The Role and Development of the Construction Industry in Turkish and World Economy

M.Sc. Thesis

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Hasan Kalyoncu University

Supervisor

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by

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I here by declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by this rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

İrfan ÜNAL

ABSTRACT

THE ROLE AND DEVELOPMENT OF THE CONSTRUCTION INDUSTRY IN TURKISH AND WORLD ECONOMY

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June 2017

Construction industry is one that is needed by humanity endlessly, of which contribution to the economy is important.

According to the results obtained from this study in which the share and effects of the construction industry in Turkey and in the world are examined; it has been found that the role and share of the construction industry in the economy is considerably large, that it has a fragile structure which meets location and infrastructure requirements of all sectors including electronics, strongly reacting to changes in the national economy and that it is an industry that will never disappear even if its added value is low and its momentum decreases from time to time. Furthermore, it has been seen that the industries of ready-mixed concrete and cement, each being one of the most important and primary materials of the industry, have a significant place in the construction industry, that dwelling production has particular importance within the industry since it meets accommodation needs of people and that any decline in residence sales does not occur even in case of economic recession.

In the light of these data, the importance of the industry in developing national economies should be considered, efforts should be made to increase the share of the industry in the GDP and the GNP, to make designs and production with higher added value instead of labour-intensive manufacturing with low added value including material and designing industries and search for foreign markets should progressively continue.

Key Words: Cement,Construction, Economy, Gross National Product (GNP), Gross Domestic Product (GDP), Material, Readymixed concrete.

ÖZET

İNŞAAT SEKTÖRÜNÜN TÜRKİYE VE DÜNYA EKONOMİSİNDEKİ YERİ VE GELİŞİMİ

ÜNAL, İrfan

Yüksek Lisans Tezi, İnşaat Mühendisliği

Tez Yöneticisi: Prof. Dr. Fevziye AKÖZ

Haziran 2017

İnşaat sektörü insanlığın tükenmeyen ihtiyacı olan, ekonomiye katkısı önemli bir sektördür.

Türkiye ve Dünya'da inşaat sektörünün ekonomideki payının ve etkilerinin, incelendiği bu çalışmadan elde edilen sonuçlara göre; inşaat sektörünün ekonomideki yerinin ve payının küçümsenemeyecek derecede büyük olduğu, elektronik dahil, tüm sektörlerin mekan ve altyapı gereksinimini karşılayan, ülke ekonomisindeki değişimlere fazlasıyla reaksiyon gösteren, kırılgan bir yapıya sahip olduğu, katma değeri düşük olsa da, zaman zaman hızı azalsa da bitmeyecek bir sektör olduğu, görülmüştür. Ayrıca sektörün en önemli ve en temel malzemelerinden olan hazır beton ve çimento sektörünün inşaat sektöründe önemli bir yerinin olduğu, insanların barınma ihtiyacını karşıladığı için konut üretiminin sektör içinde özel bir öneme sahip olduğu, ekonomide daralma yaşanması durumunda bile konut satışlarında azalma olmadığı görülmüştür.

Bu veriler ışığında inşaat sektörünün gelişmekte olan ülke ekonomilerindeki önemi dikkate alınmalı, GSYİH ve GSMH daki payının arttırılmasına çalışılmalı, malzeme ve tasarım sektöleri dahil katma değeri düşük emek yoğun üretim yerine, katma değeri daha yüksek tasarım ve üretim yapılması için çalışılmalı, yurtdışı pazar arayışları artarak sürdürülmelidir.

Anahtar Kelimeler: Çimento, Ekonomi, Gayri Safi Milli Hasıla (GSMH), Gayri Safi Yurtiçi Hasıla (GSYİH), Hazır beton, İnşaat, Malzeme.

To My Family…

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LIST OF SYMBOLS/ABBREVIATIONS

m^2	Square meters
m^3	Cubic meters
USA	United States of America
UN	United Nations
GNP	Gross National Product
GDP	Gross Domestic Product
IMF	International Monetary Fund
Türk MMMB	Turkish Consulting Engineers and Architects Association
YEM	Building Industry Center
TÜİK	Turkish Statistical Institute
UAE	United Arab Emirates
TÜBİTAK	The Scientific and Technological Research Council of Turkey
TÜRKİYE İMSAD	Turkish Construction Material Industry Association
ENR	Engineering News Record
İNTES	Turkish Construction Industry Employers' Union
TMB	Turkish Contractors Association
USD	United States Dollar

INTRODUCTION

Construction activity comprises the most important technical service components of architecture, engineering and contracting activities. Performing these services with modern standards and in accordance with professional ethics has great importance in that the construction industry develops well and it can provide the highest contribution to the development of the country. Our country is one that is developing and therefore whose needs are continuously growing. Inevitably, "construction industry" constitutes the main axis of the development. Design and construction of dams, power generation and distribution plants, roads, airports, port and harbour structures, urban spaces, factories, hospitals and all the other living spaces and the first step of all the facilities that will make these areas habitable is taken by means of "construction". In short, the first of the steps that will be taken by a country having the determination to move forward, will be construction. Construction manufacturing process had started with the existence of human being and diversifying needs also led construction manufacturing to become different. At present, construction is evaluated such that it encompasses not only the construction of the environment but also entire activities contributing to maintenance, repair and operation thereof. Construction manufacturing is not perceived just as the manufacturing of the building; rather, it means environment friendly, transparent and sustainable manufacturing which bears social responsibility and directly affects social life and social structure.

Within the construction industry, particularly building/housing constructions constitute an economic wheel with a large spectrum, which supports and dynamizes several sub-sectors. For countries suffering from economic crisis, dynamizing the construction industry is one of the most important ways out of the crisis.

In this study which has been mapped out with the purpose of determining the construction industry's contribution to the economic development in the world and in Turkey and determining the dynamics it brings into action, the construction industry market has been analyzed together with its sub-branches and the role and contribution of the industry within the GNP has been researched by utilizing

resources relevant to the subject. Within the material sector which is one of the sub-branches of the industry, the ready mixed concrete and cement industries have been studied in detail.

In the first chapter of this dissertation study, the role and development of the construction industry in the world has been researched and the importance of the construction industry in the world economy has been emphasized within a general framework. In the second chapter of the study, the structure of the construction industry in Turkey has been explained with statistical data, the contribution to economy of the sub-sectors of Turkish construction industry has been scrutinized and the role and influence of the industry in Turkish economy has been expressed.

According to the results obtained from the study; it has been found that the role and share of the construction industry in the economy is considerably large, that it is an imperious necessity which meets location and infrastructure requirements of all sectors including electronics, strongly reacts to changes in the national economy, it has a fragile structure and that it is an industry that will never disappear even though its added value is low and its momentum decreases from time to time.

In the light of these data, the importance of the industry in developing national economies should be considered, efforts should be made to make designs and production with higher added value including material and designing industries and search for foreign markets should progressively continue.

LITERATURE REVIEW

1. PLACE OF THE CONSTRUCTION INDUSTRY IN THE WORLD

The fact that the construction industry includes a great number of different sub-sectors ranging from manufacture of building materials to manufacture of electronics and that it brings several different professional fields together under the same roof is the most important indication of the industry's being one of the sectors which steer the World economy. Both employment opportunities and high-budget construction projects indicate the significance of the construction industry with regard to the world economy and development. Therefore, several factors that affect the construction industry also directly affects the world economy.

It would be appropriate to define certain economic indicators in order to assess the economic indicators concerning the construction industry and to assess the place and importance of the construction industry in the world. For instance, Gross Domestic Product (GDP) and Gross National Product (GNP) are included in the economic indicators.

GDP is defined as the value of all the final products and services produced within the boundaries of a country within a certain period of time, said value being in the currency of the relevant countries. GNP, on the other hand, is defined as the total value of the total final goods and services produced by the citizens of a country in a certain currency unit (Özorhon, 2012).

1.1. Global Indicators in Economy

In recent years the world economy has heavily suffered from the global economic crisis and national economies have been left with no choice but to struggle against this crisis. Therefore, a series of prevention packages have been prepared in many countries in order to eliminate the effects of the economic crisis and prevent economic stagnation, and it was aimed to dynamize the economy with these prevention policies. Economic crisis affected to a great extent the construction

industry which is the locomotive of national economies and caused the construction industry to seriously shrink and decelerate. Therefore, dynamizing the construction industry took place on the top in the implemented economic reform packages and the industry was aimed to achieve a stable and sustainable power.

The International Monetary Fund (IMF) predicted in the Global Economic Outlook Report it published on 14 April 2015 that the recovery in the global economy would continue at a moderate rate in 2015 and 2016. Based on this, recently the most important factor triggering the recovery from the economic crisis is the recovery of the construction industry and the contribution of the industry to the economy.

According to the same report by the IMF, as shown in Table 1.1., the World economy grew by 3.4% in 2014 especially with the positive contribution of the developing countries while this ratio was seen to rise to 3.5% in 2015 with a relative acceleration and a growth by 3.8% was predicted for 2016.

Considering the growth rates in the countries, in 2014 developed countries showed a relatively small growth by 1.8% while the growth rate in the developing countries was 4.4%. In 2015, the growth rate in the developed countries was 2.4% while in the developing countries it was 4.3% which is less than the previous year. As for the expectations for 2016, a growth by 2.4% was predicted in the developed countries and by 4.7% in developing countries.

China (7.4%) and India (7.2%) had influence in the high rate growth the world economy experienced in 2014 according to the same table. In 2015, the world economy grew by 3.5% while China achieved a growth by 6.8% and India by 7.5%. It has also been predicted that growths in China and India will contribute greatly to the anticipated growth by 3.8% in the world because similarly these countries are expected to play a determining role in obtaining the growth rates anticipated in 2015 and 2016. In 2016, China is anticipated to grow by 6.3% and India by 7.5% and these figures are remarkably high as compared to the world average of 3.8% (IMF 2016).

One of the developed economies, USA was seen to grow under the world average with a growth by 2.4% in 2014 and by 3.1% in 2015. Also in 2016, a growth by 3.1% has been expected. The Eurozone countries showed growth rates far below the world

average in 2014 and 2015 by 0.9% and 1.5% respectively, and for 2016 a very little growth of 1.6% has been anticipated. On the other hand, Japan narrowed by 0.1% in 2014, grew by 1.0% in 2015 and a growth by 1.2% has been anticipated in 2016.

Among the developing countries, the case in Russia and Brasil were also similar. Russia grew by 0.6% in 2014, declined by 3.8% in 2015 and a recession by 1.1% has been anticipated in 2016. Based on these data, Russia is seen to be the country which experienced the largest recession within the world economy. Likewise, Brasilian economy grew at too small a rate by 0.1% in 2014, declined by 1.0% in 2015 and a very small growth by 1.0% has been anticipated in 2016.

Table 1.1. illustrates the growth and inflation rates (%) in the World economy in accordance with the predictions of the IMF for 2014-2016

	Years		
Countries	2014	2015	2016
Roles of Growth (%)			
World	3,4	3,5	3,8
Developed Countries	1,8	2,4	2,4
United States	2,4	3,1	3,1
Eurozone	0,9	1,5	1,6
Japan	-0,1	1	1,2
Develoloping Economies	4,4	4,3	4,7
China	7,4	6,8	6,3
Russia	0,6	-3,8	-1,1
India	7,2	7,5	7,5
Brazil	0,1	-1	1
Rates of Inflation (%)			
Developed Economies	1,4	0,4	1,4
Developed Economies	5,1	5,4	4,8
World Trade Increase	3,4	3,7	4,7

1.2. The Place of the Construction Industry in the World Economy

The size of the construction industry within the world economy is estimated to be approximately 3.5 trillion USD and this figure comprises about 8.0% of the total world GNP (Özdemir E., Kılıç S., 2011). Within the next decade, it is expected that globally a growth by 67% will be achieved and 7.2 trillion dollar production will rise up to 12 trillions. It is predicted that China, India and USA will have a contribution of 54% in this increase. Based on the figures of 2009, rising economies comprising 46% of the world construction industry are anticipated to reach a rate of 55% by 2020 (İstanbul Ticaret Odası, 2012). Figure 1.1. illustrates the global construction volume by countries by 2009 and Figure 1.2 provides the 2020 forecasting (Özorhon, 2012).

When Figure 1.1 is viewed, it is seen that the USA, China and Japan dominate the global construction market. These countries have shares of 17.4%, 13.7% and 7.8% respectively. Germany, Spain, France and Italy follow these countries.

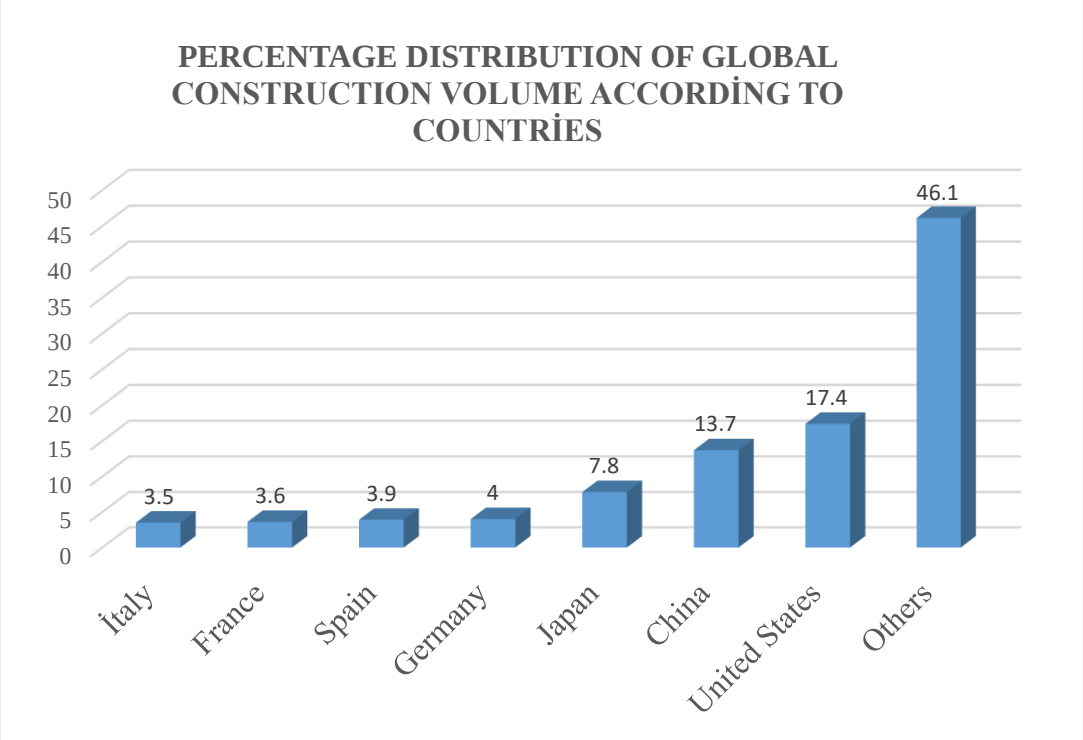


Figure 1.1. Global Construction Volume by Countries- 2009 (YEM, 2010)

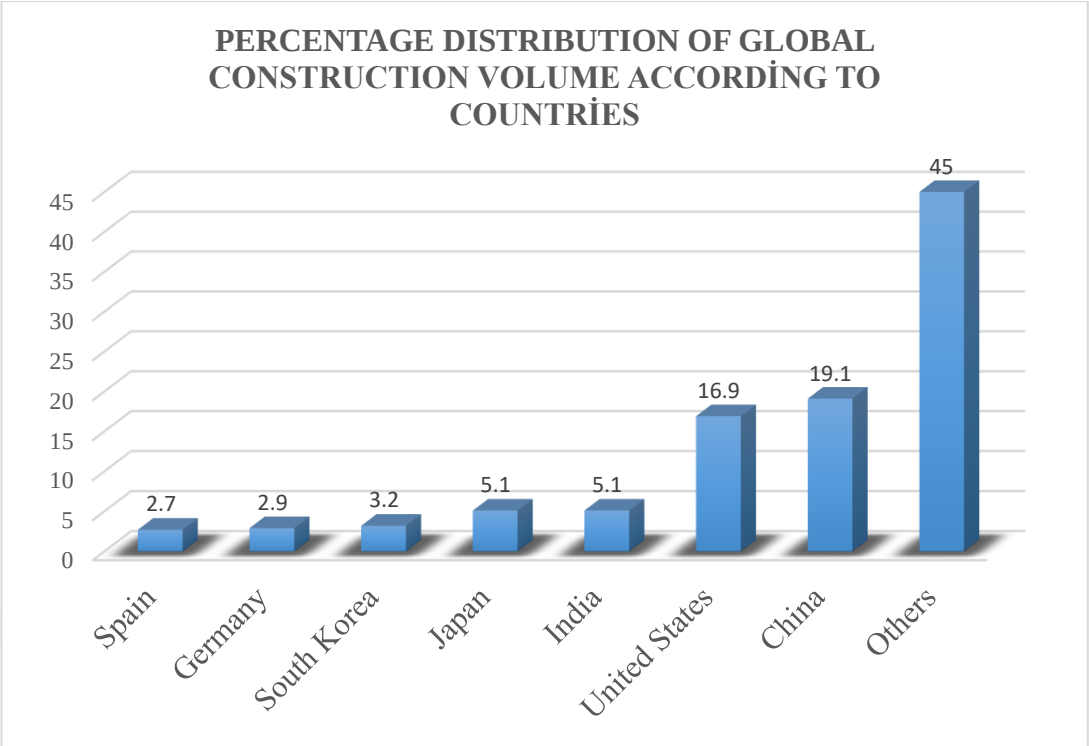


Figure 1.2. Global Construction Volume by Countries- 2020 (YEM, 2010)

As understood from Figure 1.2, it is anticipated that balances in the global markets will change in 2020 and China will be the country having the leading position. Dethroned the USA in 2010, China has become the most powerful country of the construction industry and continued to grow in 2011 as well. It is expected that the rise of China will also promote the growth of the other Asian countries (İstanbul Ticaret Odası, 2012). By 2020, with the influence of the inclination towards the rising economies in Asia, India will become the third largest construction market, thereby replacing Japan. Residential construction industry of the USA will grow with the influence of its population of 320 millions and will hit the peak among other developed countries. Non-residential construction industry will also start to regain its former condition and the construction industry will be the sector in which the largest growth will take place in the next decade (YEM, 2010).

Infrastructure requirements will increase in order to strengthen the commercial connection between Asia and Europe and in the next decade Russia and Turkey each will become a power center for the construction industry of the Eastern Europe. Due to 2018 FIFA World Cup activities, following the 2014 Winter Olimpics, the

construction industry in Russia is expected to achieve growth owing to the improvement works on airways, highways and railways.

However, in Brasil the construction industry will exhibit less growth in the upcoming five-year period compared to other rising economies because of the large investments made in the infrastructure during the preparation phase for 2014 FIFA World Cup and 2016 Rio Olimpics.

In the Middle East and Northern Africa, 4.3 trillion dollars has been allocated for the construction industry for the next decade. Thus, the growth rate in this region will almost reach 80% by 2020. In Saudi Arabia which has a young population, growth will take place in the residential construction industry by means of the expected amendments concerning the law of mortgage. Qatar, Libya and Algeria will finance the construction industry with the revenues acquired from oil and natural gas export. According to Global Construction 2020 report, Qatar will be the fastest growing construction market. In Nigeria, it is anticipated that infrastructure and housing needs will increase due to population growth and a rapid growth in the construction industry will occur (İstanbul Ticaret Odası, 2012).

Western European construction industry, however, will exhibit a limited development due to factors such as effects of the global economic crisis, high fiscal deficit and inadequate dynamic population. Because the working population is gradually decreases in Germany and Italy, they will not be able to achieve any economic growth and therefore the construction industry will not make any progress. In the United Kingdom and Sweden, positive population movements will facilitate the residential construction industry to pick up strength. One of the countries most affected from the crisis, Greece will not achieve a significant growth.

Japan will remain the most slow-growing country of the world in the next decade. Infrastructure sector of Japan is negatively affected by issues such as old population, stagnant economic growth and high public debt which are the common problems of developed countries.

2. CONSTRUCTION INDUSTRY IN TURKEY

The construction industry has an important place in Turkish economy due to activities carried out both in the domestic market and in foreign markets. In this chapter of the study, the place of the construction industry in the economy and its contribution to development, the sub-sectors included in the industry and their features will be addressed.

2.1. Place of the Construction Industry in Turkish Economy

Turkish economy is a progressively growing economy. Turkey is one of the countries overcoming the global economic crisis most rapidly and being the least affected from the recent global economic uncertainty and is the most rapidly growing economy of Europe. Turkish economy exhibited an average growth rate by 5.4% in 2002-2011 period while it grew by 8.5% in 2011 (IMF, 2012). In Table 2.1, growth predictions of Turkish economy pertaining to the upcoming years are shown according to data by the IMF. According to this, it was predicted that Turkey would grow by 2.2% in 2012 and the growth would gradually increase in 2013 and 2016. These ratios are seen to be above that of Eurozone and the USA, but below India and China.

Table 2.1. Growth predictions by country groups (IMF, 2012)

Years	**Turkey**	**Eurozone**	**United States**	**Brazil**	**Russia**	**India**	**China**
2012	2,2	-0,2	1,5	3,8	2,8	6,9	8,5
2013	2,5	1,2	2,4	4,1	4,0	7,2	8,4
2016	4,3	1,7	3,4	4,2	3,8	8,1	9,5

Within a growing economy various sectors contribute to growth at different rates. In recent years, particularly the growth in trade, tourism, investment and construction industry has a tremendous effect on Turkish economy. Annual growth rates have great importance in terms of determining economic trends. Thus, activities in the

industry can be identified with regard to annual growth rates. In Table 2.2, overall economic growth rate and Turkish construction industry's growth rate between 2005-2016 are shown.

Table 2.2. Growth in Gross Domestic Product/1000₺ (TÜİK, 2016)

Yıllar	General Economy(₺)	Construction Economy (₺)	Rates of Construction Sector %	Growth Rates of Construction Sector%
2005	83.485.590	5 250 284	5,8	9,3
2006	90.499.730	6 220 955	6,4	18,5
2007	96.738.320	6 573 647	6,5	5,7
2008	101.254.625	6 040 811	5,9	-8,1
2009	101.921.729	5 067 195	5,2	-16,1
2010	97.003.114	5 996 258	5,7	18,3
2011	105.885.643	6 688 256	5,8	11,5
2012	115.174.724	6 726 223	5,7	0,6
2013	122.476.094	7.198.092	6,0	7,0
2014	126 127 931	7 377 557	5,8	2,2
2015 1.quarter	30.224.168	1.714.626	5,7	-2,7
2015 2.quarter	32.076.646	1.907.917	5,9	1,0
2015 3.quarter	34.910.917	1.944.265	5,6	2,0
2015 4.quarter	34.077.276	1.936.708	5,7	5,4
2015	131.289.008	7.503.516	5,7	4,0
20161.quarter	31.679.388	975.156	3,1	1,6

The growth rate of the construction industry is greater that the overall growth rate except for 2008 and 2009 and according to Table 2.2, it is observed that the greatest growth rate was achieved in 2010. The share of the construction industry within the GDP is considerable. The fact that the share of the industry within the GDP is 5.7 even in the year with the largest sectoral growth is a clear indication that it cannot have enough share from the national income. Table 2.3 presents the growth rate of the GDP and the growth rate of the construction industry. According to Table 2.3,

construction industry has been on the top among the sectors the most affected by the global crisis and economic recession. Construction industry completed 2008 with a recession of 8.1%. Starting 2009 with anticipation of crisis negatively affected the construction industry. As a result of the private sector investments coming to a standstill, the industry went through a recession by 18.6 in the first quarter, by 21.1 in the second quarter, by 18.3 in the third quarter and by 6.6 in the fourth quarter. Therefore, on the annual basis, a recession by 16.1% was seen. In the third quarter of 2015, total added value of the activities comprising the industry came out to be 5 billion 564 million TLs at constant prices in the nine-month period and in regard to this data, the industry received a share of 5.8% from the Gross Domestic Product. Our industry received a share of 5.7% from the Gross Domestic Product in 2015.

In the first quarter of 2016, total added value of the activities comprising the industry came out to be 975 billion 156 million TLs and in regard to this data, the industry had a share in the level of 3.1% within the Gross National Product.

Table 2.3. Growth rate of the construction industry (%) (İNTES, 2016)

Years	**Development Rate of GDP (%)**	**Development Rate of The Construction Industry (%)**
2005	8,4	9,3
2006	6,9	18.5
2007	4,7	5,7
2008	0,7	-8,1
2009	-4,8	-16,3
2010	9,2	18,3
2011	8,8	11,5
2012	2,2	0,6
2013	7,4	2,2
2014	2,9	2,2
2015 1. quarter	2,5	-2,8

2015 2. quarter	3,8	2,0
2015 3. quarter	4,0	1,9
2015 4. quarter	5,7	5,4
2015 yearly	4,0	1,7
2016 1. quarter	4,8	1,6

Through economic precautions taken, the industry exhibited a high rate growth in 2010 in spite of the recession that took place the previous year. The industry grew by 8.3% in the first quarter of 2010 while growing by 20.4% in the second quarter. The industry also maintained its growth acceleration in the last two quarters and exhibited a growth performance of 22.1% in the third quarter. Growing by 17.5 in the fourth quarter, the construction industry completed 2010 with a growth performance of 18.3% and achieved a growth almost doubling the growth rate of the GDP which was 9.2%.

The construction industry also maintained its high rate growth in the first six months of 2011. It showed a growth performance of 15.7 in the first quarter and 13.5 in the second quarter. After the third quarter, the growth relatively decelerated and the construction industry grew by 10.7% in the third quarter of 2011 while exhibiting a growth performance of 7.1 in the fourth quarter and therefore showed an average growth of 11.5%. This value is still greater than the GDP which was 8.8%. Decreasing public sector construction expenditure and private sector consumption expenditures played a major role in the recession in the construction industry (İNTES, 2016).

In 2012 when the economic crisis was felt most intensely and political instability prevailed in the whole world, the construction industry, naturally, was also affected from this depression that Turkish economy was going through. Being the locomotive sector of Turkish economy and growing by 11.5% in 2011, the construction industry grew by 1% in the first nine months of 2012. In this nine-month period, residence sales incurred a decrease by 2.35%. The recession in the industry and increasing costs also negatively affected the actors of the industry. Although achieving a

tremendous advancement in 2011, the construction industry could only grow by 0.6% in 2012.

After the stagnation in 2012, the construction industry started to progress again in the first quarter of 2013. The industry started to recover quickly as from the beginning of 2013 and grew at a rate above the Turkey average in the second and third quarters of the year. In the third fourth quarter of 2013, the construction industry grew by 6.3% while the GDP grew by 7.4%. The industry grew by 5.8% in the first quarter, by 3.4% in the second quarter, by 2.0% in the third quarter, but declined by 2.2% in the fourth quarter resulting in an average growth of 2.2% in 2013. However, the industry sustained its stability during 2013 and in the main part of 2014 despite fluctuations in global economies and geopolitical risks. With regard to certain main indicators, public debt burden continued to reduce in 2014. Interest policies with a stable approach allowed that real cost of the debts remained at low levels. Current deficit continued to decrease and our banking sector achieved to maintain its strong and solid structure. However, inflation escalated reaching the highest levels seen in the last two years. Having escalated since the beginning of the year, the inflation came out beyond expectations. Some structural problems related to employment still existed. According to data published in the latest period of 2014, figures of unemployment were seen to be about 10 percent (İNTES, 2016).

The World incurred political and economic risks in 2014. Particularly, the recession in European economies affected global markets and therefore our national economy. Upward movement of the exchange rates of Dollar and Euro caused sectoral manufacture costs to increase and caused demands on housing to be limited and thus resulted in a low rate growth in the construction industry (İNTES, 2016).

The construction industry grew by 5.8% in the first quarter of 2014 and by 3.4% in the second quarter as compared to the same periods of the previous year. The growth rate was 2.0 in the third quarter while the construction sector completed the last quarter with a decline of 2.0% due to the decrease in public construction expenditures and stagnation in private sector construction expenditures resulting in an average growth of 2.2%(İNTES, 2016).

2015 started as a critical year due to fluctuations in economy and tension in neighbouring countries and due to the fact that the country entered into an election process. Turkish economy grew by 4% in 2015. In 2014, however, economy exhibited a growth performance of 2.9%. The growth rate achieved in 2015 conformed to Medium Term Action Plans. The highest contribution to the growth was provided by private consumption expenditures and public expenditures. In addition, the increase in public and private sector investments made in construction, machinery and equipment in the last quarter of 2015 had a major role in growth.

Growing by 5.7% in the fourth quarter of 2014, the construction industry grew by 5.4% in the corresponding period of 2015. Diminishing uncertainty in the industry after the election process improved the growth performance in the latest period of 2015.

The industry decline by 2.7% in the first quarter of 2015 while exhibiting growth by 1.9% in the second quarter and by 2.0% in the third quarter. As a result of this performance, annual growth of the industry increased by 1.7%.

Total added value of the activities comprising the industry amounted 7 billion 503 million TLs at constant prices. According to seasonally and calender adjusted data, the construction industry grew by 0.9% in the fourth quarter of 2015.

Distribution of the expenditures in the construction industry and the developments according to seasonally and calender adjusted data is as follows: Public constructions increased by 3.0%, private constructions decreased by -1.7% (İNTES, 2016).

In the construction industry of 2016, mainly build-operate-transfer model projects are being carried out. Large projects carried out particularly in transport infrastructure and in fields such as energy, household, agricultural infrastructure has been increasing the performance of the industry. In comparison with the overall economic growth of 4.8%, the construction industry exhibited a growth performance of 1.6 in the first quarter of 2016.

Table 2.4 shows non-farm employment and construction industry employment data. From these data, it is understood that employment indices vary by years. It is clearly seen that employment indices increased both in construction industry and in

agricultural employment as of 2010. It is observed that the figures are also favorable in the first quarter of 2011. Another statistical reference data for comprehending the place of the construction industry in the economy is the number of building licenses. When current data are analyzed, it is observed that the surface area of the buildings receiving building license increased by 23.6% in 2010. While the number of residential buildings was 40.610 in the first six months of 2009 as per building licenses, the number of residential buildings became 44.572 with an increase by 9.8% in the first six months of 2010. In addition, surface area of residential buildings summed 37.651.560 m^2 in the first six months of 2009 whereas their surface area increased to 47.467.006 m^2 exhibiting an increase by 26.1% in the first half of 2010 (Deloitte ve TMB, 2011).

Table 2.4.Total Employment and Construction Industry Data (TÜİK hane halkı işgücü istatistikleri, 2016)

Years	**Non-Agricultural Employment (per/person)**	**Construction Industry (per/person)**	**Construction Industry / Non-Agricultural Employment (%)**
2005	15.553.000	1.171.000	7,53
2006	15.241.000	1.189.000	7,80
2007	15.588.000	1.224.000	7,85
2008	15.959.000	1.125.000	7,00
2009	16.324.000	1.297.000	7,94
2010	17.082.000	1.442.000	8,44
2011	18.079.000	1.512.000	8,36
2012	19.080.000	1.647.000	8,63
2013	19.755.000	1.753.000	8,87
2014	20.632.000	1.829.000	8,86
2015	21.445.000	1.878.000	8,75
2015 Nisan	21.127.000	1.916.000	9,06
2016 Nisan	22.286.000	1.840.000	8,25

In view of all these data, we can comment that Turkish construction industry is on the rise in recent years and has a major share in the economy. It is to be remembered that construction is a key industry in Turkey due to its contribution to development.

2.2. Development of Turkish Construction Industry

Turkish construction industry started to make progress after the Second World War which took place in 1945. Its growth accelerated in consequence of supports offered by American government and other governments between the years 1950-1970. These aids are referred to as "Marshall Plan". In that period, leading construction companies of Turkey were established and existing companies also made remarkable progress. However, the USA and the UN terminated all these aids after Turkey-Greece Cyprus Peace Operation which broke out in 1973. Consequently, national economy was affected adversely and implemented embargo became the greatest problem of Turkish economy in the process of time (ÖZORHON B., 2012).

Until 1979, national economy went through hard times because of high inflation rate, diminishing natural resources, increasing import and decreasing export rates and ever-accumulating foreign debt. Consequently, Turkish construction industry confronted a serious crisis as well as other sectors during this period. Bankrupts, litigations for legal claims and unemployment resulting from the crisis heavily damaged the national economy. Following the military coup in 1980, military government resorted to various precautions in order to find solutions to national problems. The military government made radical changes in national economic policies so as to stabilize the economy firstly in short the term and then in the long term. These changes created a positive effect on sectors, thus remobilizing the construction industry.(ÖZORHON B., 2012).

Between the years 1980 and 1987, the construction industry made a rapid progress and achieved a notably high growth rate in comparison with previous years. As from 1980s, Turkish economy passed a crucial turning point owing to the positive outcomes of reformation and stabilization and entered into an amelioration process. Stated to be 100% in 1980s, inflation rate dropped down below 25% at the end of 1986. When it comes to 1990, political instabilities in the Middle East particularly affected Turkish construction industry. Participating in an international project in

Libya in 1972 for the first time, Turkish construction companies started to search for other markets due to political instabilities in 1990s. As a result of disintegration of the Soviet Union, new states were established in 1990s which encouraged Turkish contractors to carry out projects in those newly established independent states (ÖZORHON B., 2012).

The economic crisis which broke out in 2001 oriented Turkish construction companies towards international contracting services. Because of problems occurring in the domestic market, getting into foreign markets became attractive and increasing competition among Turkish sub-contractors facilitated rapid developments in the industry in those years.

Turkish Contractors Association (TMB) ascertained that the sectoral development taking place in this period is a result of the economic growth and the development was sustained until the economic recession in 2008. Therefore, 2001 and 2008 economic crises created the most important factors which affected international contracting services.

General economic condition directly affects the performance of the construction industry in Turkey as well as in the world. As economy grows, the industry grows at a higher rate and positively contributes to the overall growth. As the economy declines, on the other hand, the industry similarly declines at a higher rate because of the same correlation.

Since 1999, growth of the construction industry has shown a fluctuating course substantially parallel with the growth curve of the GDP. Within this context, we can categorize the period elapsing since the global crisis. Accordingly, it is possible to define 2008 and 2009 as hit rock bottom period, 2010 and 2011 rapid rising period, 2012 stagnation period and 2013 conservative recovery period. In 2014 and 2015, however, the acceleration achieved in 2013 was on decline (TÜİK).

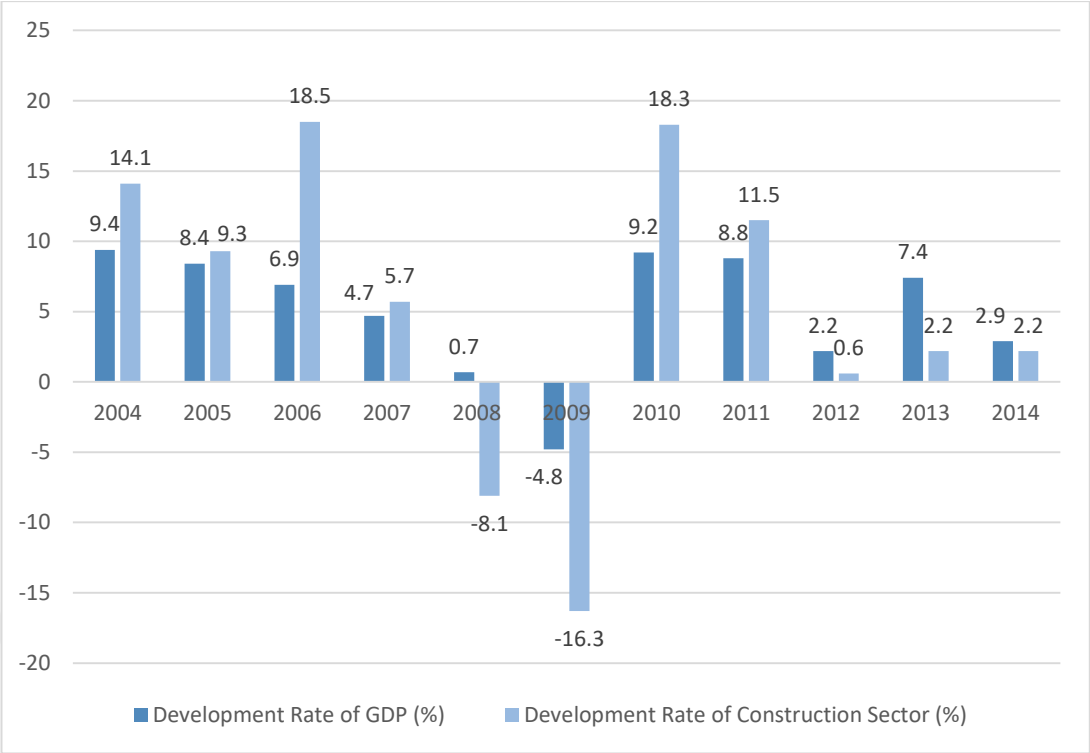


Figure 2.1. Growth rates of the GDP and the construction industry (%) (TÜİK)

As of the second half of 2014, construction industry manufacturing substantially decelerated in parallel with the economic slowdown. A growth by 5.8% was achieved in the first quarter of 2014 as compared to the same period of the previous year whereas this growth rate receded to 3.4% in the second quarter and to 2% in the third quarter and finally the industry declined by 2.0% in the last quarter. In 2014, the growth in the GDP decreased to 2.9% which reflected to the construction industry as a growth by 2.2%.

Data provided in figure 2.2 which is closely associated with the economic slowdown and the accompanying decline in public investments is not surprising because of the industry's tendency to react quickly to developments in the economy.

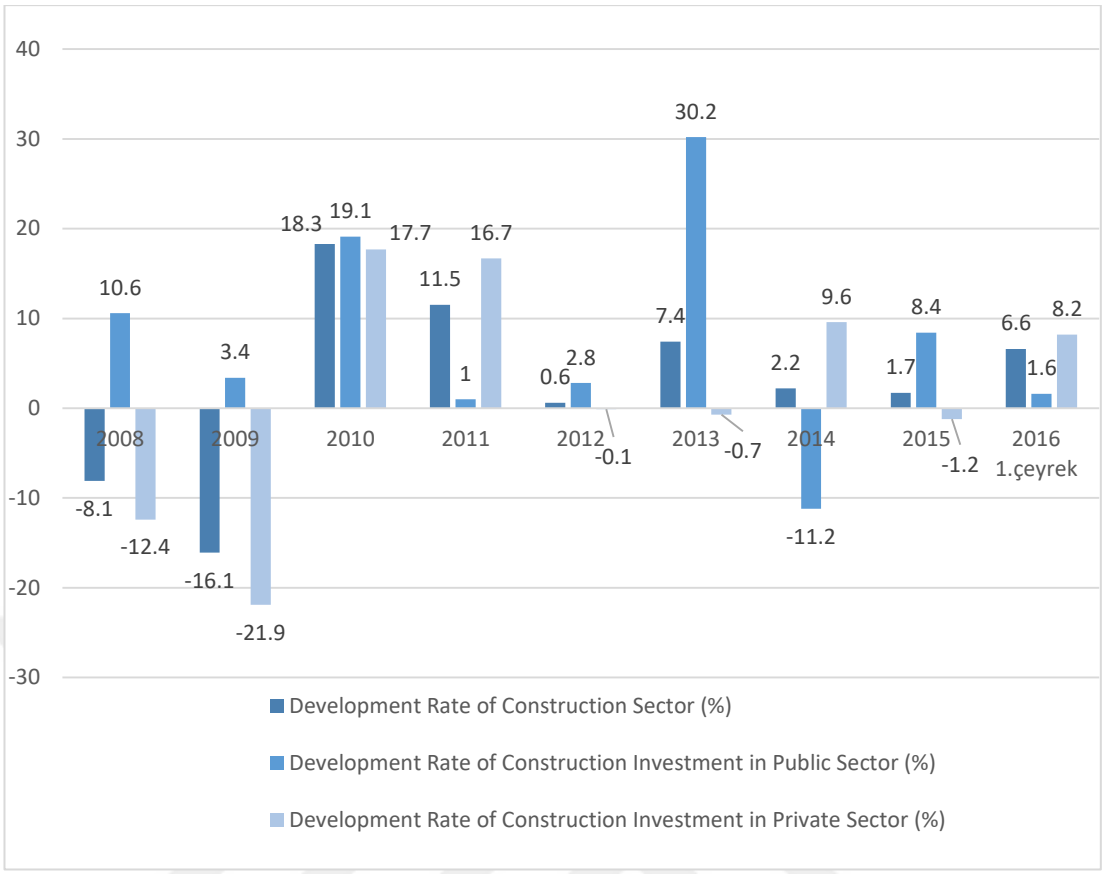


Figure 2.2. Development rates of public and private sector construction investments (%) (TÜİK)

Declining by 11.2% in 2014 and starting to increase again with a rate of 8.4% in 2015, public construction expenditures exhibited a limited increase of 1.6% by the end of the 1. quarter of 2016; on the other hand, private sector construction expenditures which increased by 9.6% in 2014 and declined by 1.2% in 2015, achieved an increase rate of 8.2% in the same period.It has been estimated that domestic demand oriented growth in the construction industry may be in the range of 4.0-50.% in 2016 and financing conditions and level of public and private sector investments will be determining factors in the process.

Considering that the share of the construction industry within the global economy is about 10-12%, the industry will potentially have a larger share in economic activities by means of ongoing urban transformation efforts and major infrastructure projects in the upcoming period.

As per TÜİK data, seasonally adjusted construction industry confidence index has shown an increase of 2.5% in July. This increase in construction industry confidence index indicates that received registered orders has increased and new projects and construction industry investments continue at full steam.

Within this framework, it is anticipated that development and growth rates of the construction industry, a locomotive sector for overall economy, will follow a stable and parallel course with the overall economy in the upcoming period as well.

2.3. Sub-sectors of the Construction Industry

When Turkish construction industry is considered as a whole, the sub-sectors contributing to the development of the industry include constituents such as building materials, architecture-engineering services, consultancy services, construction technologies and building inspection. In this chapter, sub-sectors which directly or indirectly provide competition advantage for Turkish construction industry will be analyzed under separate titles.

2.3.1. Building Materials

In parallel with the economic development in the construction industry, building materials industry also made great progress at the beginning of 1990s. However, when it came to the middle of 1990s, economic crises in home and abroad continuing until 2001 caused the industry to confront decreases in demands in domestic and foreign markets. Building material industry started to rally as a result of economy starting to recover from the crisis as from 2002.

Global economic crisis which occurred because of the crisis in financial markets in the USA spreading to the world started to be felt in Turkey as well in 2008. Construction industry ever-growing until 2008 therefore started to decline. Starting to regain strength in 2010, building material industry maintained its tendency to grow in 2011 with the influence of high growth figures that construction industry achieved (Deloitte, 2011).

Turkey is one the prominent countries of the world in respect of manufacture and export of basic building materials. As shown in Table 2.5, large amounts of

production is made particularly iron-steel components and products, cement, reinforcing bar, glass, paint, ceramic, marble, cables, plastic and aluminium building materials, electrical equipment, heating-cooling devices etc. Eastern European countries, Russia, Northern Africa and Neighboring Countries are located in the nearby geography.

Table 2.5. Sectors and their parts in production

Sectors	**Sector's Position in Terms of Production**
Cement	1st in close geography, 7th in World
Conditioning-Air conditioning-Cooling	1st in close geography
Ceramic Coating Meterials	2nd in close geography, 3rd in Europa
Natural Stones – Marbel	2nd in close geography,5th in Europa
Dye (decorative)	2nd in close geography, 6th in Europa
Plaster	3rd in close geography, 4th in Europa
Steel (crude steel)	3rd in close geography, 10th in World
Glass (flate glass)	4th in close geography, 4th in Europa

2.3.1.1. Cement

48 integrated plants and 19 grinding plants, in total 67 cement plants are available in Turkey by the end of 2011 for producing cement which is one of the basic materials of the construction industry and over 15 thousand personnel are employed in Turkish cement industry. Carrying out production based on use of 100% domestic raw material, Turkish cement industry satisfies the entire domestic demand and also exports to nearly 100 countries over the world, mainly to the Middle East countries. In 2011, cement production increased by 1.81% as compared to the previous year yielding 58.5 million tons. About 8% of the cement produced in this period was exported. In addition, 9% growth was achieved in domestic sales while a decline by 24% was seen in exports (Deloitte, 2011).

Turkey ranks 5. among top cement producing countries and 7. among major cement consuming countries in the world. Turkey ranked 2. following Iran, in cement industry exports throughout the world in 2012. Turkish cement industry takes place on top both in production and exportation in Continental Europe. Sectoral exports trended towards north and west Africa in 2012 while especially West African countries, Iraq, Libya and Russia remained important markets for sectoral exports in 2013.

Cement industry exports across Turkey declined by 10% on quantity basis and by 6% on value basis in 2013 yielding 11.8 million tons and $750 million. Clinker exports declined by 27% in quantity and 26% in value yielding 2.1 million tons and 97 million dollars. Highest exports were made to Israel, Brasil, Ghana, Romania and Togo. Similarly, cement exports declined by 5% in quantity and 2% in value yielding 9.7 million tons and 653 million dollars. Highest exports were made to Libya, Iraq, Russian Federation, Israel and Syria.

When considered on a global scale, both in Turkey which is the 5. largest cement producer and the 3. largest cement exporter in the world and in the global scale, performance of the industry is highly dependent on the construction industry in that construction industry provides input for the cement industry. The industry made 69.7 million tons production, 61.8 million tons consumption and made exports yielding 641.3 million dollars in 2014. Subsequently, in view of performance in 2015 according to data by Turkish Cement Manufacturers' Association, the industry made production at a level of 52.1 million tons in January-September period of 2015 indicating a decline by 4.6% as compared to the corresponding period of 2014. In 2015/09 period domestic sales amounted 46.4 million tons resulting from an annual decline by 4.5% while exports amounted 5.5 million tons indicating a decline by 6% on quantity basis as compared to the corresponding period of 2014.

2.3.1.2. Iron-Steel

Iron-steel industry is a sector that contributes to production and development not only in the field of building material but also in several other fields such as automotive, electronics and shipbuilding. Turkey produced 34.1 million tons of raw

steel in 2011. 29 companies carry on business and over 35.000 personnel are employed in the industry (Deloitte, 2011).

Export of long iron-steel products (bars, profiles) intensively utilized in the construction industry yielded 6.2 billion dollars in 2011. Our principal markets in this field are the United Arab Emirates (UAE), Iraq, Singapore, Egypt and Israel. Turkey manufactures any kind of pipes and connecting pieces and casting pieces intended for the construction industry. Iron steel pipes and connecting pieces exports revenue of Turkey nearly amounted 1.8 billion dollars. Our principal markets for those materials are the USA, Iraq, Czech Republic, the UK and Romania (Ekonomi Bakanlığı, 2012a).

In the industry which was adversely affected by the competition arising from global capacity surplus, production showed a recession trend after 2012. Turkish raw steel production declined by 3.4% in 2013 and by 2% in 2014 on annual basis. Despite decrease in production, with 34 million tons of production in 2014, Turkey maintained its position among the greatest steel producers ranking second in Europe and eighth in the world. On the other hand, among the eight greatest raw steel producers, solely Turkey's production decreased in 2015. In addition, among ten producer countries, Turkey was the second fastest declining country following Ukraine.

2.3.1.3. Glass

It is known that world glass industry shows a development in parallel with global economy. World glass production is estimated to be at a level of about 120 million tons. Flat glass, household glassware and glass fiber comprise the main part of this production. 34% of the total production is made in Asia, 30% in Europe, 29% in the USA and 6% in other regions. In our country, glass production capacity is about 4.3 million tons and the number of employees in this industry is about 20 thousands (TÜBİTAK, 2012).

Turkey's exports of glass products for construction industry increased by 5% in 2011 as compared to 2010 reaching 224.1 million dollar level. Our largest export markets for glass products are Iraq, Azerbaijan, Israel, Turkmenistan and Russian Federation (Ekonomi Bakanlığı, 2012a).

In view of global outlook, glass industry in the world achieves an annual average growth in the range of 2-4% depending on the performance of the global economy, and it has a size of approximately 180 million tons corresponding to 140 billion dollars by 2014. According to data by the Ministry of Science, Industry and Technology Directorate General for Industry, annual glass production capacity in Turkey (total of Turkey and abroad) is 5.6 million tons while the figure for Tukey only is at 3.5 million tons level. Achieving the fastest growth, flat glass product group comprises half of the domestic production capacity and the remaining half consists of 32% glass containers, 16% household glassware and 2% glass fiber.

2.3.1.4. Ceramic

Ceramic industry has a wide range of production area including earthenware products such as brick, roofing tile, clay pipe etc., coating materials, vitrified products and kitchenware. Among the above, in ceramic coating materials industry, Turkey meets 3.2% of the world production and 11% of European production. Having a domestic market size of 160 million m^2, Turkey is the 11. largest market of the world in respect of consumption of ceramic coatings. In addition, it is the largest ceramic medical equipment producer of Europe with production of 17 million pieces (Ekonomi Bakanlığı, 2012a).

In ceramic coatings industry 24 and in ceramic medical equipment industry 40 producer companies carry on business in Turkey. Approximately 30 thousand personnel are employed in the industry. Companies that carry on business in the industry continuously renewed their technologies making modernization investments, thus Turkish ceramic coating industry became a brand in the international platform. As of the 2. half of 2002, ceramic industry showed a tendency towards foreign trade exhibiting a course parallel with overall economic development. However, Turkish Lira gaining value extremely caused a cost increase in the industry which operates on domestic input. Therefore, growth tendency in foreign trade decelerated. Still, ceramic exports started to increase again by virtue of increasingly developing national economy (Özorhon B., 2012).

In 2011, ceramic coating material exports showed an increase by 11.5% as compared to the previous year and increased to 521 million dollars. The largest export markets

for Turkish ceramic coating materials are Israel, the UK, Germany, Iraq and Azerbaijan. Ceramic medical equipment industry exports increased by 14% in 2011 as compared to the previous year and increased to 178 million dollars. Ceramic medical equipment are most exported to Germany, Italy, France, the UK and Iraq (Deloitte, 2011).

Total export value of the ceramic industry for 2014 increased by 2% ad compared to the previous year yielding 1.021 million US dollars and total import increased by 17.4% compared to the previous year increasing to 560 million US dollars. In aforementioned period, most exports in the ceramic industry were made to Germany, the UK, Israel, the USA and Iraq (Bilim, Sanayi ve Teknoloji Bakanlığı,2015).

2.3.1.5. Natural Stones

Located on the Alpine zone which has the richest natural stone deposits of the world, Turkey has 5,1 billion m^3–13,9 billion tons of potential reserves. This value corresponds to 33% of the total world reserves which is estimated to be 15 billion m^3. Turkish natural stone industry has an important place in the global natural stone market with its rich varieties and reserves, sectoral experience, abundant raw materials, easy transport via sea route, dynamic sector structure, new technologies utilized and wide range of colors.

About 1.500 natural stone quarries, about 2.000 facilities operating at plant scale and 9.000 medium and small scaled workshops carry out activity in the sector. The number of employees is approximately 300.000. In respect of natural stone trade involving export to 200 different countries, China, the USA, Iraq, Saudi Arabia and the UK have been our top export destinations (Ekonomi Bakanlığı, 2016).

2.3.1.6. Plastic Building Materials

As an alternative to traditional materials such as iron, glass, paper and wood; consumption of plastic is increasingly growing in Turkey as well as in the world. History of Turkish plastic industry dates back to 1960s, thus it strikes attention as a rather young market but one of the markets which grow most rapidly. Between the years 1996-2000, plastic industry production achieved an annual average growth of

12.5% and an export increase of 13.2% while exhibiting an import increase of 14.9%.

In the last two decades, plastic building materials, particularly plastic door and window production and consumption increased substantially. In 2014, plastic finished good production increased by 6.3% as compared to the previous year, thereby yielding 8.5 million tons of products. In respect of plastic building materials, over 5.000 companies operate and over 200 thousand people are employed in the industry.

Plastic building material export decreased by 21% in 2015 as compared to the previous year resulting in an export revenue of 1.1 billion dollars. In the industry, exports are mainly made to Iraq, Russian Federation, Azerbaijan, Turkmenistan and Georgia (Ekonomi Bakanlığı, 2016).

2.3.1.7. Paint

By the end of 2014, Turkish paint industry's size in domestic and foreign markets reached 850 thousand tons. It has the position of the 4. largest producer of Europe. About 8-10% of our paint production is exported. In recent years, Turkish paint industry continues its efforts to improve sectoral exports over a wide geography mainly including the Middle East, Near East, Northern Africa, Eastern Europe and Caucasus. Aproximately 600 companies carry on business and 200 thousand personnel are employed in the industry.

Building paint exports declined by 0.36% in 2015 and export revenue decreased to 293 million dollars. In the industry, exports are mainly made to Iraq, Iran, Azerbaijan, Romania and Georgia (Ekonomi Bakanlığı, 2016).

2.3.1.8. Wood Products

Turkey carries on activity in forestry industry with about 8.000 companies. In 2010, the industry achieved a production of 12.6 million m^3 and it employs about 300.000 personnel. Turkish wooden building material export comprises about 10% of wood and forest products export. Wooden building material export decreased by 13.5% in 2011 as compared to the previous year and reached 423 billion dollars. The industry's

products are mainly exported to Iran, Iraq, Turkmenistan, Azerbaijan and Georgia (Deloitte, 2011).

2.3.2. Export and Import of Building Materials

Due to decreasing demands in the domestic market as a result of economic crises Turkey experienced in 2000 and 2001, building material industry started to focus on exportation. Economy starting to recover from the crisis also positively affected building material industry and sectoral export exhibited a tendency to increase as of 2002. Building material export revenue which was 4.1 billion dollars in 2002 showed an annual average increase by 34% and reached 23.5 billion dollars in 2008. In 2009, however, our building material export decreased by about 33% as compared to the previous year with the influence of the economic crisis and decline to $15.7 billion. Recovering once again as from 2010, building material industry acquired 16.4 billion dollars from export activities. As for 2013, building material export yielded 20.7 billion dollars with an increase by about 0.2% as compared to the previous year. The industry achieved export revenue of 20.8 billion dollars in 2014 and 16.5 billion dollars in 2015 (Ekonomi Bakanlığı, 2016).

Building material import, which was 7.9 billion dollars in 2012, increased by about 20% in 2013 and reached 9.5 billion dollars. In 2014, however, decreased by 11% and thus amounted 8.5 billion dollars. In 2015, import activities amounting 8.4 billion dollars were carried out. In the industry, iron-steel products constitute the largest group of the imported products. Heating and cooling devices constitute the second largest group and electrical materials constitute the third largest group. In 2015, building materials were imported from 179 countries among which China, Germany, Italy, France and Spain were the principal importers (Ekonomi Bakanlığı, 2016).

2.3.3. Architecture - Engineering

Being the fundamental constituents of the construction industry, architects and engineers carry out designing and production of any structure. The architects and engineers of our country started to take part in international projects in nearby geographies with the influence of globalization. The architects and engineers of our country serve in Turkey's neighboring countries, particularly in Russia, the Middle

East and Eastern Europe. Several high-budget projects are carried out in Turkey especially in large cities and design stands out in such projects. Shopping malls and tall buildings constructed in accordance with high standards increase the need for architects and engineers.

Survey, design, plan, project, research; preparation, acceptance and signature of accounts and implementation thereof, any professional expertise, consultancy and any supervision and inspection services can be included in the scope of architecture and engineering services. Architectural design services include services such as architectural project services, surveying, restoration services and construction drawings. Architectural practice and management services comprise fields such as architectural professional inspection, project and building site coordination and planning, site supervision, field architecture, architectural scientific responsibility, project and performance monitoring, assistant inspectorship, occupational health and safety. Architectural consultancy services may include consultancy, expertise, feasibility studies, preparation of bid documents, trade-off study and preparation of specifications (Mimarlar Odası, 2012).

2.3.4. Consultancy - Building Inspection Law and Services

As internationally accepted, a technical consultant is defined as "the person or entity providing service based on technology, knowledge and assessment concerning natural or built environment (Türk MMMB, 2012). Consultancy companies has key positions in all spheres of construction such as planning/evaluation studies on international level, feasibility studies, preparation of bid documents, preparation of technical and administrative specifications, choice of contractors, consultancy in technical field, soil surveys, quality control and occupational health.

90% of the companies being a member of the Association of Turkish Consulting Engineers and Architects (Türk MMMB) have experience in foreign projects and have done business in 60 countries in total up until now. The fields of technical consultancy service provided by Türk MMMB member companies are shown in Figure 2.3. According to this distribution, architecture and engineering project preparation services has the greatest share of 47%. Building inspection comprises 23%, project management comprises 16% and other services comprise 14% of the

distribution. Therefore, architecture and engineering field comprises the largest part within consultancy services.

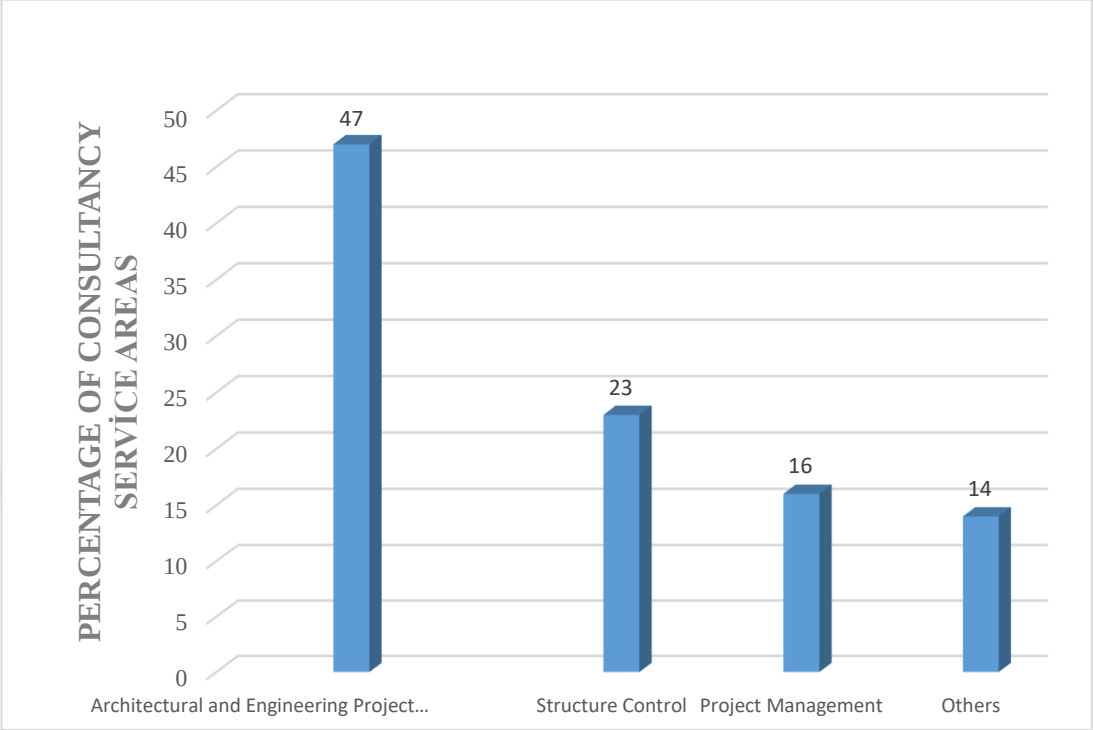


Figure 2.3. Fields of Consultancy Services (Türk MMMB, 2012)

Figure 2.4 shows distribution by sectors for which services are provided. According to this, 27% of the companies carry on business in building construction field, 21% in environment field, 17% in transportation, 13% in industry and 8% carry on business in the field of energy.

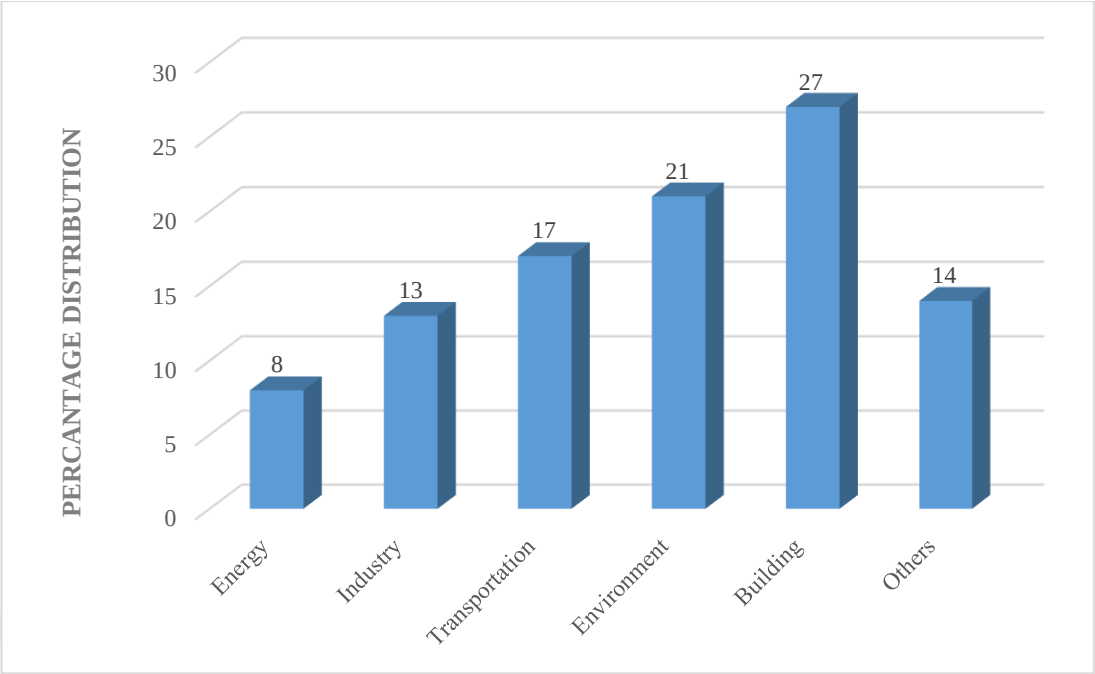


Figure 2.4. Sectoral Distribution of the Consultancy Services (Türk MMMB, 2012)

In our day, importance of technical consultancy is no longer even discussed in developed countries and it is accepted to be the initiator of the construction industry which is defined as the locomotive of economies. When the project is still at the idea stage, investor establishments and international financial institutions submit the subject of investment to technical consultants. Independent technical consultants offer required consultancy services at any stage of the project. Choice and employment of technical consultant is one of the most important decisions to be made by the employer or project owner. Success of the project usually depends on its performance by affordable, most qualified, experienced and reliable specialists.

In our country, consultancy services remained limited to planning activities of infrastructure services such as public water, waste water and road construction for many years. However, with performance of internationally financed projects, roles of consultants were started to be specified and expanded. Consultancy services initially developed in project designing based on demand, however, it has become evident over the past 20 years that consultancy is useful and required in several fields. As confirmed with data by Türk MMMB, companies get assistance mostly in project designing within the scope of consultancy services. Project management, however, is seen to have a much smaller part considering the shares of services provided. In an

insufficient market, even though it is possible to attain individual qualified experts and consultants, it is not possible to speak of sectoral growth due to lack of demand.4 Turkish companies take place among the top hundred in the largest 250 International Contracting Companies list which was published by Engineering News Record (ENR). In addition, our country has 43 companies in the entire list, having the second place after China. This situation has importance in terms of making us one of the prominent countries of the world in the construction industry and allowing us to appreciate our potential within the scope of export of building materials.

2.3.4.1. Concept of Building Inspection and Its Purpose

Building inspection passed into law after 1999 Marmara Earthquake, one of the catastrophic disasters our country suffer from. Considering the features and implementation of this regulation, it can be summarized as a zoning policy.

To define the concepts we frequently encounter in the Building Inspection Law has particular importance. The concept of "*building*", which constitutes the essence of our subject, is defined as "*Permanent or temporary, official or private, underground or surface constructions on land or sea and immovable and movable establishments including extensions, alterations and repair thereof*" within the framework of legal regulations and judicial decisions. The period between the date when the owner obtains the building licence and the date of the occupancy permit is defined as "*construction time*". The concept of "inspection", which has both a legal and administrative meaning, is defined as comparison of the situation occurring in application and the targeted results.In line with above definitions, in order to have a good understanding of the concept of "Building Inspection", it would be essential to understand its purpose and the motives which caused legislators to enact a law with the same title. Building inspection can be deemed as an urban planning service and protection of the public order. Within this framework, the 1. article of 4078 numbered Law Concerning Building Inspection states the purpose of the law as follows:

"*The purpose of this Law is to ensure project supervision and building inspection and to regulate procedures and principles concerning building inspection so that quality buildings are constructed in accordance with standards, development plan and science, art and health rules for safety of life and property*"

System and effectiveness in Building Inspection will be achieved with an inspection provided by private institutions and a collaboration between public administration and private sector. Regulation concerning Building Inspection prescribes the system to be established as follows: Undertaking legal responsibility with a Service Contract, an organization will carry out inspection, laboratory investigation and caution tasks against minimum remuneration under the supervision of the Ministry. In order to run the system efficiently, it should be aimed to expand working areas of the qualified employees in the industry, to impose deterrent sanctions and to terminate remissions of punishments related to zoning which is regulated in the article 184/5 of the Turkish Penal Code.

Maintaining efficiency and continuity in building inspection system will be achieved focusing on the above points. Although countries outside Turkey have different mechanisms with respect to this subject, it would be useful to talk about how this system works in the Continental Europe, Japan and America to be able to make comparisons. It is possible to analyze foreign systems in two established fundamental systems as the European System and the USA – Japan System.

The European System:

Under the leadership the UK, European Union member countries established the Consortium of European Building Control in 1990 in order to achieve their mutual goals. However, member countries seem to differ in certain aspects. One of the countries best implementing building inspection in the European System, France is observed to have adopted the insurance system. The French system is based on public consciousness and consumer awareness such that the system acknowledged that individuals having a building constructed cannot be very aware of inspection and therefore the project and the services offered by producer companies are insured in order to find a solution to this deficiency. Essential objective of French building inspection system is to provide technical and warranty intermediation between property owner and contractor. Insurance based building inspection is a system in which authorities have less control, but contractors' responsibilities increase. Primary elements of this system are insurance companies, audit companies, technical personnel and municipalities. With the purpose of determining ethical, technical and

legal scope of the system, National Building Federation (Fédération Nationale du Bâtiment) serves as the primary institution.

Germany, on the other hand, is seen to have adopted governmental inspection. Due to the federal structure of the system, t is observed that importance is placed on regional inspection, authorities have control responsibility and therefore contractors have less responsibilities.

The USA-Japan System

The USA did not choose a uniform system in contrast to European countries. The system in America is quite practical and it involves conferring architects the responsibilities of all buildings. Basically, the architect of a building undertakes all designing tasks and ensures coordination in building construction stages.

It is observed that Japan leaves the task of inspection to local administrations. In this system, the task of a local administration is to provide adequate number of architects and engineers. Inspection is performed such that an architect or engineer undertakes project preparation and building inspection in accordance with the building inspection application regulations.

3. EVALUATION AND DISCUSSION

The role of the construction industry in the World and in Turkish economy has been studied on relevant national and international resources and it has been seen that the industry affects economies but it is influenced by even minor changes in the economy.

3.1. Development of the Construction Industry in the World and in Turkey

Being in a process of economic development, Turkey has to continue its industrialization and infrastructural investments. Moreover, population growth rate is still high in Turkey and in parallel with this growth, its need for buildings that will meet basic needs particularly such as residences, schools, hospitals and transportation. Construction industry is one of the leading industries in Turkish economy. Contribution of the construction industry to the national income amounts up to 10 billion dollars in the years 2015-2016.

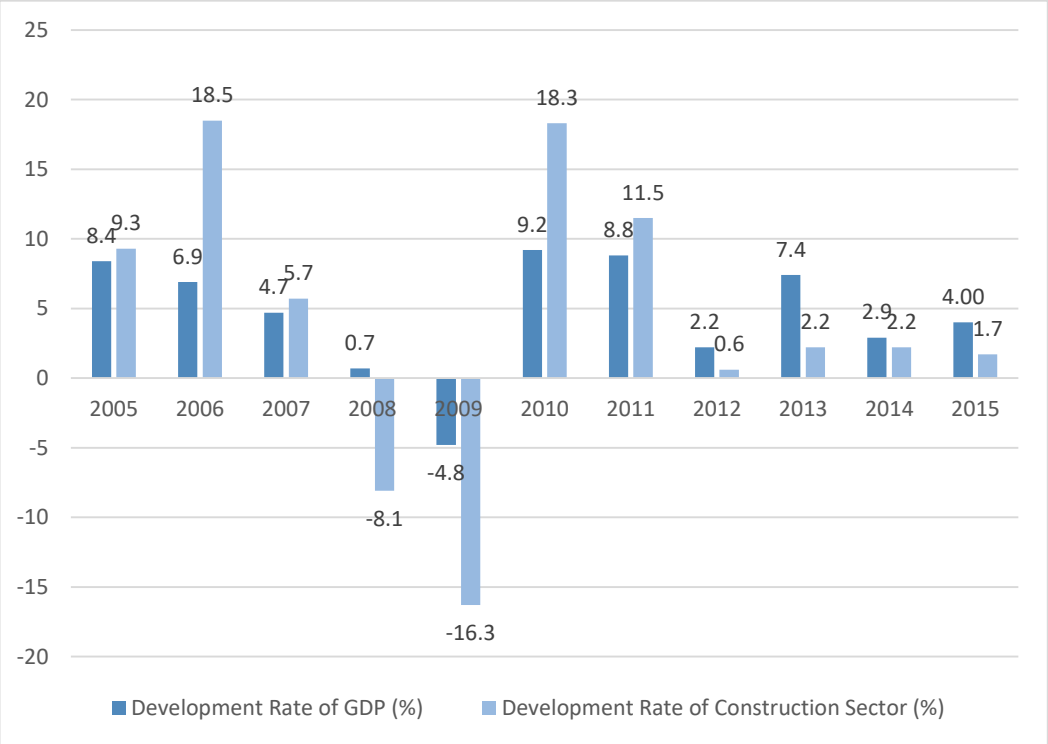


Figure 3.1. Growth rates in the GNP and in the construction industry (TÜİK, 2016)

According to data of TÜİK, the growth rates of the GNP and the construction industry are positive except the shrinkages between the years 2004-2005 and 2008-2009. The growth rate of the construction industry is higher than that of the GNP in both positive way (in growth) and in negative way (in shrinkage). These data confirm the argument that the construction industry is one of the leading industries in Turkish economy. Within the construction industry, housing is of particular importance. Both for the need for accommodation and due to the fact that it is a reliable means of investment, housing maintained its priority for Turkish people at all times. When Table 3.1 is viewed, it is seen that even in the years when the growth rates of the GNP and the construction industry are negative, housing and automobile sales did not declined but increased. A similar situation is observed in the sales figures in the Table 3.2 of vehicles such as minibuses, pickup trucks and motorcycles, as well. When the obtained data is analyzed, we see that he number of motor vehicles exhibited a regular positive growth. These figures can only be interpreted by means of subjective sociological evaluations and it is out of the scope of this dissertation.

Table 3.1 Housing and automobile sales, economic growth rate in Turkey by years

Years	**Devolopment rate of GDP (%)**	**Devolopment rate of construction sector (%)**	**Number of Houses Sold**	**Housing Sales Rate (%)**	**Number of cars sold**	**Car Sales Rate (%)**
2008	0,7	-8,1	427,105	-	6.797,000	-
2009	-4,8	-16,3	555,184	30,0	7.094,000	4,0
2010	9,2	18,3	607,098	9,0	7.545,000	6,0
2011	8,8	11,5	708,275	17,0	8.113,000	8,0
2012	2,2	0,6	701,621	-1,0	8.649,000	7,0
2013	7,4	2,2	1,157,190	65,0	9.284,000	7,0
2014	2,9	2,2	1,165,381	1,0	9.858,000	6,0
2015	4,0	1,7	1,289,320	11,0	9.944,000	1,0

Table 3.2 Number of motor vehicles in Turkey by years

Number of Domestic Motor Vehicles (Thousand)								
Years	**Cars**	**Minibus**	**Bus**	**Van**	**Truck**	**Motorcycle**	**Special-purpose vehicle**	**Total**
2006	6.141	358	176	1.696	710	1.823	34	10.937
2007	6.472	373	189	1.890	729	2.003	39	11.696
2008	6.792	384	200	2.066	744	2.181	35	12.407
2009	7.094	384	201	2.205	727	2.303	34	12.949
2010	7.545	387	209	2.399	726	2.389	35	13.691
2011	8.113	389	220	2.611	728	2.527	34	14.623
2012	8.649	396	236	2.795	752	2.658	33	15.518
2013	9.284	422	220	2.933	756	2.723	36	16.374
2014	9.858	427	211	3.062	774	2.828	41	17.202
2015	9.944	429	212	3.090	777	2.831	41	17.325

When material, engineering services, architecture services, consultancy and building audit services, which are the sub-sectors of the construction industry, are examined, it has been ascertained that among them, the share of the material sub-sector within the building cost is higher than other sub-sectors and the material sub-sector is very important in terms of production and marketing.

All sub-sectors of the construction industry is dependent on the material sub-sector in order for them to advance and maintain their growth. According to the data obtained by İMSAD from the Turkish Statistical Institute, a large number of building materials are present which are produced, used or exported (exportation) in the

country or imported (importation) form outside (İmsad, 2016). Among these, a significant portion of materials such as iron-steel, ceramic, paint and plastics are also used in industries other than the construction industry. Therefore, because evaluating the share of such materials within the construction economy requires expertise in economics, the sub-sector of building materials, specifically concrete/ready-mixed concrete and cement, being the most commonly used and primary materials of building production, has been scrutinized within the scope of this dissertation.

3.1.1 Development of the Ready-mixed Concrete Industry in the World and in Turkey

A large part of the constituents of concrete, which is one of the primary materials of building production, are the products of domestic production and used where they are produced. Concrete, which was formerly produced manually or with rudimentary tools, of which quality and quantity could not be controlled quite effectively, is now produced in plants, carried to the construction site with transit mixers and placed into molds. Although this concrete which is designated "Ready-mixed Concrete" has a lot of drawbacks, it is used in production of all types of buildings. Because most of the plants where ready-mixed concrete is produced and the buildings where it is used are recorded, it could be possible to scrutinize the role of the ready-mixed concrete in the building industry and in the economy. For this purpose, historical development of the Ready-mixed concrete in the World and in Turkey, technical and economics aspects thereof have been analyzed.

Although reinforced concrete was invented in the second half of the 19. century, due to the quality of concrete to protect steel and new facilities it provided for the construction technology, it has nowadays become the main bearing material of building production technology. Because of the fact that concrete and steel adhere well to one another, their coefficients of thermal expansion are close and they both bear load, monolithic building systems can be manufactured using these two materials. Since concrete protects steel against corrosion very well due to its basic feature, it has a very extensive area of usage including water structures (Aköz F., Çakır Ö. 2013).

In the beginning of the 20. century (1903), the first patent for "ready-mixed concrete" was obtained in Germany and concrete quality started to be improved following successive technological innovations. Particularly with the use of chemical and mineral additives, fibers and similar materials in concrete, high performance concretes for different purposes started to be manufactured. At the present day, structures such as buildings, dams, tunnels, railways, viaducts, bridges, roads, barriers are being made from concrete/reinforced concrete. Therefore, concrete has become the second most consumed material in the world following water. In Table 3.3 have been provided the start dates of ready-mixed concrete production, amount of concrete produced (regarding the years 2012 and 2013) and amount of concrete per capita.

Table 3.3. Ready-mixed concrete production in the world by years

COUNTRY	STARTING YEAR IN THE READY-MIXED CONCRETE SECTOR	Ready-Mixed Concrete Production (million m^3)		Ready-Mixed Concrete Consumption Per Person (m^3/Person)	
		2012	2013	2012	2013
Germany	1903	46.00	45.06	0.60	0.60
U.S.A	-	225.00	230.00	0.70	0.70
Austuria	1961	10.6	10.5	1.30	1.20
Belgium	1956	12.5	12.5	1.10	1.10
United Kingdom	1930	17.6	19.6	0.30	0.30
Czech Republic	-	6.9	6.5	0.70	0.60
Denmark	-	2.0	2.3	0.40	0.40
Finland	-	2.7	2.7	0.50	0.50
France	1933	38.9	38.6	0.60	0.60
Netherlands	1948	7.3	6.6	0.40	0.40
Ireland	-	2.4	2.4	0.50	0.50
Spain	1942	21.6	16.3	0.50	0.30
İsrael	1963	13.00	14.00	1.60	1.70
Sweden	-	3.3	-	0.30	-
Swiss	-	13.00	12.00	1.60	1.50

İtaly	1962	39.9	31.7	0.70	0.50
Japan	-	92.00	99.00	0.70	0.80
Norway	-	3.7	3.8	0.70	0.80
Poland	-	19.5	18.00	0.50	0.50
Portugal	-	3.7	2.7	0.30	0.30
Russia	-	42.00	44.00	0.30	0.30
Slovakia	-	1.9	1.7	0.30	0.30
Turkey	1976	93.00	102.00	1.20	1.30

Ready-mixed concrete production is relatively new in Turkey compared to other countries. The first ready-mixed concrete production in Turkey started in Ankara in 1976. When the data in the abovementioned table are reviewed, considering the worldwide ready-mixed concrete production and amount of concrete per capita, Turkey developed rapidly despite entering the ready-mixed concrete industry later than many countries. When the concrete production in Turkey and amount of concrete per capita are considered, concrete production is high and amount of concrete per capita is large. This is an indication that Turkey has not reached saturation and the industry still needs concrete.

Turkey has ranked first in ready-mixed concrete production in Europe since 2009, while being among the top countries in the World in 2013 with 102 million m^3 production. In parallel with recovery of the construction industry, it is estimated that the Ready-mixed concrete industry will also experience a boom.

3.1.2. Ready-mixed Concrete Industry in Turkey

Table 3.4. Numbers of ready-mixed concrete companies and production plants and production amount in Turkey by years

Years	**Ready-mixed concrete**					
	Ready-Mixed Concrete Company	Increase (%)	**Number Of Facilities**	Increase (%)	**Ready-Mixed Concrete Productıon (m^3)**	Increase (%)
1988	25	-	30	-	1.500.000	-
1993	70	180	110	267	10.000.000	567
1998	166	137	341	210	26.542.905	165
2003	238	43	429	26	26.828.500	1
2005	277	16	568	32	46.300.000	73
2006	409	48	718	26	70.732.631	53
2007	477	17	845	18	74.359.847	5
2008	462	-3	825	-2	69.600.000	-6
2009	467	1	845	2	66.430.000	-5
2010	500	7	900	7	79.680.000	20
2011	520	4	945	5	90.450.000	14
2012	540	4	980	4	93.050.000	3
2013	580	7	1040	6	102.000.000	10
2014	600	3	1080	4	107.000.000	5
2015	621	4	1098	2	107.000.000	1

As it can be seen from Table 3.4, the ready-mixed concrete industry in Turkey grew in a well-controlled manner to meet the need showing positive acceleration except the years 2008 and 2009. When the numbers of companies and plants in the industry are compared, it is seen that some companies has more than one plant. When the data in Table 3.6 is viewed, Marmara region is seen to be the region having largest number of ready-mixed concrete plants in 2015.

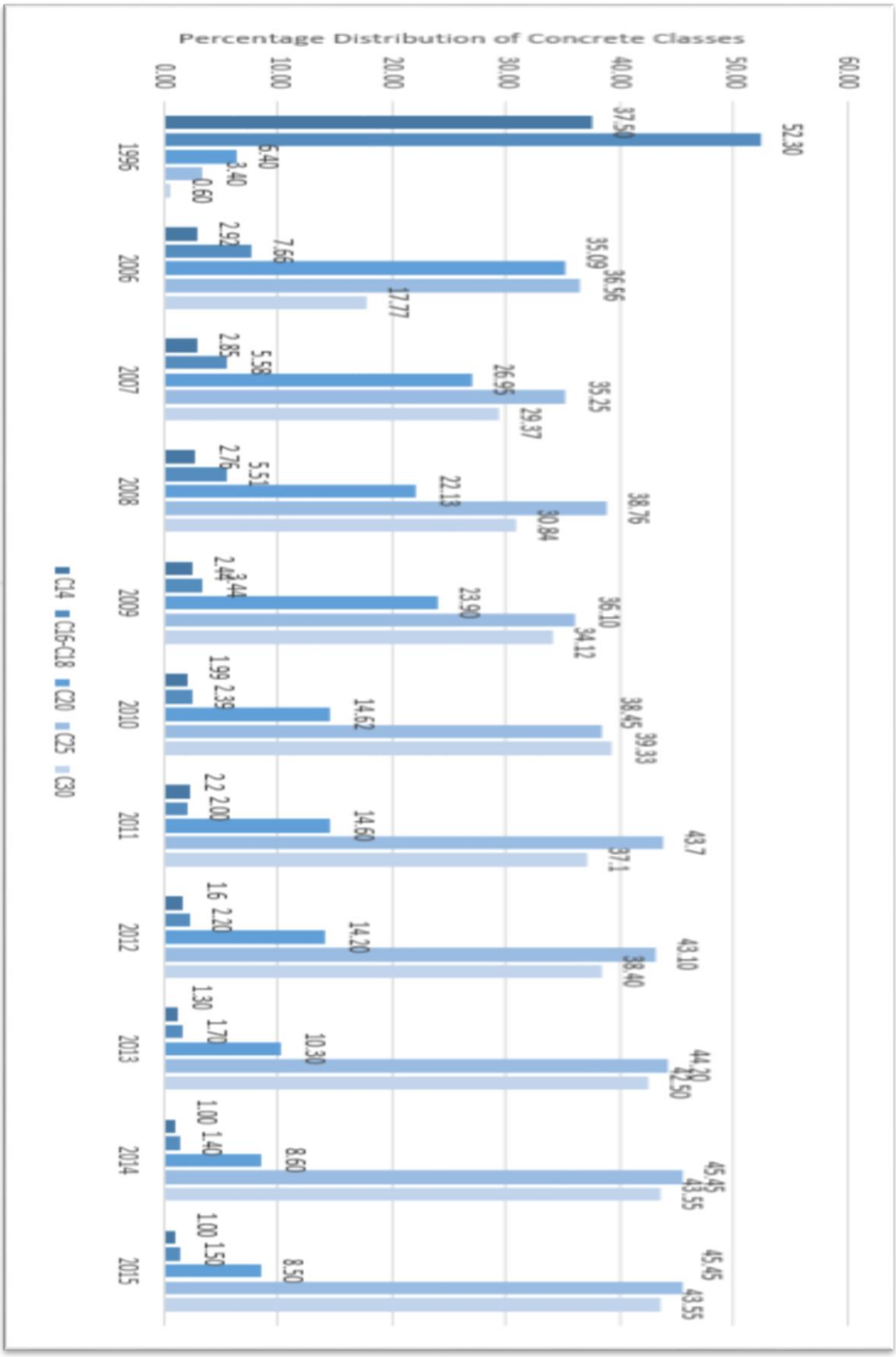
The industry achieved 102 million cubic meters of concrete production in 2013. When it comes to 2014, with a growth by 5% this figure reached 107 million cubic meters. According to the data from the year 2015, again 107 million cubic meters of concrete production was made as in 2014.

3.1.2.1.Development of the Strength Classes of Ready-mixed Concrete in Turkey

Table 3.5 Growth rate of the Construction industry and concrete classes used by years

Years	**Development Rate of GDP(%)**	**Development Rate of Construction Sector (%)**	**Concrete Classes Used(%)**				
			C 14	**C16-C18**	**C 20**	**C 25**	**C 30+**
2006	6,9	18.5	2,92	7,66	35,09	36,56	17,77
2007	4,7	5,7	2,85	5,58	26,95	35,25	29,37
2008	0,7	-8,1	2,76	5,51	22,13	38,76	30,84
2009	-4,8	-16,3	2,44	3,44	23,90	36,10	34,12
2010	9,2	18,3	1,99	2,39	14,62	38,45	39,33
2011	8,8	11,5	2,20	2,00	14,60	43,7	37,10
2012	2,2	0,6	1,60	2,20	14,20	43,10	38,40
2013	7,4	2,2	1,30	1,70	10,30	44,20	42,50
2014	2,9	2,2	1,00	1,4*	8,6*	45,45	43,55
2015	4,0	1,7	1,00	1,5*	8,5*	45,45	43,55

***: Data of C16-C18, C20 concrete classes concerning 2014 and 2015 were determined by sharing them out taking previous year into consideration and an approximate distribution was made.*



***: Data of C16-C18, C20 concrete classes concerning 2014 and 2015 were determined by sharing them out taking previous year into consideration and an approximate distribution was made.*

Figure 3.2. Development in concrete classes used in Turkey by years

With increasing ready-mixed concrete use in Turkey, usage rates of higher strength concretes increased leading to tremendous change within a 20 year period. While the usage rate of C 30 and more quality concrete classes was 17.77% in 2006, this rate continued to increase in the following years except 2011. This rate was 29.37% in 2007 and 43.55% in 2015. There are important reasons leading to such a rapid increase in concrete strength classes and their usage rates. The first and foremost reason is the fact that our country is located in an earthquake zone as shown in Figure 3.3. According to 1996 Map of Earthquake Zones, 42% of the surface area of our country is located in the I. degree seismic zone, 24% in the II. degree, 18% in the III. degree, 12% in the IV. degree and 4% in the V. degree seismic zone.

As a result of major earthquakes our country suffered, inadequate quality of the reinforced concrete constructions was proven and problems relating to issues such as urban planning, structural design and material/concrete production were clearly seen. It is essential to produce safer and more quality buildings so that such results do not arise once again. To this end, certain precautions were taken, regulations were renewed, use of higher strength class concrete started and quality control was improved. Here, the industry's gaining experience is also an important factor.

Another reason for the change in concrete classes used is the fact that the construction industry is an ever-growing industry as can be seen in Table 3.5 which was prepared based on the data in Table 2.2. The growth rate of the construction industry in the last decade exhibits an upward trend except the years 2008 and 2009. Steady growth of the Turkish economy, large investments in the construction industry and construction of complex structures have played a role in preferring high quality concrete classes.

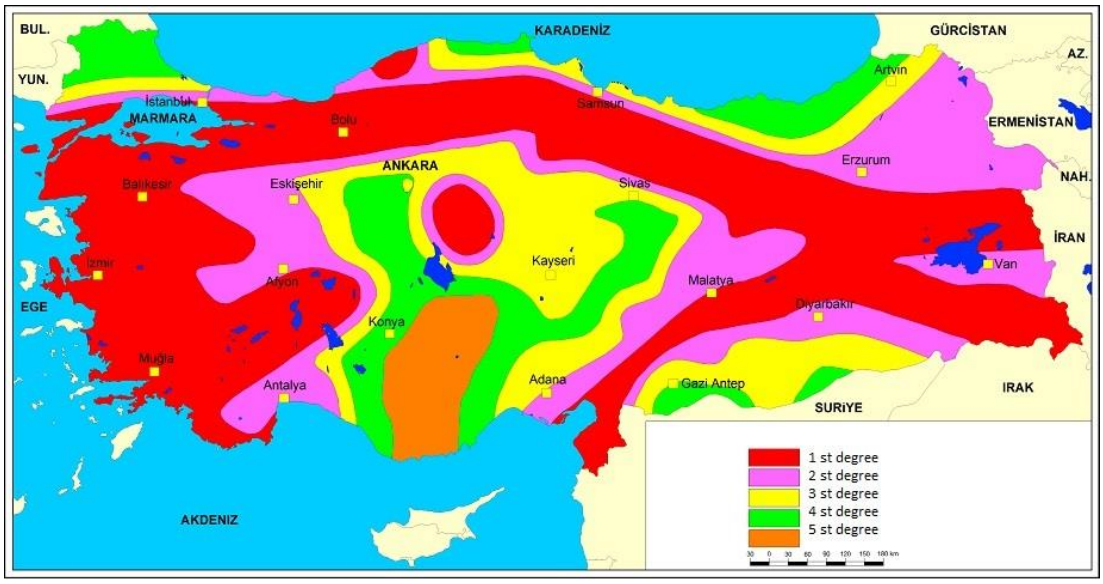


Figure 3.3. 1996 Turkey Map of Earthquake Zones

3.2. Cement Industry in Turkey

As pointed out in the previous paragraph (3.1), numeric data can be obtained concerning the cement industry, material and concrete industry. For this reason, the Cement industry which was discussed in detail in Chapter 2.3.1.1 is further addressed herein and it is scrutinized with respect to its role in and contribution to the construction industry and the ready-mixed concrete industry.

Turkey first started cement production in Darıca Cement Plant in 1911 with a cement kiln having a capacity of 20.000 tons/year. The capacity of this plant was increased to 40.000 tons/year in 1923. Until 1950s, 4 new plants were established in Ankara, Zeytinburnu (İstanbul), Kartal (İstanbul) and Sivas, and total capacity reached up to 370.000 tons/year. Cement importation continued until 1970s because the demand could not be met at an adequate level. After 1970s, with major energy and infrastructure projects of the state, the GAP project being in the first place, gaining momentum and increasing urbanization, demand for cement rapidly increased and new investments were successively made in the industry in order to respond to this increase. At present, with investments spread over all regions of Turkey, the cement industry has reached a capacity of 100 million tons, 70 million tons of production and 10 million tons of exportation figures.

The cement industry has exhibited a growth based on the construction industry in recent years. Particularly in the recent period, several large infrastructure projects such as the third airport, Çanakkale Bridge and link roads as well as urban renewal construction which is expected to increasingly continue in the upcoming period and the like positively contribute to the demand for cement and direct the decisions of large groups to make investments in this field.

In our day, the industry utilizes entirely its own resources in terms of raw material and it can meet the need of the country with its production. The cement industry which has a small import share, is increasing export share every passing year and makes sales to 90 countries of the world. A large part of the exports are made to countries which are in the process of reconstruction such as Iraq and Libya, and to countries which have developed economies such as Russia and the USA. Having no difficulty in meeting the domestic demand and continuously increasing its exportation, the industry is one of the greatest cement exporters of the world.

Even though the cement production in turkey is under the influence of the economic variables in the World, it exhibited an increase every year but 2009 over the past decade as indicated in Figure 3.4. In the years 2008 and 2009, a major decline took place in domestic cement sales as seen in Figure 3.5, however, the highest cement exportation was made in 2009 over the past decade as indicated in Figure 3.6. As understood therefrom, in 2009 the stagnation in the domestic market led to a thrust in the foreign markets allowing the industry to recover and gain an accelerating momentum.

Table 3.6 Cement sales in Turkey by regions (TÇMB, 2015)

Zones	Total Sale (t)	Ready Mixed	%	Cement Dealers	%	Others	%
Marmara	16,529,531	9,859,832	**59.65**	5,193,162	**31.42**	1,476,537	**8.93**
Aegean	4,991,533	3,337,642	**66.87**	1,314,965	**26.34**	338,926	**6.79**
Mediterranean	11,961,601	4,781,735	**39.98**	6,166,982	**51.56**	1,012,884	**8.47**
Black Sea	8,429,524	3,523,270	**41.80**	3,289,297	**39.02**	1,616,957	**19.18**
Central Anatolia	11,302,326	6,819,647	**60.34**	2,309,638	**20.44**	2,173,041	**19.23**
Eastern Anatolia	4,838,826	1,844,906	**38.13**	1,949,038	**40.28**	1,044,882	**21.59**
S.Eastern Anatolia	5,643,322	2,590,365	**45.90**	2,435,707	**43.16**	617,250	**10.94**
TOTAL	**63,696,663**	**32,757,397**	**51.43**	**22,658,789**	**35.57**	**8,280,477**	**13.00**

In 2015, cement sales in Turkey amounted 63.696.663 tons, 51.43% of the cement supplied to the domestic market was used in the ready-mixed concrete industry and the sale of the remaining cement was made by vendors or by direct sales. Marmara region was the leading region in cement sales. It is also seen from statistics that the cement industry provides one of the main and primary materials for the ready-mixed concrete and construction industries in Turkey.

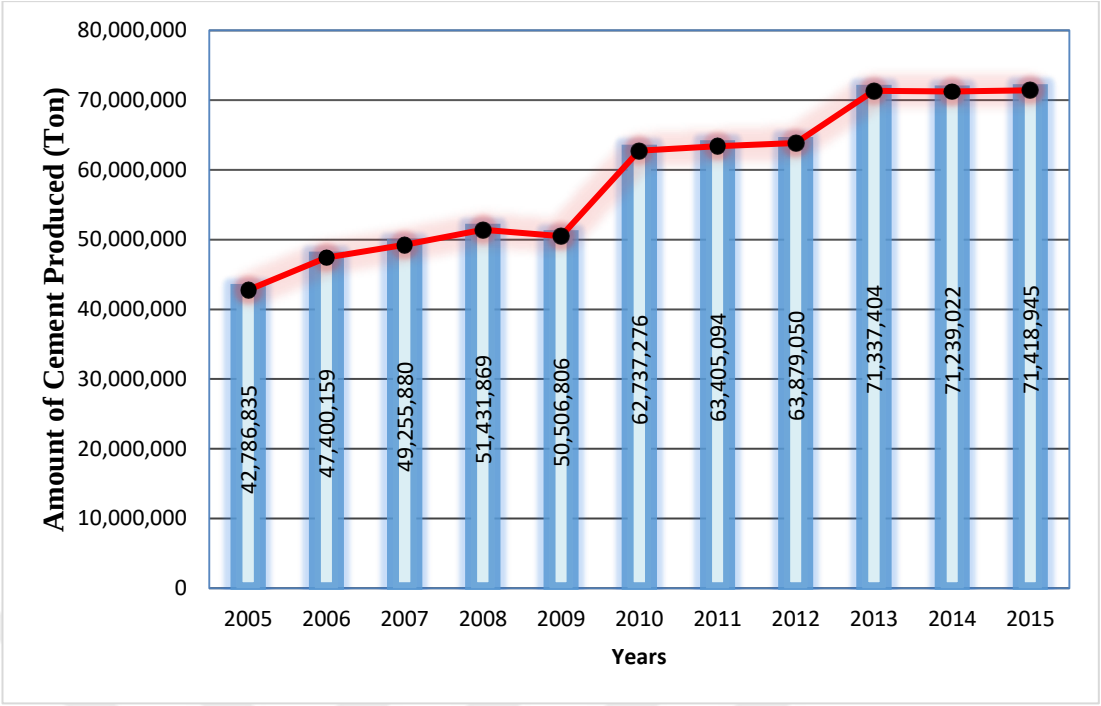


Figure 3.4. Amounts of cement produced in Turkey by years

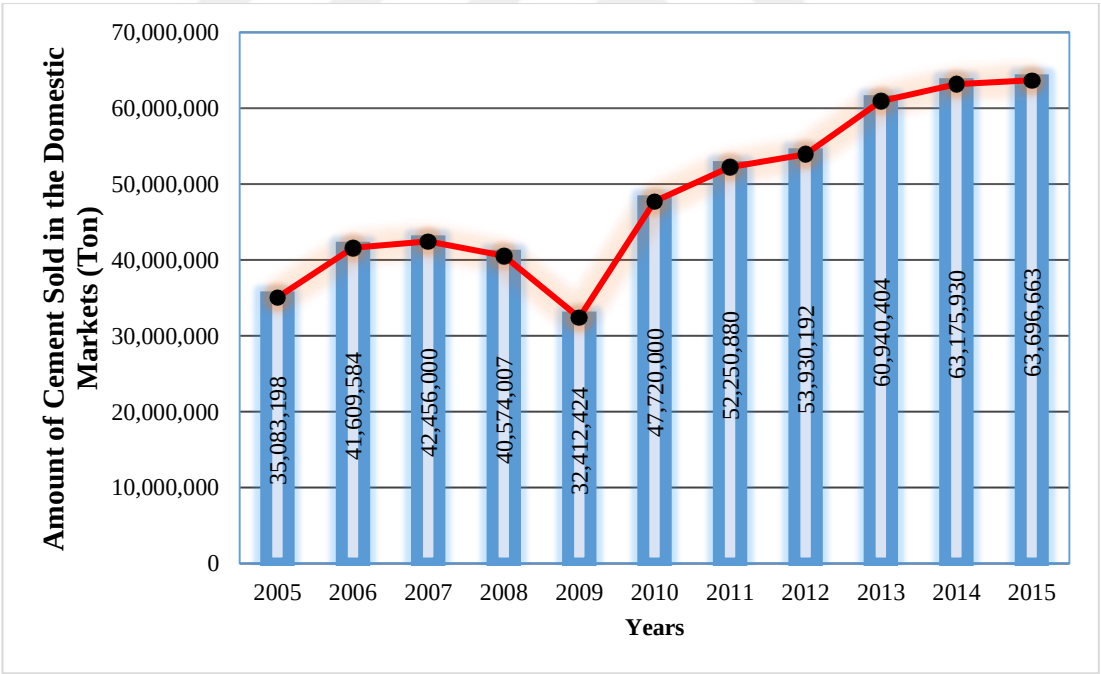


Figure 3.5 Amounts of cement sold in the domestic market in Turkey by years

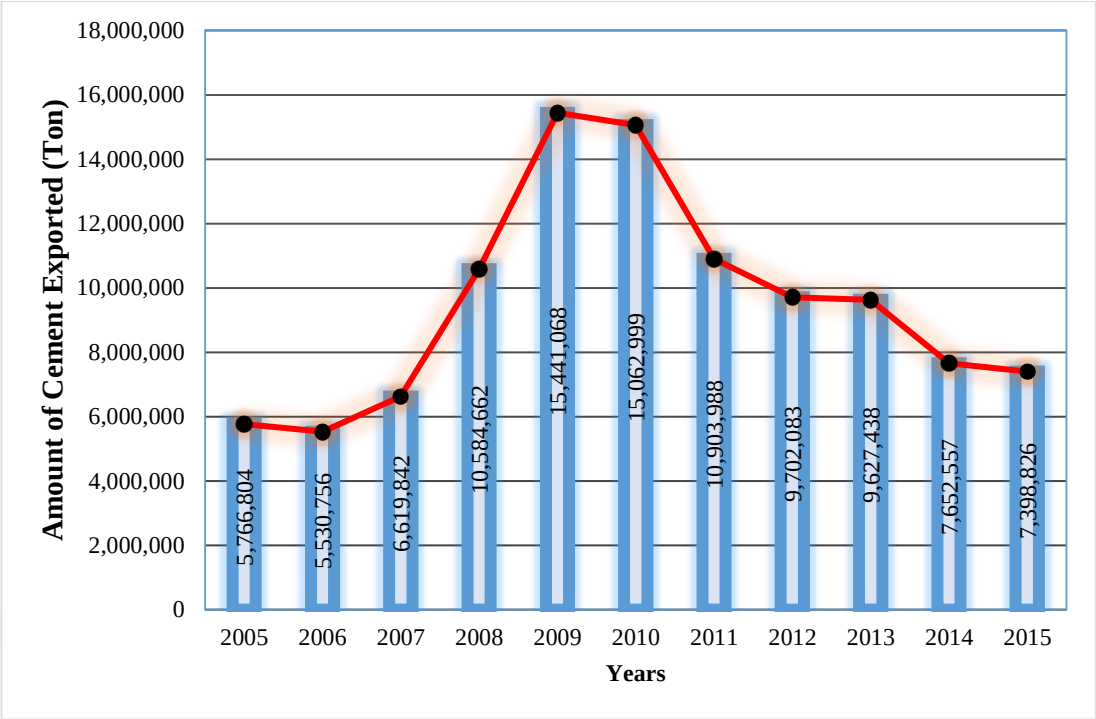


Figure 3.6 Amounts of cement exported in Turkey by years

4. CONCLUSIONS AND SUGGESTIONS

According to the results obtained from this study in which the share and effects of the construction industry in Turkey and in the World, and the effects of the ready-mixed concrete and cement industries which are among the most important and primary materials of the industry are examined:

a) The role and share of the construction industry in the economy is considerably sizeable.

b) In periods when the national economy went through shrinkage, drastic declines took place in the construction industry and when then GNP increased, the industry strongly reacted to this increase. In consequence, it is understood that the industry has a fragile structure.

c) As a result of researches, it have been assessed that the ready-mixed concrete and cement industries have a dynamic structure and exhibit a continuous development.

d) Because the construction industry is an imperious necessity which meets location and infrastructure requirements of all sectors including electronics, it is an industry that will never disappear in the World and in Turkey even though its added value is low and its momentum decreases from time to time.

e) The housing industry has a particular importance in the construction industry. Because the housing industry meets accommodation need which is one of the basic need of people, the increase in residence sales in Turkey could not be prevented even in the case of declines occurring in the GNP and the GDP.

Considering the importance of the construction industry in developing national economies, efforts should be made to increase the share of the industry in the GDP and the GNP, to make production with higher added value instead of labour-intensive manufacturing with low added value including material and designing industries and search for foreign markets should progressively continue.

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ADDS

Table Appx.1 Exportation of construction materials (2014-2015) million dollars (TÜRKİYE İMSAD, 2016)

Sectors	**2014 January-November**	**2015 January-November**	**% Change**
Plaster	72,9	47,9	-34,3
Cement	**594,6**	**506,6**	**-14,8**
Dye and Varnish	418,3	365,8	-12,6
Plastic Building Materials	1.302,30	1.030,40	-20,9
Wood Building Materials	531,3	431,4	-18,8
Wallpapers	13,6	7	-48,9
Finished Stones(marble, granite)	1.023,40	936,5	-8,5
Mineral Wools	21,6	17,5	-19,2
Asphalt, cement and equipment made of concrete	136	102,8	-24,4
Bricks, tile,	7,5	5,9	-20,8
Seramic coating	552,8	458,2	-17,1
Seramic health products	204	181,8	-10,9
Flat, insulating glass, glass brick	130,1	103,5	-20,4
Glass Wool	96,1	84,9	-11,7
Iron-steel stick, profile, wire and nail	5.284,10	3.732,20	-29,4
Iron-steel pipe and pipe connection element	1.539,00	1.311,70	-14,8
Iron-steel building materials	1.344,20	1.144,60	-14,8
Iron-steel screw, nut and bolt	317,8	301	-5,3
Iron-steel radiator	413,1	356,7	-13,7
Iron-steel health products	76,3	59,2	-22,4
Aluminum building materials	865,1	774,8	-10,4
Aluminum health products	104,2	107,7	3,4
Locks and hardware equipment	610,3	507,9	-16,8
Heating and cooling devices	696,3	599,5	-13,9
Elevators and lifts	47,5	37,3	-21,3
Taps and valves	399,8	327,9	-18
Electirical materials	520,3	447	-14,1
Insulated cables	1.550,90	1.220,60	-21,3
Lighting devices	285,2	207,1	-27,4
Prefabricated structures	208,9	225,1	7,7
Total construction materials	**19.367,50**	**15.640,20**	**-19,2**

Table Appx.2. Exportation of construction materials (2014-2015) million dollars (TÜRKİYE İMSAD, 2016)

Sectors	**2014 January-November**	**2015 January-November**	**% Change**
Plaster	7,3	5,5	-24,5
Cement	**13,5**	**16**	**18,4**
Dye and Varnish	564,4	506,8	-10,2
Plastic Building Materials	338,9	328,8	-3
Wood Building Materials	569,9	506,3	-11,2
Wallpapers	77,7	74,5	-4,1
Finished Stones(marble, granite)	214,1	186,6	-12,9
Mineral Wools	59,1	44,8	-24,3
Asphalt, cement and equipment made of concrete	67,3	56,5	-16
Bricks, tile,	3	3,1	1,9
Seramic coating	99,8	72,5	-27,3
Seramic health products	8,6	8,1	-6,3
Flat, insulating glass, glass brick	182,6	156,4	-14,3
Glass Wool	179,4	175,9	-1,9
Iron-steel stick, profile, wire and nail	423,8	386,1	-8,9
Iron-steel pipe and pipe connection element	754,9	779,2	3,2
Iron-steel building materials	245	256,7	4,8
Iron-steel screw, nut and bolt	580,1	615,2	6
Iron-steel radiator	21	17,9	-14,8
Iron-steel health products	14,2	11,6	-17,8
Aluminum building materials	81,7	79,6	-2,6
Aluminum health products	31,1	30,1	-3,3
Locks and hardware equipment	573,5	541,2	-5,6
Heating and cooling devices	832,2	931,8	12
Elevators and lifts	106,8	129,1	20,8
Taps and valves	587	566,8	-3,4
Electirical materials	998,1	980,1	-1,8
Insulated cables	317	345	8,8
Lighting devices	526,3	469,1	-10,9
Prefabricated structures	22,3	16,4	-26,3
Total construction materials	**8500,5**	**8297,7**	**-2,4**

Table Appx.3 Cement exportation of countries in 2015

COUNTRIES	Total	Denizyolu	Demiryolu	Karayolu
Syria	**1.680.461**			1.680.461
Libya	**1.502.390**	1.502.390		
Isreal	**675.663**	675.663		
Iraq	**510.629**			510.629
USA	**472.178**	472.178		
Ivory Coast	**315.800**	315.800		
Equaterial Guinea	**271.007**	271.007		
Colombia	**197.945**	197.945		
Georgia	**181.762**			181.762
Liberia	**158.022**	158.022		
Bulgaria	**140.062**	21.347	39.963	78.752
Cyprus	**125.879**	125.879		
Sierra Leone	**117.404**	117.404		
Yemen	**109.997**	109.997		
Russia	**103.426**	103.426		
Kongo	**99.812**	99.812		
İtaly	**94.161**	94.161		
Cameroon	**67.301**	67.301		
Spain	**66.324**	66.324		
Romania	**66.120**	66.120		
Brazil	**52.076**	52.076		
Algeria	**35.150**	35.150		
Morocco	**33.048**	33.048		
Germany	**32.379**	32.379		
Ukraine	**30.839**	30.839		
Mersin Free Zone	**26.831**			26.831
Greece	**24.905**	24.905		
Suadi Arabia	**24.528**	24.528		
Albonia	**22.075**	22.075		
England	**21.036**	21.036		
Abhazia	**16.653**	16.653		
Zaire	**13.200**	13.200		

Denmark	**12.987**	12.987		
Egypt	**12.826**	12.826		
Ghana	**10.500**	10.500		
Kosovo	**9.663**	9.663		
Guinea	**7.730**	7.730		
Macedonia	**6.251**	2.199		4.052
Peru	**6.048**	6.048		
Netherlands	**5.923**	5.923		
Belarus	**5.232**	5.232		
France	**4.715**	4.715		
Argentina	**4.062**	4.062		
Mauritania	**3.840**	3.840		
Azerbaijan	**2.894**	2.276		618
Sount Africa	**2.106**	2.106		
Irland	**1.918**	1.918		
Turkmenistan	**1.520**	1.425		95
Jordan	**1.356**	1.356		
Haiti	**1.276**	1.276		
Malta	**1.195**	1.195		
Estonia	**1.183**	1.183		
Finland	**1.052**	1.052		
Uzbekistan	**751**			751
Tajikistan	**646**			646
Tanzania	**540**	540		
Polestine	**512**	512		
Latvia	**408**	408		
Iranian	**400**			400
Senegal	**336**	336		
Uruguay	**256**	256		
Nigeria	**251**	251		
Trinidad Tobago	**218**	218		
Mauritius	**216**	216		
United Arap Emirates	**104**	104		
Ethiopia	**99**	99		
Bohama	**81**	81		

South Korea	**77**	77		
Brunei	**72**	72		
Serbia	**72**	72		
Poland	**56**	56		
Jamaica	**54**	54		
Sri Lanka	**54**	54		
Chile	**51**	51		
Uganda	**51**	51		
Gambia	**28**	28		
Belize	**27**	27		
Dominic	**27**	27		
Lithuanian	**27**	27		
Lebanan	**26**	26		
Taivan	**24**	24		
Austria	**22**			22
Total	**7.398.826**	**4.873.844**	**39.963**	**2.485.019**

Table Appx.4. Development in concrete classes used in Turkey by years

Years	**Concrete Classes Used (%)**				
	C 14	**C 16-C18**	**C 20**	**C 25**	**C 30 +**
1996	37,50	52,30	6,40	3,40	0,60
2006	2,92	7,66	35,09	36,56	17,77
2007	2,85	5,58	26,95	35,25	29,37
2008	2,76	5,51	22,13	38,76	30,84
2009	2,44	3,44	23,90	36,10	34,12
2010	1,99	2,39	14,62	38,45	39,33
2011	2,20	2,00	14,60	43,7	37,10
2012	1,60	2,20	14,20	43,10	38,40
2013	1,30	1,70	10,30	44,20	42,50
2014	1,00	1,4*	8,6*	45,45	43,55
2015	1,00	1,5*	8,5*	45,45	43,55

***:** *Data of C16-C18, C20 concrete classes concerning 2014 and 2015 were determined by sharing them out taking previous year into consideration and an approximate distribution was made.*

Table Appx.5. Comparison of the growth rates of the GNP and the Construction industry by years (TÜİK, 2016)

Years	**Devolopment rate of GDP (%)**	**Devolopment rate of construction sector (%)**
2005	8,4	9,3
2006	6,9	18.5
2007	4,7	5,7
2008	0,7	-8,1
2009	-4,8	-16,3
2010	9,2	18,3
2011	8,8	11,5
2012	2,2	0,6
2013	7,4	2,2
2014	2,9	2,2
2015	4,0	1,7

Table Appx.6. Figures of residence sales in Turkey by years (TÜİK, 2016)

Years	**Amount of housing sond (piece)**
2008	427,105
2009	555,184
2010	607,098
2011	708,275
2012	701,621
2013	1,157,190
2014	1,165,381
2015	1,289,320