strict EC State Aid rules. Therefore transitional rules were applied to Poland, the Czech Republic, Hungary, Slovakia, Slovenia, Romania and Bulgaria.

There are no clear guidelines for setting up a steel restructuring programme. However, Protocol 2 of the European Agreement indicates the main parameters of a restructuring program. These are viability, supplying the minimum amount of State Aid necessary to achieve viability and the reduction of capacity. Moreover each new member and candidate country has to prepare a national restructuring program to obtain transparency in their steel sector.

The overall aim of the restructuring program is to achieve long term viability of the companies concerned. Therefore in order to get state aid, the companies in the restructuring programs must be able to show that they could return to profitability at the end of the restructuring period by presenting their individual business plans.

In France, the state intervened actively during restructuring at the end of the 1970s, in the form of loans and taking of equity shareholdings in companies. At present, regional councils give their support for the granting of subsidies from EU structural funds.

In Italy legislation adopted in the late 1980s and early 1990s that enabled the industry to be restructured on the basis of early retirement.

In UK, package of regeneration measures, which worth GBP 135 million and comprising compensation payments to redundant workers and cash support for retraining, was announced for the regions of the UK most severely affected by restructuring. In 2004, the government created a GBP 400 million trust fund to provide a degree of security in retirement for victims when Allied Steel and Wire (ASW) was going into liquidation, because the company pension fund was in deficit. This fund applied across the economy rather than just to steelworkers.

In Poland, following legislation adopted in August 2001, the Minister for the Economy set up a list of 20 iron and steel companies, which accounted for 90% of sales turnover and 80% of employment. This list has categorised the companies as: those enterprises that would benefit from public aid for restructuring, those that would not receive public aid for restructuring, and those for which bankruptcy procedures had been initiated. Public aid has been extended to eight plants whose restructuring programs guarantee fulfillment of viability criteria at the end of the restructuring period. On the basis of a national restructuring plan, "the Protocol 8 of the Accession Treaty accepts the granting of state aid to eight companies from 1997 to 2003 up to a maximum of about PLN 3.4 billion. In exchange, Poland committed to cut more than 1 million tonnes of production capacity." *(European Commission, 2007, p.1)*

Belgian industrial policy has been regionalised. In some regions the government has intervened by financing a fund for equity participation in steel companies, organising tripartite negotiations with the local management of multinationals and trade unions to maintain and develop steel activities in the region; organising socially responsible workforce reduction by support measures, especially early retirement; and supporting the development of new activities.

The Danish government released an extra sum of money, to support those still unemployed six months after the closure of Dansteel in 2002. In tandem with restructuring and retraining aid, public authorities also support steel activity through financing research and development in universities, which work in partnership with companies. (Source : EFILWC, 2005, p.22)

In Romania, in compliance with the Treaty of Accession, those that will not achieve the viability coefficients by the end of 2008 will have to reimburse the State aid received until 1 January 2005, and this could lead to the closing of the companies. They do not receive new aid from the State after 1 January 2005.

3.2.7.3 Initiatives on CO_2 Emissions

Manufacturers in European Union are experiencing ever-greater pressure to meet new climate control regulations, reduced emission targets and better waste disposal.

The EU Emission Trading Scheme (EU ETS) is one of the policies being introduced across Europe to tackle emissions of carbon dioxide and other greenhouse gases and combat the serious threat of climate change.

The scheme came into force on 1 January 2005. The aim of EU Emission Trading Scheme is to reduce, EU emissions of greenhouse gases that contribute to the problems associated with global warming. It is designed to ensure that greenhouse gas emissions in the energy and industry sectors will be reduced in the most cost-effective way by allowing the EU and its member states to meet their emission targets under the 1997 Kyoto Protocol.

"Under the Kyoto agreement, the EU is formally committed to cut its greenhouse gas emissions by 8% in the commitment period 2008-2012" *(Energy and Environment Research Unit, 2004, p.3).* The first trading phase was running for three calendar years from 2005-2007; thereafter, trading phases will run for five calendar years. According to the "Directive 2003/87/EC of the European Parliament and the Council" the referred greenhouse gases include Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PRCs) and Sulphur Hexafluoride (SF_6), but only CO_2 emissions are included in the first phase of the scheme, but the EC may expand the scheme to include other greenhouse gasses in the second trading phase.

The national carbon emission caps and company allowances will be set at the member state level. Each EU Member State has been asked to draw up a "National Allocation Plan" for submission to the European Commission, setting out the total number of emission allowances to be allocated to the industry sectors covered by the EU ETS. The scheme involves setting limits on emissions on a plant-by-plant basis. Companies will be required to demonstrate each year in April, from 2006 onwards, that they have met the emissions limits. "Those exceeding these limits will be fined Euro 40 a tonne, rising in a second phase, from 2008, to Euro 100 a tonne." *(Energy and Environment Research Unit, 2004, p.6)*

Companies will be able to buy credits from those undercutting their targets, which should create a market for emission credits. It will be open to the entire EU. So companies can trade with any other company in any other Member State. Emissions trading involves the buying and selling of emission allowances between countries or

firms that are obliged to mitigate their greenhouse gas emissions at a specified level. It allows governments to regulate the amount of emissions produced in aggregate by setting the overall cap for the scheme but gives companies the flexibility of determining how and where the emissions reductions will be achieved.

All Member States governments are in charge to reduce the greenhouse gases. In March 2004, the German federal government adopted a National Allocation Plan (NAP) within the framework of the EU Emissions Trading Scheme. In Italy, the problem of the environmental impact of coke plants furnishing fuel to integrated-cycle steelworks has been raised by local institutions concerned to protect the local community. They have been backed by the judiciary, which in Genoa and Trieste has ordered the closure of coke ovens over the next few years.

Assessing the impact of the EU ETS on the competitiveness of steel requires distinguishing between two main processes for steel making: Basic Oxygen Furnace (BOF) in integrated mills, producing mainly flat products, and Electric Arc Furnace (EAF) in minimills, producing mainly long products from scrap steel.

"With total emissions of 2.0 tons of CO_2 per ton of steel, the BOF process is more exposed to carbon reduction than EAF, which has total emissions of around 0.4 tons of CO_2 per ton of steel. Nearly 100% of emissions in EAF are indirect emissions in the form of electricity, while only 10% are indirect in BOF." *(European Commission Directorate General for Environment, December 2006, p. 21)*

"At a CO_2 price of 20 Euro/ton, the total short- and mid-term cost increase is around 17.3% for BOF and 2.9% for EAF. Of the total, the indirect cost increase is around 2.0% for BOF and 2.5% for EAF. The direct cost increase is 15.3% and 0.4% respectively." *(European Commission Directorate General for Environment, December 2006, p. 21)*

The programmes and actions of the governments on this subject are not limited only with the CO2 emissions of the companies. Reducing energy consumption has also an effect on the general CO2 emission. Therefore governments are directing the companies to reduce their energy consumption. Reducing energy consumption is also in the economic interests of companies to think about sustainable production. Rising world energy costs, particularly oil prices to which continental European gas rates are tied, have triggered sharp increases in energy prices across the globe. "In

Belgium, the government of the Walloon region has recently signed a convention with the steel sector to increase its energy efficiency by 5.6% by 2010." (EFILWC, 2005, p.23). In Sweden with the recent legislation, the government permits certain tax concessions for the use of electrical energy in basic industry. In return, the companies concerned will adopt a government program to encourage more efficient use of energy.

3.2.7.4 Relationships with Social Partners

Involvement of social partners is very important to be able to achieve a competitive environment for the steel industry. However, in the majority of countries, like Denmark, Finland, Germany, Hungary, the Netherlands, Norway, Spain and the UK, the state has no formal relationship with the social partners in the steel sector. But at least there are informal consultations and negotiations. For example in France the state maintains close relationships with the steel social partners, but not apparently through any formal structure.

In Italy, the government has set up a "Steel Industry Observatory", which comprises representatives from all actors in the sector, principally the employers' organisation and trade unions. The aim is to draw up industrial policy for the steel sector, jointly with the social partners. In Poland Special 'tripartite sector teams' have been created in Poland since the 1990s to deal with the problems of selected industries (such as coal mining, metalworking and power generation) facing restructuring, privatisation and re-organisation. These teams are made up of representatives of the social partners and government with the responsibility for drawing up guidelines on restructuring within these sectors, including 'social packages' for employees. "In Belgium, the government of Walloon region also organised tripartite negotiations in 2001 and in 2003 to maintain and develop steel activities in the region." (EFILWC, 2005, p. 22)

There are also some actions on the European Union Commission level as a hub for national improvements on the improvement of relationships with social partners. Two new European sectoral social dialogue committees were established in 2006, bringing the total number of such committees to 33. "In June, the sectoral social dialogue committee for the steel industry was launched by the European

Metalworkers' Federation (EMF) and the European Confederation of Iron and Steel Industries (Eurofer)(EU0606059I)" (EFILWC, 2007, p. 36). The role of this new body is primarily monitoring sectoral developments and EU related legislation, and considering measures for promoting high-quality jobs by adopting rules and procedures.

"The Council of European Employers of the Metal, Engineering and Technology-based Industries (CEEMET) and the EMF have agreed to set up a permanent social dialogue structure" (EFILWC, 2007, p. 36). This permanent working group is composed of high-level representatives from nine European countries. The key issues of their work programme are lifelong learning, anticipation of skills and qualification needs, employee mobility and the ageing workforce.

3.2.8 Enlargement of the European Union and the Effect of New Members on the European Steel Industry

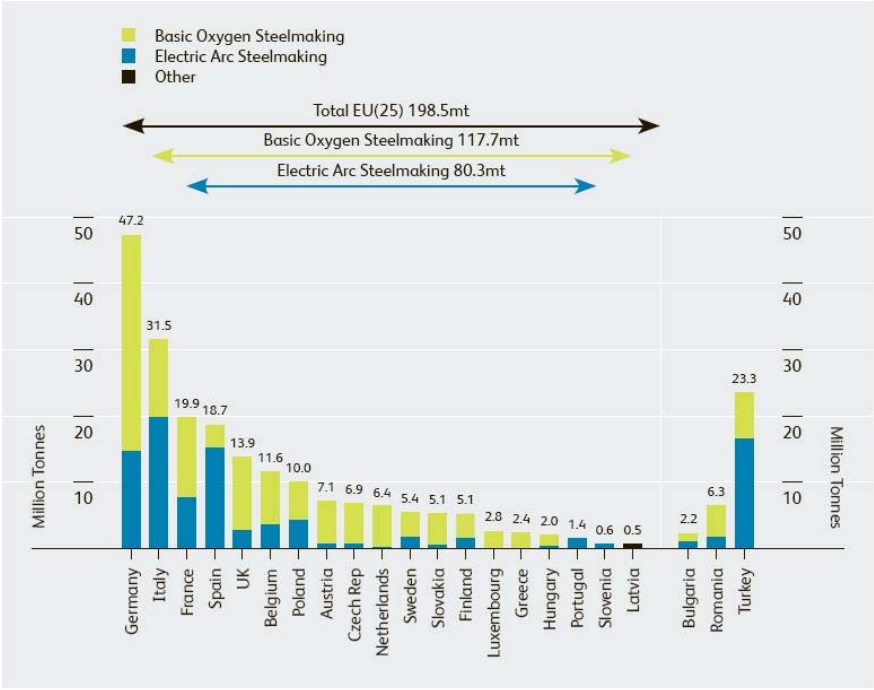
The European Union is entering a new era. The addition of ten new member states on 1 May 2004 and two more new countries on 1 January 2007 is having a significant impact on almost every industry sector. As the steel industry is the hub for many industrial sectors it will be affected substantially.

The fifth enlargement, which took place in 2004, raised the EU's steelmaking capacity by 40 million tones per annum to 240 million tones per annum according to the "The Impact of EU Enlargement on the Steel Industry" Report of Price Waterhouse Coopers (Price Waterhouse Coopers, 2005, p.2). According to the same report the EU's steel production increased from around 160 million tones per annum to more than 183 million tones per annum, covering about 19% of total world steel output in 2004. As could be seen from these figures, the capacity utilisation rates of new Member States were much lower than the EU15 countries. At the same time period the steel consumption has increased from just under139 million tones per annum to around 163 million tones per annum.

With the sixth enlargement in 2007, the production of EU27 countries increased to 207 million tonnes, with an increase of 8.5 million tonnes resulting from the production in Romania and Bulgaria. *(UK Steel, 2007, p. 15)*

Only six of these twelve new Member states have a significant amount of steel production. While production of steel has collapsed following the demise of the Soviet bloc, there are still a number of important producers in the Eastern Europe. Poland is the largest steel producer among them with a production of 10 million tones in 2006. It is followed by the Czech Republic (6.9 million tones), Romania (6.3 million tones), Slovakia (5.1 million tones), Bulgaria (2.2 million tones) and Hungary (2 million tones). As it is shown on the Figure 3.25, these quantities are modest levels when compared with the former EU-15's major steel producers like Germany (47.2 million tones), Italy (31.5 million tones), France (19,9 million tones) and Spain (18,7 million tones). But the despite of their modest levels on the quantities, steel production remains an important sector in some countries, particularly in Poland and the Czech Republic where it accounts for about 5% of total industrial production, and Slovakia where it accounts for about 10%. *(Price Waterhouse Coopers, 2005, p.2)*

Figure 3.25 EU Crude Steel Production - 2006



Source : UK Steel, "Key Statistics 2007", July 2007, p. 15

Although the EU has successfully integrated new countries on previous occasions, the 2004 and 2007 expansions are far more ambitious than any of the earlier

enlargements. This is not only because of the size of the enlargement, but also because of the economic gap between the EU and the new member states and also because of the economic changes, which has to be generated by the new member states.

The transformation of new member involves implementation of EU rules, standards and policies covering also removing barriers to trade of goods and of services, easing the movement of capital and reducing barriers to the free movement of labour within the EU. Another criterion will be providing funds to support development.

With the enlargement in 2004 the size of the European Union increased to 400 million citizens with the addition of 75 million new citizens. And with the accession of Bulgaria and Romania in 2007, the population has increased even further. By including also the enlargement in 2007 the European Union became the largest trading group. According to the "The Impact of EU Enlargement on the Steel Industry" Report of Price Waterhouse Coopers the ten new Member States add less than 5% to the EU's GDP although they constitute 18.75% of the population. But the economic growth is expected to be boosted and the steel consumption is expected to increase respectively. Substantial EU funds are available to support industrial, social and infrastructure development (around $22 billion), which should spur steel demand. The forecasts of Eurostrategy Consultants given in the Table 3.12 are also supporting this idea.

Table 3.12 Consumption of Finished Steel Products, 2003 – 2009 and 2014 – The World

Tonnes million	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*CAGR 2003-2009*	*2014*	*CAGR 2009-2014*
Accession & Candidate										
Bulgaria	0.9	0.9	1.0	1.1	1.2	1.3	1.4	7.1%	1.8	6.1%
Czech Republic	4.4	4.6	5.1	5.7	6.0	6.2	6.5	6.5%	7.0	3.9%
Hungary	2.1	2.2	2.5	2.8	2.9	3.1	3.2	7.2%	4.2	5.7%
Poland	6.8	7.6	8.2	8.8	9.3	9.9	10.2	7%	12.9	4.8%
Romania	3.1	3.3	3.6	3.9	4.2	4.5	4.8	7.8%	6.7	6.7%
Slovak Republic	1.2	1.2	1.2	1.4	1.9	2.1	2.1	10.8%	2.2	0.7%
Turkey	14.6	16.7	18.1	19.9	21.5	23.3	25.0	9.4%	36.6	7.9%
Other	1.7	1.8	2.0	2.1	2.3	2.4	2.6	7%	3.6	6.9%
Sub-Total	***34.8***	***38.4***	***41.6***	***45.7***	***49.1***	***52.7***	***55.8***	***8.2%***	***75.9***	***6.3%***
EU 15	137.5	140.2	142.4	145.0	147.8	150.7	153.6	1.9%	172.1	2.3%
CIS	28.5	30.6	32.5	34.3	36.0	37.7	39.5	8.3%	49.7	5.0%
Asia	442.5	473.5	502.1	531.8	565.1	601.7	640.1	6.3%	853.2	5.9%
North America	132.8	152.7	155.5	158.6	161.7	165.0	168.3	7.6%	185.8	2.0%
Rest of World	90.3	92.7	94.7	96.7	98.6	100.6	102.5	2.2%	114.8	1.7%
WORLD	**872.7**	**921.0**	**963.9**	**1008.5**	**1,056.5**	**1,108.1**	**1,161.4**	**4.9%**	**1,463.3**	**4.7%**

Source: Eurostrategy Consultants, February 2005, p. 4

According to the Global Steel Industry Outlook to 2014 of Eurostrategy Consultants issued in 2005, the finished steel consumption per capita in new member states will increase much more than the EU15 countries. The current consumption figures and the forecast of EU member states and Turkey are given in the Table 3.13. As it could be seen the highest consumption figures is likely to be reached in the Czech Republic. The increase in the forecasted consumption figures for most of the other new member states are also significant compared with the EU15 countries.

Table 3.13 Finished Steel Consumption per Capita, 2003 – 2014 – The World

Kg / capita	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2014*
New Member States & Candidate Countries								
Bulgaria	96.8	106.2	112.3	122.2	135.7	142.6	153.5	215.7
Czech Republic	406.4	409.0	423.8	475.5	535.7	562.3	577.2	763.9
Hungary	202.9	200.9	219.8	238.0	254.0	267.2	281.3	345.4
Poland	173.5	177.4	197.2	207.2	217.5	225.5	234.7	287.7
Romania	127.0	143.4	152.1	167.5	180.5	194.7	204.1	277.6
Slovakia	316.3	349.1	364.7	384.7	556.0	592.8	586.1	401.6
Turkey	188.6	203.5	217.5	212.6	219.6	228.8	239.0	271.0
Other	136.5	140.6	145.4	146.6	144.1	143.4	147.0	154.5
A & C Average	***198.8***	***218.4***	***235.9***	***257.3***	***275.2***	***294.6***	***310.3***	***412.9***
EU 15								
Germany	415.3	420.4	425.3	427.2	426.3	426.2	431.2	440.9
Italy	502.4	507.5	512.6	513.5	511.2	510.0	515.1	521.2
Spain	476.0	478.4	480.9	479.4	475.4	472.6	475.6	471.0
France	272.1	274.1	276.0	275.6	273.4	271.8	273.5	272.2
EU 15 Average	***365.7***	***369.0***	***372.1***	***372.2***	***370.0***	***368.6***	***371.6***	***373.2***

Source: Eurostrategy Consultants, February 2005, p. 6

Steel production in each of the new member states is dominated by just one company. Even though this is the case, none of the steelmakers in the new member states is within the world's top 30 largest producers. And these companies are mainly focused on the lower value-added long products, whereas the steel industries in the former EU-15 member states produce relatively more high value-added flat products. Their main advantages are 15 – 20% lower labour costs, compared to western EU costs, and lower transport costs for their finished products. But "on the other hand, low labour productivity, estimated to be only about one half of the 600 tones per employee per year achieved in the former EU-15" *(Price Waterhouse Coopers, 2005, p.2)* is creating a big disadvantage compared with the low labour costs. Difficulties in meeting customers' quality and delivery requirements create another potential disadvantage.

Most of the new member states, which have significant steel productions, are from the former communist block. The steel industries in those countries were previously production led. “Enterprises were managed in functional ways, with almost no experience in marketing such products and limited forms of accounting in operation. There was some evidence of corrupt practices, in both supply and export. The outcome is that this is an industry, characterised by extensive overstaffing. These industries suffer from operational inefficiencies, reflected in an absence of energy management in energy demanding industries” *(Fairbrother and et. al., 2004, p.7)*.

Adoption of EU environmental laws is likely to give rise to potentially large additional costs. And competition between companies will intensify as higher quality Western European suppliers increase their market penetration in the new member states. Under these circumstances, the EU Steel Industry will face challenges and opportunities at the same time.

3.3 Accessibility to the European Market

EU tariffs for steel products are relatively low with respect to third countries. The average consolidated bound rate was around 2% in 2000, and all tariffs disappeared in 2004 in line with the EU's commitments in the Uruguay Round. Imports from many countries enter the EU at preferential rates under bilateral agreements. More than 50% of finished steel products had been imported from the associated countries of Central and Eastern Europe at zero duty before most of them become EU members. Before most of them became EU members, steel products from all countries except Russia, Ukraine and Kazakhstan enter the EU freely without facing quantitative restrictions or similar barriers. (Györffi, 2006, p.1).

Beyond tariffs and quotas, the following accessibity reducing issues are important for steel products for EU markets. Although the market entry barriers like quotas and import duties do not exist any more for most of the countries, the certifications and homologations especially for the products used in the construction industry still act as protective measures. The key technical barrier for reinforcing steel manufacturers is the need to obtain certification and voluntary product markings in each EU Member State.

3.3.1 Certification & Homologation

Reinforcement steel for concrete - rebar and wire rod – is one of the few widely traded "commodity" construction materials. Multiple testing requirements are a problem, with well-established and complex national labeling schemes. Rebar is a mature product for which harmonisation of product standards has been attempted in the past, but due to small technical differences in mechanical properties and due to differences on multiple testing requirements, there is still not a single standard which could be applied in all European Union member countries by means of the above mentioned aspects.

Within the EU, each country has its own recognised national standards regarding the performance properties of rebar. The creation of national standards laid back to 1980's and 1990's. "In 1970's, the construction industry, contractors and clients in European countries were concerned with poor performance standards for rebar. The steel producers were beginning to face competition from low price imports. In the 1990s this has been exacerbated by low cost imports from the CIS and central Europe. It was not possible to argue the case for any improvements in national standards to restrict imports, because there were no practical means to police the markets and any complaints from users were specific to the purchaser and supplier." (*European Commission, 2000, p.7-11)*

There occurred a number of building collapses, and there have been a concern world-wide about earthquake damage to reinforced concrete buildings. In addition to that, contractors were dissatisfied due to delays on site caused by faulty material. Therefore most countries developed means of monitoring reinforcement steel quality, including the formation of specialist certification bodies for reinforcement steel. The objective of the certification bodies was to certify any manufacturer that met the requirements, regardless of country of origin.

Product standards usually refer to performance characteristics such as strength, ductility, weldability, etc. Examples of the standards in this area are given in the Table 3.14.

Table 3.14 European National Standards for Reinforcing Bars

Country	Standard Name	Qualities
Germany	*DIN 488*	*BST 420S, BST 500S*
The Netherlands	NEN 6008	FeB500 HWL
Italy	*UNI 6407 / 69*	*FEB 44K*
United Kingdom	*BS 4449 / 1997* *BS 4449 / 2005*	*GR 460B* *GR 500B*
Spain	UNE 36 068-94 /	B 400 S, B 500 S
Portugal	*LNEC E 449 - 1998*	*400S, 500S*
France	*NFA 35016*	*FE E 400, FE E 500*
Greece	ELOT 971	S400S, S 500S
Romania	STAS 438/1 - 1989	PC 52
Austria	ÖN 4200	BSt 550
Switzerland	SIA 162/1	500 S

Source: Compiled by the author from country standards

The differences in national standards mainly concern yield strength, ductility, and elongation. The differences among national standards by means of these factors are given below in the Table 3.15. Although there are different national standards for reinforcement steel, the product, and the resulting performance characteristics are very similar across the different countries. Therefore differences in the performance requirements of national standards are not a significant barrier, since one product can be produced to meet or exceed the requirements of various different standards.

Table 3.15 Some Differences in the Rebar Performance Parameter Ranges

Some differences in rebar performance parameter ranges

Parameter	Range of values	
Yield Strength (RE)	Germany: 500 N / mm² Austria: 650	UK: 460 N / mm² I, GR: 400
Stress Ratio (max. strength / yield strength)	Germany: 1.03	Sweden, Denmark and the Netherlands: 1.08
Ductility/ Elongation (AGT)	Germany 10% 2.5% in most N Europe	Sweden 12% Seismic regions 8%
	Note: early drafts of EN10080 had 3 classes based on AGT of 2.5%, 5% and 7.5%,with tThe RE based on 500N/mm2 and 450N/mm2. Later drafts have no specific values for these parameters, only some lower limits.	

Source: European Commission, 2000, p.7-14

To adopt all these standards under a single Euro-Norm, "the standard EN 10080:2005 'Steel for the reinforcement of concrete – Weldable reinforcing steel – General' was established by the European Committee for Standardisation (CEN) in 21 April 2005. The reference of that standard was published in the Official Journal of the European Union in accordance with Article 7 (3) of Directive 89/106/EE, first on 14 December 2005 and again on 8 June 2006". (*European Commission, 8 December 2006, p.1)*

Italy and the Commission raised formal objections with respect of standard EN10080:2005. The Italian formal objection was lodged on the grounds that EN10080:2005 did not satisfy the essential requirement of mechanical resistance and stability in Annex I to Directive 89/106/EEC as it does not differentiate clearly the intended use of the reinforcing steels, i.e. the reinforcing steel with specific performance required for use in seismic areas which is an important safety issue of works regulated in Italy. So the reference of standard EN10080:2005 'Steel for the reinforcement of concrete—Weldable reinforcing steel—General', is withdrawn from the list of harmonized standards published in the Official Journal of the European Union (European Commission, 8 December 2006, p.1).

The European Commission of Standards is still working on the development of a common standard. But, EN 10080 is a harmonized European Standard, and contains within it the requirements for CE marking of reinforcing steels according to the Construction Products Directive. The standard contains details of definitions, test methods, evaluation of conformity and identification of the manufacturer and the technical class. For certain performance characteristics threshold values are given. For other performance characteristics, no values are given. The standard must be used in conjunction with another technical specification like the national standards. The mandatory and voluntary clauses of the Euro-Norm are given below in the Table 3.16.

Table 3.16 Mandatory and Voluntary Clauses in EN 10080

Mandatory and Voluntary Clauses in EN 10080

Mandatory for CE marking	Clause in EN 10080	Voluntary aspects	Clause in EN 10080
Weldability	8.2	Specific uniform mechanical properties	Classes of Convenience (Parts 2 to 4)
*Yield Strength	8.3.2.1/3	Rib Patterns	8.5
*Stress Ratio (maximum strength/tensile yield strength)	8.3.2.1/3	Delivery documentation	
*Elongation	8.3.2.1/3	Re-rolled products	
*Fatigue	8.3.4	Traceability	
Bendability	8.3.5		
Sections and Tolerances on sizes	8.4		
Bond Strength	8.5		
Producer Identification[1]			

Notes: * these elements are not subject to mandatory uniform levels, but are included in classes of convenience in the 1999 drafts. The later drafts are understood to have removed specific values from most characteristics.
(1): Recently agreed as an area for mandatory regulation.

Source: European Commission, 2000, p.7-20

In addition to the above mentioned characteristics, there are also requirements in national standards for methods of testing for performance. These usually refer to testing of the bars as dispatched from steel mills, but may also refer to testing of the end product once rebar has been incorporated into concrete. It has to be noted that all countries also have standards and design codes for reinforced concrete which specify the applications and use of steel, and may refer to the above standards. Therefore the main difference is on the multiple testing requirements, because the national quality marks provide additional assurances beyond the CE marking which are important to users on site. These are specified strength property requirements, traceability back to individual steel casts and identification of supplier etc. (*European Commission, 2000, p.7-2).* They also test the steel against specific mechanical properties set out in the relevant standards cited by designers. It is to be noted once more, that the CE marking does not require any particular specification in terms of strength, elongation etc. Therefore it is likely that designers and contractors will continue to request this additional certification, even after CE marking is effective.

The main national associations for certification of reinforcing steel, members of ConsCert are the following. (Those marked ♦ are specialist organisations for reinforcing steel)

♦Belgium: Organisation pour le Contrôle des Aciers pour Béton Armé (OCAB), which manages the BENOR mark

Denmark: Danish Standards Association

♦France: Association Française de Certification des Armatures de Béton (AFCAB), which manages the French NF mark for concrete reinforcing steels.

Finland: SFS (formerly part of the Finnish Standards Association)

Germany: DVS Zert – a group of testing and certification bodies (the Institut für Bautechnik has overall responsibility and is an observer member of ConsCert)

♦Italy: Instituto Italiano de Garanzia della Qualità per i Prodotti Metallurgici(IGQ)

Netherlands: KIWA

Norway: Kontrollradet

Spain: AENOR – which manages the N mark

♦Sweden: SBS – Svensk Bygestalkontoll Stiftelse

Switzerland: EMPA – federal materials testing and research body

♦UK: UK Certification Authority for Reinforcing Steels (UKCARES)

(*European Commission, 2000, p.7-15-16)*

Each country makes slightly different requirements for their voluntary (mandatory) marks. This is a costly and time-consuming process for manufacturers. Certain country marks are actually legally mandatory, such as in Germany and Spain. The main cost items on certifications are the cost of the certificate, cost of annually few external inspections to the manufacturer's mills, cost of testing of products in the laboratories of the certifying body and additional costs. A manufacturer, which aims to sell reinforcing bars to different European Union member countries, has to take the homologation certificates from all these countries. And even some of them are charging royalty fees per each ton of sold material. The key technical barrier for

reinforcing steel manufacturers is the need to obtain certification and voluntary product markings in each EU Member State.

Due to the high volume of trade, large manufacturers have been able to carry the cost of additional testing. But this is preventing smaller scale producers to enter into the market. Despite the fact that the certification bodies have an interest in maintaining multiple schemes, a single accepted voluntary quality scheme is needed. An idealistic solution might be for all the voluntary certification bodies to adopt the same procedures and criteria and give the same mark. At least reference in specifications, tender documents and national regulations to any specific quality mark or certification should be prohibited.

Manufacturing the necessary steel grades to meet strength and elongation requirements should not be a problem, and as mentioned before generally one specification can be made to meet a range of different standards. Other additional costs arise where different national standards require different rib patterns or markings to be rolled into the bar surface as product marking. The certification usually requires that the source of the steel be identified by a code rolled into the bar surface. This marking is used as supply chain identification. This requires special mill rolls to be made, and to be changed before rolling a new batch of bars. This means the mills have to keep necessary rolls for each target market and for each desired size. Therefore a minimum export order size is necessary to cover these costs. These costs also keep smaller scale mills out of the markets. Even the larger scale producers have to aim the most potential markets within European countries to minimize their extra costs that arise because of differences between national standards of European Union member countries.

The main aim of the European Commission is to adopt a single Euro-Norm for the reinforcing bars and to certify the manufacturers with CE marking under the scope of this norm. But “the key worry is that whilst in theory CE marking will legally allow products to be sold on all EU markets, in commercial practice companies fear that national product markings will still be commercially required by engineers, and so technical barriers will still exist. Any marks that are mandatory such as those in Germany and Spain are likely to be made into voluntary marks, but engineers are likely to continue to specify them.” (*European Commission, 2000, p.7-19)*

As reported, it is likely that voluntary quality marks are still be required. At one extreme the CE marking would just become an additional requirement – but mandatory for all suppliers in EU even if they are only aiming at the small segment of the market for uncertified steel.

3.3.2 Quotas, Import Duties & Anti-Dumping Duties

In March 2002, US President Bush announced tariffs for three years of up to 30% on imported steel, guided by section 201 of the Trade Act, a safeguard clause in US trade legislation. This decision was made in order to protect the country's ailing steel industry during a restructuring of the American industry. President Bush had followed the International Trade Commission's recommendation from 2001 to impose significant tariffs of between 20% and 40% on 17 steel products for three years in order to remedy the steel crisis in the US (Györffi M.**,** European Parliament Fact Sheets, September 2006). Under WTO rules, countries can impose temporary increases in tariffs, known as safeguards, to give time for a domestic industry to restructure to improve competitiveness. The EU Commission, however, claims the US action breaks WTO rules. It is particularly concerned that there has been no significant overall increase in steel imports, which is a precondition for safeguard actions. These sanctions hit a wide diversity of steel products on the basis of an arbitrary definition of like-products. In addition to that, the US failed to ensure that the injury caused by other factors is not attributed to imports.

Two thirds of EU steel exports were affected by President Bush's actions, which came into force two weeks after the announcement. In June 2002, the WTO's Dispute Settlement Body accepted the request by the Commission and by other world producers that a panel should be established to judge the legality of the US steel safeguards. After the tariffs in US came into force, the EU Commission rapidly took action, imposing additional customs duties on imports of certain US products. But EU faced with the threat of floods of diverted steel that may come into the EU market. Therefore following the US action to severely restrict steel imports EU adopts temporary measures to guard against floods of steel imports resulting from US protectionism.

The safeguard established a generous level of imports - within which the measures will not apply - based on the highest recent level of imports in 2001. For each of the fifteen individual products, quota limits was calculated by taking the average import level for the period between 1999 and 2001 and adding 10 per cent. Imports within these limits planned to be treated as normal and not subject to any increase in tariffs. “Beyond these levels, tariffs will apply varying from 14.9% to a maximum 26%. The varying rates reflect different degrees of underselling - i.e. the differences that were found between import prices and costs of production in the EU” (EU Commission, 2002, p.1).

The overall effect was to establish the total imports of these products to around the 2001 level. EU's determination was to maintain existing level of access to the EU market. Measures were being taken solely to limit trade diversion resulting from US protectionism. The Commission concluded that under no circumstances will the EU measures last a day longer than those of the Americans. In 2003, the World Trade Organisation indicated that the US measures were "inconsistent" with free trade agreements and in december 2003 President Bush announced his decision to remove the steel tariffs. The EU dropped theirs on a voluntary basis thereafter.

In accordance with WTO rules, the EU did not apply them to imports from developing countries where such imports of a particular product do not exceed 3% of total EU imports of that product. The measures will not apply to imports from Russia, Ukraine and Kazakhstan that are the subject of separate quantitative agreements. As the export of Russia was severely affected by the US tariffs in 2002, the decrease in exports to the US is being partly compensated for by an EU-Russia trade agreement, signed on 9 June 2002, designed to increase imports of certain Russian steel products into the EU. The agreement increases quantitative limits for the import of steel products such as flat and long products into the EU for 2002 to 2004. Similar agreements have been made with both Ukraine and Kazakhstan (Györffi M.**,** European Parliament Fact Sheets, September 2006).

Bilateral trade agreements/autonomous measures on the imports of certain steel products are in place since 1995 with Russia and Ukraine and since 1999 with Kazakhstan. New bilateral steel agreements were concluded in 2007 with Ukraine (entered into force 6 July 2007) and with Russia (entered into force 17 November 2007). Autonomous measures are currently in force with Kazakhstan until

agreements are concluded. These bilateral agreements will eventually abolish on the date of accession to the WTO. The quota level is 3.03 million tones for Russis, 1.35 million tones for Ukraine and 0.20 million tones for Kazakhstan for 2008. (EU Commission, 2005, p.1)

Anti-dumping proceedings is an other protective measure. Now EU Commission is launched an anti-dumping probe against wirerod from China, Moldovia and Turkey.

3.4 Main Challenges for the EU Steel Industry

3.4.1 The Growing Impact of Globalisation

Like all other sectors also the steel industry is affected from the globalisation. The globalisation caused increased market power, stricter product requirements, and standardisation for the steel customers. As a result it has increased the international competition. "Collaboration with its traditional customers is so deeply rooted that the European steel industry has taken the necessary measures to continue to satisfy their needs in terms of services, quality and prices. Thus, many of the European steel companies have established facilities in other regions of the world or developed strategic alliances worldwide." *(European Steel Technology Platform, 2004, p. 16)*

Important steel customers, like the automotive and mechanical engineering industries are increasingly investing in, and consolidating with, companies outside the EU. Their main aim is to produce in closer proximity to end-users, to benefit from the lower costs, to avoid barriers to trade, and to improve servicing capabilities. "As far as participation in foreign production plants are concerned, EU steel producers have a considerably lower degree of investments in regions like the Americas and mainland Asia than, for example, Japanese firms" *(European Commission, 1999, p.6)*

"Firms in EU now have direct access to new and expanding markets in these new expanding markets, where the purchasing power is increasing rapidly and consumption needs are increasing by the day" *(Joaquin, 2007, p.3)*. Therefore, while companies are investing in expanding markets like India and China, they are taking advantage of low costs in production, and they are also benefiting from the proximity to end-users.

In addition to the globalisation, the trend to further liberalisation of international steel trade is another challenge for the steel producers. Consolidations, mergers, acquisitions and foreign direct investments have created giant international steel producers like Mittal-Arcelor, Tata & JFE.

"Globalisation is also driving the process of rapid technological change. New technologies can help companies to become more efficient, to make the best use of raw materials and energy and thereby raise productivity and income" *(Joaquin, 2007, p.3)*. Through the use of those new technologies, companies may become more efficient. Their productivity and income may increase through the best use of raw materials and energy by applying those new technologies.

While the companies in developed countries are enjoying benefits of producing in developing countries, the companies in those countries will enjoy the growing trade openness, higher capital inflows, rapid technological change and increasingly well-educated populations.

Globalisation is also bringing some challenges in addition to its advantages. While companies in developed countries are investing in developing countries to benefit from the cost advantages, and while they are transferring their technology to those countries, they are creating their own competitors for their own domestic and foreign markets. Therefore "they must react strategically because they will have to cope with the emergence of new economic powers, such as Brazil and India for services production and China, which is fast becoming the world's manufacturing powerhouse" *(Joaquin, 2007, p.3)*.

European Steel Industry is facing stiff competition from China, which has become the world's largest producer of steel in recent years. In addition to the competition of China, European mills are facing another pressure due to the increase of raw material prices, due to the rising demand. Another challenge is the increase of the freight rates due to high demand, problems in several geographical locations like Iraq and Iran and increasing oil prices.

Another challenge is that the growth of the global pool of labour is adversely affecting wages and employment for unskilled workers, who are hardest hit by production relocation and competitive imports.

Perhaps the major challenge for the long-run is the damage to the environment due to the unprecedented demand for energy, raw materials and natural resources. European Union is taking serious acts to protect the environment by applying environmental regulations to the producers. But in the short-run these regulations mean a huge amount of investment and these high costs are reducing the competitiveness of the European Mills further.

As it is mentioned above, the globalisation has a major impact on the steel industry with pros and cons. Beyond these advantages and disadvantages, globalisation is causing the international markets to be affected from each other and also from international crises much more than it used to be. "The financial and economic crises in the South East Asia, Russia and parts of Latin America have seriously disturbed traditional international trade flows. In response to the pressures on their markets, steel industries in various parts of the world have increasingly sought protection through anti-dumping and anti-subsidy measures, as well as through other means, such as tariff increases or minimum import prices." *(European Commission, 1999, p.6)*

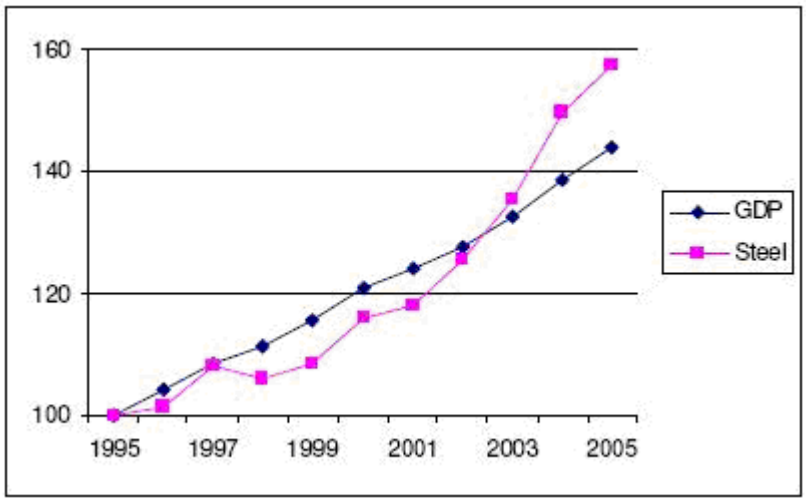
3.4.2 Matching Steel Supply and Demand

"Past experience shows that crises in the steel industry usually have their roots in imbalances caused by rapid fluctuations in demand combined with somewhat rigid supply structures and global excess capacity. Fluctuations in demand are related to business cycles but also have structural backgrounds. Economic cycles influence steel demand to a large extent, bearing in mind that steel is used for both consumer and capital goods." *(European Steel Technology Platform, 2004, p. 16).* The problem of global excess capacity is often provoked by the subsidised investments and/or public support of non-viable companies. This is no longer the case in European Union. The governments are not subsidising the steel industry, but due to globalization, the steel industry of the European Union is under the threat of the subsidised excess capacity created especially in China.

As mentioned before, the demand for steel is a derived demand and therefore must be in close relation with GDP. As the GDP grows the demand for the construction, automotive and white goods is increasing. As the steel sector is supplying materials

for all these sectors, also the steel demand is increasing. If we look at the global GDP and steel demand between 1995 and 2005 given in the Figure 3.26, we observe that until 2002 GDP Growth exceeded that of steel demand. But in the last years this situation has changed and the reverse position has held. This new balance is creating an unhealthy environment for the steel industry.

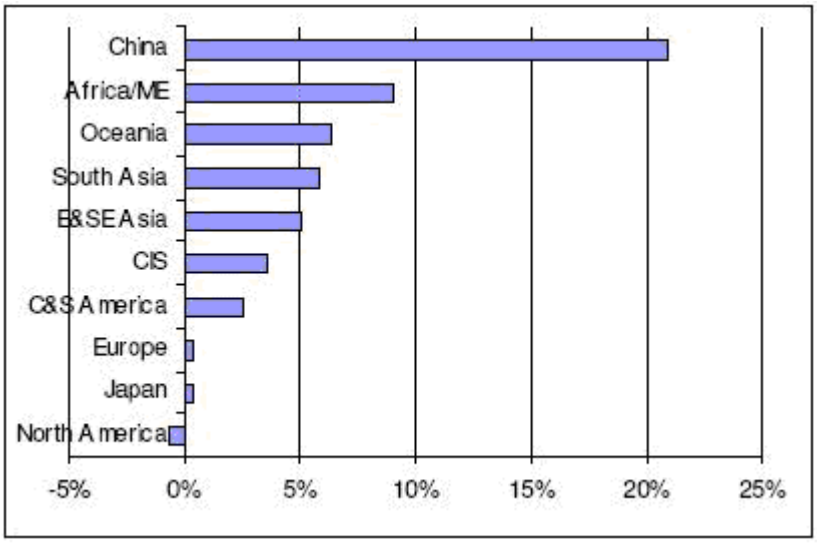
Figure 3.26 GDP and Steel Demand, 1995 - 2005



Source: Global Steel Consultants, 2006, p 1

The global steel demand is increasing with a high pace, but the situation worldwide is very heterogeneous: "in 2002, per capita steel consumption was 163 kg for China, 363 kg for Western Europe and 562 kg for Japan. This presupposes a huge potential for growth in China and a potential change in the centre of gravity for steel from Europe to Asia." *(European Steel Technology Platform, 2004, p. 16)* . "In absolute terms there has also been a change in the pace of growth. From 1995 to 2000 demand increased by about 20Mt per year; but from 2000 to 2005 it increased by over 50Mt per year." *(Global Steel Consultants, 2006, p.1)* It was due to the effect of China and also the developing countries as could be seen on the Figure 3.27.

Figure 3.27 Steel Demand Growth by Region, 2000 - 2005



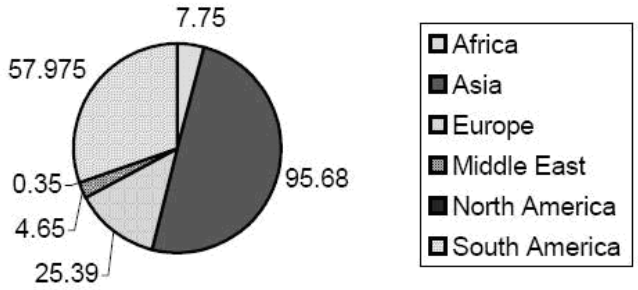
Source: Global Steel Consultants, 2006, p.1

Main reason for this situation is the level of investment being experienced throughout the world and especially in developing countries. "Low real interest rates and globalisation has encouraged industrial investment in "low-cost" regions which in turn adds to the demand for infrastructure and housing. Something like 50% of all steel is used directly in the construction sector but when one includes new plant, transport equipment (lorries, railway rolling stock and ships), oil and gas pipelines, and other capital goods, around 80% of steel demand is actually driven by investment." (*Global Steel Consultants, 2006, p.1).* The highly cyclical behaviour of the steel industry is a result of the dependence of the steel industry upon investments. What is undoubtedly true is that the industry always seems to over-invest at the peak of the cycle.

In terms of volume, steel demand is expected to increase more outside mature steel markets like the EU, Japan and the US, particularly in favour of Asian and Latin American countries. While the steel demand is increasing in developing countries, the demand is relatively stagnant in developed part of the world like EU 15 countries, North America and Japan. As well as the low GDP growth in those countries also the main focus is no longer the low value-added manufacturing or construction sectors, but mainly the service sector. This causes also a drift of manufacturing towards these regions with an advantage of low costs.

While the demand is increasing every day, the supply is increasing with a higher pace. "OECD estimates world steel making capacity in 2003 of 1.128 billion metric tons." *(OECD Special Meeting at High-Level on Steel Issues, 2005, p.3)*. Based on OECD report, steel producers announced projects that would add approximately 278 million metric tons of capacity between 2005 and 2008. 192 million metric tons out of this capacity will be for crude steel production. By looking at the distribution of this 192 million metric tons among regions, on the below graph it could be observed that half of it is planned in Asian countries and another 30% is planned in South American countries. As the demand is increasing in developing countries, also the supply is increasing mainly in the same regions.

Figure 3.28 Announced Crude Steel Capacity Expansion in million metric tones, by Region



Source : OECD, 2005, p.5

"If major steel consumers in the EU maintain production capacities in the EU, and if EU steel producers are successful in competing with imports, the EU steel industry will remain in a good position to optimise the mix between deliveries to the internal market and exports to third country markets." *(European Commission, 1999, p. 8)* On the other hand, if major EU steel users re-locate part of their production outside the EU to be close to the potential clients in developing countries due to high operational costs and high freight rates then it will have to become an important factor in strategic decision-taking by the EU steel industry.

However, the industry expects an important potential for increased demand in highly developed countries (durable consumer products, capital goods) as a result of further product development. In accordance with the above mentioned trends and high oil prices, it is expected that world steel trade will focus increasingly on higher value-added products at the expense of ordinary steels, being increasingly traded on a regional base.

3.4.3 New EU Environmental Regulations

A policy topic that has come to the fore in recent years is the environment. The major point of discussion has been the sector's energy use and its contribution to meeting the targets for reducing emissions of greenhouse gases set by the Kyoto Protocol to the 1992 United Nations Framework Convention on Climate Change.

"Over the last 50 years, the concentration of CO2 in the atmosphere increased from 280 ppm to today's level of 360 ppm. There is a growing consensus that this change is linked to anthropogenic activities. According to reports from the International Panel on Climate Change, this phenomenon will lead to a worldwide rise in temperature by 1.4 to 5.2°C by the end of this century." *(European Steel Technology Platform, 2004, p. 26)*

Although there has been important and systematic progress in steel-making resulting in the halving of the CO2 emissions per tone of steel produced over the last 50 years, the steel industry still represents an important share of the European anthropogeneous CO2 emissions (6%), and therefore remains a sector of specific importance. "Today, about 1.8 tones of CO2 are emitted per tone of steel, which represents almost the theoretical limit for the process." *(European Steel Technology Platform, 2004, p. 26)*

As far as environmental policies are concerned, various instruments are being introduced or considered, nationally and at the EU level, in order to implement commitments according to the Kyoto Protocol. These concern voluntary or negotiated Environmental Agreements, carbon-energy tax, the Kyoto Protocol's flexible mechanisms and Integrated Pollution Prevention and Control (IPPC).

The IPPC Directive lays down measures designed to prevent or reduce emissions in air, water and land including measures concerning waste. Permits will be granted by local authorities in Member States that will determine in each case the Emission Limits Values to be set. In this context, the European IPPC Bureau has been entrusted with the responsibility to write reference documents (BREFs) describing the Best Available Techniques (BAT) on the basis of an information exchange between Member States and the industries concerned. *(European Commission, 1999, p. 10)*

On the legislative front, the industry will have to implement the Integrated Pollution Prevention and Control Directive (IPPC) and ensure that its operations, including energy efficiency, conform to Best Available Techniques (BAT). In addition to conform with Best Available Techniques on Operations, the industry must also satisfy existing EU standards on wastewater treatment, air quality and waste management.

"For the steel industry, initiatives with a potentially significant impact include: integrated pollution prevention and control permits, air quality standards and the Clean Air For Europe programme, new product and waste legislation (such as the end-of-life vehicles directive) and the thematic strategies on natural resources and waste prevention and recycling, as well as new EU legislation on chemicals ('REACH')." *(European Steel Technology Platform, 2004, p. 16)*

Many countries in the world decided to take actions in accordance with the Kyoto Protocol. One of the measures taken by the EU to respect the Kyoto commitments is to create the greenhouse gas emission-trading market for certain industrial activities, including steel-making. As mentioned above, the European Union takes special actions to comply with the environmental legislation. It is a huge challenge for the companies in EU15 countries and especially for the companies in new member countries and including also the firms in candidate countries. "According to recent estimates, the cost to the 10 central and eastern European countries of meeting these requirements could be between an 80 and 110 billion, a substantial share of which will be borne by the steel sector." *(Woeldgen, 2003, p.1)*

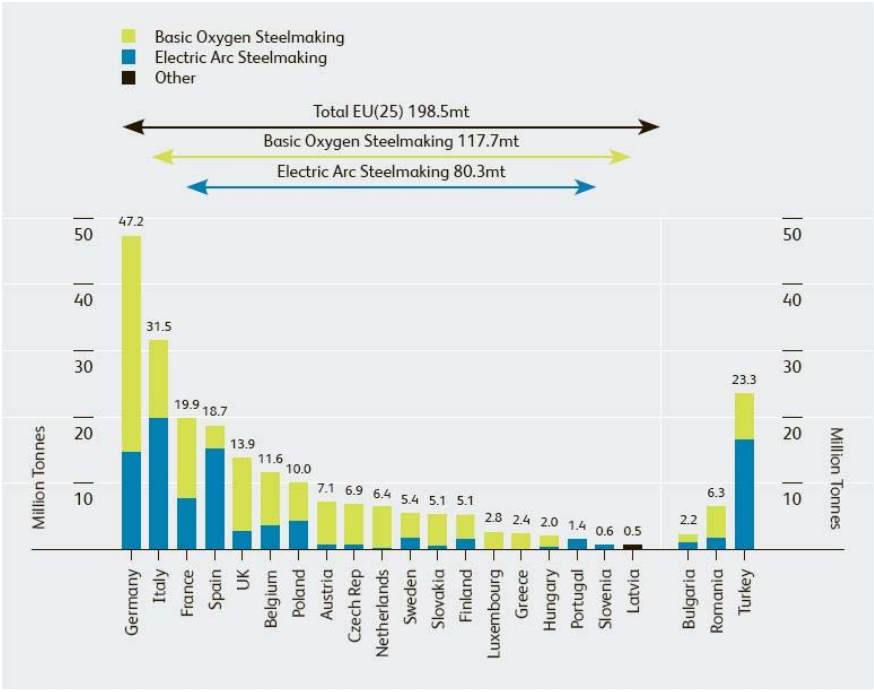
Across the whole EU economy the costs for implementing these commitments could be considerable. The risk that European steel producers could see a loss of business to non-EU competitors, which are not subject to any CO2 emissions limitations, cannot be neglected. To maintain its competitiveness, the European steel industry will have to meet the challenging combined targets of both environmental friendliness and economic growth.

3.4.4 EU Enlargement

May 2004 saw the EU15 become the EU25 and the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia, Slovakia, Malta and Cyprus joined the EU. With the last enlargement in January 2007, Romania and Bulgaria also joined the Union. And Turkey is a candidate country adapting to the European Union's regulations to be a member of the Union.

The EU is the world's second largest steel producer after China, with total production of crude steel of 198.5 million tonnes in 2006 for EU25 countries. By including Romania and Bulgaria, it is reaching up to 207 million tonnes. As shown in the Figure 3.29, six of the new member states, Poland, Czech Republic, Romania, Slovakia, Bulgaria and Hungary are themselves large steel producers. And Turkey as the candidate country is the third biggest steel producer among all these countries with a total production of 23.3 million tonnes per year.

Figure 3.29 EU Crude Steel Production 2006



Source: UK Steel, "Key Statistics 2007", July 2007, p. 15

According to the "Key Statistics 2007" report of UK Steel, the consumption of EU 25 in 2005 was 161.88 million tones, whereas the crude steel production was 186.3

million tones for the same period as mentioned in their report “Key Statistics 2006”. These values show a net surplus on the steel production. In addition to that in January 2007 Romania and Bulgaria joined the Union with an extra surplus.

The industry in new member countries presents several strengths, such as relatively low labour cost and a good level of technical qualification of the workforce. On the other hand, the industry has also some weaknesses, such as outdated production set-up in combination with slow implementation of modern production techniques, low energy efficiency and overstaffing. This results in sub-optimal productivity levels and product standards. Further developments are needed to enhance them and to protect the environment.

EU enlargement brings challenges and opportunities to the EU 15 steel producers. In many of the new member states the steel industry is of great importance. Mainly they have a surplus on the production and therefore they are net exporters of steel, half of which goes to the former EU 15 countries, with Germany receiving almost half and the rest going primarily to the other new members and other destinations. “Their competitive advantage is lower labour costs, about 15-20% of the Western EU costs” *(The European Union Center of the University of North Carolina, 2006, p.3)*.

The recently expanded European Union is also having some opportunities for the EU steel industry. The main opportunity is the open access to potential growth markets. Expanded European Union will offer a major market to steel producers as the economic stimulus to the region increases demand for high quality steels, such as those used in car production and capital equipment for manufacturing, as well as for construction-grade steels. Steel consumption per capita is currently well below that of the EU15 level.

The objective of the enlargement process is to improve the viability prospects of the steel industry in the new member and candidate countries, in order to cope with the competitive pressure arising of full EU-membership. As the steel industry represents a major economic force in the candidate countries, it will constitute a major impulse to overall economic integration. But as it is mentioned above, the steel industry has a surplus in production and therefore it needs to be restructured so that the entrepreneurs from the new member countries and EU15 countries mutually benefit from the larger European market.

Under the scope of restructuring, priorities for industrial policies in new member countries include privatisation, investments in human and physical capital, increased productivity and product quality, as well as the creation of job opportunities as an alternative to those lost in the steel business.

Companies in new member countries would benefit from the implementation of modern production techniques, along with higher energy efficiency, better organisation, and quality and services. As a result, they will achieve higher productivity levels, better product standards, and it will result with much needed environmental improvement. If restructuring of the whole EU Steel industry could be achieved, then all participants of iron & steel sector in EU mutually benefit from the larger European market.

3.5 Actions to Enhance a Sustainable Competitiveness within a Global Perspective

To able to overcome the main challenges of the EU steel industry, the EU commission defined four main factors to be improved. These are:

3.5.1 Reinforcing the Human and Technological Bases for a more Innovating Steel Industry

The objective is to contribute to the modernisation of the industry and its capacity to adjust to evolving customer requirements, through combined effects of improved industrial capability and innovation capacity. Reaching to this goal requires qualified people. Skill and knowledge requirements have risen continuously. It is not only knowledge of technical processes, but also the ability for analysis and an ability for teamwork. Therefore, “the steel industry is committed to intensify its contacts with universities and, in general, further work on its image (safety, durability and environmental performances in relation to high-technology) in order to attract highly qualified staff, which will have a solid technical and scientific base.” (European Commission, 1999, p.11)

An essential task is the need to motivate people through effective participation and responsibility sharing in the decision-taking process, in order to achieve the best results both in quality and quantity of production as well as in response and service to the client. Therefore, “the management of the EU steel companies and the national and EU-wide Federations, as well as the steelworkers’ trade Unions, are determined to deepen their long existing social dialogue.” (European Commission, 1999, p.11)

“Three driving forces of technological innovation are: the need to produce new products to satisfy customer requirements, the need to reduce production costs by new production technology and the need for clean technology (including more recycling)” (European Commission, 1999, p.11). The key factor for moving in this direction is closer co-operation with user sectors in the field of co-operative applied research to develop products according to the needs of the users. In addition to the development of new products, research is focused on a more efficient use of raw materials, optimising energy consumption, reducing polluting emissions and decreasing investment and operating costs. The industrial implementation of new technologies like thin slab casters are speeding up this process. Member States should also reinforce national research structures, like universities and RTD centers.

3.5.2 Ensuring a Level Playing Field within the EU and Globally

“Developing and administering a "workable" competition policy is one of the most important government activities in supporting the competitiveness of industries, both in home and export markets. For the steel industry, with its relatively homogeneous products and large number of suppliers, free and fair competition constitutes an essential element in securing a future” (European Commission, 1999, p.13). Therefore, competition policy and state aids have an utmost importance.

Due to the effect of globalization the international trade volume is increasing every day and markets throughout the world are increasingly open for foreign competition. However, exporters are still facing variety of trade barriers, ranging from prohibitive high customs tariffs, import restrictions, as well as bureaucratic regulations, like licensing, certification, and inspections. The EU and certain other WTO partners committed themselves in the Uruguay Round to eliminate tariffs on certain steel products by January 2004, but there are still some trade barriers, often related to

national standards, applied by a number of steel importing countries in EU. These standards need to be made more transparent and harmonised under the scope of a more effective European Standards, which could fulfil the requirements of the users in EU. In the meantime, special care has to be given to actions to reduce the environmental impact of steel operations.

3.5.3 Promoting Industrial Co-operation with Third Countries

In order to support the enlargement process, cooperation with the candidate countries is essential. With the contribution of public authorities, both from the Union and third countries a restructuring program for their iron and steel industry has to be initialised. The respective industry participants, which are producers and their associations, steel consumers, steel stockholders/service centres and representatives of labour unions must be involved.

"The Commission and steel business have to develop actions to reduce the risks and to take the opportunities that globalisation offers in relation to other potentially interesting third markets. Commission services will therefore closely monitor developments in these markets, in order to foster the creation of level playing fields for investments." (European Commission, 1999, p.13). Therefore it was planned to make industrial cooperation with potential countries.

3.5.4 Improving Co-operation between Main Stakeholders

Challenges facing the EU steel industry have an impact on all companies, ranging from the small companies upto the biggest steel producer, within the steel business. "Although a relatively high degree of integration exists throughout the production chain, factors that affect the competitiveness of individual companies are not necessarily the same. Consequently, initiatives to improve competitiveness, for example by means of strategic partnerships, should be based upon a detailed analysis of the specific competitive factors of the individual stakeholders" (European Commission, 1999, p.13). Therefore, the Commission decided to launch an efficient

and flexible forum serving as a platform for a structured dialogue between industrial stakeholders, after the expiry of the ECSC Treaty.

The ambition of the European steel industry is to maintain and reinforce a global leadership, which is both sustainable and competitive, given the strong development in other parts of the world, notably Asia. These objectives will be developed around the concepts based on the principles of sustainable growth: profit, partners, planet and people. Therefore, in parallel with this vision and above detailed action plan to enhance competitiveness, the European steel sector is aiming to ensure profit through innovation and new technologies (Profit), improve the steel sector partnership in modern society (Partners), improve environmental aspects (Planet), and attract and secure human resources and skills (People). These concepts contain the following action programs.

Profit:	**Partners:**
- Innovation in new production technologies - Strengthening intelligent manufacturing - Innovation in products - Reducing time to market and applying	- Partnership with the automotive sector - Partnership with the construction sector
Planet:	**People:**
- Reducing emissions - Reducing the waste - Increasing energy effectiveness - Improving material yield - Assessing the advantages of steel applications - Developing design tools for better environmental performance - Reducing the impact of production	- Improve health and safety - Apply human resource management in the steel industry - Attract qualified people - Demand for highly skilled educated people - Continuous training

Source : European Steel Technology Platform, March 2004, pp. 18-33

3.6 Substitutes for Steel

Much of the progress made in the past could not have been possible without the crucial support of steel. Even today "the natural processes of further sustainable development of society (promoting the quality of life and health, creating new jobs, preserving the environment, satisfying the expectations of the citizens), and the prospects of creating new opportunities for the European industry as a whole to remain competitive word-wide, assign to the steel industry a special mission." *(EUROFER, 1999, p. 68)*

Through close co-operation with its clients the EU Steel Industry achieved success on improving product standards and properties. "The range of steel is constantly extended towards new applications and high value-added special steels, to supplement the existing range of so-called ordinary steels. As a result, not only the competitive position of steel compared to its potential substitutes like aluminium, plastic and cement is re-enforced but these materials are also increasingly used to complement each other." *(European Commission, 1999, p.3)*

Despite of the importance of steel in our industrial fields, the share of the substitutes of steel is increasing. "There has been some substitution of steel in parts of autos (by aluminium and plastics), containers (by aluminium, paper, and glass), and appliances (by plastics). The total volume of steel replaced is a small percentage, although the loss largely has been in the higher-priced grades." *(EUROFER, 1999, p. 65)* One of the main reasons to replace steel with other substitutes is to save weight. Therefore steel is tried to be replaced as much as possible with metallic materials like aluminium, magnesium, and titanium to save weight on products. But most of the production of these metals and alloys is dedicated already to specific applications in selected markets. Only a small portion would be available as a substitute for steel at a competitive price, in a wide range of other markets.

The most widely used substitute material for steel is aluminium among the others. Steel production faces strong competition from aluminium in a number of markets. Comparison of steel and aluminium shows clearly two metals in a different phase of their economic life cycle. They differ in their physical production volume, their technological progress and their importance for the economy.

Steel is produced by a large number of companies with a predominantly national character. The most widespread use of steel is for structural purposes, where the mechanical properties are of primary concern. On the other hand, steel has low resistance to various forms of environmental attacks. But “there are well-known methods to protect steel from deterioration in almost all environments, methods which include coating, galvanic protection, alloying, and chemical control of the steel's environment.” *(EUROFER, 1999, p. 65)*

Aluminium is produced by a limited number of large companies. Its production is characterised by an oligopolistic structure with a global market. Its light weight, corrosion resistance, processing possibilities and easy recycling will strengthen its position on the long run.

The main energy use is related to the electrochemical conversion of alumina (Al2O3) to aluminium. “Due to the high consumption of electricity, competing primary aluminium producers are primarily located in countries with low electricity prices.” *(GIELEN and Van Drill, 1997, p.165)* Aluminium is still in the growth phase of the product cycle. Aluminium demand is still increasing, mainly due to substitution of other materials in the transportation sector and other light-weight applications.

Aluminium production can be divided into primary production from alumina and secondary production from scrap. “Aluminium recycling rates will probably further increase. Because large amounts of aluminium are stored in long life products, recycling can cover only a part of the aluminium market in the next two to three decades.” *(GIELEN and Van Drill, 1997, p.161)* The relative competitiveness of materials will depend increasingly on their ability to perform in a system life cycle.

“There is no apparent major threat to current annual world-wide steel consumption greater than a few percent fluctuations around a long-term upward trend, but there are no massive new or expanded markets to be expected in the short term. In the developing economies around the world, there is the potential for a dramatic increase in the demand for steel to improve the quality of life and to meet significant infrastructure needs.” *(EUROFER, 1999, p. 66)*

Chapter

4 The Turkish Steel Industry

4.1 The Turkish Steel Industry in General

The Turkish iron and steel industry has been playing an important role in the acceleration of Turkey's industrial development since 1920's. Iron and steel production was first started in Kırıkkale, which is now known as Makina Kimya Endüstrisi Kurumu (MKEK), in 1928, in order to produce steel products required for the defense industry. But the foundations of Turkish industrialization were laid mainly in the 1930s in parallel with the establishment of the first integrated Iron and Steel Works in Karabük in 1937. In order to meet the demand for flat products, the second integrated plant, Ereğli Iron and Steel Works (ERDEMİR) started production in 1965. In 1977, Turkey's third integrated steel mill, İskenderun Iron and Steel Works (İSDEMIR) came on line to meet the demand for long products and semi-finished products.

After 1960s, the number of electric arc furnace steel mills, known as the EAF based mini-mills, has increased and the capacity of Turkish iron and steel industry reached to 4,200,000 mt in 1980. As a result of the liberalization in economic activities, 1980 became a turning point for the development of Turkish economy as well as the iron and steel industry in Turkey. Prior to the 1980s, the steel industry was controlled and heavily protected by the government. Prices of both steel products and its raw materials were administered and protected by high import duties, and government-owned integrated producers were often subsidized.

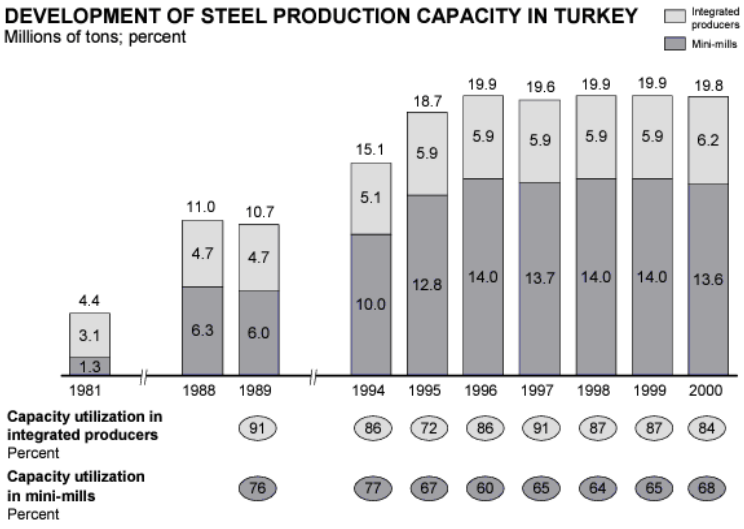
During 1980s, the number of EAF based mini-mills increased and this period was also the start of steel product exports. The start of steel product exports urged the Turkish producers to compete in a less protected environment with their international counterparts. In that sense the Turkish steel producers began to improve their

efficiency to be able to gain international competitiveness from 1980's on. On the other hand, to be able to promote export facilities and to improve the shipping industry at the same time, the state gave freight subsidies to exporters under the condition of using Turkish flag vessels after 1980's. These subsidies continued until 1 January 1995 (Devlet Planlama Teşkilatı, 2001, p. 61).

While Turkey is aiming to be a member of the European Union, its Iron & Steel Industry must be harmonized with the European Steel Industry according to the legislations of the Union. The basic principles of free trade on European Coal and Steel Community (ECSC) products between Turkey and ECSC were established by Turkey-ECSC Free Trade Agreement, which was signed in 25 July 1996 and came into effect on 1 August 1996. The transition period allowed under the ECSC-Turkey Free Trade Agreement to grant subsidies to the Turkish steel sector expired in August 2001.

With the increase of private investments on EAF based mini-mills, the Turkish iron and steel industry reached to 19.8 million mt production capacity and 14.3 million mt production by the end of year 2000 (McKinsey, 2003, p.424). The illustration of the increases between 1981 and 2000 is given in the Figure 4.1. As of 2007, the steel production capacity of the Turkish steel industry was 32.008 million mt. (Turkish Iron and Steel Producers Association, April 2008, p.13) According to the McKinsey Report, the capacity utilisation rates for integrated mills were 84% whereas it is 68% for the EAF based mini-mills in 2000.

Figure 4.1 Development of Steel Production Capacity in Turkey



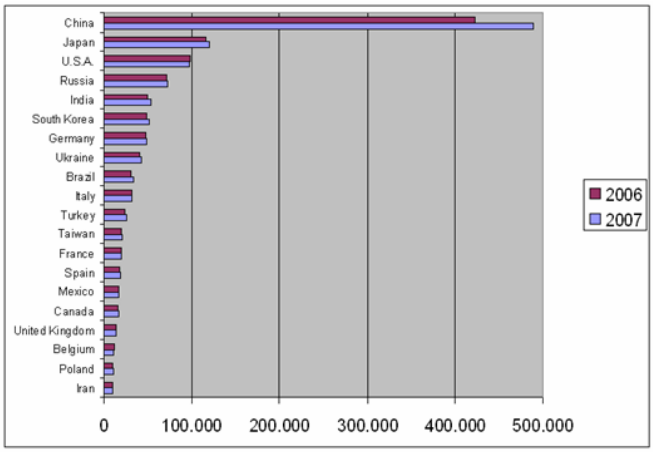
Source: McKinsey Global Institute, 2003, p.424

Beginning from 1930's with the developments on its iron and steel industry, Turkey has reached to 25.761 million mt of crude steel production in 2007 (Turkish Iron and Steel Producers Association, January – March 2008 Report No:51, p.25). With this performance, Turkey is ranking today as the 11th country on crude steel production among the world and is among the top three in Europe. The ranking of top 20 countries according to their steel productions is given in the Table 4.1. Also by means of the increase on the crude steel production, Turkey became the second after China among the top 20 steel producers in the world with its annual 10% increase. According to January – March 2008 Report of the Turkish Iron and Steel Producers Association, it is expected Turkey to increase its production capacity even further and to be ranked as 10th in the global scale and 2nd among European countries.

Table 4.1 The Ranking of top 20 Countries in 2006 and 2007 acc. to their Crude Steel Productions

Order of countries for crude steel production (2007) (1000 tons)

Country	2007	2006	% Change (07/06)
China	489.000	422.660	16%
Japan	120.199	116.226	3%
U.S.A.	97.212	98.557	-1%
Russia	72.220	70.830	2%
India	53.080	49.450	7%
South Korea	51.367	48.455	6%
Germany	48.550	47.224	3%
Ukraine	42.830	40.892	5%
Brazil	33.784	30.901	9%
Italy	31.990	31.623	1%
Turkey	**25.761**	**23.437**	**10%**
Taiwan	20.450	20.000	2%
France	19.252	19.852	-3%
Spain	19.050	18.393	4%
Mexico	17.170	16.313	5%
Canada	16.380	15.493	6%
United Kingdom	14.303	13.883	3%
Belgium	10.685	11.629	-8%
Poland	10.670	10.008	7%
Iran	10.051	9.789	3%



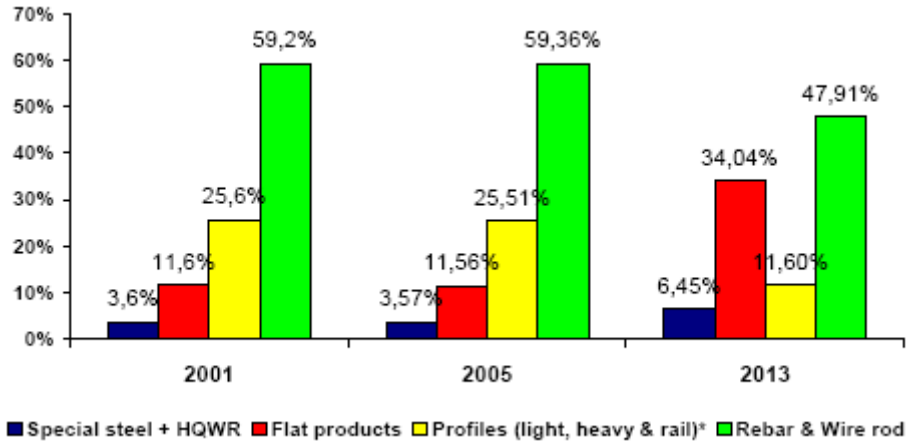
Source: Turkish Iron and Steel Producers Association, 2008, p.25

As well as the crude steel production, the Turkish steel industry has also played a major role in the production of finished products, which exceeds the crude steel production. The main reason for that is the higher rolling capacity in comparison with the crude steel production capacity. While there are only two types of players for the crude steel production, by means of the final products there are three types of players in the sector: Integrated mills, EAF based mini-mills and Re-rollers (processors). The foundations of investments on re-rolling facilities laid mainly in 1980s and 1990s. These rolling mills import semis or purchase them from integrated steel producers and mini-mills to produce mainly long products like reinforcing bars

and profiles. The distribution of the capacity among long products are given in the Table 4.2.

Table 4.2 Installed Capacity Distribution by Products (000 tons)

Distribution in Kt	2001		2005		2013	
Flat products	4.500	11,60%	4.500	11,56%	13.200	34,04%
Special steel + HQWR	1.388	3,58%	1.388	3,57%	2.500	6,45%
Profiles (light, heavy & rail)*	9.932	25,61%	9.932	25,51%	4.500	11,60%
Rebar & Wire rod	22.961	59,21%	23.111	59,36%	18.580	47,91%
Total	38.781	100,00%	38.932	100,00%	38.780	100,00%



Source: Turkish Steel Industry, National Restructuring Program, 2006, p.39

The Turkish iron and steel industry still plays a major role in the development of the Turkish economy as well as its role from 1930s up to now. It generates more than € 7 billion in annual turnover, while employing more than 30,000 people (European Commission – Turkey (Reference Year 2004)). The iron and steel industry is an important part of the Turkish economy, with about 0.8 percent share of GDP and 0.2 percent share of employment, and it constitutes 7.0 percent of total exports of Turkey. (McKinsey, 2003, p.424)

The Turkish iron and steel industry, which has been the backbone of industrialisation in Turkey and the provider of raw materials for many sectors, is among the largest exporting sectors within the Turkish economy. Referring to the temporary figures of Turkish Iron and Steel Producers Association, the total exported quantity of semi finished products, flat products, long products and special steels is 13,765,258 mt with a value of USD 8,087,660 in 2007. For the same time period, the total imports

are 13,206,030 mt with a value of USD 9,613,646 in 2007. (Turkish Iron and Steel Producers Association, January – March 2008 Report No:51, p.9)

Although the Turkish Steel Industry is among the major producers of the world, it also suffers from a symmetrically incline towards the production of long products which claim 83.50 % (21.505 million mt) of total, whereas flat products only constitute 14.46% (3.726 million mt). Of the total production, only 2.03% (523 thousand mt) was designated to special steel products. This picture shows a structural bias. The industry is embedded with a structural problem: The production is biased 83.50 % (21.505 million mt) to 14.46% (3.726 million mt) in favour of long products. As regards consumption, the ratio is almost 50 – 50 %. And only 2.03% (523 thousand mt) was directed to special steel products (Turkish Iron and Steel Producers Association, January – March 2008 Report No:51, p.7). Although the industry produces most types of steel, the product mix is skewed towards lower-value long products that are used mainly in the construction sector.

Due to the steel industry's focus on long products, Turkey has become a major player in export markets in this area. However, although Turkey exports almost half of its total production, it meets domestic demand for higher valued flat products mainly through imports. Turkey is an importer of large quantities of flat products since the domestic production does not meet the demand. As of 2007, 59.74% (7.896 million mt) of iron and steel imports was comprised of flat products, which amounts to 7,8 billion USD (Turkish Iron and Steel Producers Association, January – March 2008 Report No:51, p.9). The export – import values of the Turkish steel industry for 2006 and 2007 are given in the Table 4.3.

Despite the fact that Turkey is exporting more than it imports by means of quantities, exporting low valued long products and importing high valued flat products and special steels results in a term of trade loss and therefore a trade deficit. The increased demand on flat products, special steels and the additional affect of the over-valuation of the Turkish Lira resulted a reduction on the export / import ratio in recent years. The ratio declined from 115% in 2004 to 84% in 2007 (Demir Çelik Üreticileri Derneği – Annual Report of the year 2006 – pp. 9).

Table 4.3 Export – Import Figures for 2006 – 2007 on the Basis of Products

Export and Import Figures for 2006 - 2007 (January-December) on the Basis of Products

	İHRACAT (EXPORT)						İTHALAT (IMPORT)								
	2006		2007*		% değişim (% change) 07/06		2006		2007*		% değişim (% change) 07/06		İhracatın İthalatı Karşılama Oranı (%) (Exp./Imp. (%))		
	ton	1000$	ton	1000$	miktar (quantity)	değer (value)	ton	1000$	ton	1000$	miktar (quantity)	değer (value)	2006	2007	
YARI ÜRÜNLER (kütük,blum,levha blokları, sac platinaları)	1.582.280	635.360	1.596.658	798.302	0,9	25,6	2.838.298	1.220.885	3.391.335	1.758.780	19,5	44,1	52	45	SEMI FINISHED PRODUCTS (billet,bloom, slab)
YASSI ÜRÜNLER (levha,sac taslağı, sac,sac şerit)	1.368.349	828.398	1.214.882	880.936	-11,2	6,3	7.296.339	4.035.089	7.896.562	5.121.935	8,2	26,9	21	17	FLAT PRODUCTS (plate, sheet coils)
UZUN ÜRÜNLER (çubuk,filmaşin, profil,tel)	9.567.490	4.406.691	10.764.475	6.110.123	12,5	38,7	743.234	527.225	945.704	824.246	27,2	56,3	836	741	LONG PRODUCTS (bar, wire rod, profile, wire)
YASIFLI ÇELİK (alaşımlı, paslanmaz)	147.591	199.156	189.243	298.299	28,2	49,8	841.062	1.323.298	972.429	1.908.685	15,6	44,2	15	16	SPECIAL STEELS (alloyed, stainless)
TOPLAM	12.665.710	6.069.605	13.765.258	8.087.660	8,7	33,2	11.718.933	7.106.497	13.206.030	9.613.646	12,7	35,3	85	84	TOTAL

Source: Turkish Iron and Steel Producers Association, 2008, p.9

In contradiction to the increased capacity of the industry, the Turkish Steel industry is importing the main part of the scrap and the iron ore. Therefore on the cost figures, the industry is highly dependent on foreign markets.

4.1.1 Industry Segmentation in the Turkish Steel Industry

As it was indicated earlier, there are three types of players in the sector: Integrated mills, EAF based mini-mills and processors (Re-rollers).

Integrated mills use iron ore and coal as raw materials to produce iron using coke plants, sinter, and blast furnaces. Iron is then converted into steel in basic oxygen furnaces. There are three integrated steel producers in Turkey: Ereğli Demir Çelik A.Ş. (ERDEMİR), İskenderun Demir Çelik A.Ş. (İSDEMİR), and Karabük Demir Çelik Sanayi ve Ticaret A.Ş. (KARDEMİR). The total crude steel production capacity of the integrated mills is 6.392 million mt in 2007. (Turkish Iron and Steel Producers Association, January – March 2008 Report No:51, p.7)

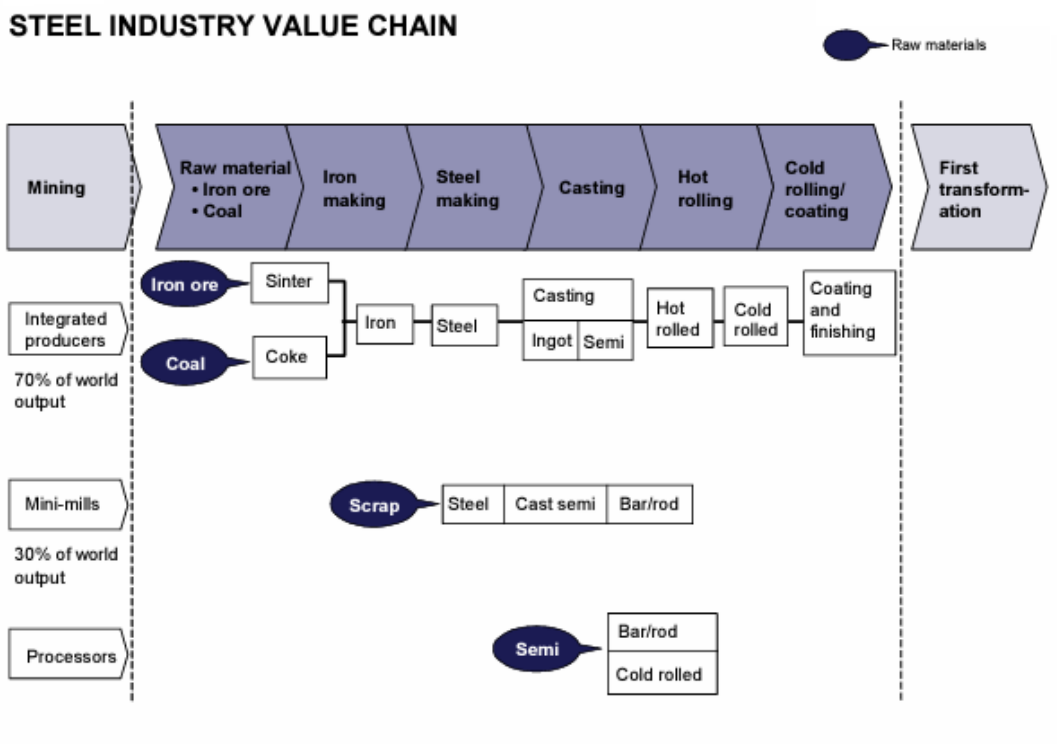
EAF based mini-mills purchase scrap and melt it in electric arc furnaces. As of today, there are 21 mini-mills in Turkey. Most of the mini-mill capacity in Turkey has been built since the 1980s through private investments. They are producing mainly long products, with the exception of a few producing higher value added steel products. But with the new investments some of the EAF based mini-mills begin to produce flat products or semi-products for flat production. Under this scope there are

significant amount of new investments in process. The EAF based mini-mills are exporting a remarkable portion of their output.

Re-rollers import semi-products or purchase them from integrated steel producers and mini-mills. With the exception of Borcelik Çelik Sanayi Ticaret A.Ş (BORÇELİK) that produces flat products and a few players producing specialized products such as spring steel, most of these players are sub-scale rolling mills supplying low-value-added long products to the construction industry. According to the figures of Iron and Steel Rerollers association, there are more than 270 re-rolling facilities focused in the production of long products in Turkey with a total capacity of 7.5 million tones.

The role and processes for each of these players are given in the Figure 4.2 regarding the steel industry value chain.

Figure 4.2 Steel Industry Value Chain

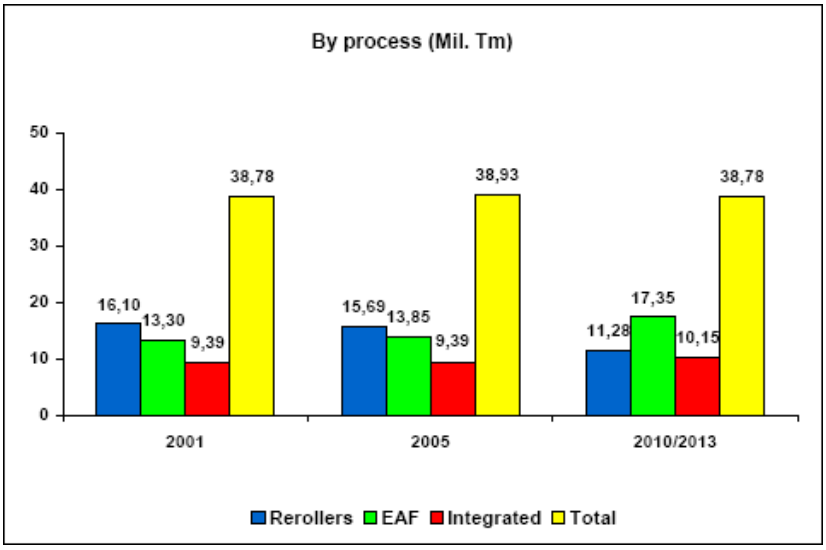


Source: McKinsey Global Institute, 2003, p.428

In 2005, the hot rolling capacity of the Turkish steel industry was 38.94 million tones. 15.69 million tones out of this quantity was produced by the Re-rollers. 13.85 million tones by EAF based mini-mills and 9.39 in integrated mills (Turkish Steel

Industry, National Restructuring Program–Final Version, August 2006, p.8). In 2013, the total hot rolling capacity is planned to remain in the same level, whereas the hot-rolling capacity of the rerollers including the flat products was planned to reduce to 11.28 million tones. At the same time, the capacity of the EAF based mini-mills will increase to 17.35 million tones. The capacity increase in the integrated mills will be only 10% to reach 10.15 million tones. Figure 4.3 illustrates the distribution of the capacities among producers.

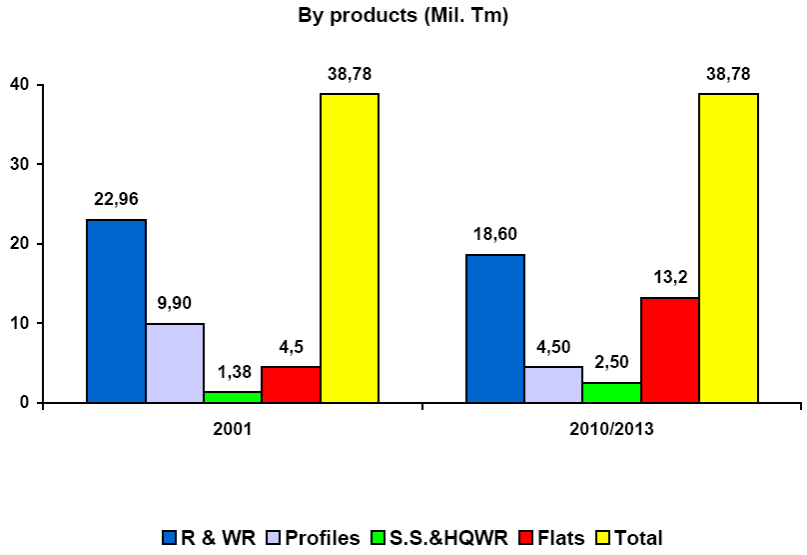
Figure 4.3 Distribution of the hot-rolling capacity by process



Source: Turkish Steel Industry, National Restructuring Program, 2006, p.8

By means of the products, in 2005 the capacity for reinforcing bars and wirerods was 22.96 million tones. It was 9.9 million tones for profiles, 1.38 million tones for special steels and high quality wirerods, and 4.5 million tones for flats. In the national restructuring program it was planned to reduce the hot rolling capacity of reinforcing bars and wirerods to 18.6 million tones in 2013. For the same period, the profile capacity will decline to 4.5 million tones. On the other hand it was planned to increase the capacity of special steels and high quality wirerods to 2.5 million tones and the flats to 13.2 million tones as shown in the Figure 4.4.

Figure 4.4 Distribution of the Hot-Rolling Capacity by Products



Source: Turkish Steel Industry, National Restructuring Program, 2006, p.8

4.2 The Current State of the Turkish Steel Industry

In this part, the Turkish Steel Industry is investigated in terms of Demand and Supply; Employment; Role of Government; State of the Turkish steel industry in foreign trade; and in addition to these, effects of the EU accession period on the Turkish steel industry will be scrutinized

4.2.1 Demand and Supply in the Turkish Steel Industry

The total crude steel production of the Turkish steel industry is 25.754 million mt in 2007. Out of this quantity, 21.505 million mt is used in the production of long products and 3.726 million mt in the production of flat products. Only 523 thousand mt is used in the production of special steel products (Turkish Iron and Steel Producers Association, January – March 2008 Report No:51, p.7). As mentioned before, these quantities show 83.50 % in favour of long products compared with 14.46% for flat products and only 2.03% for the special steel products. Although the industry produces most types of steel, the product mix is skewed towards lower-value long products that are used mainly in the construction industry. According to

the consumption figures in the Table 4.4, the consumptions of long and flat product have almost the same share. Although there were investments to increase the flat production capacity, the figures in the Table 4.4 show that the capacity expansion investments on the long product side during the last decade were higher.

Flat products and special steels are mainly customer oriented products, where it is possible to create a niche market by producing materials according to the special needs of the customers. The long products are produced mainly according to the national and even global standards. Therefore, the price of the product becomes one of the most important criteria among others for preference. In contrast to the customer orientation of the flat product and special steel product producers, the long product producers are mainly production oriented to achieve competitiveness. Due to that reason, the existing Turkish Steel Companies for long products are still investing to increase their capacity and to reduce their unit costs.

Table 4.4 Production and Consumption of Finished Steel Products 1991 – 2007

Production of Finished Steel Products (1000 tons)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	%change 07/06
Long products	6.354	7.062	8.820	8.751	9.015	9.650	10.200	10.300	10.850	10.828	9.643	10.324	11.895	13.223	15.498	18.712	21.360	14,2
Flat products	2.136	2.088	2.263	2.316	2.054	3.050	3.700	3.244	2.860	3.130	2.957	3.144	3.535	3.616	3.760	3.903	4.269	9,4
Special steel	185	210	257	216	330	300	360	365	335	309	273	299	320	329	343	429	476	11,0
Total	**8.675**	**9.360**	**11.340**	**11.283**	**11.399**	**13.000**	**14.260**	**13.909**	**14.045**	**14.267**	**12.873**	**13.767**	**15.750**	**17.168**	**19.601**	**23.044**	**26.105**	**13,3**

Consumption of Finished Steel Products (1000 tons)

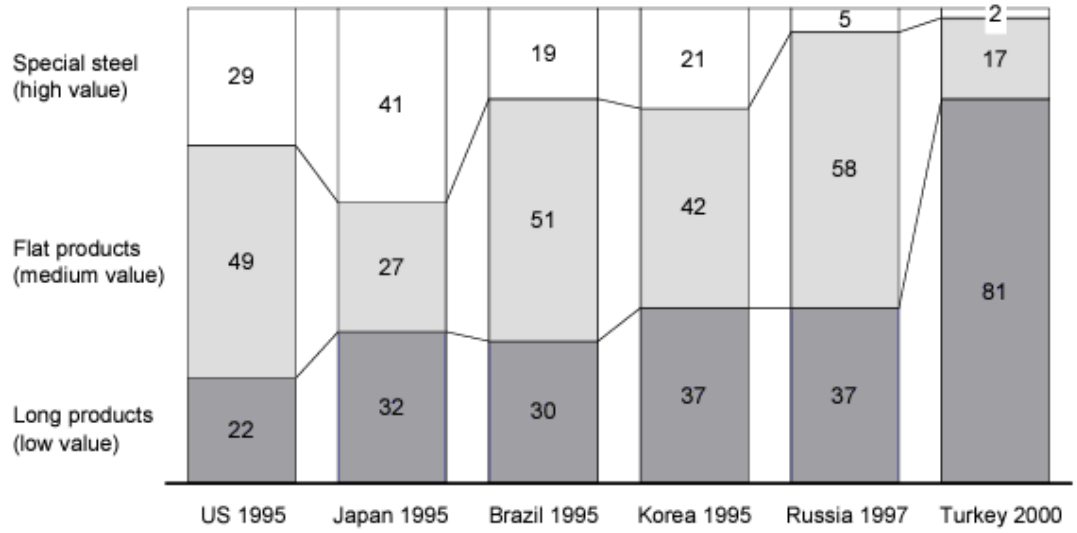
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	%change 07/06
Long products	4.271	4.499	5.234	4.054	5.457	5.600	5.850	6.405	5.769	6.533	3.993	4.930	6.205	6.758	8.598	9.888	11.541	16,7
Flat products	2.943	3.049	4.192	2.770	4.257	4.380	5.100	5.656	5.262	6.035	4.327	5.865	6.848	7.774	8.859	9.831	10.951	11,4
Special steel	275	325	464	326	590	630	550	545	562	502	387	491	602	772	908	1.122	1.259	12,2
Total	**7.489**	**7.873**	**9.890**	**7.150**	**10.304**	**10.610**	**11.500**	**12.606**	**11.593**	**13.070**	**8.707**	**11.286**	**13.655**	**15.304**	**18.365**	**20.841**	**23.751**	**14,0**

Source: Turkish Iron and Steel Producers Association, 2008, p.9

As shown in the Figure 4.5, the production of high valued flat products accounts for 50 - 60% of total steel products in developed countries. The highly developed countries like the U.S. and Japan even focus more on the special steel products, which are more value-added, whereas the share on the production of flat products in Turkey is only about 15%. The production of special steel products are much lower. This discrepancy indicates the necessity to balance the long/flat ratio by restructuring

existing plants, and modernising these plants to start producing flat products. Also the commission of the European Communities put the following remark on this subject on its 2004 Regular Report on Turkey's Progress Toward Accession p. 119. "The Turkish steel industry suffers structural problems that need to be dealt with both at national level and individual business level. Turkey's production of long products is almost twice its domestic needs, whereas flat rolled products scarcely meet half of domestic demand. Turkey's iron and steel industry has been handicapped by this imbalance in long/flat production."

Figure 4.5 Product Mix – End Product by Country (%)



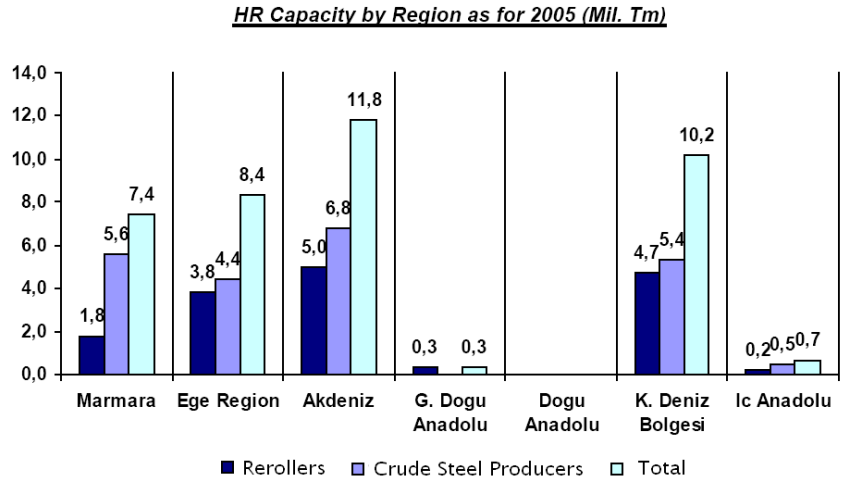
Source: *McKinsey Global Institute, February 2003, p.425*

4.2.2 Production

There are 24 crude steel producers in Turkey. Only 3 of them are integrated mills. The remaining ones are based on electric arc furnace based production. But MKEK is producing crude steel also by using induction furnaces. The locations and the capacities of these mills are given in the Figure 4 in the Appendix A. According to the metal sector sub-committee report in the ninth national development plan issued by the state planning organization, there are 270 processors also called as the re-rolling facilities.

The production is mainly focused in Akdeniz, Marmara, Karadeniz and Ege regions. The distribution of the crude steel producers and the Rerollers among regions are given in the Figure 4.6.

Figure 4.6 Hot-rolling Capacity by Region (2005)



Source : Turkish Steel Industry, National Restructuring Program, 2006, p.24

4.2.2.1 Quantities produced

The total production of crude steel in Turkey in 2007 was 25.754 million tones. As mentioned above 19.362 million tones out of this quantity is produced in EAF based mini-mills. And the quantity of integrated mills is 6.392 million tones. The distribution of crude steel production by means of processes was 75% in favour of EAF based mini-mills compared to 25% in integrated mills in the same year. These figures reveal that the share of the electric steel making plants within the total steel-making capacity is much higher than the world average. It also reflects the structural problem in the steel sector, that there is a persisting imbalance between production capacities for long products and flat products when compared with the domestic demand. The production of final products for the crude steel producers is 26.105 million tones (Turkish Iron and Steel Producers Association). The distributions of crude steel production among production techniques and products between 1992 and 2007 are given in the Table 4.5.

As it could be seen in the Table 4.5, due to the private investments in the EAF based mini-mills, the production of these mills has almost doubled in the last seven years

since 2000. At the same time period, the capacity of integrated mills increased only by 20%. But most of the investments in EAF based mini-mills aimed the production of low value-added long products. In the same time period, the production of long products increased from 11.6 million tones to 21.5 million tones with an increase of 85%. There are investments to increase the flat product production and also to expand the production capacity of existing mills, producing mainly long products.

Table 4.5 Crude Steel Production by Processes and Products 1992 – 2007

Crude Steel Production by Processes (1000 tons)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	%change 07/06
EAF	6.155	7.400	7.795	8.518	8.450	9.038	9.047	9.171	9.096	9.703	11.334	12.546	14.646	14.847	17.252	19.362	12,2
BOF	3.493	3.409	3.674	3.621	4.327	4.633	4.496	4.830	5.229	5.278	5.133	5.753	5.832	6.117	6.185	6.392	3,3
OH	605	605	605	606	605	605	605	308	-	-	-	-	-	-	-	-	-
Total	10.253	11.414	12.074	12.745	13.382	14.276	14.148	14.309	14.325	14.981	16.467	18.299	20.478	20.964	23.437	25.754	9,9

Crude Steel Production by Products (1000 tons)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	%change 07/06
Long products	8.228	9.363	9.840	10.328	10.580	11.164	11.226	11.455	11.597	11.718	13.250	14.859	17.084	17.492	19.830	21.505	8,4
Flat products	1.714	1.656	1.879	2.042	2.458	2.711	2.545	2.611	2.388	2.962	2.888	3.088	3.031	3.095	3.135	3.726	18,9
Special steel	311	395	355	375	344	401	377	243	340	301	329	352	363	377	472	523	10,8
Total	10.253	11.414	12.074	12.745	13.382	14.276	14.148	14.309	14.325	14.981	16.467	18.299	20.478	20.964	23.437	25.754	9,9

Source: Turkish Iron and Steel Producers Association

4.2.2.2 Capacity Utilization Rates

The integrated mills have a capacity of 6.6 million tones and they have produced 6.392 million tones of crude steel by working with 97% capacity utilization rate in 2007. The EAF based mini-mills have a capacity of 25.408 million tones and they used 76% of their capacity to produce 19.362 million tones of crude steel. The total crude steel capacity of the Turkish steel industry is 32.008 million tones. And as of year 2007, the total production is 25.754 million tones, which constitute 80% of the total capacity.

In 2006, the capacity utilization rate was 5% higher than in 2007. The reason for that was the new investments. As it could be seen from the Figure 4.6, there occurred substantial capacity expansion investments in 2007 like Çolakoğlu, İçdaş and İzmir Demir Çelik. Due to these new investments, the overall capacity utilization rate of the sector declined, because to be able to run a mill with full capacity needs some

time. But in 2008, the total capacity ratio of the EAF based mini-mills and therefore capacity of the sector is expected to increase again.

According to the metal sector sub-committee report in the ninth national development plan issued by the State Planning Organization, there are 270 processors also called as the re-rolling facilities. But due to the insufficient resources of raw materials and financing, 40% of these Re-rollers are working with less than 50% capacity utilization rate. Based on their daily one-shift production, their capacity is 6.5 million tones. (Devlet Planlama Teşkilatı, 2007, p.16)

Table 4.6 Turkey's Crude Steel Production Capacity and Capacity Utilisation Rate 2000-2007

Turkey's Crude Steel Production, Capacity and Capacity Utilization Rate (CU) (2000-2007)

	2000			2005			2006			2007		
	Capacity ton	Production ton	CU %	Capacity ton	Production ton	CU %	Capacity ton	Production ton	CU %	Capacity ton	Production ton	CU %
Asil Çelik	260.000	200.148	77	260.000	228.432	88	450.000	317.570	71	485.000	365.603	75
Cer Çelik	-	-		-	-		-	-		850.000	395.118	46
Çebitaş	700.000	417.160	60	700.000	372.200	53	700.000	687.661	98	750.000	721.333	96
Çemtaş	172.000	133.587	78	172.000	139.828	81	172.000	146.983	85	172.000	149.687	87
Çolakoğlu	1.522.000	1.570.053	103	1.900.000	1.701.183	90	1.900.000	1.701.321	90	3.000.000	2.030.203	68
Çukurova	1.775.000	439.167	25									
Diler	906.000	262.794	29	1.500.000	1.247.612	83	1.500.000	1.285.302	86	1.500.000	1.302.472	87
Ege Çelik	-	-		1.974.000	1.176.159	60	1.974.000	1.190.886	60	1.974.000	1.329.530	67
Ege Metal	840.000	559.387	67									
Ekinciler	1.000.000	404.227	40	1.000.000	645.637	65	1.000.000	809.002	81	950.000	920.800	97
Erege Metal				720.000	345.807	48	720.000	526.343	73	720.000	668.759	93
Habaş	1530000	1324024	86,53752	2.467.792	2.081.399	84	2.900.000	2.352.084	81	2.900.000	2.601.701	90
İçdaş	1.800.000	1.384.678	77	1.890.000	2.567.500	136	3.520.000	2.976.900	85	5.257.600	3.436.800	65
İzmir D.Ç.	850.000	742.548	87	850.000	750.908	88	850.000	851.903	100	1.320.000	787.787	60
Kaptan D.Ç.	-	-		1.050.000	949.073	90	1.350.000	1.125.814	83	1.350.000	1.131.030	84
Kroman	1.100.000	626.023	57	1.550.000	977.793	63	1.250.000	1.022.281	82	1.250.000	966.166	77
MKEK	60.000	5.763	10	60.000	9.246	15	60.000	6.955	12	60.000	7.785	13
Nursan				700.000	133.452	19	700.000	607.023	87	700.000	609.768	87
Sidemir				450.000	159.137	35	450.000	240.245	53	450.000	370.214	82
Yazıcı	817.000	824.271	101	1.000.000	896.198	90	1.000.000	940.191	94	1.000.000	975.175	98
Yeşilyurt	300.000	202.367	67	600.000	319.869	53	720.000	463.911	64	720.000	591.867	82
EAF Total	**13.632.000**	**9.096.197**	**67**	**18.843.792**	**14.701.433**	**78**	**21.216.000**	**17.252.375**	**81**	**25.408.600**	**19.361.798**	**76**
Erdemir	3.000.000	2.388.009	80	3.000.000	3.095.440	103	3.200.000	3.135.418	98	3.300.000	3.127.541	95
İsdemir	2.200.000	1.965.100	89	2.200.000	2.055.411	93	2.200.000	2.019.275	92	2.200.000	2.237.547	102
Kardemir	1.000.000	875.429	88	1.100.000	966.540	88	1.100.000	1.030.268	94	1.100.000	1.026.764	93
Integrated Total	**6.200.000**	**5.228.538**	**84**	**6.300.000**	**6.117.391**	**97**	**6.500.000**	**6.184.961**	**95**	**6.600.000**	**6.391.852**	**97**
Total	**19.832.000**	**14.324.735**	**72**	**25.143.792**	**20.818.824**	**83**	**27.716.000**	**23.437.336**	**85**	**32.008.600**	**25.753.650**	**80**

Source: Turkish Iron and Steel Producers Association

According to the Annual Report of Turkish Iron and Steel Producers Association, "in 2008, it is expected that crude steel production of Turkey will increase more than 12% to around 29 million tons. For the next five years, Turkey's total crude steel production is forecasted to reach around 40 million tons." (Turkish Iron and Steel Producers Association, April 2008, p.12)

4.2.2.3 Productivity Levels

As mentioned in the part 1.4.2 of this study, one of the effective ways to measure the productivity is the total factor productivity. Total Factor Productivity measures the synergy and efficiency of the utilisation of both capital and human resources. Higher TFP growth indicates efficient utilisation and management of resources, materials and inputs necessary for the production of goods and services. According to the total factor productivity analysis of McKinsey in 2000, the productivity level of the Turkish steel industry is 75. In that survey, all countries are indexed by assuming the productivity level of US steel industry in 1995 as 100. Within the context of the study, productivity is defined as equivalent ton of output per unit of labor and capital inputs.

As indicated above, the total factor productivity takes both capital productivity and labour productivity into calculation. The capital productivity of the industry in Turkey was calculated as 75 and its labour productivity as 76 in 2000. As shown in the Figure 4.4, the capital productivity has three components. These are equivalent tons per physical ton, capacity utilization, and capacity per US$ investment. The rate for Turkish steel industry in equivalent tons per physical ton is 77. It is 82 for the capacity utilization and 120 for capacity per US$ investment.

The capacity utilization rate of the industry is relatively low. The capacity utilization rates for the Turkish integrated mills were taken as 84% , whereas this ratio is only 68% for the mini-mills in 2000. The main reason for that is due to the new investments in the mini-mills owned by the private sector. As the mills are investing on the capacity, they are amending their capacity reports according to the new figures, but in the transition period the mills need some time to reach to those capacities by following the experience curve. Therefore, the capacity utilization rates look lower for the mini—mills.

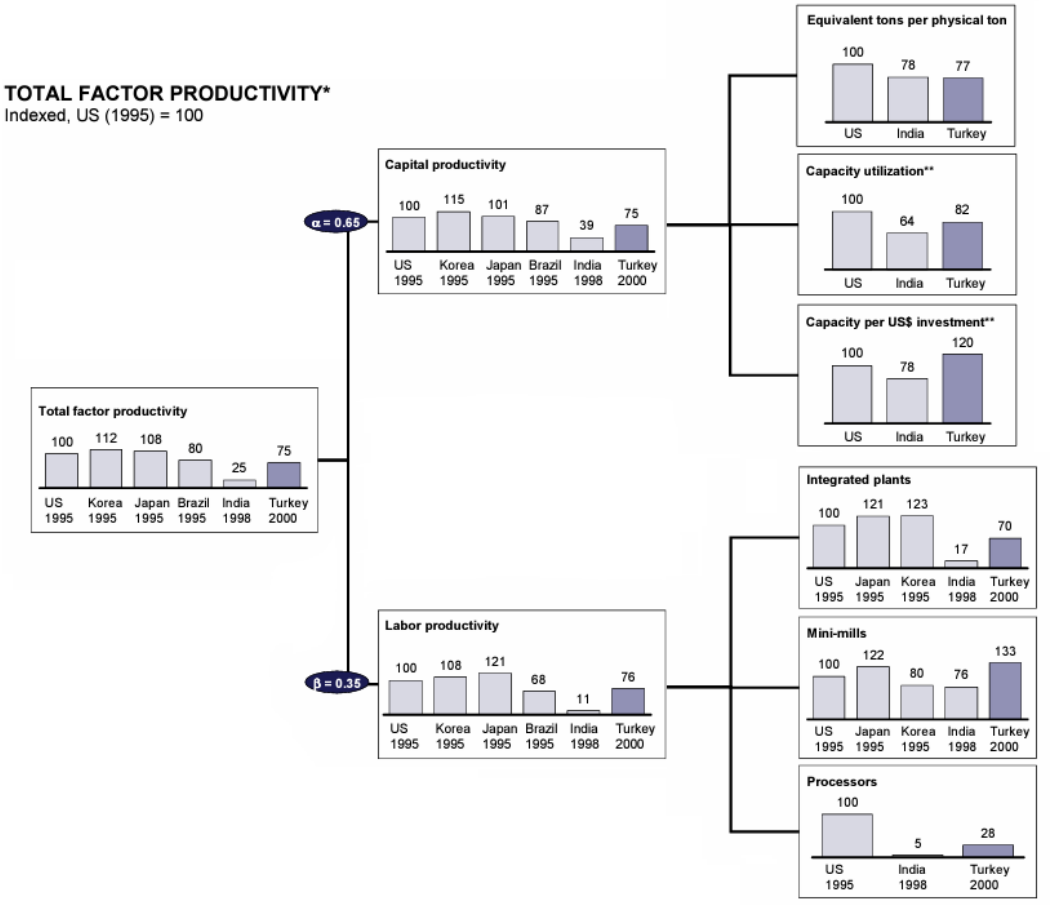
The Turkish steel industry indexes higher than the US in terms of capacity built per dollar of capital due to the higher share of mini mills in the sector, which require lower capital investments.

As it is shown in the Figure 4.7, the labour productivity has been investigated for each type of players in the market. Those are integrated mills, EAF based mini-mills and processors. The labour productivity of mini-mills (133) in Turkey index very

high: they have reached 133 percent of average US labor productivity levels and perform 9 percent better than the mini mill segment in Japan. However, the integrated mills deliver lower productivity (70), benchmarking at 70 percent of average US labor productivity levels, due to their high number of employees. Lower labor productivities in the processor rolling mills (28) have a further negative impact on overall labor productivity levels in the Turkish steel industry. But the integrated mills have reduced the number of employees in the meantime. As of 2000, the number of employees in integrated mills was 17,459. This number dropped to 9,745 in 2006. Therefore the labour productivity of the sector has also increased in the meantime.

As energy is also one of the significant factor inputs, the efficiency of its use in the Turkish industry has been compared with that of other countries. According to the McKinsey report, it was found that the energy efficiency of integrated plants and mini-mills were at similar levels to that of other countries in 2000.

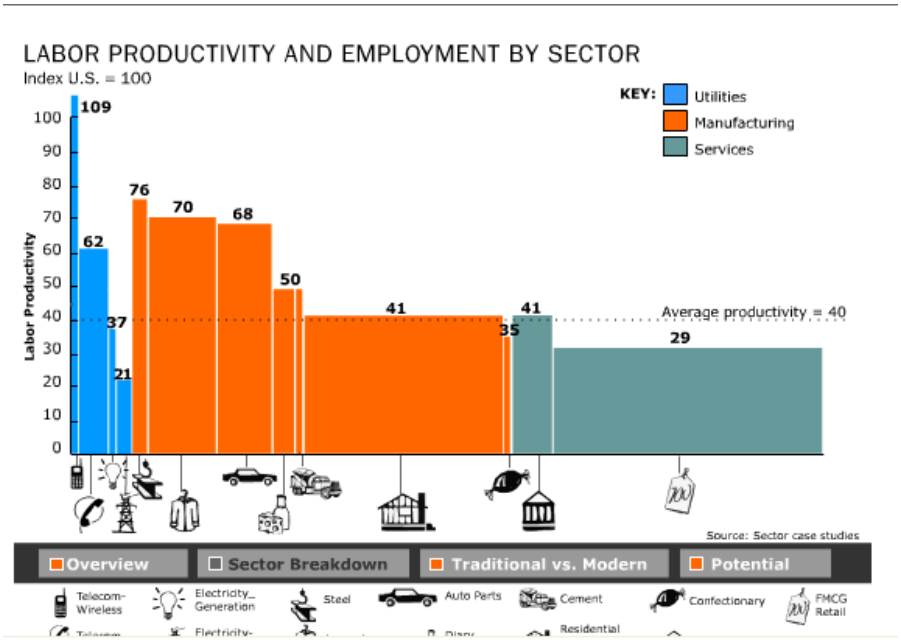
Figure 4.7 Total Factor Productivity Analysis for the Turkish Steel Industry



Source: McKinsey Global Institute, 2003, pp.429, 430 & 431

According to the McKinsey report in 2003 so far as the labor productivity is concerned, the Turkish Steel Industry (76) is the second most productive sector among all industries and it ranks as the first sector among the manufacturing industries. The labor productivity levels of each industry sector are given in the Figure 4.8. According to the same report the average labour productivity in the whole industry is 40.

Figure 4.8 Labour Productivity and Employment by Sector



Source: McKinsey, 2003

4.2.2.4 Area of Focus on the Steel Production in Turkey

With the exception of one cold rolling company, BORÇELİK, that produces high value added flat products and a few companies producing specialized products such as spring steel, most of these players are sub-scale rolling mills supplying low-value-added long products to the construction industry.

But in parallel with the national restructuring plan, required by the European Commission, investments in flat production are increasing. The main aim is to balance demand and supply on flat products. The unbalanced situation of the Turkish steel industry leads the companies to invest in flat production investments. The conversion of ISDEMIR from long to flat production was followed by the EAF based mini-mills.

Çolakoglu Metalurji has invested in what is the world's largest and most productive electric arc furnace producing steel from scrap metal. This allows the company to implement an economical mini-mill concept for the production of flat steel products. Çolakoglu Metalurji finished their investments on the meltshop in 2007 and they began to produce slabs in addition to billets. The investment on the hot-strip mill, to produce hot rolled coils out of slabs, is still continuing.

İçdaş is investing on a new electric arc furnace in their facility in Biga. With the finalization of this investment, their capacity will increase by 2 million tones to exceed a total capacity of 5 million tones. With the new investment they will begin to produce slabs and afterwards the plates.

Habaş is investing on a slab and a bloom caster. With the investment on slab continuous caster they will begin to produce the semi-product for the flat products.

Kroman made an investment for a new rolling line in 2007 to produce long products. To be able to feed the rolling line they are investing on a new 150 ton Electric arc furnace to increase their crude steel production capacity.

In addition to the capacity expansion investments of the existing crude steel producers, during the recent years, some re-rollers have been investing in setting up their own electric arc furnace mills in order to meet their billet requirements from their own sources. This trend began with the establishment of EAF mills by Kaptan Demir Çelik and Nursan Metalurji, continued with Cer Çelik in 2006, which bought Metaş on the western part of Turkey and has not been producing since 1998. In addition to these, after conversion to flat production in Isdemir Plant, there will be supply deficiency in long products in the region, which is expected to be balanced by new EAF plants to be established in İskenderun region. (Turkish Iron and Steel Producers Association, April 2008, p.12)

Nursan will change its existing 85 ton capacity Electric Arc Fırnace with a new 130 ton capacity one. So the crude steel capacity of the plant will increase from 750,000 tones to 1,200,000 tones annually.

To meet the rising demands for steel, many new investment projects have been announced. These projects will significantly expand Turkey's steel-production capacity. Some recent highlights include:

The Russian steel major Magnitogorsk Iron and Steel Works announced that it would invest 50% of a US$1.1bn joint venture with Atakas Group to build a new steel complex. The new company, MMK Atakas Metalurji Sanayi, will produce annually 2.5 million tonnes of crude steel, which will be converted mainly into flat products. The project is scheduled to finish in 2010 and will also produce galvanized steel sheet.

Kibar Holding, one of the biggest steel and aluminium producers in Turkey, announced it would establish a steel plant in Sakarya/Karasu with a value of US$1bn.The plant, which will employ some 1,500 people, will produce flat steel products and will have a capacity of 2 million tonnes per annum.

Ekinciler Iron and Steel Ind. Co plans to increase its capacity by a value of some US$250 million.

ArcellorMittal and Borusan announced the investment decision of a steel plant with an annual 4.8mt hot rolled coil capacity. They will establish a hot strip mill to produce hot rolled coils out of slabs. The value of the project is some USD 500m.

Moreover, it is known that there are projects to build 3 electric arc furnace mills in the Aliağa region. As a result of these investments, it is forecasted that a rapid growth in Turkey's crude steel production will be witnessed during the next five year period to reach around 40 million tones and export/import ratio will go over 100% again. (Turkish Iron and Steel Producers Association, April 2008, p.12)

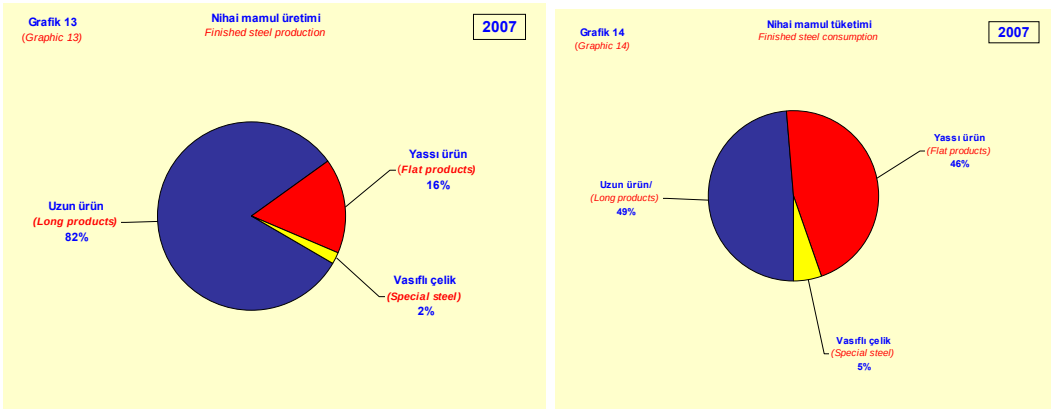
4.2.3 Consumption

As given in the Table 4.4, the total consumption of Turkey is 23.751 million tones. This figure contains 11.541 million tones for long products, 10,951 million tones for flat products and only 1.259 million tones for special steels. As it could be seen, the consumption of long and flat products are almost in the same level. But in comparison with the production figures this situation creates an unbalanced situation. The comparison for production and consumption of product groups are given in the Figure 4.8. In the beginning of 1990's the production of flat products could fulfill the demand at least by means of the quantity, but while investing continuously on the long products production, the sector came into such a level that it is far away from

supplying enough flat products to cover the demand even by means of the total quantity.

In parallel with the economic growth in Turkey, since 2002 the demand on steel products has increased. Especially the growth in the construction industry beginning from 2005 has triggered the demand and the consumption of long products.

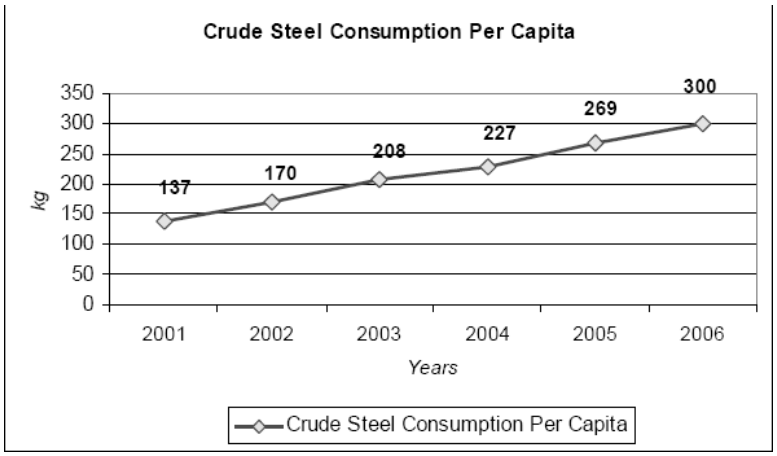
Figure 4.9 Finished steel consumption and production - 2007



Source: Turkish Iron and Steel Producers Association

The consumption of steel per capita rose by 119% from 137 kg to 300 kg between 2001 and 2006 (OECD, May 2007, p.3). Although the consumption is increasing, it is still lower than the level in developed countries like Germany, Italy and Spain, where the consumption per capita is more than 500 kg. The year on year consumption per capita figures for the Turkish steel industry are given in Figure 4.10.

Figure 4.10 Crude steel consumption per capita 2001- 2006



Source: OECD, May 2007, p.3

According to the Annual Report of Turkish Iron and Steel Producers Association, the consumption of crude steel per capita reached to 336 kg in 2007 and it is expected to increase even further to catch the level (500 kg per capita) in developed countries within the next five years. (Turkish Iron and Steel Producers Association, April 2008, p.12)

4.2.3.1 Customer Base in the Turkish Steel Industry

For long products, the target group is mainly big stockholders, final users like mesh, wire and nail producers and construction companies. On the other hand, the flat product producers are supplying their material mainly to final users like the white goods, automotive and ship building companies, service centers and big stockholders.

For the last three years, Turkish construction industry has been performing well and grown around 20% in 2006, after a similar improvement in 2005. (OECD, 2007, p.5). In 2008, the construction industry slowed down in Turkey, but in the long-run the demand from the construcvtion industry will continue to triggering the consumption. For the flat products, automotive and home appliances sectors, with their big domestic markets and significant potential in export markets, will continue to trigger the steel consumption in the long term.

4.2.4 Employment in the Turkish Steel Industry

In the past, the Turkish steel industry suffered from lower labour productivity compared to its international rivals. As mentioned in the *"Turkey: Making the Productivity and Growth Breakthrough"* of McKinsey Global Institute in 2003, the labour productivity of the Turkish steel industry was 76% of the U.S. labour productivity in 1995. And one of the main reasons for that was the high employment in integrated mills. Despite the capacity expansions, this number has decreased beginning from 1990's. As shown in the Table 4.7, the number of the employees in integrated mills fell from 33,145 in 1990 to 16,996 in 2002. The employment in the steel industry fell from 43,670 in 1990 to 26,732 in 2002

Table 4.7 Employment in Steel Making Industry

Employment in Steel Making Industry				
	1990	1996	2000	2002
EAFs	10.525	9.554	9.239	9.766
Integrated	33.145	20.278	17.459	16.966
TOTAL	43.670	29.832	26.698	26.732

Source: T.R Prime Ministry State Planning Organization (SPO), February 2004, p.61

As of year 2006, 21,599 employees were working in the crude steel producing mills to produce long products. 55% out of this (11,854 people) were working in EAF based mini-mills and the remaining 45% (9,745 people) were working in integrated mills. By taken also the 5,492 employees working in processors, the long product steel industry occupies totally 27,091 employees. (Devlet Planlama Teşkilatı, 2007, p.16)

4.2.5 Factors affecting the Cost of the Product

4.2.5.1 Raw Material

Turkey increased its production from 13.767 million tons to 25.761 million tons in the last five years starting from 2002 to 2007 and Turkey has become the 11th largest in the world and 3rd largest in Europe. As a result of private investments after year 1980s, 75 % of the steelmaking sector in Turkey is made in EAF based mini-mills (19.362 million tons). Due to above mentioned fact; Turkey is one of the biggest importers of scrap in the world and has a high level of dependency on scrap.

In the last five years, parallel to growth of the economy in Turkey, steel consumption has also increased. Quantitywise the greatest increase was in long products. Driving sectors in this consumption and production increase were mainly construction and industrial development. Especially after 2004, the Turkish construction and industrial development was the greatest within the OECD countries. Turkey imported 12.892 million tons of scrap in order to realise 20.478 million tons of crude steel production in 2004. As of 2007, the amount of imported scrap reached to 17.115 million tons to be able to produce 25.754 million tons of crude steel. (Turkish Iron and Steel Producers Association, January – March 2008 Report No:51, p.24)

The main sources of scrap imports for Turkey are EU 27 countries (42.6%), the USA (23%) and Russia (20%). Until the end of 2006, Russia was the second biggest supplier of scrap for the Turkish steel industry. In 2004 the total exports of Russia to the world was about 13 million tones, whereas in 2007 it declined to 9 million tones. Until 2009 it is expected to fall even further to 5 million tones (Metal Expert, September 2007, p.16). Due to the increase in the domestic consumption in Russia, the amount of the scrap from that source has declined and the USA became the second major source of scrap for Turkey. The distribution of scrap imports on country basis is given in the Table 4.8.

Table 4.8 Scrap Import of Turkey by Countries 2002 – 2007

Import of scrap by regions

	2002		2003		2004		2005		2006		2007 *		%change 07/06	
	ton	1000$	ton	1000$	ton	1000$	ton	1000$	ton	1000$	ton	1000$	miktar (quantity)	değer (value)
EU-27	4.689.788	490.483	7.185.716	1.029.963	5.138.059	1.190.349	5.038.754	1.181.000	5.738.242	1.465.172	7.301.954	2.402.923	27,3	64,0
USA	495.905	53.173	780.287	112.344	572.173	144.555	1.369.829	324.779	2.714.789	723.441	3.949.644	1.279.883	45,5	76,9
Russia	1.799.531	183.688	2.052.196	295.848	3.660.087	851.312	4.011.422	962.155	4.048.426	1.070.582	3.441.270	1.131.529	-15,0	5,7
Ukraine	1.852.104	189.793	1.063.168	147.533	1.322.849	315.661	674.351	161.415	429.040	113.837	501.113	159.766	16,8	40,3
Georgia	760.098	77.171	1.123.608	165.402	760.758	178.648	578.100	134.815	444.259	115.326	529.053	170.389	19,1	47,7
Others	255.799	24.978	752.510	104.686	1.438.622	333.223	1.643.347	379.128	1.699.253	423.463	1.392.841	438.472	-18,0	3,5
Total	**9.853.225**	**1.019.286**	**12.957.485**	**1.855.776**	**12.892.548**	**3.013.748**	**13.315.803**	**3.143.292**	**15.074.009**	**3.911.821**	**17.115.875**	**5.582.962**	**13,5**	**42,7**

*Temporary figures

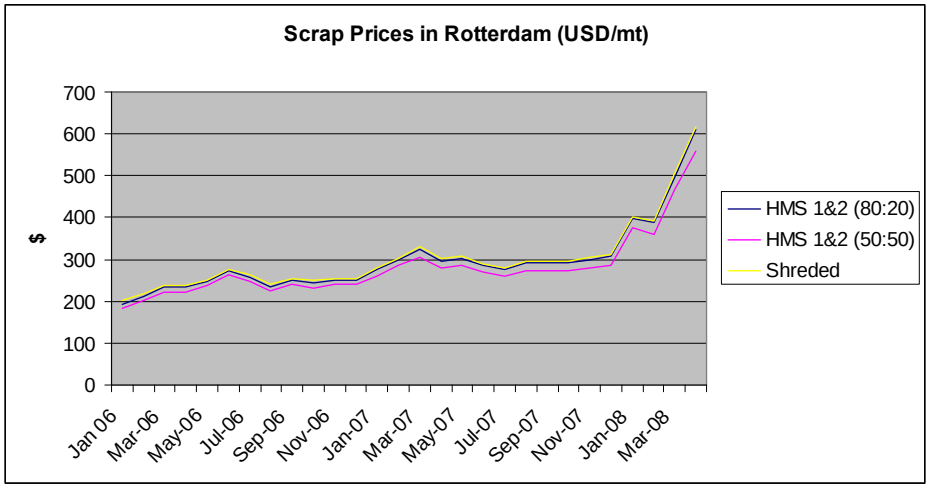
Source: Turkish Iron and Steel Producers Association, 2008, p.24

As seen in the Table 4.8, the main source of scrap for Turkey is the EU. EU is also one of the main export markets for Turkey for finished products. The Turkish producers are purchasing the scrap from EU and converting into the final product and then trying to sell to EU by competing with the local producers in EU. Due to the increasing freight costs based on sky rocketing oil prices of today, this situation creates an increasing disadvantage on competitiveness. The situation is also the same for the U.S. as the U.S. was also one of the main export markets for Turkey for finished products until the collapse of the construction industry by the mortgage crisis in 2007.

During the last three years, price of iron ore increased to unexpected levels, and the usage of direct reduced iron (DRI), hot briquette iron (HBI) or pig iron instead of scrap became unfavorable for the market. 70% of the iron ore is supplied by only two international actors in the global trade. In addition to the high oil prices, these factors

became the main reasons of the increases of the iron ore prices. Increase of demand of scrap due to high iron ore prices caused high market prices for the scrap. The evaluation of scrap prices between 2006 and 2008 are given in the Figure 4.11.

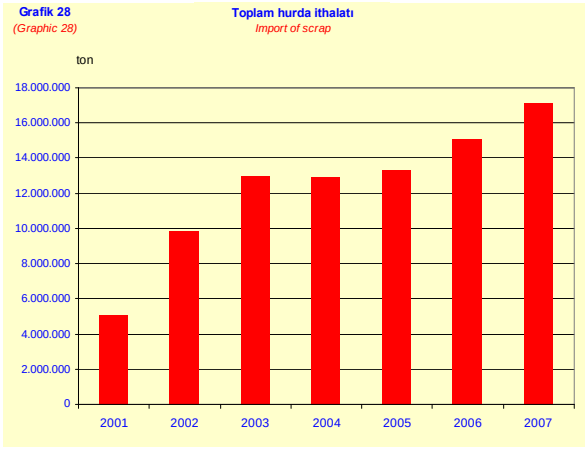
Figure 4.11 Scrap Prices in Rotterdam on FOB Basis (USD/mt) 2006 - 2008



Source: Compiled by the author according to the monthly reports of Metal Bulletin

As a result of high iron ore prices, even integrated steel plants have increased their scap usage. This finally resulted in collection of more scrap throughout the world. The usage of scrap by the Turkish steel industry is increasing with a high pace parallel to the increase in the production capacity and due to increase in the usage of crude steel production in integated mills. As Turkish steel industry depends highly on imports of scrap, also the imported quantities are increasing at higher import costs. The increase in the scrap imports are illustrated in the Figure 4.12.

Figure 4.12 Imports of Scrap 2001- 2007



Source: Turkish Iron and Steel Producers Association

As Turkey reach to 40 million tons of crude steel production in the next five years according to the forecast of the Turkish Iron and Steel Producers Association, the scrap demand will be around 25 million tons. This quantity will be supplied from local and external markets with shares of 7Mtons and 18 Mtons respectively. Under this circumstance it is obvious that Turkey will keep its position in terms of scrap importer.

Even today, Turkey is one of the highest scrap importing countries in the world. Due to the high scrap demand and high freight rates, the Turkish producers have to pay the highest prices among their international rivals. In addition to these increasing prices, the producers are urged to pay 0.5% as environment contribution fee known as "Çevre Katkı Payı", which is against the European Coal and Steel Community agreement.

Although scrap has the major importance among the imported materials, it is not the only imported item. Turkey is also importing iron ore, coal, pig iron, ferroalloys and sponge iron. The quantities and distribution of other raw materials among total imports are given in the Table 4.9.

Table 4.9 Turkey's Import of Raw Materials 2002 – 2007

Turkey's Import of Pig Iron, Ferroalloy, Sponge Iron, Scrap, Iron ore and Coal

	2002		2003		2004		2005		2006		2007 *		%change 07/06	
	ton	1000$	ton	1000$	ton	1000$	ton	1000$	ton	1000$	ton	1000$	quantity	value
Pig Iron	324.369	40.738	306.900	49.682	286.808	88.572	412.369	120.293	416.830	119.362	891.701	317.312	113,9	165,8
Ferroalloys	274.419	139.768	292.191	167.236	331.220	334.690	281.458	326.984	391.637	357.368	439.916	596.983	12,3	67,0
Sponge Iron	80.587	8.091	69.745	8.697	11.052	2.793	78.568	17.471	47.537	10.907	138.314	38.119	191,0	249,5
Scrap	9.853.225	1.019.286	12.957.485	1.855.776	12.892.546	3.013.745	13.315.802	3.143.293	15.074.009	3.911.821	17.115.875	5.582.962	13,5	42,7
Iron Ore	5.393.515	163.995	5.227.969	161.185	4.595.911	205.182	4.685.112	315.080	7.208.901	538.019	6.925.134	636.803	-3,9	18,4
Coal	13.713.257	684.365	16.168.713	926.362	16.430.243	1.217.531	17.024.036	1.573.086	20.475.319	1.971.979	22.929.549	2.558.378	12,0	29,7

Source: Turkish Iron and Steel Producers Association

4.2.5.2 Energy

As mentioned in the Part 2.2.5.2., the electricity and the natural gas costs make up a significant part of steel production cost. The current situation in Turkey regarding electricity and natural gas prices is adversely affecting the competitiveness of the Turkish steel industry in general.

The Turkish electricity sector recorded approximately 151 billion kWh of gross consumption and 121 billion kWh of net consumption (excluding loss/theft and

internal consumption) in 2004. The industrials customer group represent approximately 50% of the total demand, while residential customers consume slightly less than a quarter of the total. Commercials customer group, excluding public institutions, is placed third in terms of consumption with a 13% share.

In 2007 total electricity production increased by 8.4 percent over 2006 to 191.2 billion kilowatt-hours (kWh). In the same period domestic electric power need increased by 8.6 percent to 189.5 billion kWh, exceeding the 188.3 billion kWh predicted in the government's 2007-2015 Production Capacity Projection. Electricity exports also increased by 15.2 percent to 2.6 billion kWh while imports increased by 50.6 percent to 864 million kWh. Türkiye exports electricity to Nakhchivan, Iraq, Georgia, Syria and Greece and imports electricity from Georgia, Nakhchivan and Turkmenistan (Yatırımlar Dergisi, 2008, p.1)

Despite increasing demand, Turkey's per capita gross consumption was very low at 2,090 kWh compared to the EU average of 6,460 kWh in 2004. According to the Ministry of Energy and Natural Resources 2004-2020 projections that assume a continued cumulative annual growth rate of 7.7% in gross demand, per capita consumption is forecasted to reach 5,700 kWh by 2020 (T.R Prime Ministry Privatization Administration, 2005, p.11).

In parallel with the increase in the consumption the government expects electricity demand to increase from 141.2 TWh in 2003 to 242 TWh in 2010 and 500 TWh in 2020 with an average annual growth rate of 7.7% (International Energy Agency, 2006, p. 133). For the same time period, the government expects domestic generation to reach 242 TWh in 2010 and 481 TWh in 2020 (International Energy Agency, 2006, p. 135). The demand and supply in the electricity are almost balanced and until 2020 no shortage is expected to be faced.

In spite the fact, that Turkey can fulfill the demand by domestic production, the electricity prices in Turkey are much higher than the EU in general. The electricity prices in International Energy Agency member countries for 2005 are given in the Table 4.10.

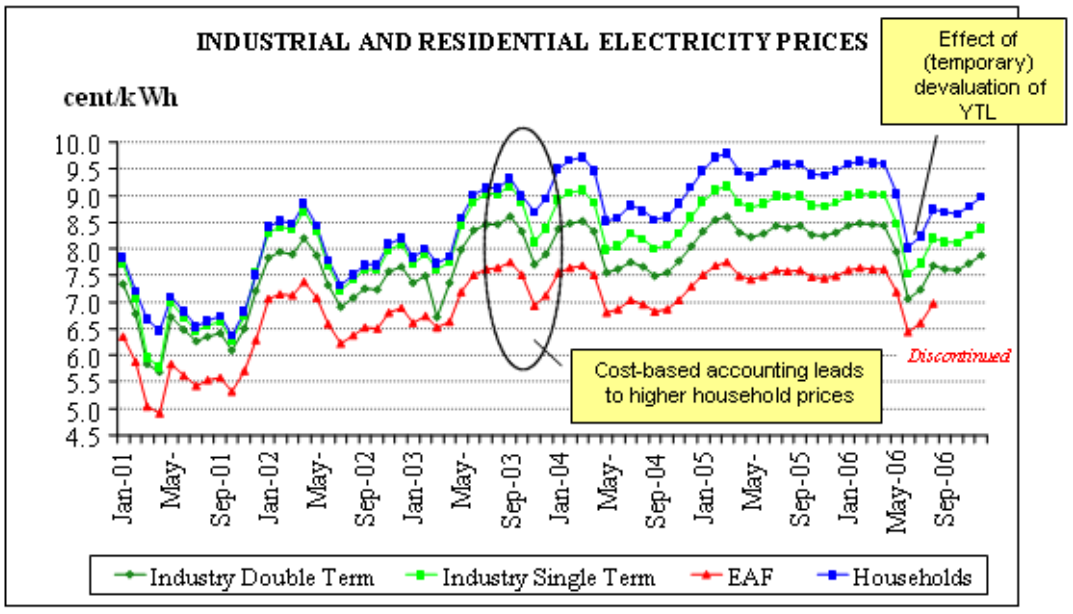
Table 4.10 Average Electricity Price for Industrial Consumers (2005)

Average 2005 electricity price for industrial consumers			
Country	**Prices in USD/MWh**	**Country**	**Prices in USD/MWh**
Italy	$173.90	Spain	$83.30
South Cyprus	$125.40	Germany	$80.75
Japan	$120.50	Czech Republic	$80.60
Turkey	**$106.60**	Finland	$70.40
Austria	$101.70	Poland	$69.90
Denmark	$100.70	Greece	$67.00
Ireland	$99.40	Australia	$63.95
Portugal	$98.00	South Korea	$58.80
Romania	$96.20	United States	$57.30
Hungary	$95.60	Taiwan	$57.10
United Kingdom	$86.70	Canada	$51.45
Slovakia	$86.30	France	$49.80
Switzerland	$83.30	Norway	$43.40

Source: International Energy Agency

In addition to Turkey's disadvantage on electricity prices, the EU is applying consumption base tariff system. In this system, the high electricity consuming companies are paying lower unit price for the electricity. The only advantage in Turkey is for the EAF based mini-mills by reducing the unit price 8% as shown in the Figure 3-13.

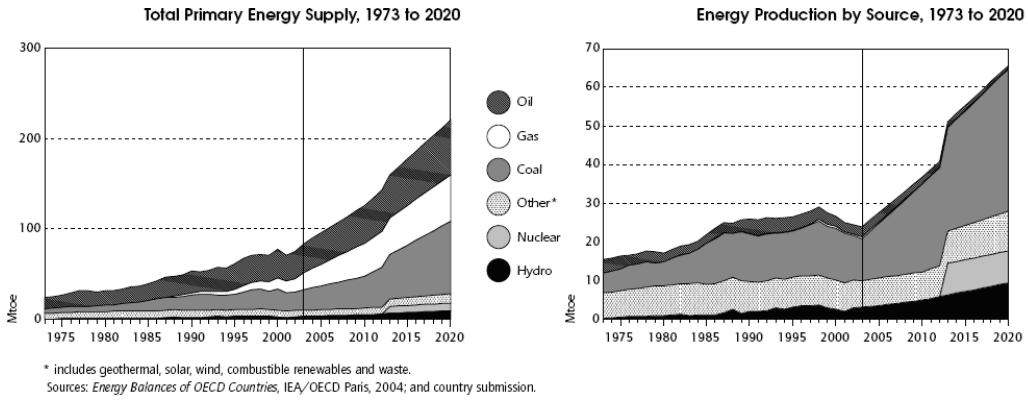
Figure 4.13 Industrial and Residential Electricity Prices in Turkey



Source TEDAS, IBS

By means of natural gas, Turkey is highly dependend on imports. According to the figures of Energy Information Administration in the US, in 2004, Turkey consumed 793 Bcf of natural gas, up 51 percent since 2000, while only producing 24 Bcf of natural gas. The demand and supply posisiton of Turkey could also be seen in the Figure 4.14.

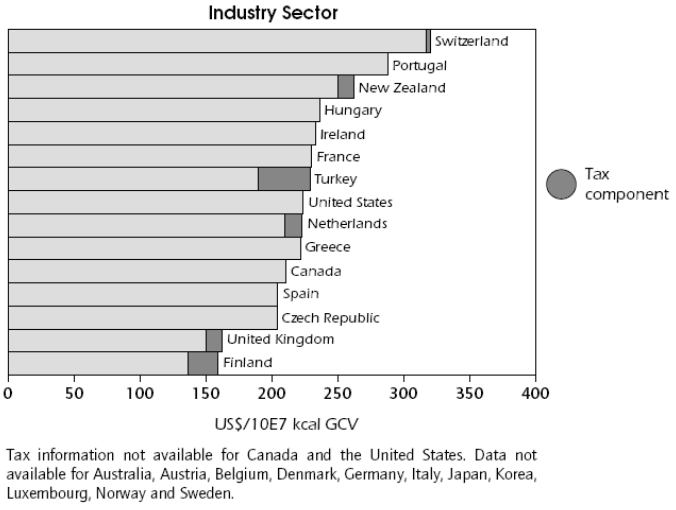
Figure 4.14 Energy demand and supply in Turkey (1973-2020)



Source: International Energy Agency, 2006, p. 53

The disadvantage in the electricity prices is also valid for the natural gas prices. Turkey is paying more than most of the EU member countries for the natural gas. The comparison of gas prices for the industrial sector of International Energy Agency member countries in 2003 are given in the Figure 4.15. Taxes on electricity and gas are increasing the prices and creating an adverse effect on the competitiveness of the Turkish industry in general and the Turkish steel industry in particular.

Figure 4.15 Gas Prices for Industrial Consumers in IEA Countries (2003)

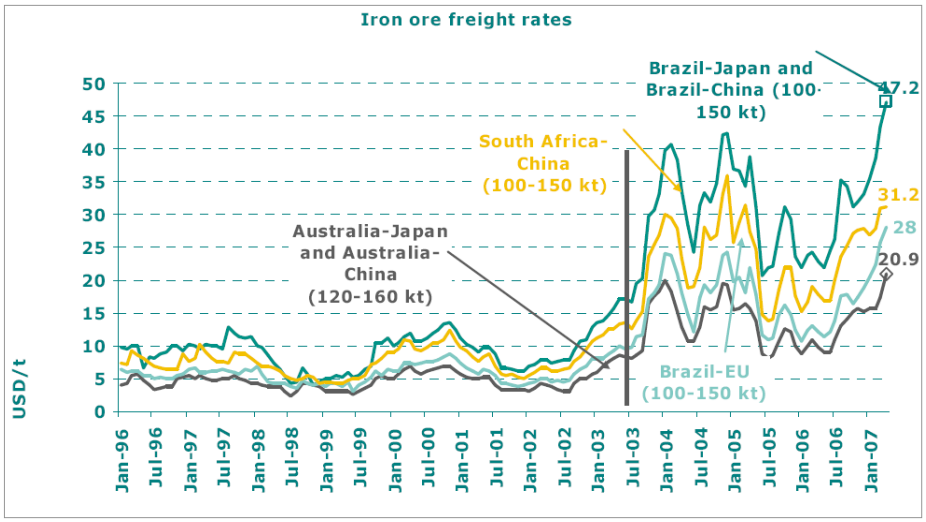


Source: International Energy Agency, 2006, p. 109

4.2.5.3 Freight

Due to the volume of imports and exports, the transportation cost has an utmost importance for the Turkish steel industry to be able to access the raw material sources and markets. In parallel with the increase in global demand and consequently oil prices, the freight rates also increased in the recent years. Figure 4.16 shows the changes in the iron ore freight rates between 1996 and 2007. During this time period the freight rates increased around five-fold.

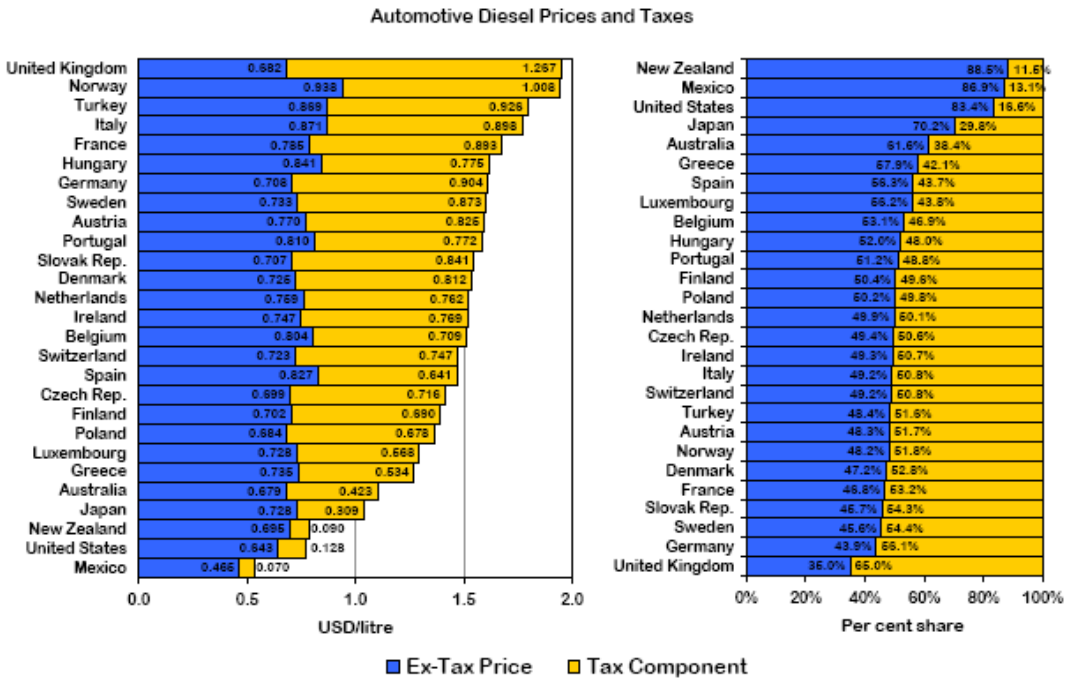
Figure 4.16 Iron ore Freight Rates (1996 – 2007)



Source: ABN Amro, 2008, p.9

Due to these increases in the freight rates, international trade becomes more localized or at least scale-dependent to be able to benefit from the freight and compete with the rivals. In addition to the effect of international freight rates, also the inland transportation costs are creating a disadvantage for the Turkish steel industry and to the consumers. Due to the extra taxes on the oil prices, Turkey is one of the most expensive countries by means of oil and gasoline prices. Turkey is ranking in the third positioning the world by means of automotive diesel prices (Figure 4.17) and in the first position in unleaded gasoline prices. The taxes are 51.6% for automotive diesel and 62.7% for unleaded gasoline. Therefore, also the domestic market is mainly localized and each company is able to sell in its own region, unless it is not a special product.

Figure 4.17 Automotive Diesel Prices and Taxes

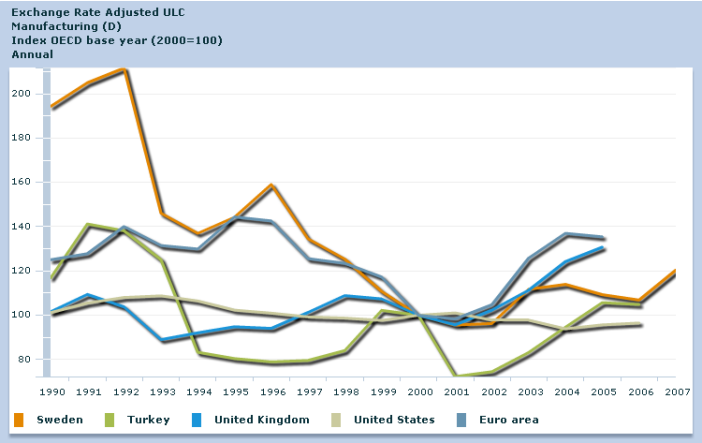


Source: International Energy Agency, 2008, p.8

4.2.5.4 Labour

With regard to labour costs, the crisis in 2001 increased the Turkish firms' competitiveness. As Figure 4.18 shows, after the crisis in February 2001, unit labour costs in manufacturing sector, measured in foreign currency, fell drastically. Within a year, they dropped to 75% of the level in 1997. In parallel with economic developments and revaluation of the Turkish Lira, the labour costs rised again in foreign currency during the period between 2002 and 2006. As of 2006, the overall unit labour costs of the manufacturing industry have exceeded the level in the U.S. It is still very low in comparison with the EU, but the increase in the labour costs are making it harder for Turkey to compete with countries, like China.

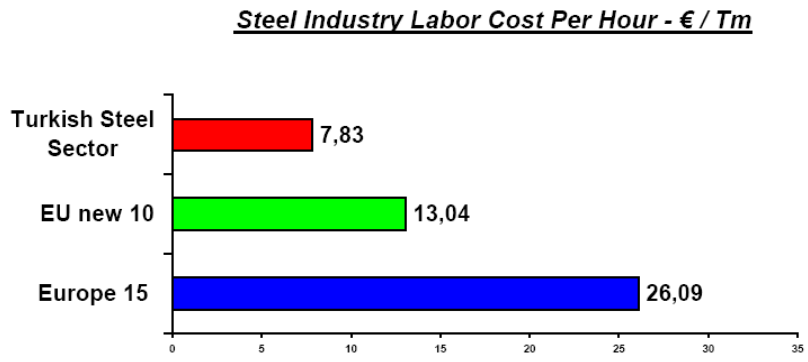
Figure 4.18 Exchange Rate Adjusted Unit Labour Costs in the Manufacturing Sectors



Source: OECD.Stat Extacts

Turkey has a comparative advantage by means of the labour costs particularly in the steel industry against the EU. The comparison of the labor costs in the steel industry between Turkey and the EU are given in the Figure 4.19. As of 2005, the labour cost per hour for the Turkish steel industry was almost one third of the EU15 countries and half of the EU27.

Figure 4.19 The Labour Costs per Hour in the Steel Industry



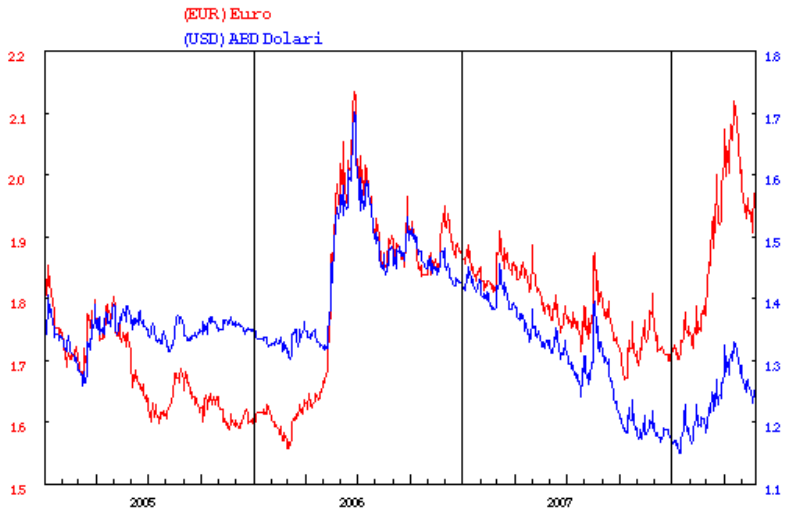
Source : Turkish Steel Industry, National Restructuring Program, 2006, p.28

4.2.5.5 Exchange Rate

The Turkish steel industry is procuring the raw materials mainly in USD from international markets and in YTL from the domestic market. On the other hand, the sales are in USD and EUR for the export markets, but in YTL for the domestic

market. Therefore the Turkish steel industry is very sensitive to changes in the exchange rates. Even significant changes in EUR/USD is causing a shift in export markets, but we are observing great changes within a short period recently. The USD/YTL and EUR/YTL exchange rate statistics are given in the Figure 4.20.

Figure 4.20 USD/YTL and EUR/YTL Exchange Rate Statistics



Source: Central Bank of the Republic of Turkey

Another disadvantage of the Turkish steel industry is the high financial costs in Turkey. The interest rates are much higher then the EU level. In combination with the exchange rate fluctuations, the financial cost is increasing.

4.2.6 Role of the Government

4.2.6.1 The Institutional Framework of the Turkish Industry

The performance of the enterprises' is highly affected by the institutions and structures. These institutions and structures shapes the business environment in which the companys operate. The following institutions formulate and implement the industrial policies in Turkey. The specific roles of related institutions are given below.

State Planning Organization (SPO) is responsible for the long-term development plans and annual programs. And industrial policy is one of the key subjects. By preparing the development plans, SPO consults all relevant public and private institutions and organisations to formulate the industrial policy, and coordinates

ministries and public institutions to ensure the efficient implementation of the industrial policy. Monitoring and evaluating of the progresses are also within their responsibility. And if needed they recommend necessary amendments to that policy.

Ministry of Industry and Trade facilitates the determination of industrial policies according to the current economic and technological conditions. They provide and encourage rapid and stable development of industry through the targets and policies envisaged by development plans and programs. They establish and control small scaled industrial estates and organized industrial zones and to provide credits. Allocating land for investors in organized industrial zones is another role of them. They also give permission for the establishment of Technology Development Regions, hold records of the industrial enterprises, take the protective measures for the protection of consumer' health, safety and economic interest. They make legal arrangement regarding the organization of artisans and craftsmen.

Other main public and private bodies involved in that process and their corresponding functions are as follows:

Undersecretariat of Treasury determines the investment incentives system, and responsible for implementation of the system, policy formulation and regulation as well as promotion of foreign investments.

Undersecretariat of Foreign Trade coordinates and supports foreign trade activities, regulates export incentives and determines principles and policies concerning the establishment, management and operation of free zones.

Privatisation Administration has the role of decision making and implementing necessary procedures for privatization.

Small and Medium Industry Development Organisation (KOSGEB) gives assistance for R&D activities, quality improvement, sectoral improvement and development. It also offers laboratory, supervision, design services, consultancy and training services for marketing and employment creation.

The Scientific and Technical Research Council of Turkey (TÜBİTAK) formulates science and technology policies, and promotes and coordinates R&D activities.

Competition Board carries out examinations and investigations concerning infringements of competition, gives permission to mergers and acquisitions and takes necessary measures in the context of competition law.

Eximbank supports foreign trade by supplying credits with lower interest rates.

Turkish Standards Institution (TSE) Prepares Turkish standards, product and system certification, calibration, industrial metrology at national level.

Turkish Patent Institute performs registration and carry out procedures for protection of industrial property rights.

Turkish Accreditation Agency is responsible for accrediting the local and international bodies rendering laboratory, certification and inspection services. It ensures them to operate in accordance with established national and international standards. Another role of them is to ensure international recognition of product/service, system, personnel and laboratory certificates.

The Union of Chambers of Commerce, Industry, Maritime Trade and Commodity Exchanges of Turkey (TOBB), **Turkish Industrialists' and Businessmen's Association (TÜSİAD)**, **The Confederation of Turkish Craftsmen and Tradesmen (TESK)** and

Sectoral Producers' Associations like **Turkish Iron and Steel Producers Association (DCUD)** and **İstanbul Mine and Metal Exporters Union (IMMIB)** are private sector institutions that cooperate with public decision makers and institutions formulating industrial policy and related measures in corresponding areas. (*SPO, August 2003, pp. 41-43)*

4.2.6.2 Deregulation

As mentioned in the part 2.2.6.1., one of the most important government activities in supporting the competitiveness of industries is developing and administering a "workable" competition policy in both domestic and export markets. In global perspective deregulation in general and privatisation in particular increase competition among the producers in the market and allow only the successful companies to live without the help of the state.

Parallel with this objective, Turkey has been implementing policies supporting not only deregulation but also the withdrawal of government from the steel sector over the last decade. “The basic legal framework is the Communiqué No 1998/4 and Communiqué No 1997/1 with regard to privatization in merger and acquisition control context. Under these Communiqués, the Turkish Competition Authority delivers its opinion before the bidding process and participates in the authorisation phase.” (European Commission, 3 May 2006, p.8). With regard to the formation of political and social consensus necessary for privation in parallel with the EU regulations, the latest privatization law (Law. No. 4046) was brought into force in 27 November 1994.

Privatization in Turkey, not only aims to minimise state involvement in economic activities and to relieve the financial burden of State Economic Enterprises (SEE) on the national budget, but also contemplates the development of capital markets and the re-channeling of resources towards new investments. Under the Privatization Law No. 4046, privatization process is carried out by two bodies: Privatization High Council and Privatization Administration.

The Privatization High Council (PHC) is the ultimate decision-making body for privatization in Turkey. The Council, headed by the Prime Minister, is composed of four ministers. PHC nominates the organisations for privatization through taking state-owned economic enterprises in and out of the privatization portfolio and is responsible from the methodology and timing of the privatization procedures by approving the final transfer procedure of the organizations to real people or/and legal entities.

The Privatization Administration (PA) is the executive body for the privatization process. It is a legal public entity with an exclusive budget, reporting directly to the Prime Minister. PA’s major duties include the execution of PHC's decisions, advising the PHC in matters related to the transfer of State Economic Enterprises (SEE) into or out of privatization portfolio and restructuring and rehabilitation of SEE's in order to prepare them for privatization. (*T.R Prime Ministry Privatization Administration, 1994)*

The privatization in the Turkish steel industry began in 1995 with the privatization of an integrated plant belonging to Türkiye Demir ve Çelik işletmeleri Genel

Müdürlüğü A.Ş. (TDCI). In 30 March 1995 TDCI's ownership was transferred to its employees and took the name Karabük Demir Çelik Sanayi ve Ticaret A.Ş. (KARDEMIR). Sivas Demir Çelik has was the second steel mill, which was privatised in 1998.

Asil Çelik, which produces high value-added special steels, was established by the private sector in 1974, but due to its debts ownership of the company was transfered to the state. As of 2000, Asil Çelik was privatized again.

Until 2000 the state had owned two integrated mills. ISDEMIR and ERDEMIR. Isdemir was working with loss. In 2000, the The Privatization Administration decided to privatize ISDEMIR, with a condition that the new owner had to make the technological investments to convert the mill from a long production oriented mill to a flat products producing mill. The forecasted investments at that time were around 750 million US Dollars. ERDEMİR, which was also owned by the state, entered into the tender alone and became the new owner in 22 August 2000.

The last state owned mill, ERDEMİR, was also privatized in 2005 by a formal tender process for the block sale of 46,12% of ERDEMİR. OYAK won the tender in November 2005 and from that time on, the state no longer has any share in the steel industry.

4.2.6.3 Support Measures During Restructuring (Subsidies)

As mentioned in the preivous part the transitional period, which was granting subsidies to the Turkish steel sector under the ECSC-Turkey Free Trade Agreement, expired in August 2001. From that time on there are no subsidies available in the sector.

According to the National Restructuring Program, which was submitted to the EU Commission for approval, the estimated cost of restructuring including the adaptation of existing facilities to EU environmental standards was 7.7 billion EUR. 1.26 Billion EUR was planned to be supplied through state aid. But, as of May 2008, the approval of this program is still pending. The details of the forecasted costs are given in the Table 4.11.

Table 4.11 Estimated Cost of Restructuring Process and Required State Aid

Concept	Purpose	Overall Requirements (Mil. €)			State aid (Mil. €)		
		2001-2005	Estimated 2006- 2010	Total 2001-2010	2001-2005	Estimated 2006- 2010	Total 2001-2010
Modernization	Achieve the required production and product distribution of the NRP	2.158[1]	4.132	6.290	276[2]	600[3]	876
Environment	Adapt the existing facilities to EU environmental standards	-	940	940		188	188
Closures	Cost of closures		210[4]	210		135	135
	- Physical Closure		85	85		85	85
	- Employment transformation		125	125		50	50
Research & Development			240	240		60	60
Total		**2.158**	**5.522**	**7.680**	**276**	**983**	**1.259**

1 Total amount of foreseen restructuring investment (some of which has not been realized yet) within the scope of investment encouragement certificates issued to steel industry in the period of 2001-2004.

2 Total amount of state aid granted to steel industry within the scope of investment encouragement certificates issued in the period of 2001-2004. This total amount reflects the sum of already benefited amount coming from realized investment and amount to be benefited in the future depending on the realization of investment.

3 Total amount of state aid to be granted to the steel industry for the estimated investment requirement in the period 2006-2010, which is calculated with the assumption that support instruments are the current Investment Encouragement Program with the measures of VAT Exemption (aid intensity 3%) and Exemption from Customs Duties and Fund Levies (aid intensity 1,5%) and 10% cash grant equivalent of the modernization cost.

Source: Turkish Steel Industry, National Restructuring Program, 2006, p.10

4.2.7 Effects of the EU Accession Period on the Turkish Steel Industry

4.2.7.1 National Restructuring Program

As mentioned before Turkey signed the ECSC – Turkey Free Trade Agreement on 25 July, 1996 and came into effect on 1 August 1996. the import – export duties were abolished and the trade between Turkey and EU member countries were liberalized for the iron and steel products. As a result of this liberalization, Turkey was obliged to harmonize its regulations in the iron and steel industry with the EU regulations in competitiveness and subsidies.

Due to structural problems in the industry a five year grace period, which allowed public aid to be granted to steel companies for restructuring, was granted to Turkey until 2001. The transition period expired in August 2001. The Turkish authorities asked the European Commission to extend the period for which public aid can be granted to steel companies for restructuring. Accordingly, the EU required the Turkish authorities to prepare a national restructuring plan (NRP) and individual business plans for all companies that needed to be involved in the restructuring process (2004 Regular Report on Turkey's Progress Toward Accession - pp 120).

Parallel to the NRP, strategic objectives for the development of the steel sector can be summarized as follows: (Devlet Planlama Teşkilatı - Sector Profiles of Turkish Industry- A General Outlook – February 2004)

- Modernization and harmonization of production capacities with market demand,
- Mainly by transforming the long/flat product ratios of the sector in favour of flat steel products.
- Improving viability and competitiveness of the sector under free market rules,
- Increasing product quality and productivity in the sector while reducing cost,
- Orientation of Turkish steel industry towards higher value added products,
- Stability of employment in the sector resulting from its competitive position in an open domestic market and international markets.

The National Restructuring Plan has an utmost importance to reach to goals in the development plan, which will be explained in the part 3.5. Under the NRP with the European Commission Turkish steel producers are expected to be able to improve the viability and competitiveness of the sector under free market rules.The conversion plan is expected to lead to sustainable growth in Turkey's steel production.

A final draft of the NRP was submitted to the EU Commission in September 2006. Turkey has already taken the initiative, and is already pushing ahead with the progressive conversion of a number of its plants, such as the Isdemir plant, which has started to produce slab since September 2006, the first step to produce flat products. It was followed by the Çolakoğlu plant in July 2007.

4.2.7.2 Harmonization with the Customs Tariff System of EU

Finalization of the accession period and being an EU member brings extra obligations to Turkey to harmonize with the common EU Common External Tariff (CET) System. After the expiry of the ECSC Treaty in July 2002, Turkey requested not to add iron and steel products in to the common EU customs tariff system, because of the vulnerabilities of the Turkish economy at the time. Furthermore difficulties in accepting the quotas applied by the EU to Russia, Ukraine and Kazakstan, protective applications like anti-dumping duties applied by the USA and EU, and the national restructuring program, which had not been finalized, also contributed to the request of Turkey to keep iron and steel out of CET. (Devlet Planlama Teşkilatı, 2007, p.32).

By being a member state, the import duties, which have a relatively lower importance on the long product side, has to be diminished especially in flat products.

4.2.7.3 Harmonization with Environmental Standards

Environmental protection issues oblige Turkish steel industry to fulfill requirements, which are prevalent in the EU countries. As a newly industrialized country fulfilling the criteria of these developed countries is bound to create difficulties in EU

accession negotiations process. Therefore fulfilling all these criteria within 5-15 years after being a member country is hoped to be receiven as a concession. (Devlet Planlama Teşkilatı, 2007, p.32).

According to the "Planning of high-cost environmental investments project" which is executed by the cooperation of the Turkish Environment and Forest Ministry and the EU commission, harmonization of the follwing directives is planned:

- integrated pollution prevention and control (IPPC)
- control of major industrial accidents involving dangerous substances (SEVESO)
- discharge of dangerous substances

If the compliance with the requirements of the above mentioned directives by the companies takes place within the next five years, the cost which accrueto be to the steel industry is expected to be 1.3 billion €. (Devlet Planlama Teşkilatı, 2007, p.33).

4.2.7.4 Climate Change Framework Convention

As of 24 May 2004 Climate Change Framework Convention came into effect in Turkey. In parallel with the EU membership, also the Kyoto agreement will come into effect in Turkey. Therefore with the contribution of the Turkish steel producing companies, preparations to establish CO_2 emission inventory including a mid-term projection until 2020 is in progress.

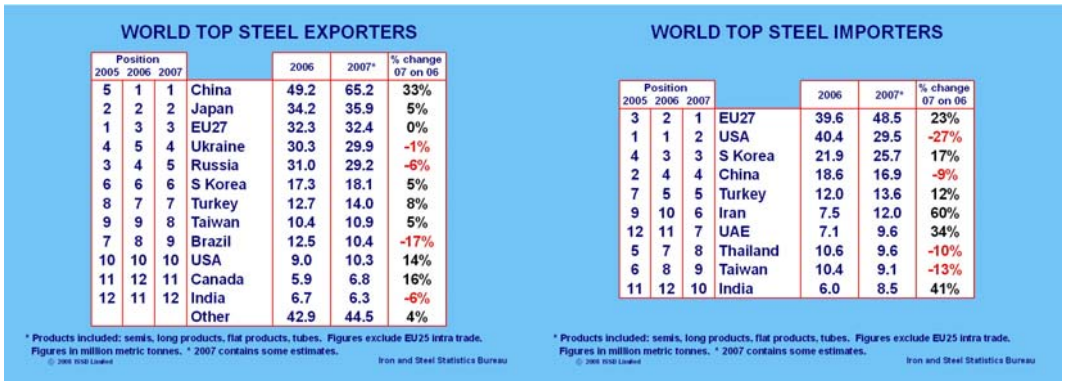
Although Turkey has not yet signed the Kyoto agreement, during the EU accession period, limitations to the emission gases might be required. One of the major industries, which might be affected due to these possible limitations is the iron and steel industry. Therefore preparing a project including energy efficiency and cost-benefit analysis for carbon emission reducing methods is essential (Devlet Planlama Teşkilatı, 2007, p.33).

4.2.8 The State of the Turkish Steel Industries in Foreign Trade

As well as the production performance, the iron and steel industry is also one of the leading sectors in the Turkish economy by means of the export performance. The Turkish steel industry is highly dependent on foreign trade. According to the figures of Undersecretariat of Foreign Trade, the iron and steel industry is the third largest exporting sector among all industrial sectors with a value of 8.352 billion US Dollar in year 2007. The first place belongs to the automotive industry with 15.904 billion US Dollar and the second most exporting sector is the machinery sector with 8.777 billion US Dollar.

According to the figures of Iron and Steel Statistics Bureau, Turkey is among the top 10 steel exporting and importing countries in the world. As shown in the Figure 4.21, Turkey was ranking as the 7th top steel exporting country, whereas on the other hand it is ranking in the 5th position within the top steel importing countries.

Figure 4.21 World Top Steel Exporters and Importers



WORLD TOP STEEL EXPORTERS

Position 2005	Position 2006	Position 2007		2006	2007*	% change 07 on 06
5	1	1	China	49.2	65.2	33%
2	2	2	Japan	34.2	35.9	5%
1	3	3	EU27	32.3	32.4	0%
4	5	4	Ukraine	30.3	29.9	-1%
3	4	5	Russia	31.0	29.2	-6%
6	6	6	S Korea	17.3	18.1	5%
8	7	7	Turkey	12.7	14.0	8%
9	9	8	Taiwan	10.4	10.9	5%
7	8	9	Brazil	12.5	10.4	-17%
10	10	10	USA	9.0	10.3	14%
11	12	11	Canada	5.9	6.8	16%
12	11	12	India	6.7	6.3	-6%
			Other	42.9	44.5	4%

* Products included: semis, long products, flat products, tubes. Figures exclude EU25 intra trade. Figures in million metric tonnes. * 2007 contains some estimates.

Iron and Steel Statistics Bureau

WORLD TOP STEEL IMPORTERS

Position 2005	Position 2006	Position 2007		2006	2007*	% change 07 on 06
3	2	1	EU27	39.6	48.5	23%
1	1	2	USA	40.4	29.5	-27%
4	3	3	S Korea	21.9	25.7	17%
2	4	4	China	18.6	16.9	-9%
7	5	5	Turkey	12.0	13.6	12%
9	10	6	Iran	7.5	12.0	60%
12	11	7	UAE	7.1	9.6	34%
5	7	8	Thailand	10.6	9.6	-10%
6	8	9	Taiwan	10.4	9.1	-13%
11	12	10	India	6.0	8.5	41%

* Products included: semis, long products, flat products, tubes. Figures exclude EU25 intra trade. Figures in million metric tonnes. * 2007 contains some estimates.

Iron and Steel Statistics Bureau

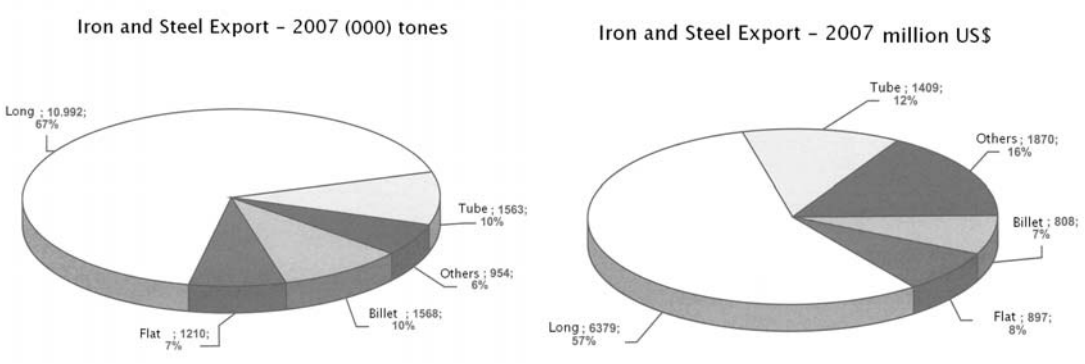
Source: Iron and Steel Statistics Bureau

The distribution of the exports among products is also in parallel with the unbalanced situation in the sector between long and flat products. According to the 2007 yearly report of İstanbul Mine and Metal Exporters Union (IMMIB) the distribution of the products among exported quantities are 67% in favour of the long products (10.992 million mt). The share of billet is 10% (1.568 million mt) and in fact as being the semi-product for the long products, billets also belong to the long products groups, which make the share of the long products as 77%. It is followed by 10% in pipes (1.563 million mt) and only 7% in flat products (1.210 million mt). The distribution

of export performances of products is a sound proof that Turkey is producing much more long products than it can consume.

The distribution of the same product groups according to the values of the exports are given in the Figure 4.22. Although the tubes are out of the scope of this study, it is important to note the share of other iron and steel related products in the total export performance of Turkey.

Figure 4.22 Export of Steel Products in Turkey



Source: İstanbul Mine and Metal Exporters Union (IMMIB), 2008, 2007 yearly report, p.54

The highest share of exports belongs to the reinforcing bars. In 2007, Turkey exported 8,699,286 mt of reinforcing bars with a value of 4,868,867,299 US Dollar. (IMMIB, 2008, 2007 yearly report, p.56). For the reinforcing bars, United Arab Emirates is in the first position among export markets with 3,186,875 mt. The second position belongs to Spain with 540,265 mt and the third major importer for Turkish rebars is Katar with 491,795 mt in 2007.

The comparison of the export and import ratios of different groups within Turkish the steel industry is given in the Table 4.12. According to the figures of the Turkish Iron and Steel Producers Association, Turkey is importing 13,206,030 tones of steel products. 59.8% (7,896,562 tones) out of this quantity is the import of flat products. It is followed by the import of billets and blooms with a share of 18.8% (2,484,247 tones). These products are the semi-products to produce long products. The import of special steels, long products and slabs has almost 7% share for each.

A remarkable finding out of these figures is the difference on the values of total exports and imports. Turkey exported 13.7 million tones of steel products with a value of 8 billion USD, whereas the value of imported 13.2 million tones is 9.6

billion USD. Although the trade volume in quantities is higher for the exports compared to imports, there is a remarkable difference in the total values between them. As seen in these figures Turkey is exporting mainly low value added products and importing higher value-added products. As the demand for flat products in Turkey continue to increase, the difference will grow, but due to the new investments on the flat production the imported quantities are expected to decline to cause a positive intra-industry trade balance. On the other hand, the exports of billets and blooms, which are the semi-products, are decreasing. In 2004, Turkey was exporting 3.77 million tones of billets and blooms. This quantity has declined to 1.56 million tones in 2007. For the same period, the imports of the same products increased from 0.58 million tones to 2.48 million tones as shown in the Table 4.12. This indicates that Turkey is increasing the proportion of high value-added products in steel exports.

Table 4.12 The Export and Import of Total Iron and Steel Products

Export of Total Iron and Steel Products

	2002		2003		2004		2005		2006 *		2007 *		%change 07/06	
	ton	1000$	ton	1000$	ton	1000$	ton	1000$	ton	1000$	ton	1000$	quantity	value
Billet,bloom	3.053.654	568.554	3.148.190	746.242	3.770.521	1.316.782	2.169.143	773.560	1.582.185	635.188	1.561.420	780.260	-1,3	22,8
Slab	22	22	38	32	86	57	206	297	95	172	35.238	18.042	36.992,6	10.389,5
Flat product	1.120.465	340.994	979.489	384.542	1.039.038	638.477	1.109.950	703.335	1.368.349	828.398	1.214.882	880.936	-11,2	6,3
Long product	5.762.444	1.241.362	6.141.998	1.673.635	7.183.700	3.123.308	7.596.228	3.178.001	9.567.490	4.406.691	10.764.475	6.110.123	12,5	38,7
Special steel	168.062	68.040	180.631	94.531	202.291	171.960	198.871	213.540	147.591	199.156	189.243	298.299	28,2	49,8
Total	**10.104.647**	**2.218.972**	**10.450.346**	**2.898.982**	**12.195.636**	**5.250.584**	**11.074.398**	**4.868.733**	**12.665.710**	**6.069.605**	**13.765.258**	**8.087.660**	**8,7**	**33,2**

Import of Total Iron and Steel Products

	2002		2003		2004		2005		2006		2007 *		%change 07/06	
	ton	1000$	ton	1000$	ton	1000$	ton	1000$	ton	1000$	ton	1000$	quantity	value
Billet,bloom	644.169	117.220	779.575	189.993	580.094	222.728	949.659	342.532	1.521.201	603.617	2.484.247	1.267.517	63,3	110,0
Slab	280.174	58.914	832.919	202.729	945.449	406.026	974.654	440.967	1.317.097	617.268	907.088	491.263	-31,1	-20,4
Flat product	3.840.937	1.036.005	4.292.916	1.552.529	5.195.347	2.740.362	6.208.374	3.440.424	7.296.339	4.035.089	7.896.562	5.121.935	8,2	26,9
Long product	368.938	131.342	451.250	194.661	627.543	376.961	696.882	473.225	743.234	527.225	945.704	824.246	27,2	56,3
Special steel	359.294	349.048	462.961	519.943	646.005	832.458	764.543	1.138.063	841.062	1.323.298	972.429	1.908.685	15,6	44,2
Total	**5.493.512**	**1.692.529**	**6.819.621**	**2.659.855**	**7.994.438**	**4.578.535**	**9.594.112**	**5.835.211**	**11.718.933**	**7.106.497**	**13.206.030**	**9.613.646**	**12,7**	**35,3**

** Temporary figures*

Source: Turkish Iron and Steel producers Association

The distribution of export and import volumes of the Turkish steel industry by means of Harmonized Tariff Schedule Codes including the raw materials like pig iron,

Ferro-alloys and scrap is given in the Tables 3-13 and 3-14. By observing these volumes we observe that the Turkish steel industry is mainly exporting low value-added long products and importing high value added flat products and special steels as mentioned before.

Table 4.13 Iron and Steel Exports of Turkey by means of Harmonised System Codes (million USD)

Harmonised Code	Products	2005	2006	2007	Değ. %	Pay %
7201	Pig Iron	3,9	9,0	13,6	51%	0,2%
7202	Ferro Alloys	29,1	45,6	60,1	32%	0,7%
7204	Scrap	69,1	144,8	182,2	26%	2,2%
7207	Billet	773,9	635,4	798,3	26%	9,6%
(7208 - 7212)	Flat Steel Products	703,3	828,4	881,1	6%	10,5%
(7213 - 7217)	Long Steel Products	3.178,0	4.406,7	6.110,3	39%	73,2%
(7218 – 7229)	Special Steels	213,5	199,2	298,4	50%	3,6%
	Others	2,6	4,3	8,1	87%	0,1%
Item 72	**Iron & Steel - Total**	**4.973**	**6.273**	**8.352**	**33%**	**100%**

Source: Undersecretariat of the Prime Ministry for Foreign Trade, June 2008, p.22

Table 4.14 Iron and Steel Imports of Turkey by means of Harmonized Tariff Schedule Codes (million USD)

Harmonised Code	Products	2005	2006	2007	Değ. %	Pay %
7201	Pig Iron	120	119	317	166%	2,0%
7202	Ferro Alloys	327	357	597	67%	3,7%
7204	Scrap	3.143	3.912	5.592	43%	34,6%
7207	Billet	783	1.221	1.761	44%	10,9%
(7208 - 7212)	Flat Steel Products	3.440	4.035	5.122	27%	31,7%
(7213 - 7217)	Long Steel Products	473	527	824	56%	5,1%
(7218 – 7229)	Special Steels	1.138	1.323	1.909	44%	11,8%
	Others	32	30	60	99%	0,4%
Item 72	**Iron & Steel - Total**	**9.458**	**11.525**	**16.182**	**40%**	**100%**

Source: Undersecretariat of the Prime Ministry for Foreign Trade, June 2008, p.26

As shown in the Table 4.15, Turkey's export volume, including the raw-materials, is 7,555.80 million USD in 2007, whereas its import volume for the same products is 14,421.00 million USD. In that sense the intra-industry trade index score of Turkey

with its counterparts is 0.69. 1 denotes maximum intra-industry trade and 0 denotes that the observed country only exports or imports from that specific product or products group. Therefore 0.69 shows a medium level intra-industry trade for Turkey with its global counter-parts.

For the raw materials the intra-industry trade is almost negligible with its value of 0.08. On the contrary we observe an almost maximum intra-industry index score for the steel products in general as its score is 0.96 for this group as shown in the Table 4.15. But this does not show that the Turkish steel industry is importing and exporting the same products. By means of classification of products as per Harmonized Tariff Schedule Codes we observe that the intra-industry trade for each group is on low level. The intra-industry trade index scores for flat, long and special steel products are 0.29, 0.24 and 0.27 respectively.

These figures show us that the Turkish steel industry has a high intra-industry trade for the steel products in general and low intra-industry trade by means of specific product groups within the iron and steel industry with its global counterparts. The reason for that is the focus on long-products in the production.

Table 4.15 Intra-industry Trade Index Scores for the Turkish Iron and Steel Industry by means of Harmonized Tariff Schedule Codes

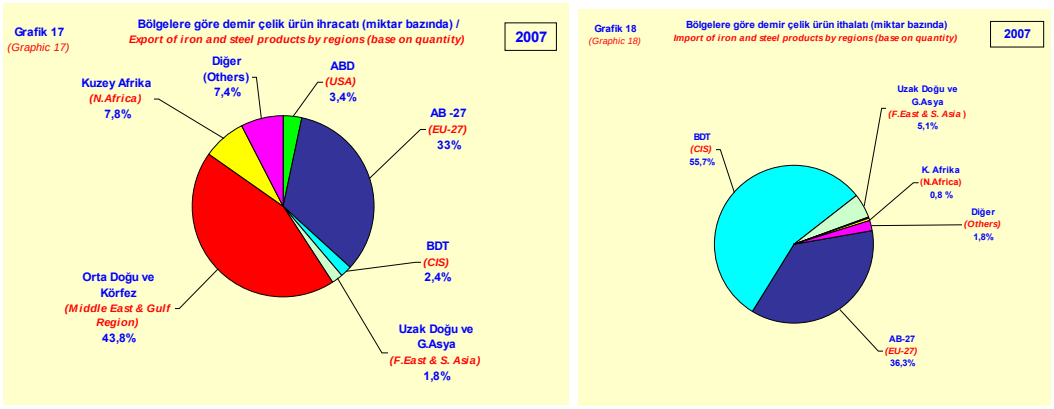
Harmonised Code	Products	Export (million USD)	Import (million USD)	Intra Industry Trade Index Score
7201	Pig Iron	13,6	317,0	0,08
7202	Ferro-Alloys	60,1	597,0	0,18
7204	Scrap	182,2	5592,0	0,06
Raw Materials - Total		**255,9**	**6506,0**	**0,08**
(7208 - 7212)	Flat Steel Products	881,1	5122,0	0,29
(7213 - 7217)	Long Steel Products	6110,3	824,0	0,24
(7218 – 7229)	Special Steel Products	298,4	1909,0	0,27
Others	Others	8,1	60,0	0,24
Steel Products - Total		**7297,9**	**7915,0**	**0,96**
TOTAL		**7553,8**	**14421,0**	**0,69**

Source: Compiled by the Author according to the figures of Undersecretariat of the Prime Ministry for Foreign Trade, June 2008

The main markets for the Turkish steel industry are the Middle East and the Persian Gulf region with 43.8%, EU-27 with 33%, North Africa with 7.8% and the USA with 3.4%. The share of the USA looks very small, but it is due to the mortgage crisis, which affected the construction industry in 2007. In 2006, the total exports of steel products to the USA was 1.73 million tones (13.7%), whereas in 2007 this amount

was declined to 0.47 (3.4%) million tones (Turkish Iron and Steel Producers Association, April 2008, p.25). The main markets for the imports of iron and steel products are CIS countries with 55.7% and EU-27 countries with36.3%. The distribution of exports and imports among regions are given in the Figure 4.23.

Figure 4.23 Exports and Imports of Iron and Steel Products by Regions



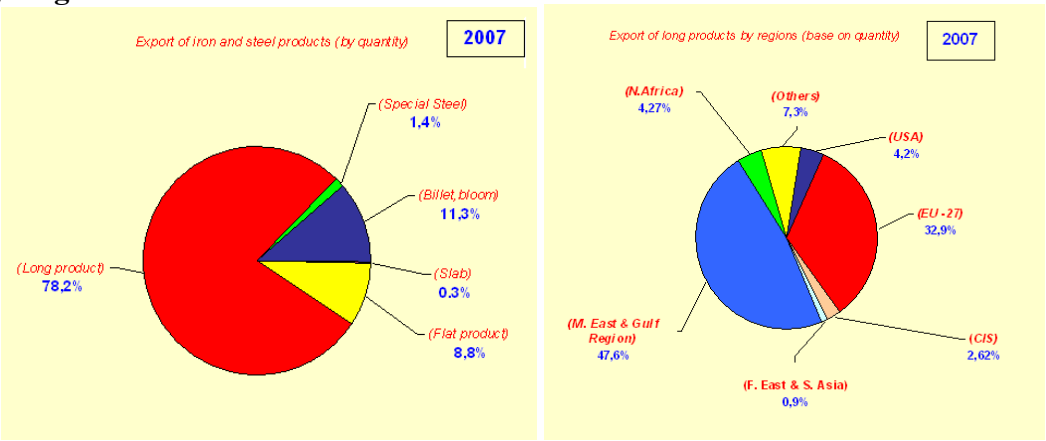
Source: Turkish Iron and Steel Producers Association

4.3 Accessibility to Markets

4.3.1 Certification & Homologation

As mentioned in the previous part, sales to foreign markets have an utmost importance for the Turkish steel industry. The total exported quantity in 2007 was 13,765,258 tones, while the total crude steel production capacity is 25,753,650 tones. As of 2007, half of the production was exported. The majority of the exported quantity was in the long products. The export of long products was 10,764,475 tones, which is 78.2% of the total exports. (Turkish Iron and Steel Producers Association, April 2008, p.23) As previously mentioned the production Turkey is mainly focused on the long production of long products. The distribution of exported quantities among product groups is also emphasizing the same fact. The distribution of exported quantities among product groups and the distribution of exports of long products among regions are given in the Figure 4.24.

Figure 4.24 Export of Steel Products and Distribution of Long Products Exports by Regions



Source: Turkish Iron and Steel Producers Association

8,699,286 tones out of the total exports of long products is the export of reinforcing bars. (IMMIB, 2008, 2007 yearly report, p.67) As shown in the Figure 4.24, the main markets for the long products are the Middle East and the European Union member countries. The certification requirements for construction products, especially for reinforcing bars, in each EU member country was explained in detail in the part 2.3.1. Export of construction industry related products to the European member countries is subject to the certifications and homologations. Due to this fact the Turkish producers has to have the certifications and homologate their companies to the related standard institutes in each EU member country.

Certifications are bringing extra costs to the Turkish steel producers. In addition to the cost of the certificates, each one of these institutes are visiting the mills for a couple of times annually to check the production facilities, the products and the quality control mechanisms. Even some of them are checking the quality assurance systems. By taking into consideration that each of the Turkish producers are having minimum a couple of certificates, these inspections are requiring extra labour and time.

Due to the domination of the English construction companies in the Persian gulf region, most of the customers in that region are requesting materials certified by CARES, which is the English certification and technical approval body for the construction industry.

On one side the certifications are a barrier to enter into the markets. But on the other side due to export oriented structure of the sector, most of the Turkish producers

already have a remarkable percentage of these certificates and therefore these certifications are bringing a competitive advantage to the Turkish steel producers against their international rivals.

4.3.2 Quotas, Import Duties & Anti-Dumping Duties

The Turkish steel industry is very sensitive to changes in international markets. As the sector is exporting around half of its production, all protective actions in international markets are affecting the competitiveness of it. As mentioned in the part 2.3.2., the quota applied in 2002 by the EU has affected the Turkish steel industry, although the aim of these sanctions was to keep the imported quantity in the level of 2001 and to keep the floods of steel imports resulting from US protectionism away from the EU. But by the end of 2003, the EU abolished the steel tariffs after the removal of US tariffs. So there is no longer a quota system applied to the Turkish steel industry.

Quotas are not the only proactive measure in international trade that The Turkish steel producers are facing. Due to some bilateral free trade agreements, the Turkish steel producers are loosing their competitiveness in some markets. Algeria is a good example for that. The EU/Algeria Association Agreement was initiated on 19 December 2001. The agreement was signed in April 2002 and following end of approval process, the Association Agreement with Algeria entered into force by 1 September 2005, including trade and tariff dismantling provisions. (European Commission, September 2007, p.2)This free trade agreement allowed the EU steel products to enter into their market without any import duty, whereas Algeria is applying 15% import duty to all remaining countries. Due to this change, the Turkish steel producers are no longer able to sell their products to Algeria.

The third obstacle for the Turkish steel producers is the anti-dumping proceedings. Since 1995 the Turkish reinforcing bar producers have been suffering from anti-dumping applications in the U.S. During the course of the investigation, orders against some Turkish companies have been revoked and on 9th May 2008 the U.S. International Trade Commission (ITC) upon conducting a sunset review determined that the order should remain in force for another five year (United Stated International Trade Commission, May 9, 2008, p.3). Now European Commission,

through a Notice published in the Official Journal of the European Union C 113 dated 8th of May 2008, initiated an anti-dumping investigation on wire rod originating from Turkey, People's Republic of China and Moldova.

While the Turkish steel industry is claiming against protective actions in international markets, on the other hand, the industry is tried to be protected by import duties. The reason for that is to protect the industry at least during the restructuring period of the sector. Although there are different customs duties for sub-items within a single Harmonized Tariff Schedule Code group, the percentages of import taxes in Turkey are given in the Table 4.16. By taking these differences into calculation, for each group import tax ranges are mentioned.

Table 4.16 Customs Duty Rates for Iron and Steel Products in Turkey

Harmonized Tariff Schedule Codes	Brief Description	CUSTOMS DUTY (%)				
		EU, EFTA, ISR, SUR, TUN, MOR, MAC, CRO, B. HER, EGY PAL, KOS	Preference Receiving Countries			Others
			Least Developed Countries	Special Program Countries	Developing Countries	
7201	Pig iron and spiegeleisen in pigs, blocks or other primary forms	0	0-2.6	0-2.6	0-2.6	0-2.6
7202	Ferroalloys	0	0-2.7	0-2.7	0-3.5	0-7
7203	Spongy ferrous products from direct reduction of ore and products in lumps, pellets etc.; iron, at least 99.94% (wt.) Pure, in lumps, pellets etc.	0	0	0	0	0
7204	Ferrous waste and scrap; remelting scrap ingots of iron or steel	0	0-6.5	0-6.5	0-6.5	0-6.5
7205	Granules and powders, of pig iron, spiegeleisen, iron or steel	0	0	0	0	0
7206	Iron and nonalloy steel in ingots or other primary forms (excluding iron of heading 7203)	0	2,5	2,5	2,5	2,5
7207	Semifinished products of iron or nonalloy steel	0	0-22.4	0-22.4	0-22.4	0-22.4
7208	Flat-rolled iron or nonalloy steel products, 600 mm (23.6 in.) Or more wide, hot-rolled, not clad, plated or coated	0	0-5	0-5	0-5	0-5
7209	Flat-rolled iron or nonalloy steel products, 600 mm (23.6 in.) Or more wide, cold-rolled, not clad, plated or coated	0	0-6	0-6	0-6	0-6
7210	Flat-rolled iron or nonalloy steel products, 600 mm (23.6 in.) Or more wide, clad, plated or coated	0	0-14	0-14	0-14	0-14
7211	Flat-rolled iron or nonalloy steel products, less than 600 mm (23.6 in.) Wide, not clad, plated or coated	0	0-7	0-7	0-7	0-7
7212	Flat-rolled iron or nonalloy steel products, less than 600 mm (23.6 in.) Wide, clad, plated or coated	0	0-14	0-14	0-14	0-14
7213	Bars and rods of iron or nonalloy steel, hot-rolled, in irregularly wound coils	0	11.9-12.0	11.9-12.0	11.9-12.0	11.9-12.0
7214	Bars and rods of iron or nonalloy steel nesoi, not further worked than forged, hot-rolled, hot-drawn etc., but including those twisted after rolling	0	15	15	15	15
7215	Bars and rods of iron or nonalloy steel nesoi	0	0-14	0-14	0-14	0-14
7216	Angles, shapes and sections of iron or nonalloy steel	0	0-17	0-17	0-17	0-17
7217	Wire of iron or nonalloy steel	0	0	0	0	0
7218	Stainless steel in ingots, other primary forms and semifinished products	0	0-0,7	0-0,7	0-0,7	0-0,7
7219	Flat-rolled stainless steel products, 600 mm (23.6 in.) Or more wide	0	2	2	2	2
7220	Flat-rolled stainless steel products, less than 600 mm (23.6 in.) Wide	0	0-2	0-2	0-2	0-2
7221	Bars and rods of stainless steel, hot-rolled, in irregularly wound coils	0	3	3	3	3
7222	Bars and rods of stainless steel nesoi; angles, shapes and sections of stainless steel	0	0-3	0-3	0-3	0-3
7223	Wire of stainless steel	0	0	0	0	0
7224	Alloy steel (other than stainless) in ingots, other primary forms and semifinished products	0	0-14	0-14	0-14	0-14
7225	Flat-rolled alloy steel (other than stainless) products, 600 mm (23.6 in.) Or more wide	0	0-6	0-6	0-6	0-6
7226	Flat-rolled alloy steel (other than stainless) products, less than 600 mm (23.6 in.) Wide	0	0-6	0-6	0-6	0-6
7227	Bars and rods of alloy steel (other than stainless), hot-rolled, in irregularly wound coils	0	3-8	3-8	3-8	3-8
7228	Bars and rods nesoi, angles, shapes and sections of alloy steel (other than stainless); hollow drill bars and rods, of alloy or nonalloy steel	0	0-10	0-10	0-10	0-10
7229	Wire of alloy steel (other than stainless)	0	0	0	0	0

Source: Turkish Iron and Steel Producers Association

4.4 Main Challenges for the Turkish Steel Industry and SWOT Analysis

To be able to analyze the competitiveness of the Turkish steel industry, the strengths and weaknesses have to be investigated.

The strengths of the Turkish steel sector are mainly due to its proximity to important markets, low labor costs, the experience accumulated by the Turkish entrepreneurs, the modern infrastructure, and up to date technology in existing facilities.

On the other hand the Turkish steel industry has also some weaknesses. These are; high electricity prices and inadequate raw materials, macro economic instability and cyclical fluctuations, and long/flat product bias or in other words unbalanced capacity structure in production. *(T.R Prime Ministry State Planning Organization (SPO), February 2004, p.63 & 64)*

The above mentioned factors are the main strengths and weaknesses of the sector in general. However, SWOT analysis must be conducted for flat and long products separately to make a complete investigation of the sector. The following chart displays the SWOT analysis for long and flat products separately.

Long Products

Strengths:	**Weaknesses**
− Strong demand and consumption in domestic market	− High input costs, especially energy costs
− Dynamic structure of companies	− Proving major part of raw materials through imports
− New and modern technologies in the majority of existing plants	− Highly competitive environment due to imports of sub-quality and cheap products and high number of producers in the domestic market
− Potential demand in infrastructure and construction sectors	− Abolishment of government investment incentives
− Harmonization with EU regulations	− High inland transportation costs for the producers not located on the seaside
− Actions to enhance the conditions for investments	− High labour costs compared with the international counterparts like China and India.
− Advanced technical know-how	− Low profit margins in comparison with international rivals
	− Inefficient use of transport channels in the domestic market
	− Inadequate customer oriented marketing activities

Opportunities	Threats
− Initiation of EU accession negotiations − Expectation of approval of the National Restructuring Program by the EU Commission − The sector's gaining an entirely private ownership structure	− Continuity of net-exporter position of China − Increase of China's raw material consumption in parallel with its increasing crude steel production − Possibility of refusal of the National Restructuring Program by the EU Commission − Free Trade Agreements of EU with the third countries − No state support for the harmonization of the industry with the EU environmental standards

Source: T.R. Prime Ministry State planning Organisation, 2007, p.28

Flat Products

Strengths	Weaknesses
− International competitiveness driven by high technology endowment and expertise, − Focus on the high value-added products in international standards, − Continuous investment culture, − Continuing investments for capacity expansion, − Loyal customer portfolio, − Proximity to developing markets like the Middle East, East Europe and Asia, − Qualified labour-force, − High technical know-how, − High level of environmental consciousness and loyalty to environment protection activities, − Having the certificates of ISO 9001:2000, OHSAS 18001 and ISO 14001	− Inadequate number of steel service centers, − Dependency on imported raw materials and semi-products, − Dependency on monopolies in the production and supply of natural gas and electricity, − High energy costs, − Inadequate usage of railroads for transportation of products

Opportunities	Threats
− Conversion of the production in İSDEMİR to produce flat products,	− Restructuring activities in the steel industries of nearby countries,
− Potential growth in flat product consuming sectors like automotive, white goods, ship building and packaging,	− Investments of international counterparts,
− Potential growth in the consumption of flat products,	− Strong rivals in international markets due to consolidations,
− Low consumption per capita rates in comparison with the developed countries,	− Investments of crude steel producers of CIS countries in vertical integration to supply their own raw material,
− Inadequate supply of domestic flat products production in comparison with the domestic demand,	− Investments of producers from the Middle East and the East Europe to produce high value-added products,
− High potential of growth of automotive sectors in countries of the Middle East and the East Europe,	− Increasing exports of China and India,
− Good relations with the steel industries of nearby countries,	− Scarcity of raw materials in international markets,
− R&D Projects,	− Tremendous increases in raw material prices and uncertainty on prices,
− Plate and armouring steel production,	− Increasing costs due to sensitivity on environmental protection and pressures due to compliance with the Kyoto Protocol,
	− Potential investments during the EU membership accession period,
	− Development of substitute materials for steel

Source: T.R. Prime Ministry State planning Organisation, 2007, p.53

4.5 Actions to Enhance a Sustainable Competitiveness

The Turkish steel industry is facing with intense competition in domestic and international markets. As the number of investments is increasing, the competition gets more severe. In the next five years Turkey will be the second biggest steel producer in Europe after Germany. After these new investments Turkey will continue to be a net exporter of steel products. To be able to keep its position the Turkish steel industry needs to enhance long-term action plans in parallel with the long-term macroeconomic policies.

The main target of long-term macroeconomic policies in Turkey is to provide sustainable economic growth, to decrease the inflation rate to the level of EU requirements and to increase the competitiveness and productivity of the economy. State Planning Organization (SPO) prepares these long-term development plans and annual programs. As mentioned before, the industrial policy is one of the key subjects, because "industrial policy aims to improve the business environment favourable to industrial competitiveness, in which entrepreneurs and enterprises can take initiatives, create opportunities and use their potential" (SPO, August 2003, p. 37). In Turkey, there are some general policies related to the industry. Besides, industrial policy has a horizontal nature and covers policy areas such as foreign trade, investment, technology, quality improvement, environment, labour, SMEs and competition. In addition, due to the specific needs of individual sectors, sectoral policies are also included.

By preparing the development plans, SPO consults all relevant public and private institutions and organisations in each sector to formulate the industrial policy. Based on the industrial policy each sector is investigated by means of Strengths, Weaknesses, Opportunities and Threats. According to the SWOT analysis, strategies, priorities, policies and actions are planned.

In the ninth five-year development plan of Turkey all of the above mentioned plans are made even in sub-sector basis. The long and flat production industries were investigated separately. This plan is for years 2007 – 2013. According to this plan the main goals and policies for the long-products sub-sector are;

- To produce high value-added products
    - The production of higher quality wirerods, structural steels and rails should be increased from its current 30% share among long products over 50%.
- to balance the long - flat production
    - Dependency on imported material should be reduced.
    - Priority should be given to investments regarding flat production.
- to increase the competitiveness of the sector

    - New export markets should be added to the current ones for long producers.

- to finalize the National Restructuring Plan
    - Investments regarding modernization should be completed
    - Number of high value-added products should be increased
    - Productivity should be increased
    - The competitiveness of the sector should be increased.

To be able to reach to these goals the following priorities and actions are planned.

- Energy costs, with priority to electricity costs, should be diminished to the level of OECD countries.
- All extra duties and taxes, which increase the input costs, for the producers should be diminished.
- The pricing on electricity should be classified according to the small, medium and large consumers in parallel with the applications in EU.
- State aids should be given to the sector to reach to the environmental standards of the EU and to support the R&D projects.
- The penalties of the Environment and Forest Ministry should be diminished to a reasonable level and it must be subject to the companies intending to act against the law. (Devlet Planlama Teşkilatı, 2007, p.38)

The main goals and policies for the flat-products sub-sector are;

- To increase flat/long product production ratio from its current (20/80%) position to the level of developed countries (60/40%) and to fulfill a big share of the domestic demand with domestic production.
    - The investments must be planned by taking the growth in flat product consuming sectors like automotive, white goods, ship building, armour and structural production into consideration
    - The investments of flat steel producers to increase the export and productivity enhance the quality, and widening the production range

should be promoted by the state in a way not to create conflict with international obligations.

- To create new strategies and take necessary actions for the sector in parallel with the harmonization of EU regulations.
    - Mergers, acquisitions, consolidations and strategic alliances with partners in EU and in the region should be established to be able to benefit from logistics.
    - Product based strategies should be established to be able to serve to the developing automotive sector in East Europe, Middle East and CIS countries.

To be able to reach to these goals the following priorities and actions are planned.

- All applications (import duties, extra taxes, quotas) and agreements to increase the input costs of the sector should be avoided.
- Energy costs (natural gas, electricity) have to be diminished to the level of OECD countries.
- Investment allowance exception, which allows reducing a specific amount of expenditures from the account of tax assessment, should continue.
- Importance to R&D activities and education should be given, and environment protection projects have to be subsidized by long term credits and investment allowance exceptions.
- Projects related to safety and health at work should be promoted.
- All protective actions of EU against the import of Turkish oriented products should be abolished.
- Producers should be promoted to invest in flat-product production.
- An Iron and steel institute, which will be responsible from developments within the sector, should be established to deal with the problems of the sector. (Devlet Planlama Teşkilatı, 2007, p.60)

Chapter

5 Research on the Turkish Iron and Steel Industry

5.1 Research Design and Methodology

5.1.1 Research Objectives

A competitiveness model for the steel industry is developed based on the literature survey on the theoretical framework, examination of the steel industries in European Union and Turkey, and interviews with the executives of the companies in the Turkish Steel Industry.

The competitiveness model of the Turkish Steel Industry has 8 factors. These are: Cost; Quality; Technology; Accessibility to the Market; Location; Role of Government; Domestic Market and Firm Characteristics. And each of these factors is composed of several variables.

The objective of the survey is to test the significance of each item with the help of their respective variables and to find out the weight of factors affecting the competitiveness of the Turkish Steel Industry.

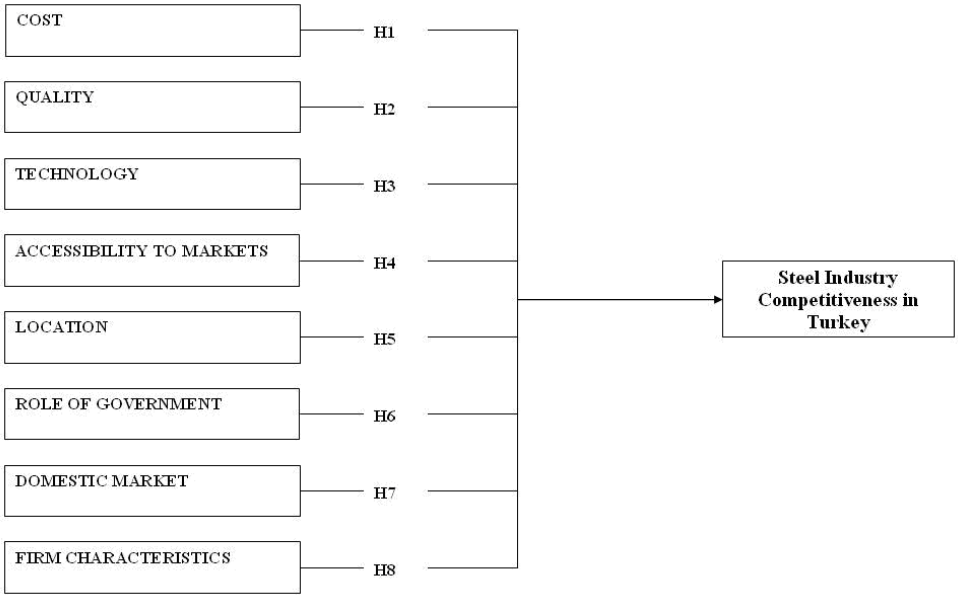
Another objective of this survey is to find out ways and means to enhance the sectoral competitiveness of the Turkish Steel Industry.

5.1.2 Research Questions

1. What are the factors affecting the steel industry competitiveness of the steel industry in Turkey?
2. How can the Turkish Steel Industry increase its competitiveness?

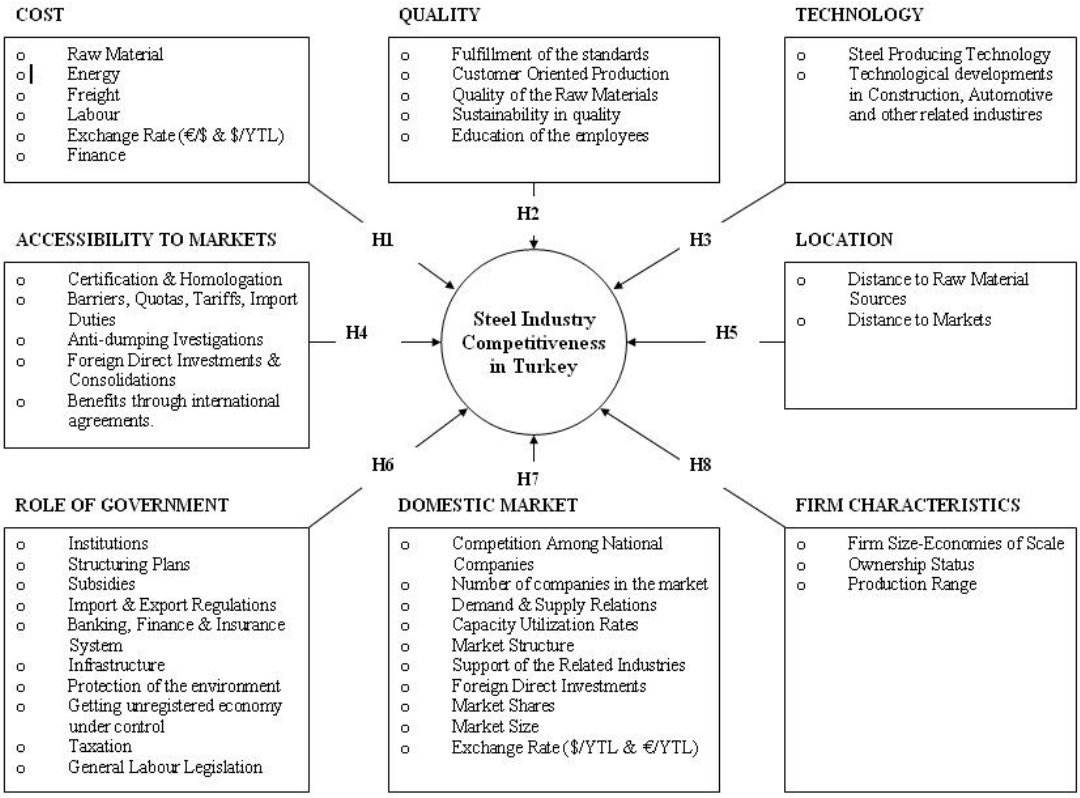
5.1.3 Model

Figure 5.1 Competitiveness Model of the Turkish Steel Industry



Source: Constructed by the author

Figure 5.2 Competitiveness Model of the Turkish Steel Industry in detail



Source: Constructed by the author

5.1.4 Hypotheses

The following hypotheses are developed based on the literature review and the proposed conceptual model.

H1: There is a positive relationship between cost and steel industry competitiveness in Turkey

H2: There is a positive relationship between quality and steel industry competitiveness in Turkey

H3: There is a positive relationship between technology and steel industry competitiveness in Turkey

H4: There is a positive relationship between accessibility to markets and steel industry competitiveness in Turkey

H5: There is a positive relationship between location and steel industry competitiveness in Turkey

H6: There is a positive relationship between role of government and steel industry competitiveness in Turkey

H7: There is a positive relationship between domestic market and steel industry competitiveness in Turkey

H8: There is a positive relationship between firm characteristics and steel industry competitiveness in Turkey

5.1.5 Questionnaire Development and Data Collection Method

The data collection was based on a structured questionnaire (see Appendix B). The questions in the questionnaire are drawn from items used in the literature to describe the factors employed in the theoretical model.

The questionnaire is composed of four parts. In the first part, descriptive questions took place to be able to get some detailed information about the companies. Questions in the first part contain nominal, ordinal, and ratio data. These questions are:

- Products of the company
- Type of raw-materials used
- Company's duration of operation in this sector
- Production capacity
- Number of employees
- Legal structure of the company
- Raw-material sources and its percentages as domestic or import
- Sales markets its percentages as domestic or export

In the second part, testing the significance and importance of the factors are aimed. The model is composed of eight factors and each of the factors is composed of variables as illustrated in the detailed model. The importance of each variable is asked by means of its effect on the company's competitiveness. To be able to measure their importance a 5-step Likert scale is used. The tested competitiveness factors are:

- Cost
- Quality
- Technology
- Accesiblity to Markets
- Freight
- Role of Government
- Domestic Market, and
- Firm Characteristics

In the third part is it aimed to find the weights of each competitiveness factor among others. 15 major concerns of the sector are chosen with the interviews of the sectors executives. These concerns are linked with the factors and the respondents are asked to mention and rank five of the major factors among those. With this method it is aimed to find out the importance of the factors from constraints that the companies are facing in their daily business life. These constraints are:

- Distance to raw-material sources
- Distance to markets
- Costs (Raw-material – Labour – Energy – Freight – Finance)
- Fluctuations on the exchange rate
- Demand – Supply relation in the domestic market
- Demand – Supply relation in the international markets
- Product Quality
- High quality standards in target markets
- Extra cost of entering in new markets (certifications, homologations)
- Difficulties in entering new markets (certification, quotas & taxes)
- Value-add by the production
- Subsidies
- Steel producing technology
- Technological developments in Construction, Automotive, White Goods and other related industries
- Your Production Range

The fourth part aims to find out way and means to enhance the sectoral competitiveness of the Turkish Steel Industry. In question 21, 3 proposals were presented to the respondents to choose among from and to assert their own personal opinion. These proposals are:

- To produce more value added products both on long and flat product groups.
- Enlargement of production ranges by producers to be able to produce or supply their own raw materials (Vertical Integration)
    - Investment on raw steel production for re-rollers,
    - Investment on iron & coal mining for integrated mills,

- Investment on scrap collection & preparation for mini-mills based on Electric Arc Furnace steel production.

- Correction of the unbalanced demand & supply position of long – flat production in favour of more value-added flat products.

Data, which are needed to test the hypotheses stated in the Hypothesis Statement section, is collected from the executives of the crude steel producers and Re-rollers. By means of the questions in the questionnaire an overview of the company in general is needed, therefore the general managers, board members, account managers, or the sales managers are targeted. These executives were contacted by phone in advance before the questionnaires had been sent to them by E-mail or fax. It is noted that some questionnaires are filled by the specialists or engineers. In fact the questionnaires are sent to the executives and they delegated the filling of these questionnaires to them.

5.1.6 Sampling

Steel industry, under the scope of this study, covers only the materials mentioned in the European Coal and Steel Community Treaty. Within this scope there are 22 crude steel producers (19 EAF based mini-mills and 3 integrated mills) and 270 processors or Re-rollers in Turkey. The capacities of the crude steel producers are according to the figures of Turkish Iron and Steel Producers Association given in the in the Table 4.6. The total capacity of them for each group in 2007 is given in the Table 5.1.

Table 5.1 Capacities of companies in the Turkish Steel Industry

Producer Type	Number of Companies	Capacity (tonnes)
Crude Steel Producers (Integrated & EAF Based mini-mills)	22	32,008,000
Processors (Re-rollers)	270	6,500,000
Total	292	38,508,000

Source: Compiled by the author according to the figures of Turkish Iron and Steel Producers Association and the State Planning Organization.

The study is conducted among the companies of the Turkish Steel Industry. Based on the State Planning Organization report of 2007, 40% of the above mentioned Re-rollers are working with less than 50% capacity. And most of the remaining ones have a very small capacity. Therefore, in addition to the full list of crude steel producers, the list of 40 major Re-rollers, taken from the Turkish Iron and Steel Producers Association, are taken as the sampling frame. The sampling frame consists of 22 Crude Steel Producers and 40 Re-rollers. The questionnaires have been sent out to the executives of each company.

17 out of 22 crude steel producers and 19 out of 40 Re-rollers responded to the survey. The attendance of Re-rollers to the survey looks quite low, but by means of the represented capacities in their group it is 71.81 %. For the crude steel producers the represented capacity is 91.37%. As of total, these 36 companies represent 87.55% of the Turkish steel industry by means of announced capacities. The capacities of the crude steel producers are not based on their own responses but based on the figures given in the Table 4.6 to be able to find the coverage of the survey by means of capacity by using the same information source. The total capacities of companies responded to the survey for each group are given in the Table 5.2.

Table 5.2 Capacities of companies in the Turkish Steel Industry responded to the survey

Producer Type	Number of Responding Companies	Total Number of Companies	Capacity of Responding Companies (tones)	Total Capacity (tonnes)
Crude Steel Producers (Integrated & EAF Based mini-mills)	17	22	29,245,600	32,008,000
Processors (Re-rollers)	19	270	4,668,000	6,500,000
Total	36	292	33,713,600	38,508,000

Compiled by the author according to the findings of the questionnaire

The names of the companies, which were stated in the survey, their capacities, the regions that they are operating, the position of the persons in companies, who filled

the questionnaires, are given in the Table 5.3. Diler & Yazıcı Demir Çelik belongs to the same group. Therefore, the questionnaires were filled by them by covering the figures of both mills. The survey took place in the 4th quarter of 2007. The capacity figures in this Table are given according to the responses to the questionnaire, which may not completely comply with the official reported capacities given in the Table 4.6.

Table 5.3 Companies responded to the survey

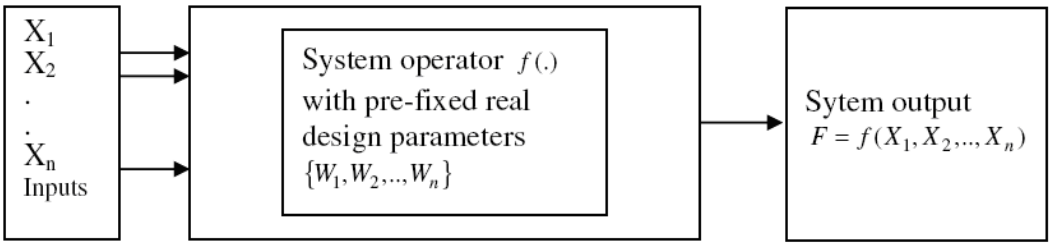
	Company Name	Capacity (tonnes)	Location	Title
Crude Steel Producers	**Çebitaş**	750.000	İzmir	Vice Chairman of Executive Board
	Çemtaş	150.000	Bursa	Deputy General Manager (Technical)
	Çolakoğlu Metalurji	3.000.000	Kocaeli	General Manager
	Diler & Yazıcı D.Ç.	2.500.000	Kocaeli & İskenderun	Export Manager
	Ege Çelik	1.900.000	İzmir	Marketing & Sales Manager
	Ekinciler	1.250.000	İskenderun	Research & Development Engineer
	EREGE Metal	700.000	İzmir	Chief of Meltshop
	Habaş	2.700.000	İzmir	Marketing Manager
	İçdaş	3.200.000	Çanakkale	Export Manager
	İzmir D.Ç.	1.200.000	İzmir	Export Manager
	Kaptan D.Ç.	1.500.000	Çanakkale	Sales Manager
	Kroman	1.100.000	Kocaeli	Chief of Sales
	Nursan	800.000	İskenderun	Director of Foreign Trade
	Sivas D.Ç.	450.000	Sivas	
	Ereğli Demir Çelik	3.100.000	Ereğli	Specialist
	İskenderun Demir Çelik	2.200.000	İskenderun	Industrial Engineer
	Kardemir	1.000.000	Karabük	Chief of Import Division
Processors (Re-rollers)	**Akın Haddecilik**	100.000	Denizli	General Manager
	Çağ Çelik	200.000	Karabük	General Manager
	Çelsentaş	90.000	Karabük	Factory Manager (Board Member)
	Demirsan	300.000	Kocaeli	Chairman of Executive Board
	Dört Yıldız	300.000	Aliağa	Factory Technical Manager
	Efesan	200.000	İstanbul	Sales Representative
	Erhallar	90.000	Karabük	Sales Manager
	İlhanlar	500.000	İskenderun	Sales Manager
	Kardemir Haddecilik	250.000	Denizli	Foreign Trade Specialist
	Kocaer	360.000	İzmir	Deputy Export Manager
	Körfez	120.000	İstanbul	Chief of Marketing Department
	Kürüm	300.000	İstanbul	Chief of Sales
	Mescier	120.000	Karabük	General Manager
	Nihat Uyar Haddecilik & Çedesan	50.000	İstanbul	Accounting Manager
	Paymetal	400.000	İskenderun	Financial Manager
	Saka D.Ç.	48.000	Karabük	Chief of Sales
	Serhat Haddecilik	90.000	Karabük	Member of Board
	Sıddık Kardeşler	150.000	İskenderun	Sales Manager
	Borçelik	1.000.000	Gemlik	Export Manager

Source: Compiled by the author according to the findings of the questionnaire

5.1.7 Data Analysis Methodology

A multi-component and multi-dimensional mathematical model of the competitiveness model of the steel industry has been developed in this thesis. To be able to test this competitiveness model, a multi-dimensional mathematical model is used. Multi dimensional mathematical models provide macroscopic view to investigate the occurrence of the events or perception of concepts under consideration by examining the effects of various variables. The schematic illustration of the competitiveness model of the steel industry is given in the Figure 4-1. The function F = f(.) under this study reflects the competitiveness of the Turkish Steel Industry as a function of independent input variables designated by {X_1, X_2, ..., X_n} and the system parameters {W_1, W_2, ..., W_n}. The steel industry competitiveness model is supported by eight factors (set of variables) therefore n = 1 to 8. These factors are cost, quality, technology, accessibility to markets, location, role of government, domestic market, and firm characteristics. So let the utility function F designated as F=f(X_1, X_2, ..., X_8; W_1, W_2, ..., W_8).

Figure 5.3 Mathematical Model for an n-Dimensional System



The steel industry competitiveness depends on the performance of the companies for each factor. But each factor has a different weight on the steel industry competitiveness. The weights of factors are designated as W_i. And the component based – performance measure score for each factor is designated as X_i. The aim of this study is to find out the weight of the competitiveness factors, which are designated as pre-fixed real design parameters {W_1, W_2, ..., W_n} given in the Figure 4-3. Simple additive weighting (SAW) method which is also known as weighted linear combination or scoring methods is used as a multi-attribute decision technique (Yoon and Hwang, 1995, p.32). The method is based on the weighted average. Let X_i be the major factor, which constitutes the performance measure such

that X is the performance score. $F = X = W_1 . X_1 + W_2.X_2 + \ldots\ldots\ldots\ldots + W_n . X_n$. So $F = \Sigma W_i.X_i$, where i=1 to 8.

X_i is the performance of the steel industry for each factor, but evaluating the competitiveness only by means of these eight factors might give only a rough idea. Therefore, the model is detailed by adding the variables for each group as shown in the Figure 4-2. The evaluation of the variables by the companies operating in the steel industry will give us a more appropriate approach. Let α_{ij} be the performance measure score for each variable and let w_{ij} be the weight of each variable. In that sense $Xi = \Sigma \alpha_{ij} . w_{ij}$, where i=1 to 8 and j = 1 to n. "n" represents the number of variables for each factor. Under this approach, by adding the effect of variable in to the model, the shematic illustration of the equation is given in the Figure 4-4.

Figure 5.4 Shematic Illustration of the Equation for the Steel Industry Competitiveness Model

$$\mathbf{Y} = \begin{pmatrix} \alpha_{11} . w_{11} + \alpha_{12} . w_{12} + \ldots\ldots\ldots\ldots + \alpha_{1n} . w_{1n} \\ \alpha_{21} . w_{21} + \alpha_{22} . w_{22} + \ldots\ldots\ldots\ldots + \alpha_{2n} . w_{2n} \\ \vdots \quad\quad \vdots \quad\quad\quad\quad \vdots \\ \alpha_{81} . w_{81} + \alpha_{82} . w_{82} + \ldots\ldots\ldots\ldots + \alpha_{8n} . w_{8n} \end{pmatrix} \cdot \begin{pmatrix} W_1 \\ W_2 \\ \vdots \\ W_8 \end{pmatrix}$$

Source: Constructed by the author

There are 43 variables in this model. These variables were requested to be evaluated by the respondants by means of their effects on their company's competitiveness performance. To be able to find the weights of variables rating method is applied. Questions with 5-step likert scale are used to get this information.

On the other hand, the weights of each factor is evaluated from the data gathered by the question 15. 15 major concerns of the sector are chosen with the interviews of the sectors executives. These concerns are linked with the factors and the respondents are asked to mention and rank five of the major factors among those. Here the ranking method is used to find the weights of the factors within the model. With this

method it is aimed to find out the importance of the factors from constraints, which companies have to encounter in their daily business life.

To be able to find the weights of each factor, the weighted average of each factor was calculated. Let β_j be the range proposed to the people who fills the questionnaire. We prefer to select β_j such that $1 \leq \beta_j \leq 5$ and α_j is integer. Therefore the respondents are asked to mention and rank five of the major concerns of the sector that are linked with the factors.

Let N_i be the number of respondents who voted for the β_j score corresponding to factor X_i. So Let $N_{Ti} = \Sigma N_{ij}$, where i = 1 to 8 and j = 1 to 5. Then we can form the following Table designated as Table 5.3 to compute the weighted average of factor preferencies W_i.

Table 5.4 Sample Table to Compute the Weighted Average of Factor Preferencies W_i

		β_1 1 =	$\beta_2 = 2$	$\beta_3 = 3$	$\beta_4 = 4$	$\beta_5 = 5$	Number of Persons (N_T)
Attributes	X_1	N_{11}	N_{12}	N_{13}	N_{14}	N_{15}	N_{T1}
	X_2	N_{21}	N_{22}	N_{23}	N_{24}	N_{25}	N_{T2}
	X_3	N_{31}	N_{32}	N_{33}	N_{34}	N_{35}	N_{T3}
	X_4	N_{41}	N_{42}	N_{43}	N_{44}	N_{45}	N_{T4}
	X_5	N_{51}	N_{52}	N_{53}	N_{54}	N_{55}	N_{T5}
	X_6	N_{61}	N_{62}	N_{63}	N_{64}	N_{65}	N_{T6}
	X_7	N_{71}	N_{72}	N_{73}	N_{74}	N_{75}	N_{T7}
	X_8	N_{81}	N_{82}	N_{83}	N_{84}	N_{85}	N_{T8}
					Total		**N_T**

Source: Constructed by the author

Let $\overline{\beta_i} = (1 / N_{Ti}) . \Sigma \beta_j . N_{ij}$ $\beta_j = j$ is an integer ranges between 1 and 5. So, $\overline{\beta_i} = (1 / N_{Ti}) . \Sigma (j) . N_{ij}$ where i = 1 to 8 and j = 1 to 5.

As 1 is the most preferred and 5 is the least, the inverse of the result have been taken. To be able to weight the importance of each factor, these numbers were multiplied by the percentage of responses over the total number of responses. By dividing each of

these results in to the sum of them gave us the percentages (weights) of each factor. $W_i = (1 / \overline{\beta_i}) . (N_{Ti} / N_T) / \Sigma ((1 / \overline{\beta_i}) . (N_{Ti} / N_T))$, where i = 1 to 8. This methos is detailed with an example in the Findings of the Research part of this thesis.

Due to the differences in the production capacities of the mills, crude steel producers and re-rollers are taken separately into evaluation. While performing these tests, the significant differences for each factor among both groups are tested with the independent samples t-test for the questions with interval and ratio data.

The objective of the survey is to test the significance of each item with the help of their respective variables and to find out the weight of factors affecting the competitiveness of the Turkish Steel Industry. Therefore the performance scores are not taken into consideration in this research.

As mentioned above Simple Additive Weighting Method is based on the weighted average. An evaluation score is calculated for each alternative by multiplying the scaled value given to the alternative of that factor with the weights of relative importance directly assigned by decision maker and then summing these values for all criteria. A survey could be applied to score the alternatives by means of the variables handled in this model. And then by using the model and the founded weights in this survey, the scores of them could be compared by means of steel industry competitiveness.

5.2 Findings of the Research

As mentioned in the part 2.2.2.1. of this study there are two major methods to produce steel: Out of iron ore and coal with the preliminary method and out of scrap with the secondary method. All 3 mills which use the preliminary method have responded to the questionnaire. Those mills are the only ones, which are using iron ore as raw material. Coal is mainly used in the preliminary method in large amounts, but it is also used in the ladle furnace in EAF mini-mills to achieve the desired chemical composition in steel production. As shown in Table 5.5, 7 mills out of 17 mills reportedly use coal as raw material. In fact all mills producing steel with Electric Arc Furnace (EAF) are using coal, but compared to the usage of scrap it has

a low percentage as raw material. Therefore some of the mills have neglected to report it as raw material.

Scrap is used as raw material mainly in the EAF based mini-mills but also in all integrated mills. Therefore all 17 crude steel producers, including the integrated mills, have marked scrap as raw material. Due to high rolling capacity compared to their crude steel production capacity, 3 of the crude steel producers are using billets as raw material. But it is mainly used as raw material by the Re-rollers. Therefore all re-rollers except Borcelik Çelik Sanayi Ticaret A.Ş. (BORÇELİK) marked billet as the raw material of their choice. They use it to roll either reinforcing bars, profiles, rounds or squares. Only BORÇELİK as a re-roller is using hot rolled coils as raw material to produce cold rolled coils and galvanized coils.

Table 5.5 Usage of Raw Materials by Producer Groups

	Crude Steel Producers		Re-rollers		Total
Iron Ore	3	100,00%	0	0,00%	**3**
Coal	7	100,00%	0	0,00%	**7**
Scrap	17	100,00%	0	0,00%	**17**
Billet	3	14,29%	18	85,71%	**21**
Hot Rolled Coil	0	0,00%	1	100,00%	**1**

Source: Compiled by the author according to the findings of the questionnaire

16 out of 17 crude steel producers are producing billets as shown in the Table 5.5. Ereğli Demir Çelik A.Ş. is the only mill which is not producing billets. (Please note that in this survey due to the size and location of the mills questionnaires were sent both to Ereğli Demir Çelik A.Ş. (ERDEMİR) and İskenderun Demir Çelik A.Ş. (İSDEMİR) although both of them are under the same ownership after the take-over of İSDEMİR by ERDEMİR in 31.01.2002. In fact due to the take-over of İSDEMİR, ERDEMİR is also producing billets.)

Wirerod is produced by 7 mills. Wirerod is a semi-product, which is used in the production of wire-mesh, wire, nail and bolts. Due to the dependence on the crude steel producers for billets as raw material, and due to the limited number of customers in the domestic market, re-rollers do not prefer to produce wirerods. And in addition to that fact they do not have a chance to compete with large crude steel producers in such a limited market because of the economies of scale factor they fail

to catch. Therefore all of the wirerod producers are crude steel producers. Instead of wirerod, re-rollers focused mainly on the production of reinforcing bars, profiles, flat, angles, rounds and squares.

26 out of 36 mills are producing reinforcing bars as the period under survey (Table 5.6). Because of the mass production and the advantages that arise out of economies of scale, most of the crude steel producers are producing reinforcing bars. Within 26 mills there are 14 crude steel producers and 12 re-rollers. The re-rollers are trying to be specialised on different product categories, and on the production of smaller diameter reinforcing bars, which the big mills do not prefer to produce because of the reduction on the productivity as 8mm reinforcing bars production generate more material loss. From point of view of the number of companies, re-rollers seem to be more focused on the profile – flat and angle production then the steel producers. As shown in the Table 5.6 there are 9 re-rollers producing those products, whereas this number is only 4 on the steel producer's side.

Table 5.6 Products by Producer Groups

		Crude Steel Producers			Re-rollers			Total
Long Products	**Billet**	16	100,00%	**16**	0	0,00%	**18**	**16**
	Wirerod	7	100,00%		0	0,00%		**7**
	Reinforcing Bar	14	53,85%		12	46,15%		**26**
	Profile - Flat - Angle	4	30,77%		9	69,23%		**13**
	Slab	3	100,00%		0	0,00%		**3**
	Round	2	50,00%		2	50,00%		**4**
	Square	1	33,33%		2	66,67%		**3**
	Plate	1	100,00%		0	0,00%		**1**
Flat Products	**Hot Rolled Coil**	1	100,00%	**1**	0	0,00%	**1**	**1**
	Cold Rolled Coil	1	50,00%		1	50,00%		**2**
	Galvanised Coil	1	50,00%		1	50,00%		**2**
Total				**17**			**19**	

Source: Compiled by the author according to the findings of the questionnaire

As seen from the figures of Table 5.6, most of the mills in Turkey are concentrated on the production of long products, which contain billets, reinforcing bars, profiles, flats, angles, rounds and squares. These products are mainly low-value added products and the end usage of these products is mainly the contraction industry. 16

out of 17 crude steel producers and 18 out of 19 Re-rollers are producing long products.

The flat products on the other hand are mainly more value-added products and used mainly in the automotive sector, white goods, pipe, ship building and other related industries. The production of flat products, which contain slabs, hot rolled coils, cold rolled coils, galvanised coils and plates, is limited to a few number of companies. As shown in Table 5.6, 3 out of 17 crude steel producers are producing flat products. And there is only one out of 19 Re-roller which is currently producing flat products. ERDEMİR, İSDEMİR and Çolakoğlu Metalurji A.Ş. (ÇOLAKOĞLU) are the only mills in Turkey, which are producing slabs. ERDEMİR is also the only company in Turkey which is producing hot rolled coils. Cold Rolled Coils production is available only in ERDEMİR and BORCELİK in Turkey.

Regarding the time length the companies display in the steel production, Karabük Demir Çelik is the oldest, which date back to 1939. The foundations of Turkish industrialization were laid in the 1930s in parallel with the establishment of first the integrated Iron and Steel Works in Karabük. Almost all of other crude steel producing companies have been established during 1970's and 1980's. For Re-rollers the trend comes much later, in parallel with the increase in demand in the domestic market. Most of the re-rollers have been established during 1980's and 1990's. The distribution of the age of the companies among crude steel producers and re-rollers are given on Table 5.7. The age of the companies are distributed on 10 years interval time scale. As it could be seen during the last decade, not so many new companies entered the market. But the steel industry has mainly grown up by the investments for capacity expansions.

Table 5.7 Age of the Company Cross-Tabulation

		Age of the company					Total
		0 - 10 years	11 - 20 years	21 - 30 years	31 - 40 years	40+ years	
Type	Crude Steel Producer	1	1	4	6	5	17
	Re-roller	1	7	8	2	1	19
Total		2	8	12	8	6	36

Source: Compiled by the author according to the findings of the questionnaire

As most of the mills are producing almost the same products, differentiation is achieved mainly on service quality and price. The capacities of mills have a high importance on variable costs and therefore the price of the products. The economies of scale, as it indicates greater volume of production, tend to create cost advantage ensuring competitive prices for producers operating under economies of scale. Especially on the long product side, the qualities are mainly commercial qualities and it is well defined by international standards. Therefore product quality is not the main aspect to be differentiated. Service quality and reputation in the market is an important aspect to be chosen among others. But it is my contention that at the end, the competitive price has a higher importance than all the others for the customers. This is also the reason why most of the producers are trying to increase their capacity on the long product side, although the total supply is much more than the total demand in domestic market. They are trying to be competitive by getting the benefit out of economies of scale and reducing their costs, so that they can easily adjust their prices according to the global market conditions, without making much sacrifice in their profit margins.

Most of the crude steel producers in Turkey have a capacity higher than one million mt. The number of mills exceeding one million mt is 11 out of 17 and 6 of them have more than 2,000,000 mt capacity, whereas the capacity of most Re-rollers change mainly between 100,000 and 400,000 mt. The results of Robert P. Rogers' research on "The minimum optimal steel plant and the survivor technique of cost estimation" shows that minimum optimal scale for conventional integrated steel mill in the United States is 6 million tonnes per year. The basis for this estimate is that the MOS for the modern blast furnace is roughly 3 million tones per year, and a mill needs two such furnaces to maintain a continuous flow of product. Repair and maintenance requires that one furnace be out of production for considerable periods of time. (Rogers, 1993, p.1). And Paul Crompton and Jean-Baptiste Lesourd's research on "Economies of Scale in the Global Iron-Making Industry" in the Chinese steel industry shows that a rough estimate of the breakeven scale of an integrated mill, where costs equal revenue, is 4.5 million tones per year (Crompton and Lesord, 2004, p.7). With the latest investments on capacity expansion Ereğli Demir Çelik and İsdemir reached to 3 and 5 million tones crude steel production capacity respectively. There is no research on the optimum size for Electric Arc Furnace based mini-mills,

but recent projects aim minimum 2 - 3 million tones of crude steel production annually. With the latest investments Çolakoğlu, Diler (including Yazıcı plant), Habaş and İçdaş exceeded 3 million tones crude steel production capacity. The distribution of recent capacities among crude steel producers and re-rollers are given on Table 5.8.

Table 5.8 Production Capacity Cross-Tabulation

		Production Capacity					Total
		0 - 200.000 mt	200.001 - 500.000 mt	500.001 - 1.000.000 mt	1.000.001 - 2.000.000 mt	2.000.000+ mt	
Type	Crude Steel Producer	1	1	4	5	6	17
	Re-roller	11	7	1	0	0	19
Total		12	8	5	5	6	36

Source: Compiled by the author according to the findings of the questionnaire

As the capacities are higher on the crude steel producers than the Re-rollers, also the numbers of people employed in those mills are much higher than the re-rollers. As shown in Table 5.9, most crude steel producers have more than 1,000 employees. 6 of them have higher than 1,500 employees in their mills. This number does not exceed 1,000 employees in re-rollers. Most of the re-rollers have around 200 employees. Only 2 rolling mills exceed 500 employees level.

Table 5.9 Number of Employees in Companies Cross-Tabulation

		How many employees do you have in your company?							Total
		1-50	51 - 100	101 - 200	201 - 500	501 - 1000	1001 - 1500	> 1500	
Type	Crude Steel Producer	0	0	0	2	6	3	6	17
	Re-roller	1	6	6	4	2	0	0	19
Total		1	6	6	6	8	3	6	36

Source: Compiled by the author according to the findings of the questionnaire

As for the ownership status of steel producers in Turkey, the Turkish steel industry is mainly dominated by the family owned companies. There are two state-private partnership companies (Sivas Demir Çelik & Körfez Haddecilik, and there is only one domestic – foreign partnership company operating in the market. 6 out of 36 companies have shareholders and they are quoted in the Istanbul Stock Exchange.

But in reality the majority of the shares still belong to the families and the management decisions as well. The family owned companies have an advantage on giving their decisions much more quickly than the corporate companies. *In a market, where frequent fluctuations are observed on prices and demand in different markets, the ability of companies to adjust to changes in market conditions is higher in family owned firms. This should be counted as an asset which gives such companies a special competitive edge assuming everything else is constant.*

Table 5.10 Legal Structures of Companies Cross- Tabulation

		Which of the following legal structures suit to your company's current structure?				Total
		Publicly Held	Family Owned	Domestic - Foreign Partnership	State - Private Partnership	
Type	Crude Steel Producer	5	11	0	1	17
	Re-roller	1	16	1	1	19
Total		6	27	1	2	36

Source: Compiled by the author according to the findings of the questionnaire

Although the ownership structure of crude steel producers and the Re-rollers are almost the same, as for the supply sources and their target markets there is a difference. 15 crude steel producers and 18 re-rollers responded to the question regarding their raw material sources. (3 companys did not respond to the question). The results were received as percentages of domestic market and imports by means of the source of their raw material supplies. The results were collected afterwards on 20 percent interval scale as shown in Table 5.11. The same procedure has been applied to the percentage of markets for their sales among export markets and domestic market as shown in Table 5.12.

As indicated in Table 5.11, Crude Steel Producers mainly procure their raw materials, which are scrap, iron ore and coal, from foreign markets. 53% of 15 crude steel producers are procuring 80 % and above of their demand for raw materials through imports. 66% of the same group procures more than 50% of their raw materials from abroad. Contrary to the steel producers, the Re-rollers are getting their raw materials, which are billets, mainly from the domestic market. 66% of 18 Re-rollers are supplying 81 percent and above their procurements of for raw-material

from the domestic market. The share of the Re-rollers, which import more than 50% of their raw material demand is 22%. As seen from these figures the Re-rollers are highly dependent on the crude steel producers. As it would be detailed later on; the percentage of raw material on cost figures are higher on Re-rollers than the crude steel producers. Therefore the Re-roller's competitiveness also depends relatively on the prices they could get from the crude steel producers for their raw material, which are billets.

Table 5.11 Percentage Share of Raw Material among Sources Cross-Tabulation

			Percentage of Raw Material Source					
		Domestic Market	0-20	21-40	41-60	61-80	81-100	Total
		Import	100-80	79-60	59-40	39-20	19-0	
Type	Crude Steel Producer		8	1	3	2	1	15
	Re-roller		2	1	1	2	12	18
Total			**10**	**2**	**4**	**4**	**13**	**33**

Source: Compiled by the author according to the findings of the questionnaire

As the sales of companies are concerned, the situation is not fully parallel to raw material sources. 50% of the steel producers are exporting more than 50% of their production to foreign markets. There are a few mills targeting mainly the domestic market for their sales. The major ones are Ereğli Demir Çelik and İskenderun Demir Çelik. ERDEMİR is producing flat products and İSDEMİR is transforming from long to flat products and producing semi products such as slabs, for the production of flat products. Their capacity is not sufficient enough to expand their production for exports; although total capacities of both mills exceed 5,000,000 mt annually. It is due to the insufficient capacity in Turkey for the flat products. Therefore their production is for the domestic market. Sivas Demir Çelik and Kardemir are also targeting mainly the domestic market. The reason is due to the location of their mills. Sivas Demir Çelik is in inland far away from any seaport and Kardemir is supplying its billets to the re-rollers nearby; selling their reinforcing bars to the region and they are the only producer of rails for railroad constructions. Therefore, they have a niche market. All other steel producers, which are not specialised on a certain niche product are exporting most of their production.

The re-rollers are mainly focused on the domestic market in terms of their sales activities. While 66% of the re-rollers procure more than 80 percent of their raw material from domestic market, on the sales side the share of domestic market for 80% and up of the same group is only 47%. Only 21% of the 19 Re-rolles are exporting more than half of their production. Those companies are mainly producing more value added products like merchant bars, profiles, angles and flats or they are working as sub-contractors for steel producers to roll 8 mm reinforcing bars that the crude steel producers do not prefer due to the reduction in their productivity.

Table 5.12 Percentage Shares of Markets for the Sales and Type of Producer Cross- Tabulation

			Percentage of Markets for Sales					
		Domestic Market	0-20	21-40	41-60	61-80	81-100	Total
		Export	100-80	79-60	59-40	39-20	19-0	
Type	Crude Steel Producer		2	5	3	2	4	16
	Re-roller		2	2	2	4	9	19
Total			**4**	**7**	**5**	**6**	**13**	**35**

Source: Compiled by the author according to the findings of the questionnaire

As for the specific market sources of raw material that companies use, 15 out of 17 crude steel producers and 18 out of 19 re-rollers responded to the question. The main sources of raw materials for the crude steel producers are the European Union (EU 15), the countries of America and the Black Sea Region countries and the Eastern Europe. The details are given on Table 5.13. As for the three main raw materials, which are used by the crude steel producers, integrated mills import iron ore and coal, whereas the EAF based mini-mills import scrap, pig iron and relatively small amounts of coal. The main suppliers of iron ore on global markets are Brazil, Australia, Canada and the U.S. There are only 3 integrated mills in Turkey, which are using iron ore as raw material. The majority of the mills by means of the number of companies are producing steel with EAF based mini mills. Therefore those countries mentioned above are not necessarily suppliers of raw materials for EAF based mini-mills. The raw material of the EAF mills is mainly the scrap. The scrap is created either out of the industry as industrial scrap or by means of the demolishing scrap. In that sense the industrial scrap is supplied mainly by the developed countries

like the European Union and the U.S. whereas the Black Sea Region countries and the Eastern European countries are main suppliers of demolishing scrap.

Table 5.13 Ranking of Foreign Raw Material Sources for Crude Steel Producers

		Ranking						
	IMPORT	1	2	3	4	5	6	Total
Crude Steel Producer	Black Sea Countries and East Europe	4	2	6	1	1	0	14
	Europe (EU15)	7	3	1	1	0	0	12
	America	2	7	2	0	0	0	11
	Middle East	0	0	0	4	1	0	5
	Far East	0	0		1	2	0	3
	Others	1	0	2	1	0	0	4
		14	12	11	8	4	0	

Source: Compiled by the author according to the findings of the questionnaire

On the other hand the Re-rollers prefer mainly Black Sea Region countries and Eastern Europe as import sources due to the proximity and the size of the shipments. The details are given in the Table 5.14. With the increase on the oil prices, the freight rates reached to record high levels, therefore as the import shipments of re-rollers are much smaller in size compared to the shipments of imports of crude steel producers the imports from nearby countries are much more feasible for them. The main raw material of the re-rollers is billets. There is only one company among the attending companies to the survey, which is using hot rolled coils as the raw material. All others are using billets to roll reinforcing bars and merchant bars.

Table 5.14 Ranking of Foreign Raw Material Sources for Re-rollers

		Ranking						
	IMPORT	1	2	3	4	5	6	Total
Re-roller	Black Sea Countries and East Europe	11	0	0	0	0	0	11
	Europe (EU15)	1	1	0	0	0	0	2
	America	0	0	1	0	0	0	1
	Middle East	0	0	0	0	0	0	0
	Far East	0	1	0	0	0	0	1
	Others	0	1	0	0	0	0	1
		12	3	1	0	0	0	

Source: Compiled by the author according to the findings of the questionnaire

The means of crude steel producers and Re-rollers by means of their percentage of raw material sources and sales markets are given in the Table 5.15. As it could be seen also from these figures, the crude steel producers are procuring most of their material from foreign countries, whereas the Re-rollers are procuring most of their raw material need from the domestic market. Also on the sales figures the crude steel producers are more focused to foreign markets than the Re-rollers.

The main reason for the dependency of the Re-rollers on domestic suppliers for the billets is the 22.4% import tax, which is applied to imports from third countries except the countries mentioned in the Table 4.16. Only those companies, which use those billets to export their final products to third countries, are exempted from this import tax under the scope of inward processing regime.

Short delivery time and minimum quantities, which may be ordered from nearby domestic mills are also affecting their decision on their procurements. The minimum quantity, which may be imported even from the nearest countries, is a couple of thousand tones, whereas from the nearby crude steel producers they can buy even on truck basis. In these days, where the market prices are fluctuating a lot, the Re-rollers are trying to procure their raw materials in parallel with their sales without taking too much position like their end-users.

And the last but not the least important factor is the payment conditions. From the domestic crude steel producers they can procure with performance bonds, checks or even on open account basis, whereas for the international suppliers they have to open a letter of credit or buy in cash.

Table 5.15 The Arithmetic Means of Percentage of Raw Material Sources and Sales Markets for Crude Steel Producers and Re-rollers

		Percentage of Domestic Market as Raw Material Source	Percentage of Import as Raw Material Source	Percentage of Domestic Market among sales	Percentage of Foreign Markets among sales
		Mean	Mean	Mean	Mean
Type	**Crude Steel Producer**	36,67%	63,33%	56,14%	43,86%
	Re-roller	76,94%	23,06%	73,68%	26,32%

Source: Compiled by the author according to the findings of the questionnaire

The descriptive statistics of both groups by arithmetic means of percentages on raw material sources and sales markets are given in the Table 5.16.

Table 5.16 Percentage Shares of Raw Material Sources and Sales Markets of Crude Steel Producers and Re-rollers

	Type	N	Mean	Std. Deviation	Std. Error Mean
Percentage of Domestic Market as Raw Material Source	Crude Steel Producer	15	36,6667	26,29684	6,78981
	Re-roller	18	76,9444	27,97787	6,59445
Percentage of Import as Raw Material Source	Crude Steel Producer	15	63,3333	26,29684	6,78981
	Re-roller	18	23,0556	27,97787	6,59445
Percentage of Domestic Market among sales	Crude Steel Producer	16	56,1375	28,66419	7,16605
	Re-roller	19	73,6842	28,17811	6,46450
Percentage of Foreign Markets among sales	Crude Steel Producer	16	43,8625	28,66419	7,16605
	Re-roller	18	27,7778	28,24380	6,65713

Source: Compiled by the author according to the findings of the questionnaire

An independent sample t-test has been applied to test the significant difference among both groups. The results of the independent sample t-test are given in Table 5.17. At 95% confidence level there are significant differences for percentages of domestic and import markets as raw material sources for both groups due to the above mentioned reasons. But for the sales markets no significant differences are observed, although the re-rollers are mainly targeting the domestic market for their sales activities.

Table 5.17 Independent t-test for Percentages on Raw Material Sources and Sales Markets of Crude Steel Producers and Re-rollers

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Percentage of Domestic Market as Raw Material Source	Equal variances assumed	,018	,893	-4,231	31	,000	-40,27778	9,52023	-59,69442	-20,86114
	Equal variances not assumed			-4,255	30,511	,000	-40,27778	9,46511	-59,59454	-20,96102
Percentage of Import as Raw Material Source	Equal variances assumed	,018	,893	4,231	31	,000	40,27778	9,52023	20,86114	59,69442
	Equal variances not assumed			4,255	30,511	,000	40,27778	9,46511	20,96102	59,59454
Percentage of Domestic Market among sales	Equal variances assumed	,070	,793	-1,821	33	,078	-17,54671	9,63645	-37,15221	2,05879
	Equal variances not assumed			-1,818	31,799	,078	-17,54671	9,65101	-37,21006	2,11664
Percentage of Foreign Markets among sales	Equal variances assumed	,070	,794	1,646	32	,110	16,08472	9,77232	-3,82085	35,99029
	Equal variances not assumed			1,644	31,416	,110	16,08472	9,78108	-3,85322	36,02266

Source: Compiled by the author according to the findings of the questionnaire

An independent sample t-test has been applied to both groups also to compare the means on import markets. It is observed that there is significant difference on imports from the Black Sea countries and the Eastern Europe. In addition to that none of the Re-rollers reported that they are importing any raw material from the Middle East. For all other import markets there is no significant difference among crude steel producers and re-rollers. The details of the descriptive statistics and the independent sample t-test are given on Table 5.18 and Table 5.19 respectively.

Table 5.18 Import Markets of Crude Steel Producers and Re-rollers

	Type	N	Mean	Std. Deviation	Std. Error Mean
Import - Black Sea Countries and East Europe	Crude Steel Producer	14	2,5000	1,22474	,32733
	Re-roller	11	1,0000	,00000	,00000
Import - Europe (EU15)	Crude Steel Producer	12	1,6667	,98473	,28427
	Re-roller	2	1,5000	,70711	,50000
Import - America	Crude Steel Producer	11	2,0000	,63246	,19069
	Re-roller	1	3,0000	.	.
Import - Middle East	Crude Steel Producer	5	4,2000	,44721	,20000
	Re-roller	0[a]	.	.	.
Import - Far East	Crude Steel Producer	3	4,6667	,57735	,33333
	Re-roller	1	2,0000	.	.
Import - Others	Crude Steel Producer	4	2,7500	1,25831	,62915
	Re-roller	1	2,0000	.	.

a. t cannot be computed because at least one of the groups is empty.

Source: Compiled by the author according to the findings of the questionnaire

On Table 5.17 for the Black Sea countries and the East Europe as import market the significance was lower than 0.05 therefore equal variances are not assumed. H_0 hypothesis is based on the assumption that the means of both crude steel producers and the Re-rollers are the same. The significance for this case is also lower than 0.05 therefore the H_0 hypothesis is rejected and a significant difference among both groups for the Black Sea countries and the East European Countries was observed. As mentioned before the reason is the concentration of Re-rollers for procurement of raw-materials to those countries due to the proximity and the size of the orders.

Table 5.19 Independent t-test for Import Markets of Crude Steel Producers and Re-rollers

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Import - Black Sea Countries and East Europe	Equal variances assumed	25,760	,000	4,043	23	,001	1,50000	,37099	,73255	2,26745
	Equal variances not assumed			4,583	13,000	,001	1,50000	,32733	,79285	2,20715
Import - Europe (EU15)	Equal variances assumed	,466	,508	,226	12	,825	,16667	,73677	-1,43861	1,77194
	Equal variances not assumed			,290	1,734	,803	,16667	,57516	-2,70903	3,04236
Import - America	Equal variances assumed	.	.	-1,514	10	,161	-1,00000	,66058	-2,47186	,47186
	Equal variances not assumed			.	.	.	-1,00000	.	.	.
Import - Far East	Equal variances assumed	.	.	4,000	2	,057	2,66667	,66667	-,20177	5,53510
	Equal variances not assumed			.	.	.	2,66667	.	.	.
Import - Others	Equal variances assumed	.	.	,533	3	,631	,75000	1,40683	-3,72716	5,22716
	Equal variances not assumed			.	.	.	,75000	.	.	.

Source: Compiled by the author according to the findings of the questionnaire

The main export markets of crude steel producers are the European Union (EU15) countries, the U.S., Arab countries especially in the Persian Gulf area known as the Gulf Corporation Council (GCC) countries, and Africa. Also the Eastern European countries have a significant contribution to the export sales of Turkish producers especially in the last years after their accession to the European Union. The improvement on their economies have resulted in an increase on their demand especially for the construction industry on infrastructures and residential buildings. The details of export markets for crude steel producers are given in the Table 5.20.

Table 5.20 Ranking of Export Markets for Crude Steel Producers

		Ranking						
	EXPORT	1	2	3	4	5	6	Total
Crude Steel Producer	Black Sea Countries and Eastern Europe	0	2	4	3	1	0	10
	Europe (EU15)	7	4	1	1	0	0	13
	America	0	1	5	2	1	2	11
	Middle East	6	4	0	2	0	0	12
	Far East	0	0	1	1	3	1	6
	Others	0	1	1	3	1	0	6
		13	12	12	12	6	3	

Source: Compiled by the author according to the findings of the questionnaire

The main markets for the Re-rollers are the Middle East countries, European Union (EU-15), Africa, and Black Sea Countries and East European Countries as shown in the Table 5.21. Re-rollers are aiming markets in the region due to constraints in logistics.

Table 5.21 Ranking of Export Markets for Re-Rollers

		Ranking						
	EXPORT	1	2	3	4	5	6	Total
Re-roller	Black Sea Countries and Eastern Europe	3	0	2	3	0	0	8
	Europe (EU15)	3	3	2	1	1	0	10
	America	1	1	1	1	1	0	5
	Middle East	5	3	2	0	0	0	10
	Far East	0	0	0	0	0	0	0
	Others	1	4	2	0	0	0	7
		13	11	9	5	2	0	

Source: Compiled by the author according to the findings of the questionnaire

The markets of crude steel producers and the Re-rollers show similarity by means of the markets for their export sales activities. But in fact there is a difference on the products, which are exported. 10 Re-rollers have reported that they are exporting to the Middle East. 6 out of them are producing profiles, angles, and flats, which are called as merchant bars. These products have higher value-add than the reinforcing bars. And 1 out of them is producing cold rolled coils and galvanised coils.

An independent t-test has been applied to both groups to be able to compare their means on the export markets. The details of the independent sample t-test are given in the Table 5.22 and the Table 5.23. The means of export markets for the Far East could not be compared, because none of the Re-rollers are exporting to that region. But for other markets no significant difference could be found on the target markets among them. All companies in both groups have marked Africa on the others part therefore we also have the opportunity to compare the significant differences among their sales for Africa. There is also no significant difference for their sales to African markets. So the Far East is the only market where the crude steel producers are exporting their products although the Re-rollers can not.

Due to their limited capacities, the Re-rollers are mainly focused on nearby markets to export their products. To be able to be competitive enough to make a shipment to GCC countries in the Middle East, the size of the cargo has to be big enough to gain

advantage on the freight. This is out of the scope of most of the Re-rollers, producing reinforcing bars. The only way for those Re-rollers to reach to these markets is to sell especially their 8mm rebars to big crude steel producers or to export higher value-added products, where the share of the freight on costs has a relatively lower percentage.

Another reason for that is the proximity of the Re-rollers in İskenderun to Iraq, Iran, Syria and Israel. Although both groups have marked the Middle East, the Re-rollers are mainly supplying to these countries, whereas the crude steel producers are targeting GCC countries in addition to them.

Table 5.22 Export Markets of Crude Steel Producers and Re-rollers

	Type	N	Mean	Std. Deviation	Std. Error Mean
Export - Black Sea Countries and East Europe	Crude Steel Producer	10	3,3000	,94868	,30000
	Re-roller	8	2,6250	1,40789	,49776
Export - Europe (EU15)	Crude Steel Producer	13	1,6923	,94733	,26274
	Re-roller	10	2,4000	1,34990	,42687
Export - America	Crude Steel Producer	11	3,8182	1,32802	,40041
	Re-roller	5	3,0000	1,58114	,70711
Export - Middle East	Crude Steel Producer	12	1,8333	1,11464	,32177
	Re-roller	10	1,7000	,82327	,26034
Export - Far East	Crude Steel Producer	6	4,6667	1,03280	,42164
	Re-roller	0[a]	.	.	.
Export - Others	Crude Steel Producer	6	3,6667	1,03280	,42164
	Re-roller	7	2,1429	,69007	,26082

a. t cannot be computed because at least one of the groups is empty.

Source: Compiled by the author according to the findings of the questionnaire

Table 5.23 Independent t-test for Export Markets for Producer Groups

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Export - Black Sea Countries and East Europe	Equal variances assumed	3,467	,081	1,214	16	,242	,67500	,55590	-,50345	1,85345
	Equal variances not assumed			1,161	11,798	,268	,67500	,58118	-,59368	1,94368
Export - Europe (EU15)	Equal variances assumed	1,604	,219	-1,479	21	,154	-,70769	,47843	-1,70265	,28726
	Equal variances not assumed			-1,412	15,448	,178	-,70769	,50125	-1,77340	,35801
Export - America	Equal variances assumed	,098	,759	1,080	14	,299	,81818	,75780	-,80714	2,44350
	Equal variances not assumed			1,007	6,701	,349	,81818	,81261	-1,12085	2,75721
Export - Middle East	Equal variances assumed	,297	,592	,313	20	,757	,13333	,42567	-,75460	1,02126
	Equal variances not assumed			,322	19,764	,751	,13333	,41390	-,73071	,99737
Export - Others	Equal variances assumed	1,023	,334	3,174	11	,009	1,52381	,48007	,46718	2,58044
	Equal variances not assumed			3,074	8,519	,014	1,52381	,49579	,39254	2,65508

Source: Compiled by the author according to the findings of the questionnaire

In the question 8, the percentages of certain items on their cost calculations were asked. 13 out of 17 crude steel producers and 16 out of 19 Re-rollers responded to the question. The major share belongs to the raw material for both groups. An independence sample t-test has been applied to both groups to find a significant difference among cost items, if there exist any. Percentages of raw materials are the only item, where a significant difference is found between crude steel producers and Re-rollers. The founding's of the independent sample t-test are given on Table 5.24 & 5.25.

Table 5.24 Percentage Shares of Cost Items for Producer Groups

	Type	N	Mean	Std. Deviation	Std. Error Mean
Percentage of Raw Material on Cost Structure	Crude Steel Producer	13	68,3462	8,81614	2,44516
	Re-roller	16	79,7500	6,91375	1,72844
Percentage of Energy on Cost Structure	Crude Steel Producer	13	10,8846	6,18976	1,71673
	Re-roller	15	7,6667	4,15188	1,07201
Percentage of Labour on Cost Structure	Crude Steel Producer	12	6,7083	5,43749	1,56967
	Re-roller	15	4,9000	2,47992	,64031
Percentage of Freight on Cost Structure	Crude Steel Producer	8	7,1250	6,57783	2,32561
	Re-roller	12	3,0833	2,80287	,80912
Percentage of Finance on Cost Structure	Crude Steel Producer	10	2,6600	1,69457	,53587
	Re-roller	11	3,1818	2,83084	,85353
Percentage of Others (Maintenance, Spare	Crude Steel Producer	10	7,9900	5,72916	1,81172
	Re-roller	10	4,0500	3,22706	1,02048

Source: Compiled by the author according to the findings of the questionnaire

Table 5.25 Independent t-test for Percentages of Cost of Steel Producers and Re-rollers

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Percentage of Raw Material on Cost Structure	Equal variances assumed	,504	,484	-3,907	27	,001	-11,40385	2,91868	-17,39249	-5,41520
	Equal variances not assumed			-3,808	22,495	,001	-11,40385	2,99438	-17,60589	-5,20180
Percentage of Energy on Cost Structure	Equal variances assumed	,758	,392	1,635	26	,114	3,21795	1,96771	-,82675	7,26264
	Equal variances not assumed			1,590	20,510	,127	3,21795	2,02395	-,99721	7,43311
Percentage of Labour on Cost Structure	Equal variances assumed	9,923	,004	1,151	25	,261	1,80833	1,57098	-1,42716	5,04383
	Equal variances not assumed			1,067	14,647	,303	1,80833	1,69525	-1,81260	5,42927
Percentage of Freight on Cost Structure	Equal variances assumed	7,497	,013	1,260	20	,222	2,61667	2,07679	-1,71545	6,94878
	Equal variances not assumed			1,179	11,747	,262	2,61667	2,21866	-2,22896	7,46229
Percentage of Finance on Cost Structure	Equal variances assumed	2,111	,163	-,506	19	,619	-,52182	1,03193	-2,68167	1,63803
	Equal variances not assumed			-,518	16,576	,611	-,52182	1,00780	-2,65225	1,60862
Percentage of Others (Maintenance, Spare Parts, Administrative etc.) on Cost Structure	Equal variances assumed	3,285	,087	1,895	18	,074	3,94000	2,07935	-,42856	8,30856
	Equal variances not assumed			1,895	14,189	,079	3,94000	2,07935	-,51421	8,39421

Source: Compiled by the author according to the findings of the questionnaire

The means of percentages of raw material within the cost figures is higher for the Re-rollers than the crude steel producers. The reason for that is that there is more value-add on crude steel producers than the Re-rollers. They are producing first billets or slabs, which are semi-products, out of scrap or iron ore. And then they are producing the final products like reinforcing bars, wirerods, profiles, hot rolled coils or plates out of these semi products, whereas the Re-rollers are converting only the semi-products into final products. During this process the crude steel producers are consuming more energy as shown in Table 5.26. Due to the size of the enterprises the administrative, labour and maintenance costs of the crude steel producers are higher, but the financial costs are lower in percentage. But even in that case no significant difference is observed on the cost calculations for these items. The Re-rollers are supplying their raw material, which are the semi-products, mainly from the domestic market. In that sense the percentage of freight on producing raw material is lower than the crude steel producers.

Table 5.26 Percentage Shares of Cost Items

	Percentage of Raw Material on Cost Structure	Percentage of Energy on Cost Structure	Percentage of Labour on Cost Structure	Percentage of Freight on Cost Structure	Percentage of Finance on Cost Structure	Percentage of Others (Maintenance, Spare Parts, Administrative etc.) on Cost Structure	Total
	Mean	Mean	Mean	Mean	Mean	Mean	
Crude Steel Producer	66,82%	10,64%	6,56%	5,57%	2,60%	7,81%	100,00 %
Re-roller	77,70%	7,47%	4,77%	3,00%	3,10%	3,95%	100,00 %

Source: Compiled by the author according to the findings of the questionnaire

In the question number 7, a 5-step Likert scale has been used to measure the importance of each cost item according to its effect on competitiveness. All crude steel producers and Re-rollers responded to the question. The number of companies from both groups, who responded to each level of importance, is given on the Table 5.27. The responses are generally in parallel with the responses to the question number 8. As the contribution of these cost items on the cost structure are increasing, their importance on the competitiveness are increasing as well. As it could be seen from the Table 5.27, 33 out of 36 companies have indicated the effect of raw materials on the competitiveness as “very important”. From the point of importance

the cost of raw materials is followed by the energy, freight, exchange rate, finance, and labour for the crude steel producers. This is shown in the Table 5.27. For the Re-rollers the sequence also starts with the raw material and it is followed by energy, exchange rate, freight; finance and labour.

According to the independent sample t-test results, the only significant difference among both groups is on the effect of labour at 95% confidence level. The significance is 0,027 for the effect of labour. For all other cost items no significant difference has been observed.

In the "others" part, 2 respondents mentioned the importance of the spare parts with 3,50 average out of 5. And another respondent mentioned the importance of the cost of the stocks with a score of 2.

Table 5.27 Effect of Cost Items on the Competitiveness

		Unimportant	Of Little Importance	Moderately Important	Important	Very Important	Total
Raw Material	Crude Steel Producer	0	0	0	1	16	17
	Re-roller	0	0	0	2	17	19
Energy	Crude Steel Producer	0	0	0	5	12	17
	Re-roller	0	0	1	7	11	19
Labour	Crude Steel Producer	0	2	10	2	3	17
	Re-roller	0	0	5	9	5	19
Freight	Crude Steel Producer	0	1	5	4	7	17
	Re-roller	0	1	4	8	6	19
Exchange Rate (€/$, €/YTL & $/YTL)	Crude Steel Producer	0	2	5	6	4	17
	Re-roller	0	1	2	10	6	19
Finance	Crude Steel Producer	0	2	7	3	5	17
	Re-roller	0	1	6	4	8	19
Others	Crude Steel Producer	0	1	1	0	1	3
	Re-roller	0	0	0	3	0	3

Source: Compiled by the author according to the findings of the questionnaire

Table 5.28 Importance of Cost Items by Producer Groups

	Crude Steel Producers					Re-rollers				
Cost	N	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation
Raw Material	17	4	5	4,94	0,243	19	4	5	4,89	0,315
Energy	17	4	5	4,71	0,470	19	3	5	4,53	0,612
Labour	17	2	5	3,35	0,931	19	3	5	4,00	0,745
Freight	17	2	5	4,00	1,000	19	2	5	4,00	0,882
Exchange Rate (€/$, €/YTL & $/YTL)	17	2	5	3,71	0,985	19	2	5	4,11	0,809
Finance	17	2	5	3,65	1,057	19	2	5	4,00	1,000
Others	3	2	5	3,33	1,528	3	4	4	4,00	0,000

Source: Compiled by the author according to the findings of the questionnaire

In the question number 14, a 5-step Likert scale has been used again to measure the importance of each quality factor according to its effect on competitiveness. All crude steel producers and Re-rollers responded to the question. The number of

companies from both groups, responded to each importance level is given on the Table 5.29. According to the independent sample t-test results there is a significant difference between the crude steel producers and the Re-rollers by means of the importance of the "Compliance with international standards" (level of significance is 0,017) on the competitiveness. As it is less than 0,05 at 95% confidence level, the means are not the same. The reason is that the crude steel producers have been in the market for a longer period. As the supply in the market is higher than the demand, they have been exporting their products to a wider variety of countries. They have already adopted their system for the quality requests of different countries and became staunchly followers of international standards. Therefore by fulfilling international standards they already passed that issue. On the other hand the Re-rollers are mainly focused on the domestic market and they are rarely exporting their products. Therefore, they still have a long way to go with international standards.

Although there was no significant difference for the "sustainability of quality" among both groups, it seems to be more important for the Re-rollers. This is due to the same reasoning behind the compliance with international standards. For all other quality factors there is not a significant difference between the crude steel producers and the Re-rollers.

The Re-rollers are using billets and hot rolled coils as raw material, and the quality of the raw material is much more important for them then the crude steel producers. Because the crude steel producers are using scrap, iron ore and coal as raw material, they have less concern about the quality of the raw materials as they can adjust the chemical composition during the production of semi-products.

As the Re-rollers are more dependent on the demand in the domestic market and as there is a very competitive environment due to excess supply, they are supposed to be more customer oriented. On the other hand the crude steel producers are working on mass production basis with less care on customer needs. Another reason for this is that they are supplying their materials to export markets for so many years, that they have already adopted their systems according to the requirements of their main customers.

One of the most remarkable results of this question is the importance of "Education of Employees" on the competitiveness. The score for this factor is less than all other

quality factors. The main reason for that is the producers are focused mainly on the production of low value-added products, where the mass production and enjoying the benefits of economies of scale have been factors of higher importance.

Table 5.29 Effect of Quality Factors on the Competitiveness

		Unimportant	Of Little Importance	Moderately Important	Important	Very Important	Total
Compliance with International Standards	Crude Steel Producer	0	0	2	7	8	17
	Re-roller	0	0	0	3	16	19
Customer Oriented Production	Crude Steel Producer	0	1	6	4	6	17
	Re-roller	0	0	3	12	4	19
Quality of the Raw Materials	Crude Steel Producer	0	0	6	6	5	17
	Re-roller	0	0	1	8	10	19
Sustainability in Quality	Crude Steel Producer	0	0	1	8	8	17
	Re-roller	0	0	1	5	13	19
Education of the Employees	Crude Steel Producer	1	0	5	7	4	17
	Re-roller	0	0	5	9	5	19
Others	Crude Steel Producer	0	0	1	0	1	2
	Re-roller	0	0	0	0	0	0

Source: Compiled by the author according to the findings of the questionnaire

Table 5.30 Importance of Quality Factors by Producer Groups

	Crude Steel Producers					Re-rollers				
Quality	N	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation
Compliance with International Standards	17	3	5	4,35	0,702	19	4	5	4,84	0,375
Customer Oriented Production	17	2	5	3,88	0,993	19	3	5	4,05	0,621
Quality of the Raw Materials	17	3	5	3,94	0,827	19	3	5	4,47	0,612
Sustainability in Quality	17	3	5	4,41	0,618	19	3	5	4,63	0,597
Education of the Employees	17	1	5	3,76	1,033	19	3	5	4,00	0,745
Others	2	3	5	4,00	1,414	0				

Source: Compiled by the author according to the findings of the questionnaire

In the question 16 it was aimed to measure the importance of Accessibility to the Markets factors on competitiveness. 16 out of 17 crude steel producers and 13 out of 19 Re-rollers responded to the question. Import duties and anti-dumping applications were indicated as the most important factors among them for the re-rollers. Whereas for the crude steel producers the most important factors are Certifications & Homologations; and Anti-dumping Applications as shown in the Table 5.32. According to the independent sample t-test results there is no significant difference between the crude steel producers and the Re-rollers at 95% confidence level by means of the importance of the Accessibility to the Market factors on the competitiveness. The responses to the question are given below in Table 5.31.

There are not many foreign direct investments in the Turkish iron and steel market and there are only a few numbers of companies, which invested in foreign countries. Therefore these items scored lower in evaluations made by the respondents in the questionnaire. But there is a current trend where companies are getting larger and larger through consolidations in global markets to take advantage of economies of

scale and being closer to customers in different markets. Therefore the importance of foreign market orientation factors will improve in a near future.

As there is a surplus on the production of long products in the industry, most of the crude steel producer companies have to export a substantial percentage of their production. As mentioned before the Re-rollers have concentrated mainly on the domestic market. But as shown in the Table 5.12, most of the crude steel producers are exporting more than half of their production. Therefore, the main concern is the factors, which may affect the export performance of the producers. In that sense the responses also show that Certifications & Homologations; and Anti-dumping Applications have higher importance than others. The European Union is one of the major markets for the Turkish steel industry. However, for the products each member country in the EU still has its own standard and certification despite the approximation and harmonization of standards at the union level, particularly when it comes to steel products to be used in the constructions

For some semi and final products the foreign governments apply import duties to protect their domestic producers. i.e. Algeria is applying 15% import tax to Turkey in combination with all countries except EU member countries. Major import taxes in the Turkish Steel Industry are 22.4% for Billets, 14% for Galvanised Coils, 12% for Wirerods, and 5% for Hot Rolled Coils & Cold Rolled Coils as given in the Table 4.16. As it could be seen from the Table 5.30, these taxes are especially important for the Re-rollers using these semi products as raw material.

Table 5.31 Effect of Accessibility to the Markets Factors on the Competitiveness

		Unimportant	Of Little Importance	Moderately Important	Important	Very Important	Total
Certifications & Homologations	Crude Steel Producer	0	0	5	5	6	16
	Re-roller	0	1	2	7	3	13
Quotas	Crude Steel Producer	0	1	7	4	4	16
	Re-roller	1	2	3	5	3	14
Tariffs	Crude Steel Producer	0	3	3	4	6	16
	Re-roller	1	2	4	4	2	13
Import Duties	Crude Steel Producer	0	3	3	5	5	16
	Re-roller	0	1	3	4	7	15
Anti-Dumping Applications	Crude Steel Producer	0	2	2	6	5	15
	Re-roller	0	0	3	7	3	13
Foreign Direct Investments	Crude Steel Producer	1	4	6	3	1	15
	Re-roller	0	2	6	3	2	13
Benefits & Opportunities through International Agreements	Crude Steel Producer	0	2	5	7	2	16
	Re-roller	0	1	6	4	1	12
Consolidations	Crude Steel Producer	0	3	6	5	2	16
	Re-roller	0	1	3	6	3	13
Others	Crude Steel Producer	0	0	0	1	0	1
	Re-roller	0	0	0	0	1	1

Source: Compiled by the author according to the findings of the questionnaire

Table 5.32 Importance of Accessibility to the Markets Factors by Producer Groups

	Crude Steel Producers					Re-rollers				
Accessability to the Markets	N	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation
Certifications & Homologations	16	3	5	4,06	0,854	13	2	5	3,92	0,862
Quotas	16	2	5	3,69	0,946	14	1	5	3,50	1,225
Tariffs	16	2	5	3,81	1,167	13	1	5	3,31	1,182
Import Duties	16	2	5	3,75	1,125	15	2	5	4,13	0,990
Anti-Dumping Applications	15	2	5	3,93	1,033	13	3	5	4,00	0,707
Foreign Direct Investments	15	1	5	2,93	1,033	13	2	5	3,38	0,961
Benefits & Opportunities through International Agreements	16	2	5	3,56	0,892	12	2	5	3,42	0,793
Consolidations	16	2	5	3,38	0,957	13	2	5	3,85	0,899
Others	1	4	4	4,00	.	1	5	5	5,00	.

Source: Compiled by the author according to the findings of the questionnaire

In the question 17, the affect of the technology as a factor on competitiveness was asked. As mentioned before, the major advantage in the sector is gained through efficiency and economies of scale. 17 crude steel producers and 16 Re-rollers responded to this question parallel to this idea. Responses are given in the Table 5.33. They choose the Steel Production technology to be more important then the technological developments on the consumption side (construction, automotive, white goods). The crude steel producers scored 4,18 out of 5 and the Re-rollers scored 4,31. The scores on the consumption side are relatively lower. 3,33 for the crude steel producers and 3,80 for the Re-rollers as shown in Table 5.34. According to the results of the independent sample t-test there is no significant difference among both groups. Both groups have the idea that the steel producing technology is more important that the technological developments on the consumption side.

Table 5.33 Effect of Technology Factors on the Competitiveness

		Unimportant	Of Little Importance	Moderately Important	Important	Very Important	Total
Steel Production technology	Crude Steel Producer	0	0	5	4	8	17
	Re-roller	0	0	2	7	7	16
Technological Developments in Costruction, Automotive & Other related Industries	Crude Steel Producer	0	3	6	4	2	15
	Re-roller	0	0	5	8	2	15
Others	Crude Steel Producer	0	0	0	0	0	0
	Re-roller	0	0	0	0	0	0

Source: Compiled by the author according to the findings of the questionnaire

Table 5.34 Importance of Technology Factors by Producer Groups

	Crude Steel Producers					Re-rollers				
Technology	N	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation
Steel Production technology	17	3	5	4,18	0,883	16	3	5	4,31	0,704
Technological Developments in Costruction, Automotive & Other related Industries	15	2	5	3,33	0,976	15	3	5	3,80	0,676
Others	0					0				

Source: Compiled by the author according to the findings of the questionnaire

The effect of the domestic market on the competitiveness of the Turkish Steel Industry has been asked in the question 18. All of the crude steel producers and Re-rollers responded most of the items in this question as shown in the Table 5.35. The means of scores are given in the Table 5.36. Demand & Supply Relations (4,47), Market Size & Structure (4,24), and the Exchange Rate (4,24) became the most important items for the crude steel producers. On the other side for the Re-rollers the most important items seems to be the Demand & Supply Relations (4,57), the Market Size & Structure (4,18), and the Competition among National Companies (4,16). The difference is mainly due to the difference on the raw material sources of both groups. While the crude steel producers are mainly dependent on imports of the raw material, the Re-rollers are procuring their raw material mainly from the domestic market. In that sense, the exchange rates (€/YTL or the $/YTL) are much more important for the crude steel producers. Despite this difference no significant difference has been observed by independent sample t-test with 95% confidence level.

As mentioned above, the Demand & Supply relation in the domestic market is the most important competitiveness factor for the industry under the domestic market factors. Due to the surplus on the production side, the demand in the domestic and the international markets have the utmost importance. Sudden fluctuations in the demand make producers to choose either domestic market or foreign markets to sell their products. But focusing on a any market for sales seems to cause prices to decline under competitive pressure.

Competition among national companies is not as severe for the crude steel producers as they have a bigger range of markets to sell. But for the Re-rollers, which target mainly the domestic market, the competition among national companies has a greater importance. But despite this situation, each company has to maintain its market share in the domestic market. As a result both groups have the same idea that market share of national companies has a relatively higher importance on their competitiveness.

One of the Re-rollers made a remark on the “others” that the marketing and sales strategies of rivals are moderately important.

Table 5.35 Effect of Domestic Market Factors on the Competitiveness

		Unimportant	Of Little Importance	Moderately Important	Important	Very Important	Total
Competition among national companies	Crude Steel Producer	0	0	5	10	2	17
	Re-roller	0		4	8	7	19
Number of companies in the market	Crude Steel Producer	0	0	6	7	4	17
	Re-roller	0	0	7	11	1	19
Demand & Supply Relations	Crude Steel Producer	0	0	1	7	9	17
	Re-roller	0	0	1	7	10	18
Capacity Utilisation Rates	Crude Steel Producer	0	0	8	6	3	17
	Re-roller	0	0	7	8	3	18
Support of the related Industries	Crude Steel Producer	1	2	11	2	0	16
	Re-roller	1	3	7	6	1	18
Foreign Direct Investments	Crude Steel Producer	1	3	8	3	1	16
	Re-roller	1	2	10	3	2	18
Market Shares of National Companies	Crude Steel Producer	0	0	8	7	2	17
	Re-roller	0	0	8	8	2	18
Market Size & Structure	Crude Steel Producer	0	0	3	7	7	17
	Re-roller	0	0	2	10	5	17
Exchange Rate ($/YTL & €/YTL)	Crude Steel Producer	0	0	3	7	7	17
	Re-roller	0	2	4	7	6	19
Others	Crude Steel Producer	0	0	0	0	0	0
	Re-roller	0	0	1	0	0	1

Source: Compiled by the author according to the findings of the questionnaire

Table 5.36 Importance of Domestic Market Factors by Producer Groups

	Crude Steel Producers					Re-rollers				
Domestic Market	N	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation
Competition among national companies	17	3	5	3,82	0,636	19	3	5	4,16	0,765
Number of companies in the market	17	3	5	3,88	0,781	19	3	5	3,68	0,582
Demand & Supply Relations	17	3	5	4,47	0,624	18	3	5	4,50	0,618
Capacity Utilisation Rates	17	3	5	3,71	0,772	18	3	5	3,78	0,732
Support of the related Industries	16	1	4	2,88	0,719	18	1	5	3,17	0,985
Foreign Direct Investments	16	1	5	3,00	0,966	18	1	5	3,17	0,985
Market Shares of National Companies	17	3	5	3,65	0,702	18	3	5	3,67	0,686
Market Size & Structure	17	3	5	4,24	0,752	17	3	5	4,18	0,636
Exchange Rate ($/YTL & €/YTL)	17	3	5	4,24	0,752	19	2	5	3,89	0,994
Others	0					1	3	3	3,00	

Source: Compiled by the author according to the findings of the questionnaire

All crude steel producers and Re-rollers responded to the question 19, regarding the Role of the Government as a factor on the competitiveness as shown in the Table 5.37. Taxation, and subsidies are the most important factors for both groups. For taxation crude steel producers scored 4,47 and the Re-rollers 4,21 out of 5. And for the subsidies the Re-rollers are more concerned about this factor with 4,39 out of 5, while the crude steel producers scored 4,24. (Table 5.38)

Due to the import taxes on the semi-products, the Re-rollers are mainly concerned about the Export – Import Regulations (3,94), whereas this subject has a relatively lower importance for the crude steel producers (4,12). However, despite the difference in the mean values in favor of the crude steel producers, the ranking order of Export-Import Regulations give us the impression that it is more important for the Re-rollers than the crude steel producers. (In the ranking, the export – import regulations are the 6th item for the crude steel producers whereas it is the 3rd for the Re-rollers.)

There is no import tax for the scrap, iron ore or coal. On the other hand there is a range of import tax varying between 0 – 22.4% on the billets and 5 % on the hot rolled coils. For the Re-rollers the import tax for the hot rolled coils is 3%. Especially after the increases on the steel prices in the beginning of 2008, these taxes on the billets and hot rolled coils are forcing the Re-rollers to procure their raw materials from the domestic market. Only the Re-rollers who are exporting their products can get the benefit of the inward processing regime. According to the regulations of the inward processing regime producers can import the raw material (billets or hot rolled coils) from third counties without any import duty if they aim to produce the final products out of this material to export to third countries. With this method they are exempted from the Import duty as well as the 18% Value Added Tax (VAT), as they could not be able to collect VAT when they export.

The crude steel producers also get the benefit of inward processing regime for the scrap, but only on a limited scale. Scrap is exempted from the VAT from all sources including the domestic market. In that sense the EAF based crude steel producers benefit only out of environment protection tax by the inward processing regime when they import scrap.

For the industry, one of the major aspects is the infrastructure. Therefore both groups mentioned the importance of "Preparation of the Infrastructure" as one of the major roles of the government. Crude Steel Producers scored 4,18 and the Re-rollers scored 3,89 out of 5 as seen in Table 5.38.

As well as the preparation of the infrastructures, another major role of the government is to promote the re-structuring of the sector to prevent excessive surplus in production or excess capacity. In the domestic market part of this questionnaire, all producers gave the highest scores to demand & supply relations in the domestic market, as the market and therefore the companies could be highly affected from the fluctuations on the demand and supply sides due to the surplus in the market for long products and the vacant position in the capacity for flat products. In Turkey a national restructuring program for the entire steel industry has been prepared and submitted to the EU Commission in 2006. The crude steel producers scored 4,12 and the Re-rollers scored 3,83 out of 5 for this factor.

Another important factor is to get the unregistered economy in the sector under control. The unregistered economy is creating an unfair competition in industries by means of the tax payments and labour costs. Companies which do not fulfill regulations gain a competitive advantage in lower labor cost in particular and total costs in general in the domestic market. Although this may give such companies an incremental competitive advantage in international markets, it is not desired ultimately because of the unfair competition they constitute not only for their domestic rivals but also for their international counterparts. This gives them an unfair opportunity to maximize their profits or it may give them a stronger impulse to gain competitiveness by reducing the prices. Therefore crude steel producers and Re-rollers have marked a high importance as 4,18 and 3,83 respectively on this subject.

The crude steel producers gave higher importance to the environmental regulations in the questionnaire due to the nature of their process; as their processes are generating more emissions compared to the Re-rollers. Due to the generated heat on the melt shops they also use tremendous amount of water to cool their systems. Therefore they have to be approved by the Ministry of Environment and Forests with an Environmental Impact Assessment Report "Çevresel Etki değerlendirilmesi (ÇED) Raporu". To be able to get this report the crude steel producers have to invest in the necessary filtration systems for emissions and water treatment systems for discharges. As the regulations for the crude steel producers are much more severe, they also marked a higher importance for environmental futures. (Crude steel producers scored 3,88 out of 5, while the Re-rollers scored 3,47.)

Investments in protection of environment are expensive, so they are increasing costs of producers. Furthermore such investments do not necessarily contribute to their productivity in the short-run. Therefore most of the mills see these investments as futile cost items, which reduce their competitiveness relative to the mills in China, India or Common Independent States Countries; because in these countries the environmental regulations are not so strict like in European Union Countries or in Turkey. Nevertheless in the near future, the European Union will strictly require compliance of producers to environmental standards, which supply their products to EU destinations.

According to the results of the independent sample t-test there is a significant difference among both groups only on the importance of the Regulation of Insurance System with 95% confidence level. The significance on this item is 0,001.

One of the crude steel producers marked the importance of the embassies to inform the business opportunities to Turkish producers as very important. According to their opinion, the business opportunities in each country have to be transferred to the sector to create new businesses.

Table 5.37 Effect of Role of Government Factors on the Competitiveness

		Unimportant	Of Little Importance	Moderately Important	Important	Very Important	Total
Preparation of the Infrastructure	Crude Steel Producer	0	0	4	6	7	17
	Re-roller	0	1	4	9	4	18
Establishment of the Institutions	Crude Steel Producer	0	0	3	12	2	17
	Re-roller	0	2	6	8	2	18
Structuring of the Sector	Crude Steel Producer	0	0	3	9	5	17
	Re-roller	0	1	5	8	4	18
Subsidies	Crude Steel Producer	1	1	0	6	9	17
	Re-roller	0	0	3	5	10	18
General Labour Legislations	Crude Steel Producer	0	0	7	8	1	16
	Re-roller	0	0	11	6	2	19
Export - Import Regulations	Crude Steel Producer	0	0	2	11	4	17
	Re-roller	0	0	6	7	5	18
Taxation	Crude Steel Producer	0	0	2	4	9	15
	Re-roller	0	0	4	7	8	19
Getting unregistered economy under control	Crude Steel Producer	0	1	3	5	8	17
	Re-roller	0	2	6	5	5	18
Environmental Regulations	Crude Steel Producer	0	0	5	8	3	16
	Re-roller	0	0	11	7	1	19
Regulation of Banking & Finance System	Crude Steel Producer	0	1	3	10	2	16
	Re-roller	0	0	8	7	2	17
Regulation of Insurance System	Crude Steel Producer	0	0	6	9	1	16
	Re-roller	0	5	10	3	0	18
Others	Crude Steel Producer	0	0	0	0	1	1
	Re-roller	0	0	0	0	0	0

Source: Compiled by the author according to the findings of the questionnaire

Table 5.38 Importance of Role of Government Factors by Producer Groups

	Crude Steel Producers					Re-rollers				
Role of Government	N	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation
Preparation of the Infrastructure	17	3	5	4,18	0,809	18	2	5	3,89	0,832
Establishment of the Institutions	17	3	5	3,94	0,556	18	2	5	3,56	0,856
Structuring of the Sector	17	3	5	4,12	0,697	18	2	5	3,83	0,857
Subsidies	17	1	5	4,24	1,147	18	3	5	4,39	0,778
General Labour Legislations	16	3	5	3,63	0,619	19	3	5	3,53	0,697
Export - Import Regulations	17	3	5	4,12	0,600	18	3	5	3,94	0,802
Taxation	15	3	5	4,47	0,743	19	3	5	4,21	0,787
Getting unregistered economy under control	17	2	5	4,18	0,951	18	2	5	3,72	1,018
Environmental Regulations	16	3	5	3,88	0,719	19	3	5	3,47	0,612
Regulation of Banking & Finance System	16	2	5	3,81	0,750	17	3	5	3,65	0,702
Regulation of Insurance System	16	3	5	3,69	0,602	18	2	4	2,89	0,676
Others	1	5	5	5,00	.	0				

Source: Compiled by the author according to the findings of the questionnaire

In the question 20, it is aimed to measure the importance of the firm characteristics factors on the competitiveness. The mills in Turkey are mainly production oriented. It could be seen also from their responses to the question's (Table 5.39). Both groups mentioned the importance of Production Range and Size of National Companies factors, but with a small difference. The Re-rollers are more concerned about the size of national companies. This factor get scored 4,26 for the Re-rollers and 4,12 for the crude steel producers (Table 5.40). As the crude steel producers are having already the benefit on costs due to the economies of scale, the Re-rollers are more concerned about this factor.

The production range scored an average of 4,18 for the crude steel producers and 4,17 for the Re-rollers. They scored almost the same and also according to the independent sample t-test, there is no significant difference among both groups for any one of the factors under the scope of Firm Characteristics factors.

As most of the mills are owned by the family-owned companies the overall score for the ownership is lower compared with other factors. It is 3,12 for the crude steel producers and 3,00 for the Re-rollers. The ownership status scored higher only in the responses of corporate companies. The responses are also parallel in the factor regarding the partnership with foreign takeovers. Turkish steel industry is not subjected to consolidations and foreign ownerships recently. Therefore the effect of these factors still remains insignificant. The crude steel producers scored 2,81 and the Re-rollers scored 3,11 for this factor.

In the others part, 3 crude steel producers mentioned the importance of the reliability of a company (4,00), penetration to the market through mills in geographically different places (4,00), and vertical integration of the companies to produce their own raw material for procurement facility (5,00).

Table 5.39 Effect of Firm Characteristics Factors on the Competitiveness

		Unimportant	Of Little Importance	Moderately Important	Important	Very Important	Total
Size of National Companies	Crude Steel Producer	0	0	5	5	7	17
	Re-roller	0	0	1	12	6	19
Ownership Status	Crude Steel Producer	1	4	6	4	2	17
	Re-roller	0	6	6	6	0	18
Production Range	Crude Steel Producer	0	1	2	7	7	17
	Re-roller	0	1	2	8	7	18
Partnership with foreign company	Crude Steel Producer	0	8	5	1	2	16
	Re-roller	0	4	10	2	2	18
Others	Crude Steel Producer	0	0	0	2	1	3
	Re-roller	0	0	0	1	0	1

Source: Compiled by the author according to the findings of the questionnaire

Table 5.40 Importance of Firm Characteristics Factors by Producer Groups

	Crude Steel Producers					Re-rollers				
Firm Characteristics	N	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation
Size of National Companies	17	3	5	4,12	0,857	19	3	5	4,26	0,562
Ownership Status	17	1	5	3,12	1,111	18	2	4	3,00	0,840
Production Range	17	2	5	4,18	0,883	18	2	5	4,17	0,857
Partnership with foreign company	16	2	5	2,81	1,047	18	2	5	3,11	0,900
Others	3	4	5	4,33	0,577	1	4	4	4,00	.

Source: Compiled by the author according to the findings of the questionnaire

The location factors are the distance to the raw material sources and the distance to markets. According to the location theory we have to check the material index to find out the importance of the location. The formula of the material index is given below.

$$\text{Material index} = \frac{\text{total weight of materials used to manufacture the product}}{\text{Total weight of the finished product}}$$

If the product is a pure material its index will be 1. If the index is less than 1 the final product has gain weight in manufacture, thus favoring the industry to be located near the market place. But most products lose weight in manufacture, thus their material index will be more than 1, thus favoring the industry to be located near the raw material site.

In the crude steel production, the final products loose weight. The major loss on the crude steel production is by the preliminary process. 1,134 kilograms (kg) of iron ore, 635 kg of coal, and 54 kg of limestone is used to produce 1 mt of crude steel in integrated mills (Fenton, 2003, p.39.1). The electric arc furnace method requires about 1.10 mt of scrap to produce 1 mt of crude steel. With these high yield percentages for the crude steel producers it is more important to be close to the raw material sources. In that sense the steel industry in Turkey is mainly located near by seaside as the crude steel producers are importing 63.33% of their raw materials. As shown in the Table 5.14 the crude steel producers are procuring 36.67% of their raw materials from the domestic market and they are selling 54.54% of the final products to the domestic market. Therefore as the domestic market sales and procurements are concerned it is more important for the crude steel producers to be close to the markets. As shown in Table 5.17, Turkish crude steel producers are procuring their raw materials mainly from the countries in Black Sea and East Europe; European Union (EU15); and America. On the other side the export markets are mainly the

countries in European Union (EU15); Middle East; America; and Black Sea and East Europe (Table 5.21). According to the theory, due to the high percentage in imports of raw materials (63.33%) in comparison with the percentage in exports of final products (45.46%), the crude steel producers are more concerned about the distance to raw material sources. But it has to be noted that the raw-materials are mainly procured in bigger quantities per lot, whereas the final products are sold in relatively smaller quantities. Therefore the freight per ton of sold final product is higher than the raw material. This fact increased the importance of distance to markets for the crude steel producers as shown in the Table 5.41.

In the re-rolling process the loss on the re-rolling mills is relatively lower than this but the loss is not less than 2% due to loss of the oxide layer. All these data have been acquired through interviews with the executive of the mills in the Turkish steel industry. With respect to this fact, all re-rolling mills are located near to the crude steel producers mainly in the İstanbul, İzmit, Çanakkale, Ereğli, Karabük, Aliağa, Denizli and İskenderun.

As most of the Re-rolling mills aim to supply their products also to the nearby regions in domestic market, according to the location theory they are more concerned about the distance to the raw material sources. But on the other side as shown in Table 5.15, the re-rollers are importing 29,32% of the raw material and exporting 34,30% of the final products. As shown in the Table 5.18, whereas they import the raw materials mainly from the Black Sea Countries and the East European Countries, they export their products to the EU15 countries, the Middle East, the Black Sea and Eastern Europe and Africa. The freight rates to these markets are higher than the freight rates between raw Material Sources and Turkey. Therefore, for foreign markets they are mainly concerned about the distance to the markets. But due to the low percentage of export share for the Re-rollers, the distance to markets has a relatively lower importance for the Re-rollers as shown in the Table 5.41.

In general according to the results of question 15, the importance of distance to raw material sources and markets for crude steel producers and Re-rollers are as follows:

Table 5.41 Importance of Location

	Crude Steel Producers	Re-rollers
Distance to raw material sources	48.0 %	58.5 %
Distance to markets	52.0%	41.5%

Source: Compiled by the author according to the findings of the questionnaire

By examining all 8 factors, which composes the model, the shares of each variable are found, by comparing the means of the responses given to the questions. All results regarding the factors are merged in the Table 5.42. As all of the responses have been evaluated for both groups separately, therefore also the results are given separately for the crude steel produces and the Re-rollers.

Table 5.42 Importance of each Variable by Producer Groups

		Crude Steel Producers							Re-rollers						
		N	Minimum	Maximum	Mean	Std. Deviation	Group Mean	Percentage	N	Minimum	Maximum	Mean	Std. Deviation	Group Mean	Percentage
Cost	Raw Material	17	4	5	4,94	0,243			19	4	5	4,89	0,315		
	Energy	17	4	5	4,71	0,470			19	3	5	4,53	0,612		
	Labour	17	2	5	3,35	0,931			19	3	5	4,00	0,745		
	Freight	17	2	5	4,00	1,000			19	2	5	4,00	0,882		
	Exchange Rate (€/$, €/YTL & $/YTL)	17	2	5	3,71	0,985			19	2	5	4,11	0,809		
	Finance	17	2	5	3,65	1,057			19	2	5	4,00	1,000		
	Others	3	2	5	3,33	1,528	4,04	13,04%	3	4	4	4,00	0,000	4,25	13,43%
Quality	Compliance with International Standards	17	3	5	4,35	0,702			19	4	5	4,84	0,375		
	Customer Oriented Production	17	2	5	3,88	0,993			19	3	5	4,05	0,621		
	Quality of the Raw Materials	17	3	5	3,94	0,827			19	3	5	4,47	0,612		
	Sustainability in Quality	17	3	5	4,41	0,618			19	3	5	4,63	0,597		
	Education of the Employees	17	1	5	3,76	1,033			19	3	5	4,00	0,745		
	Others	2	3	5	4,00	1,414	4,07	13,14%	0			0,00		4,40	13,91%
Location	Distance to Raw Material Sources and Markets	17	2	5	4,00	1,000	4,00	12,92%	19	2	5	4,00	0,882	4,00	12,64%
Accessability to Markets	Certifications & Homologations	16	3	5	4,06	0,854			13	2	5	3,92	0,862		
	Quotas	16	2	5	3,69	0,946			14	1	5	3,50	1,225		
	Tariffs	16	2	5	3,81	1,167			13	1	5	3,31	1,182		
	Import Duties	16	2	5	3,75	1,125			15	2	5	4,13	0,990		
	Anti-Dumping Applications	15	2	5	3,93	1,033			13	3	5	4,00	0,707		
	Foreign Direct Investments	15	1	5	2,93	1,033			13	2	5	3,38	0,961		
	Benefits & Opportunities through International Agreements	16	2	5	3,56	0,892			12	2	5	3,42	0,793		
	Consolidations	16	2	5	3,38	0,957			13	2	5	3,85	0,899		
	Others	1	4	4	4,00		3,67	11,87%	1	5	5	5,00		3,75	11,84%
Technology	Steel Production technology	17	3	5	4,18	0,883			16	3	5	4,31	0,704		
	Technological Developments in Costruction, Automotive & Other related Industries	15	2	5	3,33	0,976			15	3	5	3,80	0,676		
	Others	0			0,00		3,78	12,21%	0			0,00		4,06	12,85%
Domestic Market	Competition among national companies	17	3	5	3,82	0,636			19	3	5	4,16	0,765		
	Number of companies in the market	17	3	5	3,88	0,781			19	3	5	3,68	0,582		
	Demand & Supply Relations	17	3	5	4,47	0,624			18	3	5	4,50	0,618		
	Capacity Utilisation Rates	17	3	5	3,71	0,772			18	3	5	3,78	0,732		
	Support of the related Industries	16	1	4	2,88	0,719			18	1	5	3,17	0,985		
	Foreign Direct Investments	16	1	5	3,00	0,966			18	1	5	3,17	0,985		
	Market Shares of National Companies	17	3	5	3,65	0,702			18	3	5	3,67	0,686		
	Market Size & Structure	17	3	5	4,24	0,752			17	3	5	4,18	0,636		
	Exchange Rate ($/YTL & €/YTL)	17	3	5	4,24	0,752			19	2	5	3,89	0,994		
	Others	0			0,00		3,77	12,19%	1	3	3	3,00		3,79	11,99%
Role of Government	Preparation of the Infrastructure	17	3	5	4,18	0,809			18	2	5	3,89	0,832		
	Establishment of the Institutions	17	3	5	3,94	0,556			18	2	5	3,56	0,856		
	Structuring of the Sector	17	3	5	4,12	0,697			18	2	5	3,83	0,857		
	Subsidies	17	1	5	4,24	1,147			18	3	5	4,39	0,778		
	General Labour Legislations	16	3	5	3,63	0,619			19	3	5	3,53	0,697		
	Export - Import Regulations	17	3	5	4,12	0,600			18	3	5	3,94	0,802		
	Taxation	15	3	5	4,47	0,743			19	3	5	4,21	0,787		
	Getting unregistered economy under control	17	2	5	4,18	0,951			18	2	5	3,72	1,018		
	Environmental Regulations	16	3	5	3,88	0,719			19	3	5	3,47	0,612		
	Regulation of Banking & Finance System	16	2	5	3,81	0,750			17	3	5	3,65	0,702		
	Regulation of Insurance System	16	3	5	3,69	0,602			18	2	4	2,89	0,676		
	Others	1	5	5	5,00		4,03	13,01%	0			0,00		3,74	11,81%
Firm Characteristics	Size of National Companies	17	3	5	4,12	0,857			19	3	5	4,26	0,562		
	Ownership Status	17	1	5	3,12	1,111			18	2	4	3,00	0,840		
	Production Range	17	2	5	4,18	0,883			18	2	5	4,17	0,857		
	Partnership with foreign company	16	2	5	2,81	1,047			18	2	5	3,11	0,900		
	Others	3	4	5	4,33	0,577	3,60	11,63%	1	4	4	4,00		3,65	11,53%
	Total						30,97	100,000%						31,64	100,000%

Source: Calculated by the author according to the findings of the questionnaire

Table 5.42 shows only the percentage of importance of the variables within each factor, by assuming that all 8 factors have the same importance among each other, which is not the case. As well as the variables, the factors themselves have different weights of importance. In Question 15 of the questionnaire it is aimed to find out the importance of each factor. Requesting from the respondents to rank these 8 factors from 1 to 8 might be a solution to find the importance of each factor. But this method may result a huge difference among the importance levels. It will not reflect the real importance levels. Therefore 15 major concerns of the sector are chosen with the interviews of the sectors executives. These concerns are linked with the factors and the respondents are asked to mention and rank five of the major factors among those. With this method it is aimed to find out the importance of the factors from constraints that the companies are facing in their daily business life. According to the results of the survey, most of these constraints also ranked higher by means of their importance for the Turkish steel mills' competitiveness. The link between each constraint and the factor are given in Table 5.43.

Table 5.43 Links between Sectoral Constraints in Competitiveness and Factors

Constraints		Constructs
a	Distance to raw-material sources	Location
b	Distance to markets	
c	Costs (Raw-material – Labour – Energy – Freight – Finance)	Cost
d	Fluctuations on the exchange rate	
g	Product Quality	Quality
h	High quality standards in target markets	
m	Steel producing technology	Technology
n	Technological developments in Costruction, Automotive, White Goods and other related industries	
f	Demand – Supply relation in the international markets	Accessibility to new Markets
i	Extra cost of entering in new markets (certifications, homologations)	
j	Difficulties in entering new markets (certification, quotas & taxes)	
l	Subsidies	Role of Government
e	Demand – Supply relation in the domestic market	Domestic Market
k	Value-add by the production	Firm Characteristics
o	Your Production Range	

Source: Constructed by the author

16 crude steel producers and 19 Re-rollers responded to the question. Their responses for both groups are given in Table 5.44. As shown in the table, the major concern for both groups is the cost factor. 10 crude steel producers and 13 Re-rollers mentioned this factor in the first place. As the prices of the final products have reached to record high levels of all times in 2008, the importance of costs, especially cost of raw materials, is much higher than before. As mentioned in Table 5.26, the percentages of raw materials for Re-rollers (77.70%) are higher than for the crude steel producers

(66.82%). Therefore the importance of raw material costs still seems to be higher especially for the Re-rollers.

As the new investments for the Re-rolling facilities in global markets are increasing, also the demand for the semi-products is increasing. This situation is causing the prices of the semi-products to increase. Therefore there is a small margin for the Re-rollers to transform the raw materials into the final products. As Turkish steel industry has a remarkable role in international trade for imports of raw materials and export of semi and final products, cost and price calculations are made mainly in USD terms in the market. But in the domestic market the products are traded in New Turkish Lira and also most of the cost items except for the imported raw materials and the spare parts are denominated in New Turkish Lira. As the re-rollers aim mainly the domestic market to sell their products, the importance of the fluctuations on the exchange rate are higher for them compared to the crude steel producers.

Another major important factor for the crude steel producers is the demand - supply relations in international markets as they depend highly on international markets for their procurements and sales. On the other side, in parallel to prior explanations, the Re-rollers are mainly concerned about the demand - supply relations in the domestic market.

The distance to raw-material sources and markets are very important for the competitiveness of both groups. As the share of imports and exports are higher for the crude steel producers, the location factors are more important for them. Also in parallel to prior explanations, the crude steel producers are mainly concerned about the distance to markets, whereas it is the opposite for the Re-rollers.

One of the most interesting results of this question is the difference for the importance of the product quality and high quality standards in target markets. While the Re-rollers see these factors remarkable to affect their competitiveness, the crude steel producers did not mark those items much. As explained before, the crude steel producers had enough experience in international markets due to the surplus in the sector. Turkish crude steel producers are exporting their products to countries in almost all regions of the world in parallel with the market conditions. While exporting to these markets they had to fulfill the national standards of all these countries. Low scores of crude steel producers in this subject are not because the

crude steel producers do not care much about the quality. On the contrary it because they already overcome all problems regarding the quality long time ago and therefore these factors no longer affects their competitiveness. As the Re-rollers are mainly focused on the domestic market, their export shares are much lower. Therefore fulfilling the requirements of standards in international markets is a bigger concern for them.

Instead of the quality the crude steel producers mainly concern about the difficulties in entering new markets, whereas none of the Re-rollers indicated this factor. This is also in parallel with the explanations given above.

As previously mentioned the crude steel producers are mainly focused on the production and try to maximize their profits by producing commercial grades and benefit from the advantages of economies of scale. On the other side due to the limited number of customers in the domestic market, the Re-rollers have to care more about the value added products. But the production range has almost the same importance for both groups.

The Re-rollers also emphasized the importance of subsidies and the steel producing technologies higher than the crude steel producers.

Table 5.44 Major Sectoral Constraints in Competitiveness for Crude Steel Producers and Re-rollers

	Crude Steel Producers							Re-rollers						
	1	2	3	4	5	Sum	%	1	2	3	4	5	Sum	%
Distance to raw-material sources	2	3	2	0	1	8	11,00%	2	3	1	0	3	9	8,96%
Distance to markets	2	1	4	2	2	11	11,62%	0	2	1	3	2	8	6,35%
Costs (Raw-material – Labour – Energy – Freight – Finance)	10	4	1	0	0	15	34,99%	13	1	1	2	0	17	31,98%
Fluctuations on the exchange rate	0	0	0	3	4	7	5,00%	1	3	2	3	0	9	9,32%
Product Quality	1	1	0	0	1	3	3,67%	2	3	2	2	2	11	10,88%
High quality standards in target markets	0	0	0	0	0	0	0,00%	0	0	0	2	0	2	1,44%
Steel producing technology	0	0	1	0	2	3	2,26%	0	1	0	2	3	6	4,14%
Technological developments in Costruction, Automotive, White Goods and other related industries	0	0	0	0	0	0	0,00%	0	0	0	0	0	0	0,00%
Demand – Supply relation in the international markets	1	5	2	6	1	15	15,98%	0	2	7	0	0	9	9,32%
Extra cost of entering in new markets (certifications, homologations)	0	0	0	0	1	1	0,65%	0	0	1	0	0	1	0,96%
Difficulties in entering new markets (certification, quotas & taxes)	0	1	1	3	0	5	4,80%	0	0	0	0	0	0	0,00%
Subsidies	0	0	0	1	0	1	0,82%	1	0	0	0	2	3	2,35%
Demand – Supply relation in the domestic market	0	1	5	0	2	8	7,74%	0	3	4	1	4	12	9,86%
Value-add by the production	0	0	0	0	0	0	0,00%	0	1	0	2	0	3	2,59%
Your Production Range	0	0	0	1	1	2	1,45%	0	0	0	1	2	3	1,85%
	16	16	16	16	15	79	100,00%	19	19	19	18	18	93	100,00%

Source: Calculated by the author according to the findings of the questionnaire

The scores given in the Table 5.44 are combined under each factor by taking the average of the scores of related constraints as shown in the Table 5.46. The constraint "Technological developments in Construction, Automotive, White Goods and other related industries" has taken out of the calculations, as none of the

respondents have marked this constraint within the major important five constraints. The constraint "Extra cost of entering in new markets (certifications, homologations)" has marked by one crude steel producer in 5th position and by a Re-roller in 3rd position. Due to its negligible effect, it is also taken out of the calculations.

To be able to find the weights of each factor, the weighted average of each factor was calculated. Let β_j be the range proposed to the people who fills the questionnary. We prefer to select β_j such that $1 \leq \beta_j \leq 5$ and α_j is integer. Therefore the respondents are asked to mention and rank five of the major concerns of the sector that linked with the factors.

Let N_i be the number of people who voted for the β_j score corresponding to factor X_i. So Let $N_{Ti} = \Sigma N_{ij}$, where i = 1 to 8 and j = 1 to 5. Then we can form the following Table designated as Table 5.45 to compute the weighted average of factor preferencies W_i.

Table 5.45 Sample Table to Compute the Weighted Average of Factor Preferencies W_i

		β_1 1 =	β_2 = 2	β_3 = 3	β_4= 4	β_5 = 5	Number of Persons (N_T)
Factors	X_1	N_{11}	N_{12}	N_{13}	N_{14}	N_{15}	N_{T1}
	X_2	N_{21}	N_{22}	N_{23}	N_{24}	N_{25}	N_{T2}
	X_3	N_{31}	N_{32}	N_{33}	N_{34}	N_{35}	N_{T3}
	X_4	N_{41}	N_{42}	N_{43}	N_{44}	N_{45}	N_{T4}
	X_5	N_{51}	N_{52}	N_{53}	N_{54}	N_{55}	N_{T5}
	X_6	N_{61}	N_{62}	N_{63}	N_{64}	N_{65}	N_{T6}
	X_7	N_{71}	N_{72}	N_{73}	N_{74}	N_{75}	N_{T7}
	X_8	N_{81}	N_{82}	N_{83}	N_{84}	N_{85}	N_{T8}
					Total		**N_T**

Source: Compiled by the author

Let $\overline{\beta_i} = (1 / N_{Ti}) . \Sigma \beta_j . N_{ij}$ $\beta_j = j$ is an integer ranges between 1 and 5. So, $\overline{\beta_i} = (1 / N_{Ti}) . \Sigma (j) . N_{ij}$ where i = 1 to 8 and j = 1 to 5.

As 1 is the most preferred and 5 is the least, the inverse of the result have been taken. To be able to weight the importance of each factor, these numbers were multiplied by the percentage of responses over the total number of responses. By dividing each of these results in to the sum of them gave us the percentages (weights) of each factor.

$W_i = (1 / \overline{\beta}_i). (N_{Ti} / N_T) / \Sigma ((1 / \overline{\beta}_i). (N_{Ti} / N_T))$, where i = 1 to 8.

For example: For the crude steel producers, the weighted average of Cost factor was found as follows: Weighted average = (1x5 + 2x2 + 3x0.5 + 4x1.5 + 5x2) / (Total number of responses for Cost) = 26.5 / 11 = 2.41. As 1 is the most preferred and 5 is the least, the inverse of the result have been taken 1/ 2.41 = 0.415. Weight of Cost factor = 1/weighted average x (number of responses for Cost / number of total responses). Weight of Cost factor = (1/2,41) x (11/45) = 0,10146. By calculating also the weight factors for other factors, the sum of all factor weights, which is 0,3387 is found. So the weight of Cost factor is found by dividing the weight of cost factor into sum of all factor weights. Weight of Cost factor = 0,10146/0,33875 = 29,95%.

Extra cost of entering into new markets scored by one crude steel producer in the fifth position and by a single re-roller in the third position. Due to the high reducing effect of it compared to its importance, this constraint is taken out of the calculations. According to the results, the most important factors for the crude steel producers are Cost, Location, Accessibility to new Markets, and Domestic Market, whereas for the Re-rollers they are Cost, Domestic Market, Location, and Quality. The average scores and the weights of the factors are given in the Table 5.46.

Table 5.46 Scores and Weights of Factors in Competitiveness for Crude Steel Producers and Re-rollers

			1	2	3	4	5	Sum	%	1	2	3	4	5	Sum	%
Location	a	Distance to raw-material sources	2,0	2,0	3,0	1,0	1,5	9,5	22,34%	1,0	2,5	1,0	1,5	2,5	8,5	13,53%
	b	Distance to markets														
Cost	c	Costs (Raw-material – Labour – Energy – Freight – Finance)	5,0	2,0	0,5	1,5	2,0	11,0	29,95%	7,0	2,0	1,5	2,5	0,0	13,0	34,12%
	d	Fluctuations on the exchange rate														
Quality	g	Product Quality	0,5	0,5	0,0	0,0	0,5	1,5	3,69%	1,0	1,5	1,0	2,0	1,0	6,5	10,88%
	h	High quality standards in target markets														
Technology	m	Steel producing technology	0,0	0,0	1,0	0,0	2,0	3,0	4,54%	0,0	1,0	0,0	2,0	3,0	6,0	7,41%
Accessibility to new Markets	f	Demand – Supply relation in the international markets	0,5	3,0	1,5	4,5	0,5	10,0	20,83%	0,0	1,0	3,5	0,0	0,0	4,5	8,34%
	j	Difficulties in entering new markets (certification, quotas & taxes)														
Role of Government	i	Subsidies	0,0	0,0	0,0	1,0	0,0	1,0	1,64%	1,0	0,0	0,0	0,0	2,0	3,0	4,21%
Domestic Market	e	Demand – Supply relation in the domestic market	0,0	1,0	5,0	0,0	2,0	8,0	15,55%	0,0	3,0	4,0	1,0	4,0	12,0	17,65%
Firm Characteristics	k	Value-add by the production	0,0	0,0	0,0	0,5	0,5	1,0	1,46%	0,0	0,5	0,0	1,5	1,0	3,0	3,86%
	o	Your Production Range														
			8,0	8,5	11,0	8,5	9,0	45,0	100,00%	10,0	11,5	11,0	10,5	13,5	56,5	100,00%

Source: Calculated by the author according to the findings of the questionnaire

According to the level of importance, the competitiveness factors for the crude steel producers are Cost (29.95%), Location (22.34%), Accessibility to new Markets (20.83%), Domestic Market (15.55%), Technology (4.54%), Quality (3.69%), Role of Government (1.64%), and Firm Characteristics (1.46%). For the Re-rollers this ranking is first the Cost (34.12%), then Domestic Market (17.65%), Location (13.53%), Quality (10.88%), Accessibility to new Markets (8.34%), Technology (7.41%), Role of Government (4.21%), and Firm Characteristics (3.86%) as shown in the Table 5.47.

Table 5.47 Weights of Factors in Competitiveness for Crude Steel Producers and Re-rollers

	Crude Steel Producers	**Re-rollers**
Cost	29.95%	34.12%
Quality	3.69%	10.88%
Location	22.34%	13.53%
Accessibility to Markets	20.83%	8.34%
Technology	4.54%	7.41%
Domestic Market	15.55%	17.65%
Role of Government	1.64%	4.21%
Firm Characteristics	1.46%	3.86%
Total	**100.00%**	**100.00%**

Source: Calculated by the author according to the findings of the questionnaire

According to the findings of this research the major factor affecting the competitiveness of the Turkish steel industry is the input cost. "Distance to raw material sources and markets" is the next imported item in combination with the desire to access international markets. It is followed by the domestic market. Although the quality scored low for the crude steel producers due to their ability to fulfill the standards in advance, in fact the Turkish steel producers are very sensitive to quality. Due to the continuous investment culture, the technology became also a very important item. Despite the low scores, the "role of the government" and "firm characteristics" factors have a contribution to the competitiveness of the Turkish steel industry. Under the scope of these findings all of the hypotheses are tested and H_0 hypothesis are proven.

To be able to compare the competitiveness of steel industries in different countries, regions or individual companies between each other the weights of each variable

within the model has to be calculated. The weights of variables within each factor were calculated generally in the Table 5.42 buy calculating the percentage of mean values. But these figures only show the related weights of variables within the related factors. To be able find the importance level of each variable within the model we have to include the impact of the factors given in the Table 5.47. By multiplying the weights of the variables with the weights of the factors we find the level of importance for each variable in the model are as shown in the Table 5.48 for the crude steel producers and in the Table 5.49 for the Re-rollers.

The mean values achieved by the questions with Likert scale were adequate to comment on the effect of each cost item on the competitiveness, but due to the 5 step likert scale real differences among cost items could not be emphasized. Therefore instead of them, the percentages of cost items from the question 8 are taken into consideration.

Due to the great difference on the production sizes between crude steel producers and re-rollers, these competitiveness factors were not merged in a single Table to show the competitiveness factors of the Turkish steel industry. Rather, the competitiveness factors are preferred to be mentioned separately for crude steel producers and re-rollers. The results under the column of "Total Weight" show the effect of each competitiveness model variable on the competitiveness of the Turkish crude steel producers and the Re-rollers. According to these calculated weights of variables each test subject will be scored and the total score will show the competitiveness score of each test subject as shown in the following formula given in the Data Analysis Methodology part (Section 4.1.7) of this thesis.

Let W_{ij} be the total weight of each variable in the model. Total weight for each variable in the model is found by multiplying the weight of each variable within the factor with the weight of each factor within the model.

$$W_{ij} = W_i \,.\, w_{ij}$$

The steel industry competiveness is a function of performance measure score for each variable (α_{ij}) and the pre-fixed design parameters (W_{ij}). The copetitiveness score of each test subject will be found by the following formula.

$$F = \Sigma\, \alpha_{ij} \,.\, W_{ij}$$

Table 5.48 Weights of Variables in the Competitiveness Model for Crude Steel Producers

Crude Steel Producers

	Wi		Mean	wij	Total Weight (Wij)
Cost	29,95%	Raw Material	4,94	66,82%	20,01%
		Energy	4,71	10,64%	3,19%
		Labour	3,35	6,56%	1,96%
		Freight	4,00	5,57%	1,67%
		Finance & Exchange Rate (€/$. €/YTL & $/YTL)	3,71	2,60%	0,78%
		Others (Maintenance, Spare Parts, Administrative Costs etc.)	3,33	7,81%	2,34%
Quality	3,69%	Compliance with International Standards	4,35	17,87%	0,66%
		Customer Oriented Production	3,88	15,94%	0,59%
		Quality of the Raw Materials	3,94	16,18%	0,60%
		Sustainability in Quality	4,41	18,12%	0,67%
		Education of the Employees	3,76	15,46%	0,57%
		Others (Business Ethics)	4,00	16,43%	0,61%
Location	22,34%	Distance to Raw Material Sources	4,00	48,00%	10,72%
		Distance to Markets		52,00%	11,62%
Accessability to Markets	20,83%	Certifications & Homologations	4,06	12,27%	2,55%
		Quotas	3,69	11,13%	2,32%
		Tariffs	3,81	11,51%	2,40%
		Import Duties	3,75	11,32%	2,36%
		Anti-Dumping Applications	3,93	11,88%	2,47%
		Foreign Direct Investments	2,93	8,86%	1,84%
		Benefits & Opportunities through International Agreements	3,56	10,76%	2,24%
		Consolidations	3,38	10,19%	2,12%
		Others (Logistics)	4,00	12,08%	2,52%
Technology	4,54%	Steel Production technology	4,18	55,61%	2,53%
		Technological Developments in Costruction, Automotive & Other related Industries	3,33	44,39%	2,02%
		Others	0,00	0,00%	0,00%
Domestic Market	15,55%	Competition among national companies	3,82	11,29%	1,76%
		Number of companies in the market	3,88	11,46%	1,78%
		Demand & Supply Relations	4,47	13,20%	2,05%
		Capacity Utilisation Rates	3,71	10,94%	1,70%
		Support of the related Industries	2,88	8,49%	1,32%
		Foreign Direct Investments	3,00	8,86%	1,38%
		Market Shares of National Companies	3,65	10,77%	1,67%
		Market Size & Structure	4,24	12,50%	1,94%
		Exchange Rate ($/YTL & €/YTL)	4,24	12,50%	1,94%
		Others	0,00	0,00%	0,00%
Role of Government	1,64%	Preparation of the Infrastructure	4,18	8,48%	0,14%
		Establishment of the Institutions	3,94	8,01%	0,13%
		Structuring of the Sector	4,12	8,36%	0,14%
		Subsidies	4,24	8,60%	0,14%
		General Labour Legislations	3,63	7,36%	0,12%
		Export - Import Regulations	4,12	8,36%	0,14%
		Taxation	4,47	9,07%	0,15%
		Getting unregistered economy under control	4,18	8,48%	0,14%
		Environmental Regulations	3,88	7,87%	0,13%
		Regulation of Banking & Finance System	3,81	7,74%	0,13%
		Regulation of Insurance System	3,69	7,49%	0,12%
		Others (support of Turkish Consulates in foreign countries)	5,00	10,16%	0,17%
Firm Characteri	1,46%	Size of National Companies	4,12	22,19%	0,32%
		Ownership Status	3,12	16,80%	0,24%
		Production Range	4,18	22,51%	0,33%
		Partnership with foreign company	2,81	15,16%	0,22%
		Others (Reliability, Vertical integration of companies)	4,33	23,35%	0,34%
		Total		800,000%	100,000%

Source: Calculated by the author according to the findings of the questionnaire

Table 5.49 Weights of Variables in the Competitiveness Model for Re-rollers

Re-rollers

	Wi		Mean	wij	Total Weight (Wij)
Cost	34,12%	Raw Material	4,89	77,70%	26,51%
		Energy	4,53	7,47%	2,55%
		Labour	4,00	4,77%	1,63%
		Freight	4,00	3,00%	1,02%
		Finance & Exchange Rate (€/$. €/YTL & $/YTL)	4,11	3,10%	1,06%
		Others (Maintenance, Spare Parts, Administrative Costs etc.)	4,00	3,95%	1,35%
Quality	10,88%	Compliance with International Standards	4,84	22,01%	2,39%
		Customer Oriented Production	4,05	18,42%	2,00%
		Quality of the Raw Materials	4,47	20,34%	2,21%
		Sustainability in Quality	4,63	21,05%	2,29%
		Education of the Employees	4,00	18,18%	1,98%
		Others (Business Ethics)	0,00	0,00%	0,00%
Location	13,53%	Distance to Raw Material Sources	4,00	58,50%	7,91%
		Distance to Markets		41,50%	5,61%
Accessability to Markets	8,34%	Certifications & Homologations	3,92	11,37%	0,95%
		Quotas	3,50	10,14%	0,85%
		Tariffs	3,31	9,58%	0,80%
		Import Duties	4,13	11,98%	1,00%
		Anti-Dumping Applications	4,00	11,59%	0,97%
		Foreign Direct Investments	3,38	9,81%	0,82%
		Benefits & Opportunities through International Agreements	3,42	9,90%	0,83%
		Consolidations	3,85	11,14%	0,93%
		Others (Logistics)	5,00	14,49%	1,21%
Technology	7,41%	Steel Production technology	4,31	53,16%	3,94%
		Technological Developments in Costruction, Automotive & Other related Industries	3,80	46,84%	3,47%
		Others	0,00	0,00%	0,00%
Domestic Market	17,65%	Competition among national companies	4,16	11,18%	1,97%
		Number of companies in the market	3,68	9,91%	1,75%
		Demand & Supply Relations	4,50	12,10%	2,14%
		Capacity Utilisation Rates	3,78	10,16%	1,79%
		Support of the related Industries	3,17	8,51%	1,50%
		Foreign Direct Investments	3,17	8,51%	1,50%
		Market Shares of National Companies	3,67	9,86%	1,74%
		Market Size & Structure	4,18	11,23%	1,98%
		Exchange Rate ($/YTL & €/YTL)	3,89	10,47%	1,85%
		Others (Strategies of rivals)	3,00	8,07%	1,42%
Role of Government	4,21%	Preparation of the Infrastructure	3,89	9,47%	0,40%
		Establishment of the Institutions	3,56	8,66%	0,36%
		Structuring of the Sector	3,83	9,33%	0,39%
		Subsidies	4,39	10,68%	0,45%
		General Labour Legislations	3,53	8,58%	0,36%
		Export - Import Regulations	3,94	9,60%	0,40%
		Taxation	4,21	10,25%	0,43%
		Getting unregistered economy under control	3,72	9,06%	0,38%
		Environmental Regulations	3,47	8,46%	0,36%
		Regulation of Banking & Finance System	3,65	8,88%	0,37%
		Regulation of Insurance System	2,89	7,03%	0,30%
		Others	0,00	0,00%	0,00%
Firm Characteri	3,86%	Size of National Companies	4,26	22,99%	0,89%
		Ownership Status	3,00	16,18%	0,62%
		Production Range	4,17	22,47%	0,87%
		Partnership with foreign company	3,11	16,78%	0,65%
		Others (Reliability, Vertical integration of companies)	4,00	21,57%	0,83%
		Total		800,000%	100,000%

Source: Calculated by the author according to the findings of the questionnaire

Another aim of this research was to find out strategies to enhance the competitiveness of the Turkish steel industry. Under this perspective 3 main alternatives were proposed to the respondents and asked to agree or disagree with these alternatives in the question 21. By aiming not to direct the respondents to a limited number of solutions, their own opinions were also asked. The responses to this question are given in the Table 5.50. 16 crude steel producers and 18 Re-rollers responded to the question.

The most common solution for both groups to enhance the competitiveness of the Turkish steel industry is to produce more value-added products both on long and flat product groups. 12 crude steel producers and 8 Re-rollers supported this idea. One of the crude steel producer commented that heavy profiles has be produced as more value added product on the long product side.

The second major solution is the correction of unbalanced demand & supply position btw. long and flat products in favor of more value added products. 9 crude steel producers and 6 Re-rollers supported this idea. But one of the crude steel producers put a remark that with the already launched investments the flat steel production will exceed the consumption in 2010. By means of total quantities produced this statement is true, but the final products which are aimed to be produced after these investments are mainly hot rolled coils and plates. But there will be even a demand for the alloy steels and especially stainless steels, which could not be fulfilled by the already planned investments of domestic producers.

The solution of vertical integration, which is the enlargement of production ranges by producers to be able to produce or supply their own raw materials, is another accepted alternative. Under the scope of vertical integration, 3 alternatives were suggested in favor of Re-rollers, integrated mills, and EAF based mini mills. The acceptance levels of each solution under this scope shows differences between both groups. As explained before, the Re-rollers depend mainly on the domestic crude steel producers for the raw material. And due to the high demand in international markets for the billets, the prices of the billets has increased more than the increase in the final product prices. Therefore the difference between the semi and final product prices has reduced. Under these circumstances the 13 Re-rollers are in the opinion to have their own crude steel production facilities to be able to survive.

The idea of investment on iron & coal mining for integrated mills is mainly proposed by the integrated mills. Due to the minority of such companies by means of the number of firms, this idea does not have a high percentage of acceptances. But in fact all integrated mills are in the same opinion.

As each group has supported mainly the idea of vertical integration related to their situation, it is not the case for the EAF based mini mills. Only 4 crude steel producers and 2 Re-rollers supported the idea of investment on scrap collection & preparation for EAF based mini-mills. Even 1 of these 4 crude steel producers is an integrated mill. One of the reasons behind this response is the difficulties in collecting scrap. Another but mainly the main reason is the capacities of these companies. As mentioned before most of the crude steel producers have more than 2,000,000 mt production capacity. And after the new investments in the sector, the number of companies exceeding 3,000,000 mt production capacity are increasing. And the scrap to feed such production activities is 10 – 12% more than the production capacity. To able to setup an organisation structure to supply such an amount of scrap is not easy. The operations, labour and finance to support such a business is preventing the EAF based mini-mills to invest in that field of vertical integration.

Table 5.50 Solutions to enhance the competitiveness of the Turkish Steel Industry

		Agree	Disagree	Total
To Produce value added products both on long and flat product groups	Crude Steel Producer	12	4	16
	Re-roller	8	10	18
Investment on crude steel production for Re-rollers	Crude Steel Producer	1	15	16
	Re-roller	13	5	18
Investment on iron & coal mining for integrated mills	Crude Steel Producer	4	12	16
	Re-roller	2	16	18
Investment on scrap collection & preperation for EAF based minimills	Crude Steel Producer	4	12	16
	Re-roller	2	16	18
Correction of unbalanced demand & supply position btw. long and flat products in favour of more value added products	Crude Steel Producer	9	7	16
	Re-roller	6	12	18
Personal Proposal	Crude Steel Producer	6	0	6
	Re-roller	3	0	3

Source: Compiled by the author according to the findings of the questionnaire

6 crude steel producers and 3 Re-rollers proposed new strategies and solutions to enhance the competitiveness of the Turkish steel industry. These are as follows:

The proposals of the crude steel producers:

1. A product development center has to be established in a university or institute.

2. The method of consolidations has to be used to expand the limits due to the geographical position.

3. Due to the increasing oil prices and the freight rates respectively, marketing researches has to be made to increase the market share in countries with closer proximity.

4. Energy costs have to be reduced by using discriminatory metering prices to allow the high consuming companies to pay gradually less for the unit price like in European Union countries.

The proposals of the Re-rollers:

1. The government has to give subsidies to promote export of the products and reduce custom duties on raw materials and semi finished products.

2. The crude steel producers must allow the Re-rollers to survive by respecting their share.

3. The responsibilities and taxes on labour cost have to be diminished.

4. The companies has to be more export oriented

5. The cost of certification in different markets (especially in European Union countries) has to be diminished by bilateral agreements.

Conclusion

The primary objective of this thesis has been to find the competitiveness of the Turkish Steel Industry on the way to be a member of the European Union (EU). The main idea is to find out the factors affecting the competitiveness of the steel industry in general, highlight advantages and disadvantages of the European and the Turkish Steel Industries and to find out whether the Turkish steel industry has comparative advantage or not. In addition to this objective, this thesis has been concentrated on the inquiry of ways and means to enhance the sectoral competitiveness of the Turkish Steel Industry.

In the thesis I have tried to outline theories which explain conpetitiveness first to set up the basic pillars of the argumentation followed in the preceding chapters. According to the literature survey, eight factors have been developed as the main factors affecting the competitiveness of the steel industry in general. These factors were supported by the variables. Eight hypothesis were outlined at the beginning of the thesis, which molded in the research questions of 7, 14, 15, 16, 17, 18, 19 and 20. The factors, which supposedly affect competitiveness are defined as Cost; Quality; Technology; Accessibility to Markets; Location; Role of Government; Domestic Market; and Firm Characteristics.

The EU steel industries have been examined in the thesis in detail to set up a bases for reference for Turkey which takes measures to approximate, harmonize, converge and therefore restructure its industrial infrastructure to complement the EU single market and to compete not only with its EU counterparts, but also with its global low-cost and/or rivals in an ever competetive global market.

The question of to what extend the trade in iron and steel industry complies with existing theories can be answered as follows:

- In Chapter 1 of this study, the national competitiveness theories are investigated in detail. According to David Ricardo's theory of comparative advantage, countries must specialise in the production of those goods that it produces most efficiently and to buy the goods that it produces less efficiently from other countries. The current situation in global iron and steel industries including Turkey does not match with this theory. Iron and steel industry stands at the hub of many industrial sectors as steel products are used as inputs in almost all industries. Therefore it is seen as a vital industry for almost all countries without considering the efficiency. In addition to that the comparative advantage theory underlines the advantages of labour, whereas especially the labour cost has a very low percentage on the steel production nowadays.

- The iron and steel industry does not match also with the factor endowments theory of Heckscher & Ohlin (H&O) due to the same reason. Most of the major steel producing countries can not supply the necessary raw materials from their own domestic resources. Due to the importance of iron and steel industry, these countries are mainly importing raw materials like iron ore, coal and scrap.

- There are two main factors of production, capital and labour in the H-O Model. The theory asserts that a nation will export the commodity that makes intensive use of the country's relatively abundant and cheap factor and import the commodity whose production requires the intensive use of relatively scarce and expensive factor. To determine if a country is capital or labor endowed (or abundant), we need to look at the comparative physical availability in each country, namely, capital-labor ratios. If a country has a higher capital-labor ratio than another, that country is endowed with capital, or is capital abundant. But on the contrary we observe cross-trade between capital and labour abundant countries for the same steel products due to unbalanced demand and supply relations. The main reason of this situation is again the countries seeing the iron and steel industry as inevitable.

- According to the Revealed Comparative Advantage Theory of Bela Balassa, as long as the trade pattern is determined by comparative advantage, then direct observations of trade performance should reveal the comparative advantage. The stronger a country's relative trade performance in a certain commodity, the greater the comparative advantage in the production of that commodity. The comparison between export performances of Turkey and major European Union countries show that Turkey has the major revealed comparative advantage on raw-material intensive goods and labor intensive goods. For the capital intensive goods including also the steel products Turkey has a lower export volume than the above mentioned sectors.

- From the Vernon Product Cycle Theory perspective, if we look at the steel producing industry, we observe that the percentage of the world steel production has shifted in the last fifty years from developed countries like the European countries and the US to emerging countries like China, Ukraine, Brazil & India. But still the main difference is that the developed countries are mainly concentrated on the high value added products whereas the developing countries are focusing on the production volume with low value added products. What is more important than the performance of countries is the power and performance of international companies like Arcelor-Mittal, which is growing globally through consolidations. As mentioned above the main aim is to reach as many countries as possible to strengthen their positions globally with an increased product range and to eliminate their disadvantage due to location.

- When Country Similarity Theory of Linder is questioned for the steel industry the situation does match with the assumption that a country exports products which are driven mainly by local demand. On the other hand it does not match with the second assumption that importing and exporting countries have similar tastes and income levels. As an example if we observe the export – import trade patterns of Turkey then we observe than the major markets in

2006 for the export are the countries in the Persian Gulf (4,801,100 mt), European Union 25 countries (3,309,375 mt) and United States (1,736,546 mt) On the import side for the Turkish Steel Market the main sources are the Common Wealth of Independent States (CIS) countries (6,459,615 mt) and European Union 25 countries (2,405,478 mt).

- In the Economies of Scale Theory of Krugman and Lancaster the main difference from Factor Endowments Theory is the increasing rate of return. The economies of scale, as it indicates greater volume of production, tend to create cost advantage ensuring competitive prices for producers operating under economies of scale. The capacities of mills have a high importance on variable costs and therefore the price of the products. The common point in all countries is that steel industry is mainly dominated by the players with high production capacities. Especially on the long product side, the qualities are mainly commercial qualities and it is well defined by international standards. As most of the mills are producing almost the same products, differentiation is achieved mainly on service quality, reputation and price. Therefore product quality is not the main aspect to be differentiated. But it is my contention that at the end, the competitive price has a higher importance than all the others for the customers. Due to that reason most of the producers are trying to increase their capacity in Turkey on the long product side, although the total supply is much more than the total demand in domestic market. They are trying to be competitive by getting the benefit out of economies of scale and reducing their costs, so that they can easily adjust their prices according to the global market conditions, without making much sacrifice in their profit margins.

- As mentioned by Krugman and Lancaster, the economies of scale in differentiated products give rise to intra-industry trade. As shown in the Table 4.15, Turkey's export volume, including the raw-materials, is 7,555.80 million USD in 2007, whereas its import volume for the same products is 14,421.00 million USD. In that sense the intra-industry trade index score of

Turkey with its counterparts is 0.69, showing a medium level intra-industry trade for Turkey with its global counter-parts. For the raw materials the intra-industry trade is almost negligible with its value of 0.08. On the contrary we observe an almost maximum intra-industry index score for the steel products in general as its score is 0.96 for this group. But this does not show that the Turkish steel industry is importing and exporting the same products. By means of classification of products as per Harmonized Tariff Schedule Codes we observe that the intra-industry trade for each group is on low level. The intra-industry trade index scores for flat, long and special steel products are 0.29, 0.24 and 0.27 respectively.

- These figures show us that the Turkish steel industry has a high intra-industry trade for the steel products in general and low intra-industry trade by means of specific product groups within the iron and steel industry with its global counterparts. The reasons for that is less differentiated products and especially focus on low value-added long-products in the production.

- According to Alfred Weber's Location Theory an industry must be located where it can minimize its costs, and therefore maximize its profits. Three categories of costs are defined under this theory. These are: Transportation; Labor, and Agglomeration costs. In the crude steel production, the final products loose weight in manufacture, thus favoring the industry to be located near the raw material site. 1,134 kilograms (kg) of iron ore, 635 kg of coal, and 54 kg of limestone is used to produce 1 mt of crude steel in integrated mills (Fenton, 2003, p.39.1). The electric arc furnace method requires about 1.10 mt of scrap to produce 1 mt of crude steel. With these high yield percentages for the crude steel producers it is more important to be close to the raw material sources. In that sense in parallel with the location theory, the steel industry in Turkey is mainly located near by seaside as the crude steel producers are importing 63.33% of their raw materials and also exporting 45.46% of final products. According to the 2006 Annual Report of Iron and Steel Producers Association the imported quantity of iron ore is 6,690,906 mt

and 20,286,056 mt for coal (all of this coal is not used for steel industry). The production of crude steel in integrated mills is 6,177,000 mt. For the same period the quantity of the imported scrap is 14,771,928 mt to produce 17,131,000 mt crude steel in EAF based mini-mills. Therefore, in Turkey we observe that most of the steel industry is located around Marmara, Ege, Karadeniz and Akdeniz regions. In Germany we observe that the steel industry is located mainly in the states of Nordrhein-Westfalen and Saarland. The reason for both cases is to reduce the transport costs by establishing the industry near to raw material sources and also to agglomerate the sector in some regions to reduce the agglomeration costs by getting the benefits of shared facilities, labour force, infrastructure, services and raw materials if they are sited in the same place.

- Other industrial sectors are also located near to the steel mills as steel is used in almost all sectors either in their infrastructures, machineries or directly as raw material. Sharing the same geographical area brought an advantage also to the EAF based mini-mills as scrap is mainly collected from industrial areas. In that sense the transportation of scrap out of domestic market is also very easy and cost effective.

- In the re-rolling process the loss on the re-rolling mills is relatively lower than this but the loss is not less than 2% due to loss of the oxide layer. As most of the Re-rolling mills aim to supply their products also to the nearby regions in domestic market, according to the location theory they are more concerned about the distance to the raw material sources. With respect to this fact, all re-rolling mills are located near to the crude steel producers mainly in the İstanbul, İzmit, Çanakkale, Ereğli, Karabük, Aliağa, Denizli and İskenderun. While trying to be close to the crude steel producers the re-rollers became also close to the seaside, which brought an advantage to them for their export performance.

- As mentioned above according to Weber, another important cost item, which has to be minimised, is the labor cost. Higher labor costs reduce profits. Depending on the share of the labor costs among total costs, a company might do better farther from raw materials and markets if cheap labor is available. This is the case for the labor intensive industries. As steel industry is a capital intensive industry, the share of labor costs are much lower than the transportation costs.

- As Michael Porter theorizes in his Diamond Model there are four attributes of a nation that shape the environment in which local firms compete and these attributes promote or impede the creation of competitive advantage. These attributes are: Factor endowments; Demand conditions; Relating & Supporting Industries; and Firm strategy, structure, and rivalry. These attributes constitute the diamond.

- Basic factor endowments like natural resources do not hinder the countries to invest in the iron and steel industry as all countries see this sector as inevitable. But advanced factors like skilled labour force brought an advantage to them.

- The demand conditions always triggered the iron and steel industries in each country. Due to the high growth rates, the demand in infrastructures and rapidly growing population leaded the Turkish steel industry to focus on the long products, which are mainly used in the construction industry. On the other hand the EU member states in general have a lower growth rate, less need on new infrastructures and housing. Therefore the EU steel industry is mainly focused on the production of higher value added products to be used in machinery, automotive and white-goods industries.

- The demand in the domestic market is creating the related and supporting industries as well and these industries are forcing the iron and steel industries

to produce higher qualities according to their demand. Strong related and supporting industries result more competitive iron and steel industries globally.

- Firm strategy, structure, and rivalry leaded the steel industry investing to meet the mainly domestic and also global demand conditions, while increasing their productivity to compete with their domestic and global rivals. It also leaded them to invest in downstream or upstream industries to widen their production range, while reducing their costs.

- Government factor, which is added to the model as exogenous factor became one of the most important factors as the flow in international trade and investment decisions are highly affected by the decisions of the governments. Protective measures like quotas, tariffs, import / export taxes, or anti-dumping actions are changing the trade patterns in one day and resulting the companies harder to build their firm strategies.

The findings of the inquiry of this thesis can be summarized as follows :

- The EU27 is the second biggest steel producer after China with a total crude steel production of 210.32 million tones in 2007. On the other hand, the Turkish steel industry is the 11th biggest steel producer in the world and ranking in the third position in Europe with its 25.75 million crude steel production at the same time period.

- In the EU, the production is made mainly by the BOF technology in integrated mills out of iron ore and coal. On the contrary 75% of the crude steel production in Turkey is made in the EAF based mini-mills, using scrap as raw material. Both industries are dependent on the imported raw materials. EU is importing 60% of its iron ore and 80% of coal, but is a net exporter for the scrap. Turkey is a net importer for iron ore, coal, and scrap. Therefore the

market is so sensitive to changes in international markets. Imported scrap amounts 60% of the demand and 42.6% out of it was supplied in 2007 from EU.

- The second most important cost item for steel producers is the energy cost. The Turkish producers have a disadvantage in energy costs, compared to their counter-parts in EU. In addition to that, the steel producers in EU with a bigger capacity are gaining competitive advantage due to the consumption based tariff system, which does not exist in Turkey.

- Due to the increase in global demand, oil prices, and consequently the increasing freight costs, proximity to raw material sources and markets become important. Nevertheless geographically distant producers like China beat the global competitivenss challange by low raw-material and labor costs.

- EU is procuring its raw-materials mainly from distant counties like Brazil, Australia and Canada. On the other hand Turkey imports its raw-materials mainly from the EU, the USA, and Russia for the scrap and Brazil and Australia for the iron ore in parallel to their rivals in EU. Therefore both of them have the same disadvantages on raw-material supply side in general. But particularly the EAF based mini-mills in EU have a comparative advantage in comparison with their counter-parts in Turkey due to the proximity to the scrap sources. But, on the other side for other major markets, due to the proximity of Turkey, the Turkish producers have an advantage and in combination with the production capacity, they have a very big influence in the region.

- The consumption per capita rates in EU are more than 400kg, whereas in Turkey this rate is around 300kg, therefore the steel producers in the EU are mainly aiming the EU itself, the Eastern Europe and the North Africa to sell their products, whereas the main markets for the Turkish steel producers are

the Middle East, the EU and the USA. Due to aiming distant markets compared to the EU producers, the Turkish producers have a disadvantage. For sales to the EU, by procuring the scrap from the EU and selling again to the same market after converting it into the final products is causing a relatively smaller profit margin between the EAF based mini-mills in both markets against the Turkish steel producers. But for the other major markets like the GCC countries the situation is the opposite. Another factor is that the competitive position of the Turkish steel industry is firmly built on strong domestic demand.

- Due to protective actions like; certifications, homologations, import taxes and anti-dumping proceedings, the Turkish steel producers are facing difficulties in accessing some markets like, the EU, the USA, and Algeria. While the producers in the EU are only facing this problem by accesing to the US market. The capacity utilization rate for the Turkish integrated mills was 97% in 2007. It is higher than the capacity utilization rates in EU, but in EAF based mini-mills in Turkey the rate is relatively lower. The reason for that is the continuous investments on capacity expansions in the Turkish steel industry. But in a couple of years the capacity utilizations rates are expected to become higher in parallel with the finalization of investments. Due to the continuous investments, there are new and modern technologies in the majority of existing plants, which will create an advantage in the productivity.

- Main difference among steel industries of EU and Turkey is the focus in production. Due to the focus on long products, the major customer segment for the Turkish steel industry is the construction industry, whereas this segment has a share of only 24% in the EU, despite of its leading position. The steel industry in EU is producing higher value-added products covering the needs of automotive, metalware, tubes and mechanical engineering. The EU is focused on the specialization of higher value-added products, whereas the Turkish steel industry tries to expand the capacity on existing plants to

benefit from the economies of scale and to gain competitiveness by reducing costs.

- Therefore the Turkish steel industry suffer from a structural problem. The production is biased 83.50 % (21.505 million mt) to 14.46% (3.726 million mt) in favour of long products. As regards consumption, the ratio is almost 50 - 50 %. This unbalanced situation is also reflected to the export - import rates. The exports can only compensate 84% of the imports in value, although the exported quantities (13.76 million mt) are higher than the imported quantities (13.20 million mt). But new investments, mainly focused on the flat production, will increase the value-added in the Turkish steel industry. In the EU accession period, in coordination with the EU Commission, the government is establishing a national restructuring program (NRP) to restructure the industry and to balance the long-flat production. Another aim of the NRP is to direct the Turkish steel industry into higher value-added products to cache the EU level. In parallel with the EU steel industry, the Turkish producers are also suffering due to environmental regulations and penalties. Both groups have to invest for environmental protection. These investments will bring extra costs to both parties in the short-run.

- Due to the appreciation of New Turkish Lira (YTL) the labour costs are increasing in Turkey, but the Turkish steel industry still display a comparative advantage regarding the labour costs. The labour costs are one third of the EU15 countries and half of the EU27. In spite of this fact, due to the above mentioned focus on long products and due to the low capacity utilization rates in total, the total factor productivity is less than that of EU. Therefore, the Turkish steel industry could not benefit completely from the low labour costs.

- The steel industry in the EU is dominated by the international companies like Arcelor-Mittal, Tata-Corus and Riva, but the share of the family owned companies account for 36%. In Turkey, the sector is not yet affected much by

the consolidations. It is mainly dominated by the family owned private companies. The international companies are benefiting from logistics and this gives the European producers the possibility to reach to different markets easily. Whereas due to the ownership structure the Turkish steel industry is more flexible to adapt to changes by giving decisions faster.

- To be able to test all these factors in the Turkish steel industry, a 21 question-questionnaire was given to the members of the Iron and Steel Producers Association and to the re-rollers as the sampling frame. 17 out of 22 crude steel producers and 19 out of 40 major Re-rollers responded to the survey. The attendance of Re-rollers to the survey looks quite low, but by means of the represented capacities in their group it is 62.24 %. For the crude steel producers the represented capacity is 95.94%. As of total, these 36 companies represent 81.44% of the Turkish steel industry by means of announced capacities.

- According to the responses, the competitiveness of crude steel producers and Re-rollers were investigated separately in detail. As a result, all suggested factors in the model are found to be positively related with the competitiveness of the Turkish steel industry. The result of the questionnaire indicate the comparative importance of each factor for the representatives of companies chosen in the survey and the outcome is as follows:

	Crude Steel Producers	**Re-rollers**
Cost	29.95%	34.12%
Quality	3.69%	10.88%
Location	22.34%	13.53%
Accessibility to Markets	20.83%	8.34%
Technology	4.54%	7.41%
Domestic Market	15.55%	17.65%
Role of Government	1.64%	4.21%
Firm Characteristics	1.46%	3.86%
Total	**100.00%**	**100.00%**

- To be able to compare the competitiveness of steel industries in different countries, regions or individual companies between each other the weights of each variable within the model is calculated. The level of importance for each variable in the model are given in the Table 5.48 for the crude steel producers and in the Table 5.49 for the Re-rollers. According to these calculated weights of variables each test subject could be scored and the total score will show the competitiveness score of each test subject.

- As mentioned before, another objective of this study and the survey was to find ways and means to enhance the sectoral competitiveness of the Turkish Steel Industry. According to the findings of the survey, there is a consensus in the sector that the sector has to be focused more on the production of higher value-added products both on long and flat products. In parallel with the NRP, the respondents are in the same opinion that the unbalanced demand and supply position has to be corrected to be able to increase the competitiveness of the Turkish steel industry. In addition to these, the intention of vertical integration among the Re-rollers is very common. And we also observe this intention by the actual investment decisions to produce their own raw-material.

The Turkish steel industry has the above mentioned advantages and disadvantages in comparison with the EU steel industry. In parallel with the EU Accession period, some of these diasadvantages are expected to disappear. But it is my contention that the following measures have to be taken.

- The long – flat steel products ratio has to be balanced according to the domestic demand,
- The Turkish steel industry has to focus on the production of higher value added long and flat steel products,
- Differentiation and widening in the product range must be achieved,

- Energy costs should be reduced to the level of our competitors (OECD countries),
- Pricing on electricity should be differentiated according to the consumption rate of the producers,
- Investment on environment protection projects must be made to achieve EU standards,
- Environment protection projects have to be subsidized by long term credits,
- In parallel with the situation in the global markets, the Turkish steel industry has to increase its competitiveness through mergers, acquisitions, consolidations and strategic alliances with global partners,
- Due to the increasing oil prices and the freight rates respectively the international trade gets more localized. Therefore marketing researches has to be made to increase the market share in countries in closer proximity
- In parallel with the investments on flat products, new markets must be generated and marketing activities in these markets must be conducted,
- Upwards and Downwards vertical integration including investments in other countries must be achieved,
- Importance to R&D activities and education should be given,
- A more corporate culture has to be adopted to the Turkish steel companies,
- In addition to the common bulk cargo shipments, the option of alternative transportation methods like containers must be evaluated.

In conclusion, I content that, especially with the new ongoing investments to produce higher value-added products, the Turkish steel industry took a very important step to increase its competitiveness. As long as the Turkish steel industry follows the above mentioned precautions, it will increase its competitiveness and maintains its position as a regional power in the region.

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Appendix A Figures and Tables

TABLES :

Table 1 : Comparison of Revealed Comparative Advantage for the EU15 and Trukey in terms of the distribution of sectors between technological classes

Comparison of Revealed Comparative Advantage For the EU-15 and Turkey in terms of the Distribution of Sectors between Technological Classes

%

	RMIG	LIG	CIG	EIRG	DIRG	TOTAL
Turkey	39.0[2] (1)[3]	37.8 (2)	14.6 (3)	2.4 (5)	6.1 (4)	32.0[4]
Austria	15.9 (4)	**32.7 (1)**	16.8 (3)	7.1 (5)	27.4 (2)	44.1
Belgium	**35.0 (1)**	22.0 (2)	18.7 (3)	13.8 (4)	10.6 (5)	48.0
Denmark	**39.8 (1)**	24.7 (2)	6.5 (5)	8.6 (4)	20.4 (3)	36.3
Finland	**26.2 (1)**	21.3 (2)	18.0 (3)	13.1 (4)	21.3 (2)	23.8
France	**29.3 (1)**	16.4 (4)	23.3 (2)	10.3 (5)	20.7 (3)	45.3
Germany	13.3 (5)	16.8 (2)	15.0 (3)	14.2 (4)	**40.7 (1)**	44.1
Greece	**46.1 (1)**	30.3 (2)	15.8 (3)	2.6 (5)	5.3 (4)	29.7
Ireland	**44.2 (1)**	11.5 (3)	9.6 (4)	23.1 (2)	11.5 (3)	20.3
Italy	16.0 (3)	**42.0 (1)**	11.0 (4)	3.0 (5)	28.0 (2)	39.1
Netherlands	**52.2 (1)**	10.4 (4)	12.2 (3)	14.8(2)	10.4 (4)	44.9
Portugal	36.6 (2)	**42.3 (1)**	7.0 (3)	7.0 (3)	7.0 (3)	27.7
Spain	**34.3 (1)**	29.4 (2)	20.6 (3)	4.9 (5)	10.8 (4)	39.8
Sweden	25.0 (2)	16.7(4)	18.1 (3)	6.9 (5)	**33.3 (1)**	28.1
UK	22.6 (2)	18.3 (4)	16.1 (5)	19.4 (3)	**23.7 (1)**	36.3

Notes: 1.RMIG = Raw material-intensive goods, LIG = Labour intensive goods, CIG = Capital intensive good, EIRG = Easy-to-imitate research intensive goods, DIRG = Difficult-to-imitate research intensive goods.
2. Share of, e.g., RMIG in total RCA sectors for a given country.
3. Figures in parentheses show the ordering of the categories.
4. Percentage of RCA exporting sectors in total exporting sectors.

Source: Erlat, 2001, p.5

Table 2 : Finished steel consumption per capita, 2003-2014: World

Table 2 Finished Steel Consumption Per Capita, 2003 – 2014: World

Kg / capita	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2014*
New Member States & Candidate Countries								
Bulgaria	96.8	106.2	112.3	122.2	135.7	142.6	153.5	215.7
Czech Republic	406.4	409.0	423.8	475.5	536.7	562.3	577.2	763.9
Hungary	202.9	200.9	219.8	238.0	254.0	267.2	281.3	345.4
Poland	173.5	177.4	197.2	207.2	217.5	225.5	234.7	287.7
Romania	127.0	143.4	152.1	167.5	180.5	194.7	204.1	277.6
Slovakia	316.3	349.1	364.7	384.7	556.0	592.8	586.1	401.6
Turkey	188.6	203.5	217.5	212.6	219.6	228.8	239.0	271.0
Other	136.5	140.6	145.4	146.6	144.1	143.4	147.0	154.5
A & C Average	***198.8***	***218.4***	***235.9***	***257.3***	***275.2***	***294.6***	***310.3***	***412.9***
EU 15								
Germany	415.3	420.4	425.3	427.2	426.3	426.2	431.2	440.9
Italy	502.4	507.5	512.6	513.5	511.2	510.0	515.1	521.2
Spain	476.0	478.4	480.9	479.4	475.4	472.6	475.6	471.0
France	272.1	274.1	276.0	275.6	273.4	271.8	273.5	272.2
EU 15 Average	***365.7***	***369.0***	***372.1***	***372.2***	***370.0***	***368.6***	***371.6***	***373.2***
Asia								
China	164.4	203.8	231.5	253.9	272.3	292.0	317.7	451.0
Japan	566.6	558.6	550.9	543.3	536.1	529.1	522.4	488.1
South Korea	917.3	930.2	942.9	956.6	970.5	984.7	999.1	1,072.7
Asia Average	***130.5***	***146.6***	***158.1***	***167.4***	***175.2***	***183.6***	***194.3***	***247.7***
CIS								
Russia	147.2	160.4	171.0	182.1	193.7	205.2	219.0	286.6
Ukraine	55.9	61.1	65.4	69.8	74.5	79.1	84.7	112.5
CIS Average	***106.7***	***116.3***	***124.0***	***132.0***	***140.4***	***148.8***	***158.7***	***207.8***
North America								
USA	366.0	367.4	370.5	371.6	372.1	372.5	372.6	376.9
Canada	503.0	504.1	508.9	510.6	511.8	512.8	513.3	520.4
Mexico	136.5	138.6	142.1	145.5	149.1	152.8	156.6	177.1
North America Average	***320.7***	***322.0***	***325.1***	***326.6***	***327.6***	***328.6***	***329.4***	***336.8***
Rest of the World								
Brazil	93.7	95.7	98.7	100.9	102.9	104.9	106.9	115.8
Iran	105.8	107.9	110.0	112.1	114.5	116.8	118.1	125.1
Australia	346.0	346.6	347.8	347.8	347.6	348.6	349.2	348.5
ROW Average	***40.4***	***42.1***	***40.9***	***42.5***	***41.9***	***43.4***	***44.9***	***48.0***
WORLD AVERAGE	**131.6**	**142.0**	**147.2**	**153.8**	**157.4**	**163.6**	**171.1**	**204.6**

Source: US Census Bureau 2004; EuroStrategy Consultants, 2005

Table 3 : Crude steel production by process, 2006

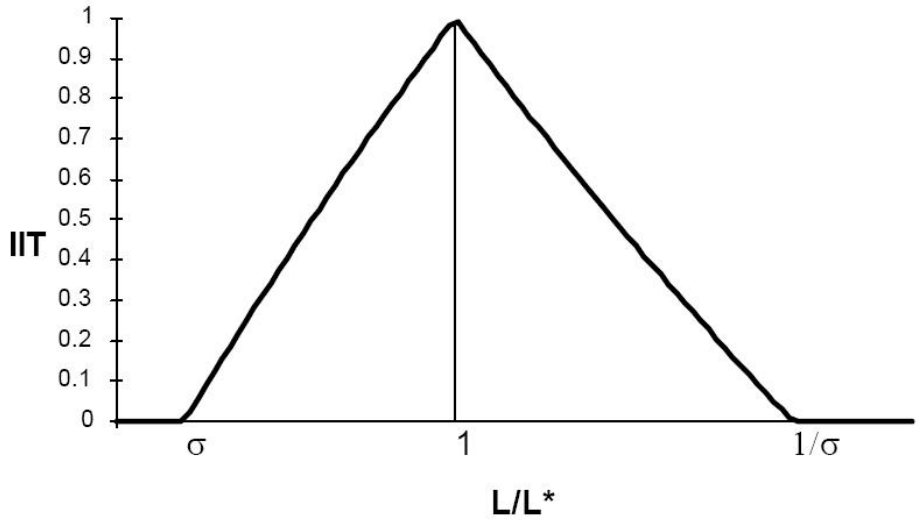
	Production mmt	Oxygen %	Electric %	Open hearth %	Other %	Total %
Austria	7.1	91.0	9.0	-	-	100.0
Belgium	11.6	70.3	29.7	-	-	100.0
Czech Republic	6.9	91.6	8.4	-	-	100.0
Finland	5.1	68.3	31.7	-	-	100.0
France	19.9	61.7	38.3	-	-	100.0
Germany	47.2	68.9	31.1	-	-	100.0
Hungary	2.1	79.0	21.0	-	-	100.0
Italy	31.6	37.4	62.6	-	-	100.0
Luxembourg	2.8	-	100.0	-	-	100.0
Netherlands	6.4	97.7	2.3	-	-	100.0
Poland	10.0	57.6	42.4	-	-	100.0
Slovakia	5.1	92.6	7.4	-	-	100.0
Spain	18.4	19.6	80.4	-	-	100.0
Sweden	5.5	65.6	34.4	-	-	100.0
United Kingdom	13.9	80.8	19.2	-	-	100.0
Other EU	4.4	-	100.0	-	-	100.0
European Union (25)	**197.9**	**59.5**	**40.5**	**-**	**-**	**100.0**
Romania	6.3	69.8	30.2	-	-	100.0
Turkey	23.3	29.2	70.8	-	-	100.0
Others	6.3	44.6	55.4	-	-	100.0
Other Europe	**35.9**	**39.0**	**61.0**	**-**	**-**	**100.0**
Russia (e)	70.8	61.6	18.4	20.0	-	100.0
Ukraine (e)	40.9	56.4	9.8	33.8	-	100.0
Other CIS	8.9	47.9	43.7	8.5	-	100.0
CIS	**120.7**	**58.8**	**17.3**	**23.9**	**-**	**100.0**
Canada	15.4	58.6	41.4	-	-	100.0

Mexico	16.3	25.7	74.3	-	-	100.0
United States	98.6	43.1	56.9	-	-	100.0
NAFTA	**130.3**	**42.7**	**57.3**	**-**	**-**	**100.0**
Argentina	5.5	47.5	52.5	-	-	100.0
Brazil	30.9	73.9	24.4	-	1.7	100.0
Chile	1.6	72.4	27.6	-	-	100.0
Venezuela	4.9	-	100.0	-	-	100.0
Others	3.4	22.4	77.6	-	-	100.0
Central and South America	**46.3**	**59.1**	**39.7**	**-**	**1.2**	**100.0**
Egypt (e)	6.0	21.5	78.5	-	-	100.0
South Africa	9.7	53.2	46.8	-	-	100.0
Other Africa	2.6	45.2	54.8	-	-	100.0
Africa	**18.4**	**41.6**	**58.4**	**-**	**-**	**100.0**
Iran (e)	9.8	22.5	77.5	-	-	100.0
Saudi Arabia	4.0	-	100.0	-	-	100.0
Other Middle East	1.3	-	100.0	-	-	100.0
Middle East	**15.1**	**14.6**	**85.4**	**-**	**-**	**100.0**
China	422.7	87.0	13.0	-	-	100.0
India (e)	44.0	47.3	50.5	2.3	-	100.0
Japan	116.2	74.0	26.0	-	-	100.0
South Korea	48.5	54.3	45.7	-	-	100.0
Taiwan, China	20.2	53.0	47.0	-	-	100.0
Other Asia	17.0	-	100.0	-	-	100.0
Asia	**668.5**	**76.5**	**23.3**	**0.2**	**-**	**100.0**
Australia	7.9	81.7	18.3	-	-	100.0
New Zealand	0.8	71.3	28.7	-	-	100.0
World	**1241.7**	**65.5**	**32.0**	**2.4**	**0.0**	**100.0**

FIGURES :

Figure 1 :

Intra-Industry Trade and Relative Market Sizes

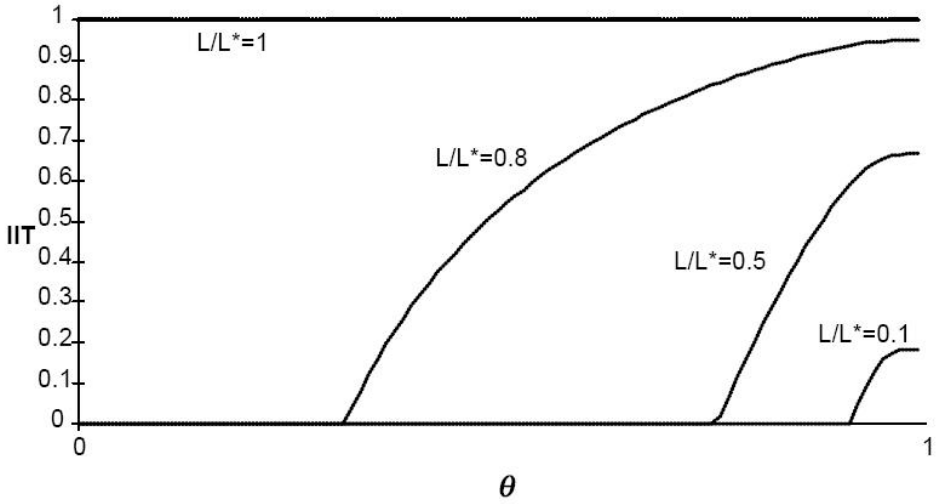


Source : Brülhart 1995, p.23

Figure 2 :

Intra-Industry Trade and Scale Economies

($\tau = 0.8$)

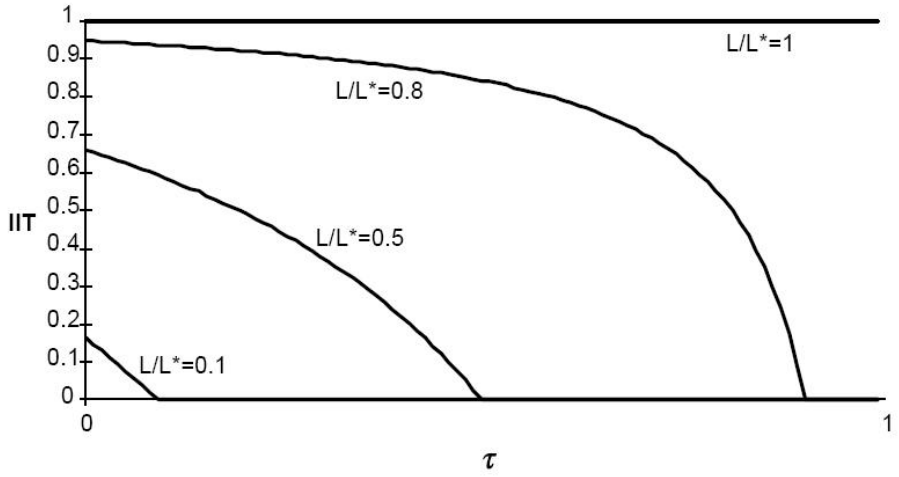


Source : Brülhart 1995, p.23

Figure 3 :

Intra-Industry Trade and Transport Costs

(θ = 0.5)



Source : Brülhart 1995, p.24

Figure 4 :Location of the Steel Industry in Turkey

Source : Demir Çelik Üreticileri Derneği

Appendix B Questionnaire

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This questionnaire is prepared by Koray Günay, who is writing his phd Thesis at Işık University Social Science Institute Mangement Department, to be evaluated in his thesis "Competitiveness of the Turkish Steel Industry" and it is under the supervision of Chairperson of the Department of Economics Prof. Dr. Sema Kalaycıoğlu. The main purpose of this reseach is to find out the factors affecting the competitiveness of the Turkish Steel Industry. But it is also aiming to find solutions to enhance the sectoral competitiveness of the Turkish Steel Industry. Therefore information to be supplied by the companies constituting this sector has an utmost importance.

All information to be provided by you will only be used for academic purposes. Unless you prefere otherwise you are not expected to give your personal details. Upon your request a copy of the thesis will be send to you after its approval by the academic committee.

Thank you very much for your cooperation.

Best Regards,

1. Please mark the products your firm is currently producing

   a. Billet .....
   b. Wirerod .....
   c. Reinforcing Bar .....
   d. Profile - Flat - Angle .....
   e. Slab .....
   f. Hot Rolled Coil .....
   g. Cold Rolled Coil .....
   h. Galvanised Coil .....
   i. Others (please mention) .....

2. Which of the folowing items are used as raw material in your production process? Please mark .

   a. Iron Ore .....
   b. Coal .....
   c. Scrap .....
   d. Billet .....
   e. Hot Rolled Coil .....
   f. Others (please mention) .....

3. Since when has your company been in operation in this sector?

   Since19 ....

4. What is your total production capacity?

   ..... mt / year

5. How many employees do you have in your company?

a. 1 – 50
b. 51 – 100
c. 101 – 200
d. 201 – 500
e. 501 – 1,000
f. 1,001 – 1,500
g. > 1,500

6. Which of the following legal structures suit to your companies current structure?

a. Open to public
b. Family Owned
c. Domestic – Foreign Partnership
d. State – Private Partnership

7. Please mark the importance of each cost item according to the effect of it to your competitiveness.

	Unimportant	Slightly Important	Important	Very Important	Extremely Important
a. Raw Material	1	2	3	4	5
b. Energy	1	2	3	4	5
c. Labour	1	2	3	4	5
d. Freight	1	2	3	4	5
e. Exchange Rate (€/$, €/YTL & $/YTL)	1	2	3	4	5
f. Finance	1	2	3	4	5
g. Others (please mention)	1	2	3	4	5

8. Please mention the percentage of the following items on your cost structure?

a. Raw Material % .....,.....
b. Energy % .....,.....
c. Labour % .....,.....
d. Freight % .....,.....
e. Finance % .....,.....
f. Others (Maintenance, Spare parts, Administrative etc.) % .....,.....

9. Please mention the percentage of your raw material sources.
(If you are not importing any raw material then please continue from Question 11)

a. Domestic Market % .....,.....
b. Import % .....,.....

10. If you are importing any raw materials, please indicate those sources among the following regions regarding the amount of your imports from 1 to 6.

a. Blacksea Countries & East Europe .....
b. Europe (EU 15) .....
c. America .....
d. Middle East .....
e. Far East .....
f. Others (please mention) .....
.....

11. Please mention the percentage of your sales among domestic and foreign markets. (If you are not exporting any product then please continue from Question 14)

a. Domestic Market .... %
b. Export .....%

12. If you are exporting any products, please enumerate those markets among the following regions regarding the amount of your sales from 1 to 6.

a. Blacksea Countries & East Europe .....
b. Europe (EU 15) .....
c. America .....
d. Middle East .....
e. Far East .....
f. Others (please mention) .....
.....

13. Which countries or companies are your major competitors in your target markets as the origin of production?

Country :

a. Billet .....
b. Wirerod .....
c. Reinforcing Bar .....
d. Profile - Flat - Angle .....
e. Slab .....
f. Hot Rolled Coil .....
g. Cold Rolled Coil .....
h. Galvanised Coil .....
i. Others (please mention) .....

14. Please mark the importance of each quality factor according to their importance to the competitiveness of your production.

	Unimportant	Slighdy Important	Important	Very Important	Extremely Important
a. Compliance with international standards	1	2	3	4	5
b. Customer Oriented Production	1	2	3	4	5
c. Quality of the Raw Materials	1	2	3	4	5
d. Sustainability in Quality	1	2	3	4	5
e. Education of the Employees	1	2	3	4	5
f. Others (please mention)	1	2	3	4	5

.....

15. Which of the following factors are most likely to affect your products' competitiveness? Please mention the most important 5 of them by sequencing them.

a. Distance to raw-material sources
b. Distance to markets
c. Costs (Raw-material – Labour – Energy – Freight – Finance)
d. Fluctuations on the exchange rate
e. Demand – Supply relation in the domestic market
f. Demand – Supply relation in the international markets
g. Product Quality
h. High quality standards in target markets
i. Extra cost of entering in new markets (certifications, homologations)
j. Difficulties in entering new markets (certification, quotas & taxes)
k. Value-add by the production
l. Subsidies
m. Steel producing technology
n. Technological developments in Costruction, Automotive, White Goods and other related industries
o. Your Production Range
p. Others (please mention) .....

1. ..... 2. ..... 3. ..... 4. ..... 5. .....

16. Please mark the importance of each factor regarding the accessability to markets according to the effect of it to your competitiveness.

	Unimportant	Slightly Important	Important	Very Important	Extremely Important
a. Certifications & Homologations	1	2	3	4	5
b. Quotas	1	2	3	4	5
c. Tariffs	1	2	3	4	5
d. Import Duties	1	2	3	4	5
e. Anti-Dumping Applications	1	2	3	4	5
f. Foreign Direct Investments	1	2	3	4	5
g. Benefits & Opportunities through International Agreements	1	2	3	4	5
h. Consolidations	1	2	3	4	5
i. Others (please mention)	1	2	3	4	5

17. Please mark the importance of each technology factor according to the effect of it to your competitiveness.

	Unimportant	Slightly Important	Important	Very Important	Extremely Important
a. Steel producing technology	1	2	3	4	5
b. Technological developments in Costruction, Automotive, White Goods and other related industries	1	2	3	4	5
c. Others (please mention)	1	2	3	4	5

18. Please mark the importance of each factor regarding the domestic market according to the effect of it to your competitiveness.

	Unimportant	Slightly Important	Important	Very Important	Extremely Important
a. Competition among national companies	1	2	3	4	5
b. Number of companies in the market	1	2	3	4	5
c. Demand & Supply relations	1	2	3	4	5
d. Capacity Utilisation rates	1	2	3	4	5
e. Support of the related industries	1	2	3	4	5
f. Foreign Direct Investments	1	2	3	4	5
g. Market shares of national companies	1	2	3	4	5
h. Market size & structure	1	2	3	4	5
i. Exchange rate ($/YTL & €/YTL)	1	2	3	4	5
j. Others (please mention)	1	2	3	4	5
.....					

19. Please mark the importance of each factor regarding the role of the government in your sector to effect your competitiveness.

	Unimportant	Slightly Important	Important	Very Important	Extremely Important
a. Prepation of the Infrastructure **(Transport, Industrial Areas, Electrification, etc.)**	1	2	3	4	5
b. Establishment of the Institutions **(Chamber of Commerce, Turkish Iron & Steel Producers Association, Universities, Tübitak, KOSGEB etc.)**	1	2	3	4	5
c. Structuring of the sector	1	2	3	4	5
d. Subsidies **(Tax deduction, suitable creadit opportunities and subsidies)**	1	2	3	4	5
e. General Labour Legislations	1	2	3	4	5
f. Export – Import Regulations	1	2	3	4	5
g. Taxation **(Corporation Tax, VAT, Private Consumption Tax, Income Tax etc.)**	1	2	3	4	5
h. Getting unregistered economy under control	1	2	3	4	5
i. Environmental Regulations	1	2	3	4	5
j. Regulation of Banking & Finance system	1	2	3	4	5
k. Regulation of Insurance system	1	2	3	4	5
l. Others (please mention)	1	2	3	4	5
.....					

20. Please mark the importance of each factor regarding the firm characteristics according to the effect of it to your competitiveness.

	Unimportant	Slighdly Important	Important	Very Important	Extremely Important
a. Size of national companies	1	2	3	4	5
b. Ownership status (Family owned vs. Corporate Companies)	1	2	3	4	5
c. Production Range	1	2	3	4	5
d. Partnership with a foreign company	1	2	3	4	5
e. Others (please mention)	1	2	3	4	5

21. Which of the following porpasals are the most important to increase the competitiveness of the Turkish Steel Industy? Please also mention if you agree or disagree with other alternatives.

a. To produce more value added products both on long and flat product groups.
b. Enlargement of production ranges by producers to be able to produce or supply their own raw materials (Vertical Integration)
    i. Investment on raw steel production for re-rollers,
    ii. Investment on iron & coal mining for integrated mills,
    iii. Investment on scrap collection & preperation for minimills based on Electric Arc Furnace steel production.
c. Correction of the unbalanced demand & supply position of long – flat production on the favour of more value-added flat products.
d. (Personal Proposal) .....

.....

.....

.....

.....

.....

.....

.....

Optional

Company : .....

Name & Surname : .....

Title : .....

E-M@il Adress* : .....

(*Please mention if you would like to receive the results of this questionnaire)

Bu anket Işık Üniversitesi Sosyal Bilimler Enstitüsü İşletme Anabilim dalında doktora tezini yazmakta olan Koray Günay tarafından Türk Demir Çelik Sektörünün rekabetçiliği üzerine doktora tez çalışmasında değerlendirilmek üzere hazırlanmış olup İktisat Bölüm Başkanı Prof. Dr. Sema Kalaycıoğlu'nun bilgisi dahilindedir. Ana amacı rekabetçiliği etkileyen faktörleri belirlemek olan bu çalışmanın diğer bir amacı da Türkiye'nin sektörel rekabetçiliğini arttırmak için olası çözümler getirmektir. Bu nedenle sektörü oluşturan firmalar olarak sizlerin vereceğiniz bilgiler büyük önem taşımaktadır.

Vereceğiniz bilgiler sadece bilimsel amaçla kullanılacak olup kişisel bilgilerinizi yazıp yazmamak konusunda serbestsiniz. Araştırmanın bilimsel bulguları size tarafımdan, tezin akademik kuruldan geçmesini müteakiben mail adresinizi yazmanız halinde elektronik ortamda bildirilecektir.

Katkılarınızdan dolayı teşekkürlerimi sunarım.

Saygılarımla

1. Ürettiğiniz ürünleri işaretleyiniz

   a. Kütük .....
   b. Filmaşin .....
   c. İnşaat Demiri .....
   d. Profil - Lama - Köşebent .....
   e. Slab .....
   f. Sıcak Haddelenmiş Sac .....
   g. Soğuk Haddelenmiş Sac .....
   h. Galvanizli Sac .....
   i. Diğer (lütfen belirtiniz) .....

2. Hammadde olarak aşağıdakilerden hangisini / lerini kullanıyorsunuz?

   a. Demir Cevheri .....
   b. Kömür .....
   c. Hurda .....
   d. Kütük .....
   e. Sıcak Haddelenmiş Saç .....
   f. Diğer (lütfen belirtiniz) .....

3. Firmanız bu alanda faliyet göstermeye hangi yıl başladı?

   19 .... yılında

4. Tonaj olarak kapasiteniz ne kadardır?

   ..... mt / yıl

5. Firmanızda kaç kişi çalışmaktadır?

a. 1 – 50
b. 51 – 100
c. 101 – 200
d. 201 – 500
e. 501 – 1,000
f. 1,001 – 1,500
g. > 1,500

6. Firmanızın hukuki yapısı aşağıdakilerden hangisi ya da hangileridir?

a. Halka Açık
b. Aile Şirketi
c. Yerli – Yabancı Ortaklık
d. Kamu – Özel Ortaklık

7. Maliyet açısından aşağıdaki maliyeti etkileyen kalemlerin ne derece önemli oldugunu belirtiniz.

	Hiç Önemli Değil	Pek Önemli Değil	Önemli	Çok Önemli	Son Derece Önemli
a. Ham Madde	1	2	3	4	5
b. Enerji	1	2	3	4	5
c. İşçilik	1	2	3	4	5
d. Nakliye	1	2	3	4	5
e. Döviz Kuru (€/$, €/YTL & $/YTL)	1	2	3	4	5
f. Finansman	1	2	3	4	5
g. Diğer (lütfen belirtiniz)	1	2	3	4	5

8. Maliyet Kalemlerinizin 100 birim icerisinindeki yaklaşık dağılımı nedir?

a. Ham Madde % .....
b. Enerji % .....
c. İşçilik % .....
d. Nakliye % .....
e. Finansman % .....
f. Diğer (Bakım, Onarım, Yedekparça, İdari v.b.) % .....

9. Ham Madde Teminini hangi kaynaklardan yaptığınızı yüzde olarak belirtiniz. (İthalat yapmıyor iseniz lütfen 11. sorudan devam edin.)

a. İç piyasa % .....
b. İthalat % .....

10. İthalat yapıyor iseniz ithalat yaptığınız kaynakları miktar büyüklüklerine göre 1 den 6 ya kadar sıralayınız.

a. Karadeniz ülkeleri ve Doğu Avrupa .....
b. Avrupa (AB 15) .....
c. Amerika .....
d. Orta Doğu .....
e. Uzak Doğu .....
f. Diğer (lütfen belirtiniz) .....
.....

11. Ürün satışlarınızda iç – dış pazar oranlarını yüzde olarak belirtiniz.
(İhracat yapmıyor iseniz lütfen 14. sorudan devam edin.)

a. İç piyasa % .....,.....
b. İhracat % .....,.....

12. İhracat yapıyor iseniz sevkiyat yaptığınız pazarları miktar büyüklüklerine göre 1 den 6 ya kadar sıralayınız.

a. Karadeniz ülkeleri ve Doğu Avrupa .....
b. Avrupa (AB 15) .....
c. Amerika .....
d. Orta Doğu .....
e. Uzak Doğu .....
f. Diğer (lütfen belirtiniz) .....

13. İhracat yaptığınız piyasalarda en önemli rakipleriniz üretim yeri itibari ile hangi ülkelerdir?

ÜLKE :

a. Kütük .....
b. Filmaşin .....
c. İnşaat Demiri .....
d. Profil - Lama - Köşebent .....
e. Slab .....
f. Sıcak Haddelenmiş Sac .....
g. Soğuk Haddelenmiş Sac .....
h. Galvanizli Sac .....
i. Diğer (lütfen belirtiniz) .....

14. Rekabeti etkilemesi açısından aşağıdaki kalite faktörlerinin ne derece önemli oldugunu belirtiniz.

	Hiç Önemli Değil	Pek Önemli Değil	Önemli	Çok Önemli	Son Derece Önemli
a. Standartlara uygun üretim	1	2	3	4	5
b. Müşteri odaklı üretim	1	2	3	4	5
c. Hammadde kalitesi	1	2	3	4	5
d. Kalitede süreklilik	1	2	3	4	5
e. Çalışanların eğitimi	1	2	3	4	5
f. Diğer (lütfen belirtiniz)	1	2	3	4	5

15. Sizce firmanızın ürettiği ürünlerdeki rekabetçiliğini etkileyen en önemli faktörler hangileridir (ilk 5 tanesini önem sırasına göre belirtiniz)

a. Ham madde kaynaklarına uzaklık
b. Hedef pazarlara uzaklık
c. Maliyetler (Hammadde – İşçilik – Enerji – Nakliye – Finansman)
d. Döviz kurundaki değişkenlik
e. İç piyasadaki arz – talep dengesi
f. Global piyasalardaki arz – talep dengesi
g. Ürün kalitesi
h. Hedef pazarlardaki kalite standartlarının yüksek olması
i. Hedef pazarlara girmenin getirdiği ek maliyet (sertifikasyonlar)
j. Hedef pazarlara girmedeki zorluklar (sertifikasyonlar, kotalar ve vergiler)
k. Katılan katma değer
l. Devlet teşvikleri
m. Üretim teknolojisi
n. İnşaat, otomotiv ya da beyaz eşya gibi nihai kullanım alanlarındaki teknolojik gelişmeler
o. Ürün gamınızın genişliği
p. Diğer (lütfen belirtiniz) .....

1. ..... 2. ..... 3. ..... 4. ..... 5. .....

16. Rekabetçiliğinizi etkilemesi açısından yeni pazarlara ulaşma ile ilgili olarak aşağıdaki faktörlerinin ne derece önemli oldugunu belirtiniz.

	Hiç Önemli Değil	Pek Önemli Değil	Önemli	Çok Önemli	Son Derece Önemli
a. Sertifikasyonlar ve Homologasyonlar	1	2	3	4	5
b. Kotalar	1	2	3	4	5
c. Tarifeler	1	2	3	4	5
d. İthalat Vergileri	1	2	3	4	5
e. Anti-Dumping Uygulamaları	1	2	3	4	5
f. Yabancı Sermayeli Doğrudan Yatırımlar	1	2	3	4	5
g. Uluslararası anlaşmalarla sağlanan tavizler ve olanaklar	1	2	3	4	5
h. Uluslararası bazda büyük şirket birleşmeleri	1	2	3	4	5
i. Diğer (lütfen belirtiniz)	1	2	3	4	5

17. Rekabetçiliğinizi etkilemesi açısından aşağıdaki teknoloji faktörlerinin ne derece önemli oldugunu belirtiniz.

	Hiç Önemli Değil	Pek Önemli Değil	Önemli	Çok Önemli	Son Derece Önemli
a. Çelik Üretim teknolojisi	1	2	3	4	5
b. İnşaat, otomotiv ya da beyaz eşya gibi nihai kullanım alanlarındaki teknolojik gelişmeler	1	2	3	4	5
c. Diğer (lütfen belirtiniz)	1	2	3	4	5

18. Rekabetçiliğinizi etkilemesi açısından aşağıda belirtilen iç pazar faktörlerinin ne derece önemli oldugunu belirtiniz.

	Hiç Önemli Değil	Pek Önemli Değil	Önemli	Çok Önemli	Son Derece Önemli
a. Firmalar arası rekabet	1	2	3	4	5
b. Pazardaki Firma Sayısı	1	2	3	4	5
c. Arz & Talep Dengesi	1	2	3	4	5
d. Kapasite Kullanım Oranları	1	2	3	4	5
e. Yan sanayinin desteklenmesi	1	2	3	4	5
f. Yabancı Yatırımlar	1	2	3	4	5
g. Pazardaki Firmaların Pazar Payları	1	2	3	4	5
h. Pazar Büyüklüğü ve İstikrarı	1	2	3	4	5
i. Döviz Kuru ($/YTL & €/YTL)	1	2	3	4	5
j. Diğer (lütfen belirtiniz)	1	2	3	4	5

19. Rekabetçiliğinizi etkilemesi açısından devletin rolünü gösteren aşağıdaki faktörlerin ne derece önemli oldugunu belirtiniz.

	Hiç Önemli Değil	Pek Önemli Değil	Önemli	Çok Önemli	Son Derece Önemli
a. Teknik Alt Yapının Hazırlanması **(Ulaştırma, Sanayi Bölgeleri, Elektrifikasyon vb.)**	1	2	3	4	5
b. Kurumsal Alt Yapının Hazırlanması **(Ticaret Odaları, Sanayi Odaları, Demir Çelik Üreticileri Derneği, Üniversiteler, Tübitak, KOSGEB vb.)**	1	2	3	4	5
c. Sektörün yapılandırılması	1	2	3	4	5
d. Teşvikler **(Vergi indirimleri ve kolaylıkları, ucuz kredi ve sübvansiyonlar)**	1	2	3	4	5
e. Genel iş mevzuatının düzenlenmesi	1	2	3	4	5
f. Dış Ticaret mevzuatının düzenlenmesi	1	2	3	4	5
g. Vergilendirme **(Kurumlar V., KDV, ÖTV, Gelir V. vb.)**	1	2	3	4	5
h. Kayıt Dışı Ekonominin Önlenmesi	1	2	3	4	5
i. Çevreyi Koruyucu Yaptırımlar	1	2	3	4	5
j. Bankacılık ve Finans sisteminin düzenlenmesi	1	2	3	4	5
k. Sigortacılık sisteminin düzenlenmesi	1	2	3	4	5
l. Diğer (lütfen belirtiniz)	1	2	3	4	5

20. Rekabetçiliğinizi etkilemesi açısından aşağıdaki firma karakteristiği faktörlerinin ne derece önemli oldugunu belirtiniz.

	Hiç Önemli Değil	Pek Önemli Değil	Önemli	Çok Önemli	Son Derece Önemli
m. Pazardaki Firmaların Büyüklükleri	1	2	3	4	5
n. Firmanın Aile Şirketi ya da Kurumsal Şirket olması	1	2	3	4	5
o. Ürün Gamının Genişliği	1	2	3	4	5
p. Yabancı Ortaklık	1	2	3	4	5
q. Diğer (lütfen belirtiniz)	1	2	3	4	5

21. Sizce Türkiye'nin demir çelik sektöründeki rekabetçiliğini arttırmak için atılacak en önemli adım hangisidir? Diğer önerilere katılıp katılmadığınızı belitiniz.

r. Hem uzun hem de yassı üretiminde daha yüksek katma değerli ürünlere yönelmek
s. Üretici Fimaların hammaddelerini kendileri tedarik edecek şekilde ürün gamlarını genişletmeleri (Dikey Entegrasyon)
   i. Haddehanelerin İzabe tesis kurmaları,
   ii. Entegre Demir Çelik Üreticilerinin Demir ve Kömür Madeni işletmeciliği yapmaları,
   iii. Elektrik Ark Ocaklı Çelik Üreticilerinin Hurda Toplama ve İşleme tesisi kurmaları
t. Türkiye demir çelik pazarında yassı – uzun üretim dengesizliginin daha katma değerli ürün olan yassı ürünler yönünde giderilmesi
u. (Kişisel Öneriniz).....

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Firma Adı : .....

Anketi Dolduran Kişinin İsmi : .....

Anketi Dolduran Kişinin Ünvanı : .....

E-M@il Adresiniz* : .....

(*Anket sonuçlarını almak isterseniz)

Curriculum Vitae

Koray Günay was born on 10 November 1973, in Beirut, Lebanon. He received his B.S. degree in Metallurgical and Materials Engineering in 1996 from Middle East Technical University. He completed Executive MBA in 2002 in Işık University by writing his M.A. thesis on "Liberalization and Protectionalism Issues in the Global Steel Industry and A Case Analysis of Turkish Steel Industry". He started his profeesional career in 1996 at Borusan Boru Fabrikaları A.Ş., where he worked as a Quality Control Engineer until 1998. Since 1999 he has been working as the Regional Export Sales Manager at Çolakoğlu Metalurji A.Ş.