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The Impact of the Iron and Steel Industry to Karabük and Sheffield: A Historical Background**

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ABSTRACT

In this study, the two cities, Sheffield in the UK and Karabük in Turkey, which are famous for iron and steel producing, were analyzed through their historical background to focus on the differences and similarities from an urban perspective. Both the rise in the production of iron and steel in the 18th century through Industrial Revolution and the innovations made Sheffield popular throughout the world. Karabük is called "The Republic City" in Turkey because the first iron and steel works were built in Karabük in 1937 shortly after the proclamation of Republic of Turkey. The museums were visited and the local studies and academic papers were sorted out to see the effects of sudden changes which the heavy industry caused in the cities and it's concluded that the industrial, urban and social experiences of Sheffield may be a guide for Karabük.

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1. INTRODUCTION

The Industrial Revolution began in England sometime after the middle of the 18th century. The revolution was something more than just new machines, smoke-belching factories, increased productivity and an increased standard of living (Historyguide, 2013). England is the first country which achieves the industrial revolution and one of the leading countries in iron and steel industry. Abundance of underground and aboveground sources, mining and technological advances paved the way for England's fast industrialization. Sheffield had been one of the first cities in mass iron and steel production. By the sixteenth century Sheffield was nationally known for its production of knives and blades of all sorts (Linton, 1956). During the Industrial Revolution, a lot of innovations were made in iron and steel production. Sheffield's industries manufactured metal and metal alloy products which in turn helped to advance technological discoveries (Howse, 2011).

The development of the iron and steel industry in Turkey consisted of two phases. They were in the last periods of The Ottoman Empire and The Turkish Republic period. The economy was mostly based on agriculture in The Ottoman Empire. Some operations were applied in order to develop industry in the

period of reforms. However, they were unsuccessful to reach the innovations and production capacity of the Industrial Revolution which began in England and spread to Europe. The reason for this fact was that the beginning and the effects of the industrial revolution fell upon the stagnation and fall period of The Ottoman Empire. In this study, developments in Karabük and Sheffield are researched through historical background since the two cities had been the iron and steel production centres.

2. HISTORICAL DEVELOPMENT OF THE IRON AND STEEL INDUSTRY IN THE WORLD

Archaeological evidence suggests that people have been using iron for at least 5000 years. Iron is the cheapest and one of the most abundant of all metals, comprising nearly 5.6% of the earth's crust and nearly all of the earth's core. Iron metal has been used since ancient times, though copper alloys, which have lower melting temperatures, were used even earlier in human history. The first iron production started in the Middle Bronze Age but it took several centuries before iron displaced bronze. Samples of smelted iron from Asmar, Mesopotamia and Tall Chagar Bazaar in northern Syria were made sometime between 2700 and 3000 BCE. The Hittites appear to be the first to understand the production of iron from its ores and regard it highly in their society. They began to smelt iron between 1500 and 1200 BCE and the practice spread to the rest of the Near East after their empire fell in 1180 BCE. The subsequent period is called the Iron Age. Huge amounts of iron are used to make steel, an alloy of iron and carbon. Steel typically contains between 0.3% and 1.5% carbon, depending on the desired characteristics [1].

Developments in the iron industry also played a central role in the Industrial Revolution. In the early 18th century, Englishman Abraham Darby (1678-1717) discovered a cheaper, easier method to produce cast iron, using a coke-fueled (as opposed to charcoal-fired) furnace. In the 1850s, British engineer Henry Bessemer (1813-1898) developed the first inexpensive process for mass-producing steel. Both iron and steel became essential materials, used to make everything from appliances, tools and machines, to ships, buildings and infrastructure. The steam engine was also integral to industrialization. In 1712, Englishman Thomas Newcomen (1664-1729) developed the first practical steam engine (which was used primarily to pump water out of mines). By the 1770s, Scottish inventor James Watt (1736-1819) had improved on Newcomen’s work, and the steam engine went on to power machinery, locomotives and ships during the Industrial Revolution (historyguide.org, 2014).

2.1. 19th Century

Iron is a metal which has been used since prehistoric ages; obtainment procedure by refining iron from ore has greatly accelerated after coke was found in 18th century (Bilir, 2012). Progresses in the areas of construction, transportation and technology have enhanced the use and the need of iron. From the year of 1825 on, while the first road in England was built, railroads have been the preferred system in transportation all over the world (Durak, 2012).

In case of steel production, various processes have been developed. Modern steelmaking process has been started with the use of air blast convertor in duplicate production which was invented by H. Bessemer in 1856 in England. Thomas process has been developed with alterations of implementation of cast iron which contains high incidence of phosphorus in Bessemer process in 1878. Commercial production of Bessemer steel began in 1858 and the output reached a peak in Great Britain and later all over in Europe (Bodsworth, 1998). Innovations in production technology have expanded the whole world and steel production from arising has caused the emergences of many steelmaker countries in the world. Between 1875 and 1896, world's pig iron production more than doubled. In addition, scrap iron was increasingly used as a raw material, particularly for open hearth steelmaking. World pig iron production as is seen on Table 1, had risen from 30.22 million tons to 58.09 million tons between the years of 1896 and 1906. Within this time period, steel production increased from 18.36 million tons to 50.40 million tons.

Table 1. World Production of Pig Iron and Steel 1896 - 1906 Million Tons, (Carr and Taplin, 1962: 183).

Year	**Pig Iron**	**Steel**
1896	30.22	18.36
1898	35.30	24.18
1900	39.81	27.83
1901	39.81	30.56
1902	43.36	33.96
1903	45.73	35.51
1904	44.71	35.74
1905	53.24	44.22
1906	58.03	50.40

2.2. 20th century

In the world, only USA, Germany, France and Russia produced steel for trade in the early 1900s. In the years following the end of the World War II, more than half of the world's steel production was provided by the USA. If we count Russia and England's productions in this, the total amount of these three countries' steel production in that period meant 75% of the world's production. However, world's production area of iron and steel industry has considerably expanded today and many countries have become producers (Koca, 2008).

The great financial depression that the world experienced in 1930s and the effects of which continued until 1940s influenced the iron and steel sector, too. The shrinking in demands and the increase in production costs brought about companies' closing down and firings in this period. World steel production, which shows a constant increase tendency, is seen with a rigid fall in the years of great

depression, especially in 1932 in Figure 1. The production, which was 118.880 million tons in 1929, went down to 49.920 million tons in 1932.

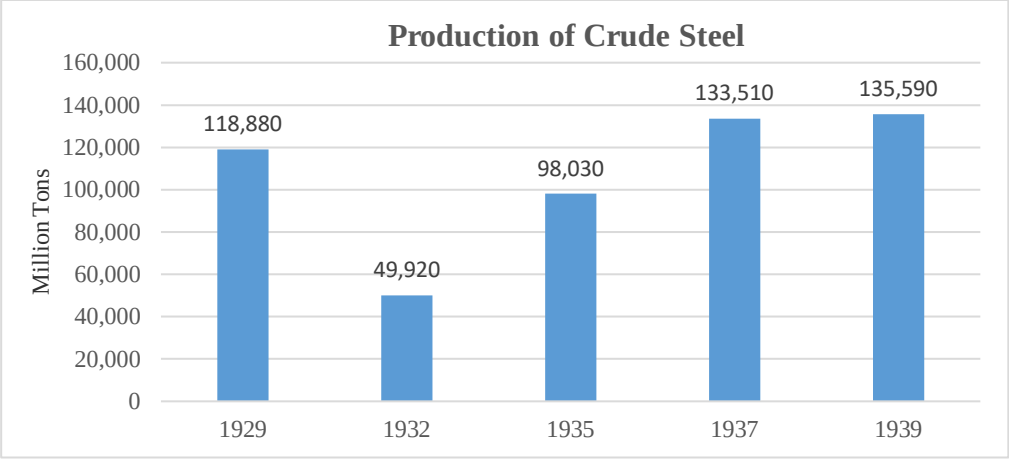

Figure 1. World Production of Crude Steel 1929–1939, Million Tons, (Carr and Taplin, 1962).

2.3. 21st century

World's steel production tends to increase demand for steel products and accordingly the increase of consumption rate. As seen in Table 2, world's ultimate consumption of steel rose to 756, 6 million tons in 2000 from 591, 4 million tons in 1985 and mounted to 1.208,5 million tons in 2007 by developing 6,9% per year in the period of 2000-2007. Turkey reached a consumption level of 23,8 million tons in 2007 by increasing its iron and steel consumption by 9,4% per year in the period of 2000-2007 (Koca, 2008).

Table 2. World's Ultimate Consumption of Steel (1985-2007)

Year	**Consumption (Million Tons)**
1985	591,4
2000	756,6
2007	1.208,5

The countries which increased their production most in 2011 were South American countries. Production in the area reached to 48.5 million tons by increasing 10, 2% per year. Productions of North American countries produced approximately 119 million tons with an increase of 6, 8%. Productions of EU countries in 2011 reached to 177. 4 million tons with 2, 8% increase while productions of Asian countries surpassed 988 million tons with an increase of 7, 9% per year. Production of raw steel in Middle-East countries reached 20.9 million tons with 6, 9% increase while African countries' production, influenced by political instability, decreased to 14,3 million tons with a fall of 13,8% [2]. In

Figure 2 world's steel production increased by three times in around 40 years. The production was 595 million tons in 1970 went up to 1 billion 547 million tons in 2012.

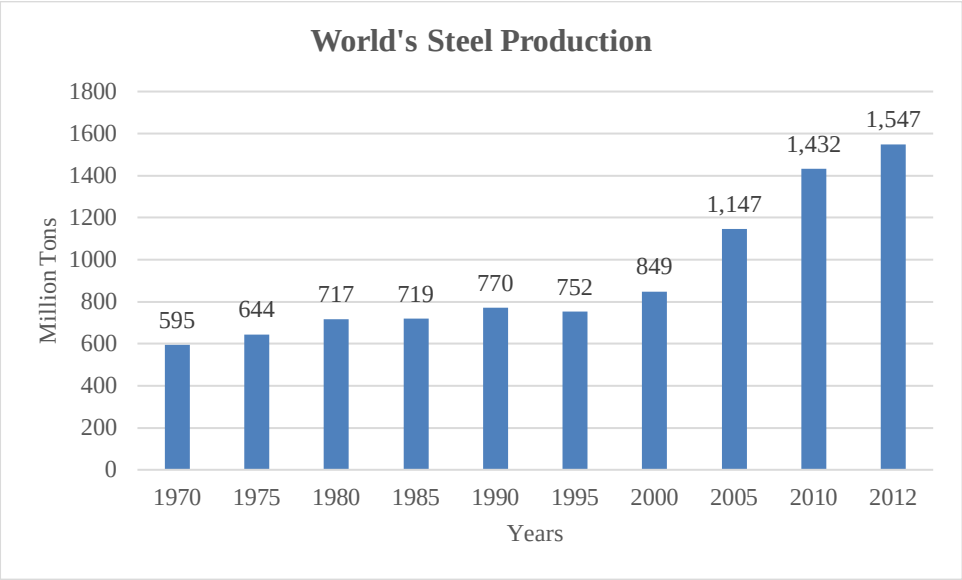

Figure 2. World Production of Crude Steel 1970 - 2012, [3]

3. THE HISTORY AND THE DEVELOPMENT OF IRON STEEL INDUSTRY IN TURKEY

3.1. Pre-Republic Period

Iron in Ottoman times, was generally mined by the local public and then bought by the government and engraved in order to be sent to the cast house in Istanbul for making war equipment. Iron used in these cast houses were taken from previous Ottoman territory Bosnia, Serbia, Greece, Bulgaria, Kalecik, Keban and Kigi (Duman, 2008).

Industrial and technical dominance of The Ottoman Empire continued until the late 18th century. What draws attention in this century is the development of machine production industry which started in England first and rapidly spread to the other Western European countries. Being unable to keep up with these rapid developments, The Ottoman Empire started to fall behind in terms of economy. While the large industry rapidly developed in this period, The Ottoman Empire was financially exhausted. Also the political influence of The Ottoman Empire cleared away. Capitulations disabled The Ottoman Empire to adjust the customs tariffs freely (Duman, 2008).

3.2. After Republic Period

Turkish Republic, being founded after the fall of Ottoman Empire in the World War I, had an economy lacking modern industrial institutions. What it had earlier had been destroyed in the war. In the economy,

the production of industry and craft were weighed more and besides that, limited industrial business depended on textile. A fast process of reconstruction and industry began after the proclamation of the republic announced on the 29th of October in 1923. Turkey, going through a hard and long war period, headed towards iron steel and mechanization which are the first cores of defence industry. It made it hard without a previous history of production. The iron and steel industry was dependent on foreign sources. New financial and industrial institutions were started to be founded. Within this scope, Industry and Maadin Bank was founded in 1925 after which Teşvik-i Industrial Law was introduced. The first legal regulation about that 'The Law about the Iron Industry Institution' was accepted on the 17th of March in 1926. With this law, Iron Industry Head Office was founded on the 11th of May in 1926. With the legal steps, it was aimed to support private enterprise. Yet, Turkey was affected negatively because of the financial negations. Included in the process was state industry resulting in no private enterprise (Kütükçüoğlu, 2012: 32).

After a short period of the announcement of the republic of Turkey, Machinery Chemist Industrial Institution (MKEK) was founded which was the first step and the basic core of the industrial structure got into operation in 1928. The other plants started to operate in Ankara and Kırıkkale at certain intervals. Then, all these plants had become as a major centre for the production of armaments. Light Weapon and Gun Repair Shops, Casing and Carpenter Factories in Ankara in 1924, Brass Factory, Electric Machinery Factory in Kırıkkale in 1928 and Munitions Factory in Kırıkkale in 1929 were the first to go into operation. Later, Kayaş Primer Factory in Ankara in 1931, Steel Factory in Kırıkkale in 1931, Mamak Gas Mask Factory for producing gas masks in Ankara, powder, rifle and gun factories in Kırıkkale were established in 1936. These factories have underlain today's MKEK [4].

3.3. 1960s' and the period after 1960

The second iron and steel plant of Turkey was planned due to emerging economic conditions of the country and increased demand for products. The construction and installation works of Ereğli Iron and Steel Plants (ERDEMİR) started in 1961 and were completed in a short time of 42 months and they started production with the capacity of about 0.5 million tons of raw steel and 0.4 million tons of flat steel on May 15, 1965 [5]. Later, Iskenderun Iron and Steel Plants (İSDEMİR) being the third integrated plant of Turkey were established in the vicinity of Payaş (Yakacık), which is 17 km from Iskenderun, on the shores of the Mediterranean in the south of Turkey on October 3, 1970. On the date of establishment, it was settled on an area of 16.75 million m^2 in total (factory site is 6.8 million m^2) with its community facilities. İSDEMİR is the only integrated plant producing long and flat products of Turkey with its 3.5 million tons/year of hot-rolling capacity which was put into use in 2008 [6].

Numerous iron and steel products like metal things, machine, pipe and section have been produced in iron and steel production plants in Turkey and these products have been basis of national economy due to the fact that they have provided input to all other sectors which are from automotive to white goods. When it came to 2005, iron and steel sector made progress thanks to public and private sector enterprises in Turkey. Although the Turkish steel industry declined; in December 2012, Turkey managed to maintain its position currently ranked 8th of the world's largest steel producers [7]. Among steel producing countries in Europe, it has ranked second after Germany. This is an indication of the importance given to steel production and advancing technology in Turkey. The usage of steel and steel products has become popular all around the world. Turkey's position in the world steel production is important and steel production will play an important role in the country's development. Turkey has increased its raw steel production by 5.2% with producing 35.8 million tons that year compared to 34, 1 million tons a year ago. With this performance, Turkey has been the eighth country among the top then countries in the ranking of the World Raw Steel Production [8].

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4. IRON AND STEEL INDUSTRY IN KARABÜK

4.1. 1937-1995 Period

In this period, Karabük Iron and Steel Plant (KISP) has been the first and biggest step for the establishment of the iron and steel sector and the prevention of foreign-source dependency in Turkey. The foundations of KISP were laid by Prime Minister Ismet Inönü in Karabük on April 3, 1937. KISP kept increasing their capacity of production from the year 1939 till the year 1989. But, it could not get its old golden years back after the strike even though they got an agreement on the subject. Institution's competitive force in the domestic market ran short because it was not being able to keep up with the technological advancements and there was a heavy burden on the public with the raw material export and the increase on the iron-steel products imported to the country. In addition, it caused uneasiness inside the institution that the demands of the workers were rejected in the meetings between the union and the governments of that time. Besides, there was an excessive employment, which was a political reality that governments could not prevent (Kalyoncu, 2007).

4.2. After 1995

In 1994, the banking crisis led to the introduction of the April 5 measures in Turkey. In accordance with the April 5th Economical Stability Precautions by the government of that time in 1994, KISP Board of Directors was decided to have establishments stop their operations. However, union and non-governmental organizations got together and reclaimed that the institution is the most important source of income of the region. Due to the objection of the locals to the closure of the institution, the option of transferring it to the workers and the public use by the way of customizing was started to be considered. Thus, a community named 'city council' was formed consisted of craftsmen, industrialists, union and

management part of the institution participated in. Afterwards, the Board of Entrepreneurship was founded by Öz-Çelik Labor Union and the Commercial and Industrial Chamber of Karabük. Transfer conditions of the integrated institutions were negotiated between the government and the Board of Entrepreneurship. At the end of it, the institution was decided to be customized (Kalyoncu, 2007).

As a result, through the privatization process, KISP works were taken into the program of customizing by the Customizing High Commission with the 94/16-numbered and 13.12.1994-dated verdict. The shares of the factory which were turned into Karabük Iron Steel Factories A.Ş (Incorporated Company) on the 13th of January in 1995 were transferred to Karabük Iron Steel Industry and Trade Corporation (Kardemir Inc.) which had 12.7000 multi partners including factory workers, locals, craftsmen and industrialists [9]

5. IRON STEEL INDUSTRY IN SHEFFIELD

Sheffield, making a name for itself in the production of fork, knife and other sharp tools in the local scale, got attuned to technological advancements from being a part of iron steel production to atelier production. During the 19th century, Sheffield gained an international reputation for steel production. Many innovations were developed locally, including crucible and stainless steel, fuelling an almost tenfold increase in the population during the Industrial Revolution. Sheffield received its municipal charter in 1843, becoming the City of Sheffield in 1893. The major event in the history of steelmaking was the making of Stainless Steel which was pioneered at Sheffield in 1903 - although it was developed in Germany and the USA at around the same time. Sheffield was a major centre for the manufacture of armaments during the first and second world wars and as a target for enemy bombing, suffered much wartime damage [10].

5.1. The Production of Iron and Steel

The expansion of the Sheffield steel industry was achieved largely by means of the endeavors of many relatively small concerns operating with comparatively little capital and often in very restricted premises. In 1856 there were no fewer than 135 steel-making firms in Sheffield, most of them founded by cutlers or other steel users (Linton, 1956). Much of Sheffield's early industrial development was based on water power. Steam power was first used locally to work the pumps that drained the deeper coal mines (Liddament *at al*, 1997). Later, the use of steam engine in manufacturing and the innovations in production of steel increased the amount of production. The first important change was the substitution of steam for water-power in grinding, a change which was not possible until James watt, in 1871, had made his improved steam-engine capable of rotative motion. No doubt the abundance of water-power and its relative cheapness had favoured the localization of the cutlery trades in the Sheffield region, but water power was subject to the disadvantage of irregularity, since it might fail through

drought in summer or freezing in winter. Certainly from the late 18th century, it was being superseded, though slowly. 1794 there were 3 steam-driven wheels and 83 driven by water; by 1908 only 8 water-driven wheels were in use as compared with 300 driven by steam (Linton, 1956).

5.2. The period before the World War I

The rapid growth in industrial process with the mass production resulted in the need of human work force, and the industrial revolution triggered the migration to the industrial centres throughout the UK. When the commercial and industrials activities were compared with other cities, apart from being the oldest city Sheffield, did not make production just for England markets. During the 16th century, the companies in Sheffield produced and exported the steel productions to firstly to Spain and Austria and later to the Arabic world (Fine, 1992).

Sheffield also became the city of innovations coal and steel and sub-industry. An event which greatly stimulated the expansion of Sheffield trade was the invention of silver-plating by Thomas Boulsover. He became a cutler and in 1742, while repairing a knife, part copper and part silver, he accidentally fused the two metals. This suggested to him the possibility of coating copper with a silver covering. Developing the process, which is now called “Sheffield Plate”, he plated buttons, buckles and snuff-boxes (Vickers, 1987). By 1750, silver plated tea pots, cups, plates and candlesticks became very popular because of their shiny and silver appearance in the middle-class (Wray *at al*, 2001). This invention soon led to growing number of silversmiths and an Assay Office for stamping silverwork was opened in Sheffield in 1773 (Vickers, 1987).

In 1740, Benjamin Huntsman, a Doncaster clockmaker came to live at Handsworth, little knowing that he was to have a profound effect upon one of Sheffield’s principal industries, the iron and steel trade. In 1740, he moved to Sheffield where there was a better supply of the coke he needed as a fuel. He first settled in the district of Handsworth just to the south of the centre of Sheffield where he carried out his experiments in secret [11]. After many years of experimenting, he finally perfected his crucible steel process and realised that this process could be used to make superior tools and cutlery. His experiments led to the invention of crucible steel, that is steel melted at a high temperature in sealed clay crucibles, a crucible being a kind of pot. Huntsman had made Sheffield internationally famous as a steel-making centre. The industry had expanded so rapidly that by the mid-19th century the Sheffield region manufactured 90 per cent of British steel and nearly half the European output (Hey, 2010:154).

The first integrated factory was the Sheaf Works near the canal basin, built in 1823 for William Greaves, manufacturer of steel, razors and cutlery mainly for the American market, later taken over by Thomas Turton and Sons who manufactured saws, files, edge tools and railway springs. This was followed by the Globe Works, built for the Ibbotson Brothers between 1825 and 1830. By 1850 integrated factories were also operated by two of Sheffield's most famous cutlery manufacturers, Joseph Rodgers and Sons, at the Norfolk Works and George Wostenholm and Son at the Washington Works; and by one of the two leading silver plate manufacturers, James Dixon and Sons, at Cornish Place (Jones, 2005).

Sheffield, being the pioneer the city in steel production in England was registered in London. The Great Exhibition was organized in London in 1851. 158 firms from Sheffield participated in this international industrial exhibition to present their productions. 6 million people visited this exhibition which was open for 4 months.1 As seen in Table 3 (Tweedale, 1995), there were lots of large steel producer firms in Sheffield in those years. The largest firm was Jessop with its 120 furnaces. The following firm was Sanderson Bros with its 110 furnaces.

Table 3. Leading Sheffield Steel Firms, (1852)

Company	**Converting Furnaces**	**Crucible Holes**
Jessop	10	120
Sanderson Bros.	10	110
Naylor&Vickers	8	90
Firth	N/A	80
Beet&Griffiths	N/A	70
Turton&Sons	11	48
Johnson&Cammel	6	40
John Brown	4	40

In Sheffield, with the rise in steel making, the production of rail systems increased. John Brown made his first rails in 1860 and for a time was the largest rail maker in the world. In 1861 Charles Cammel started the same trade. In 1871 George Brown founded Brown, Bayley&Dixon, in Attercliffe, in order to manufacture Bessemer steel and rails. By 1873 the Sheffield district was able to make about a quarter of a million tons of rails per annum. America, in particular, was a major customer for Sheffield steel. It has been estimated that in 1871 Brown's and Cammel's alone exported to the U.S about three times the whole domestic American output. The other famous name in special steels is that of Harry Brearley

[1] This information was gotten personally from the Industrial Museum in Kelham Island in Sheffield after visiting the interactive sections and observing the exhibition.

(1871-1948), a man with a working-class background and little formal education who found employment at the Brown-Firth Research Laboratory. While working in his lab in 1912 he discovered a low-carbon steel containing about 12 per cent chromium which resisted corrosion. The first called "rustless steel", but the name that caught on was "stainless steel". The usefulness of this discovery for the Sheffield cutlery industry soon became apparent (Hey, 2010).

Then, in 1939 he was presented with the Freedom of the City of Sheffield (Jones, 2005). Harry Brearley was certainly the pioneer of stainless steel but after he left Brown Firth Research, his successor Dr. W.H. Hatfield went on to develop a stainless steel which even today is probably the widest used alloy of this type. It is referred to as "18/8". This steel also includes nickel [12]. The population of Sheffield started to increase in parallel with industrial renewals in England. In 1851, the population of Sheffield being a borough was 135.310, after 1893 being a city, its population arrived to 400.000 in 1901 (Hey, 2010).

5.3. First and Second World War Period

Sheffield was an important centre for supplying the England's war machine during the First World War. Sheffield steel was used to make a range of armaments, from bayonets and guns to heavy naval shells, as well as defensive products such as helmets and armour plate. Sheffield's steel companies experienced major growth during the war resulting in a significant increase in the industrial labour force. By 1915 over 5.000 women were employed at Thomas Firth and Son's National Projectile Factory at Templeborough. (Firth's produced over 4 million shells and 2 million steel helmets). Hadfield's had a workforce of over 15,000 by the time the war ended and was Sheffield's largest employer. New lodgings were built in the manufacturing areas to accommodate the influx of workers - huts on Tyler Street, Petre Street and at Tinsley were built in 1916 for the Ministry of Munitions [12].

By the beginning of the First World War, in spite of the steady expansion of the light steel trades, the heavy steel traders dominated industry in Sheffield. While its sister industry had expanded slowly and unevenly, the heavy steel industry had gone forward by leaps and bounds. The industry employed about 40.000 workers in 1914, an increase of 80 per cent since 1891. Between 1891-1911, employment in steel making had increased by 50 per cent and in engineering by more than 80 %. There were 193 firms in the city engaged in refining and manufacturing steel, 41 firms engaged in rolling and forging steel and there were 33 foundries (Jones, 2004). In 1911, the number of people working in heavy industry was 38.379, while the number of people in cutlery and light industry was 34.800 (Pollard, 1959). By 1914, Sheffield had become the world leader for armour, projector and certain alloy steels (Hey *at al*, 1997). When the First World War ended, the demand for the armour and shells etc. ascended, the firms in the city confronted some fiscal problems. After the war in 1921 there were 65.724 workers in heavy industry and there were 40.536 workers in light industry (Pollard, 1959).

The price of steel decreased and unemployment had broken out. In the middle of October 1920 there were less than 6000 unemployed workers in the city but within a week this had more than doubled to 13.000 and a year later the figure had risen to between 40.000 and 50.000. After that date over the next decade there were periods of marked improvement but also major setbacks and between May and September 1932 unemployment in the city was between 60.000 and 70.000 out of a total workforce of 171.000 a staggering figure of between 35 and 41 per cent. It has been estimated that employment in Sheffield's heavy trades decreased from 66.000 in 1921 to 47.000 in 1931- a fall of nearly 29 per cent. But technical change went on in this period of recession and depression. The electric arc furnace, which had been introduced just before the outbreak of the First World War became increasingly important in the production of special steels, output from electric arc furnaces rising from 55.000 tons of ingots and castings in 1920 to 221.000 tons in 1939, more than three-quarters of total British electric arc production (Jones, 2004).

Through the crises years, firms had come together to prevent increasing stress on the steel producers. In 1928 Vickers and Cammels amalgamated to form English Steel Company (ESC). In 1930 Firths and Browns amalgamated to form Firth-Browns and in 1934 further amalgamations of Firth Vickers Stainless with ESC created the English Steel Corporation. In this period, the steel firms in North America and in Europe closed the gaps in technological developments and in steel production and they had become forward in heavy trades market. In the years leading up to the start of Second World War, the industry was reinvigorated and output reached new heights. By 1939 Firth-Browns were melting 145.000 tons of liquid steel compared with 79.000 tons in 1934 (Machan, 2010).

During Second World War, Sheffield became geared to supply the Army, Navy and Air Force. Parts for all the tanks, Churchills, Valentines, Cromwells, Centaurs and Shermans, in use by the Allies were also produced by the English Steel Corporation in Sheffield. HMS Sheffield was launched on 23 July 1936. The cruiser had a displacement of 9.025 tons, was 591 feet in length and was armed with heavy guns. Because of the many fittings of Sheffield stainless steel, the cruiser was known throughout the Navy as the Shiny Sheff (Vickers, 1987).

The steel industry was in full production during the 1950s. By the end of the decade, United Steel's profits rose from 9 million Pounds in 1954 to 23 million Pounds in 1960. In the late 1950s, the English Steel Corporation regularly achieved profits of 4-5 million Pounds. Firth-Brown trading profits increased from 586.173 Pounds in 1949 to 2.2 million Pounds in 1960 (Hey, 2010). In 1954 in Sheffield,

100 % of hot-rolled strip, 97,2 % of tyres, wheels and axles, 95 % of rods and bars in coil, 95 % of tool and magnet and 88,3% of high-speed steel as percentage of the U.K were produced (Linton, 1956).

In the immediate post-war period stretching into the 1950s and 1960s, Sheffield's heavy steel and engineering industry remained in full production, profits were large and there were even labour shortages (Jones, 2004) and for the first time attracted large numbers of workers from overseas, particularly people who had been born in East or West Pakistan (Hey *at al*, 1997). The period also saw the giant combines nationalized by the Labour Government in 1949, de-nationalised by the Conservatives between 1953 and 1955 and re-nationalised by Labour in 1967 (Jones, 2004).

5.4. 1970's

Until the 1970s, Sheffield had boasted virtually full employment, with unemployment rates consistently below the national average. The global oil shock of 1974 and the increasing globalization of trade and manufacturing dealt a major blow to British industry and Sheffield was among the cities hardest hit. Its status as a centre for primary production with an economy which was heavily reliant on its manufacturing sector, left it highly vulnerable in the face of industrial decline. The steel crisis was a recession in the global steel market during the 1970s recession, following the end of the post-World War II economic boom and the 1973 oil crisis. During the 1970s, Britain suffered a long running period of relative economic malaise, dogged by severe inflation, strikes and union power as well as inflation, with neither the Conservative government of 1970-1974 nor the Labour government which succeeded it being able to halt the country's economic decline. The Sheffield City Council thus made a commitment to addressing the deep economic problems of the city through a generous spending regime, which was to continue until the mid-1980s [12].

Until the 1970s, Sheffield had boasted virtually full employment, with unemployment rates consistently below the national average. The global oil shock of 1973 and the increasing globalization of trade and manufacturing dealt a major blow to British industry and Sheffield was among the cities hardest hit. Sheffield's large steel firms failed to adapt to the changing economic landscape during the 1970s as the country began to deindustrialize (Power *at al,* 2010).

In 1979, Sheffield's manufacturing base began to shrink drastically Both the British Steel Corporation and the private firms faced serious difficulties from foreign competition and the shrinking home market in engineering. By the later 1970s, Sheffield no longer produced as much alloy steel as did countries as diverse as Brazil, Italy, Spain and Sweden (Hey, 2010).

5.5. 1980's and after

The early 1980s recession tore through the fabric of the Lower Don Valley-Sheffield's industrial zone-like a whirlwind, destroying jobs factories and Sheffield's sense of pride in the achievements of its heartland. Sheffield had too many jobs tied to just one industry, metals manufacture. So factory closures followed one another in rapid succession. Between 1975 and 1988 the Valley, where the factories were, suffered a reduction in employment from 40.000 to 13.000 jobs. By 1988 fewer than 300 residents remained and 40 % of all the available industry land was vacant, derelict or underused (Hey *at al*, 1997).

Factory closures in Sheffield, which had begun in the late 1970s, accelerated through the 1980s, with the unemployment rate exceeding the national average for the first time in 1981, rising from 4 % in 1978 to 11 % in 1981. By 1984, unemployment had soared to 16 %, and the manufacturing industry that had employed almost 50 per cent of the city's workforce in 1971 now employed just 24 % (Power *at al*, 2010).

In spite of a bitter national strike in 1981, large plant after large plant was closed and eventually swept away. John Brown's Atlas Works opened in 1857 was closed in 1983 and Hadfield's massive East Hecla Works opened in 1898 was closed in the same year. The city was in shock and the lower Don Valley was badly in need of economic and environmental regeneration (Jones, 2004).

In 1983, Firth Brown amalgamated with the River Don Works to form the private sector company, Sheffield Forgemasters, employing a workforce of 6,500. Within three years and despite an annual turnover of £100m, the company recorded losses of approximately £20m per annum. With British Steel due for privatization in 1987, Sheffield Forgemasters' management agreed a management buy-out. In 1998 the company was sold in two parts to USA buyers - the aerospace business to Allegheny Teledyne, and the River Don and Rolls businesses to Atchison Castings [13].

By the mid-1990s, the work force had fallen below 10.000. About two-thirds of the total registered unemployment in the Sheffield district came from the loss of jobs in the steelworks. The majority of the local labour-force were no longer employed in either the "heavy" or the "light" trades. A long era in the history of the city was coming to a close (Hey, 2010:289). In 1970, 45.000 people were working in the steel and cutlery industries in Sheffield. By the mid-1980s the number had fallen 12.000 and in 2001 there are fewer than 8.000 steel and cutlery workers (Howse, 2011.

By the early 1990s, indeed, the whole employment structure of Sheffield and South Yorkshire had experienced a profound and very sudden transformation. In Sheffield itself, for example, the "City of Steel", the vast majority of the 235.000 people in employment in 1993 was actually employed in shops, hospitals, offices, education and recreation. The three largest employers in the city were the City Council, the health authority, and the two universities (Taylor *at al*. 1996).

By the 1990s the co-operation between the City Council, the Sheffield Development Corporation and the Chamber of Commerce had been extended to include other institutions, such as the two universities, in a body known as the City Liaison Group to regenerate Sheffield's economy. Towards the end of 1994, a strategy for the future of the city centre was agreed by the City Liaison Group. Between 1990 and 1996 at least £300 million was invested in the city centre, and another £200 million was projected for further developments by the end of the century (Hey, 2010).

6. CONCLUSION

England was the country which industrial revolution started. The most important tool of technological improvements with the revolution is iron-steel sector. Iron-made products were an indispensable part of production, transportation and armament industries have become impulsive force for countries to constantly increase their production capacity. Sheffield's economy had been based on steel, cutlery, engineering and tool-making industries, for which the city had gained a world-wide reputation. The steel industry collapsed in the early 1980s and Sheffield City Council was one of the first in the UK to turn to the cultural industries as an alternative source of employment creation and urban regeneration. Constantly decreased production capacity of steel has decreased considerably nowadays.

The history of production of iron-steel in Turkey is very new compared to England and the industry is still growing. The first integrated iron and steel factory constructed in Karabük in 1937 and began to produce in 1939. However, the steel production capacity in Turkey is increasing every year and it is estimated that the increase will continue in the future. Therefore, England which entered the stage of early industrialization will be a role model to Turkey with the terms of industrialization, urbanization and social aspects. Sheffield has developed and experienced urbanization process with the rapid increase in production of iron-steel. Especially in the last two decades, various projects were embodied to increase the quality of life in the city and to enable citizens live in a more comfortable way in the social aspects by local administrations.

On the other hand, planned urbanization couldn't come into existence in Karabük in the first period of iron-steel industry. So irregular urbanization was experienced and projects aiming to increase the quality of living in the city are not enough. The local authorities and non-governmental organizations should come together to prepare a master plan about Urban Regeneration in Karabük. To maintain a strong sense of community further housing schemes should be planned and completed. In addition, new public parks in a walking distance in the city centre must be designed. The busy road that passes through the city centre should be moved and the new projects must be developed for the iron and steel plants in the city centre.

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