

Comparative Urban and Industrial Development, an Integrated Approach: Karabük and Sheffield

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Abstract: *In this study, Karabük and Sheffield, where iron and steel industry was established and developed, were analyzed. Iron and steel sector played a major role in the urbanization of these two cities. Dating back its settlement history to 13th century, Sheffield where cutting equipment and knife workmanship were developed and Karabük which was a railway station with 13 houses in 1935 became heavy industry centers and as they grew fast, they became famous in the world. In this study, the findings acquired by researching the urbanization and environment related problems in the cities of Karabük and Sheffield which are significant centers of iron and steel industry, are analyzed comparatively. As a result, the index values for Karabük and Sheffield were found as; population index value 108167 and 336, PM index value 77 and 88, motor vehicles index value 116 and 103, solid waste index value 122 and 96, higher education students' index value 2045 and 257.*

Keywords: *Environment, Iron-Steel, Karabük, Sheffield, Urbanization*

I. Introduction

Although cities home to opportunities that facilitate human life in many ways, the viewpoints of the people living in them are in the direction that the negative sides of cities outweigh the benefits. Cities offer education, health, employment, and socio-cultural options more than urban settlements, and have become residential areas where people live far from natural life in more crowded environments in an individual manner.

The urbanization phenomenon, which was first observed with the industrialization process in the world, made cities become attraction centers in terms of social and economic opportunities. The urbanization level in today's developed countries is following a steady progression; however, it is also observed that this level is increasing at a fast pace in developing Asian and South American countries. The population in cities is increasing with each passing day despite the traffic jams, environmental pollution and expensive living conditions. The borders of cities are also expanding at a fast pace, and intra city public transportation has become more important than ever. People generally do not live in city centers, but mostly live in areas that are near to the city centers, and spend most of their time having difficulty in traffic every day.

England is the first country in which the industrial revolution was first experienced. It was the first country which was the pioneer in heavy industry until 1970s in the world. Since Sheffield was the first city where traditional methods were developed in iron and steel production as of 13th Century, it also became the first heavy industry city that reacted first to the technological developments in industrial revolution. Although it was not a harbor city, which is accepted to facilitate the supplying of raw materials, it contributed greatly to the economy of Britain. After England joined European Economic Community, the balance in Iron Curtain Countries changed in iron and steel production, and the production capacity experienced a fast decrease due to the international crises. Today, the iron and steel sectors are increasing fast in developing countries and the market conditions are determined by these countries.

When compared with Britain, Turkey has been introduced with heavy industry extremely later. Heavy industry programs that may be developed with statist policies continued until 1990s because private sector enterprises were inadequate. Karabük is a city where iron and steel sectors were first established and developed. Karabük Iron and Steel Factories (KISF), which were established in 1937, constituted the basis of the heavy industry in Turkey, and opened the way for other heavy industry investments. Karabük was a sub-village settlement, and became a province in 1995, and its population exceeded 100.000. The urbanization process developed extremely fast in Karabük, and this process will continue with an increasing rate with the developing iron and steel production capacity.

Karabük is located in the Western Black Sea Region of Turkey. It is mentioned as the City of the Republic. The reasons for this are its being established after the proclamation of the republic and its being industrialized in those years. The surface area is 1376 km, and the population of the city center is 110.537 according to 2012 data; and the total population of it together with its surroundings is 225.145 [1]. Sheffield, on the other hand, is the most important city of South Yorkshire in England, and located in the middle part of Great Britain. The surface area of the city is 367,94 km² and the total population - together with its rural areas- is 640.720 [2].

II. Urban And Industrial Developments In Karabük

The urban and industrial developments in Karabük have been examined as two periods; the period between 1935 and 1969; and the period after 1960.

2.1. 1935 - 1960 Period

In 1935, the population of Karabük was about 100 people [3]. It increased at a fast pace after the year 1937 with the establishment of Karabük Iron and Steel Factory (KISF). KISF started its production in 1939, and a need for qualified and unqualified employees emerged in the city, which experienced a fast industrialization process. People who looked for job opportunities and better living conditions started to migrate to Karabük firstly from the nearby villages, counties and cities of Karabük, and then from any parts of Turkey. As a result of this, Karabük experienced a fast urbanization process. The population of Karabük was 100 people in 1935, and it became 10.782 in 1945, and 31.483 in 1960 with a fast increase.

The first municipality organization was established on December 2, 1938, in Karabük. A construction plan that would cover the needs of the fast-increasing population was not realized, and no appropriations were assigned for this purpose. On the other hand, KISF established the “Yenisehir Neighborhood” with its houses that had construction plans and central heating for its employees, officers and technical staff. The factory also built the Iron-Steel Hospital, schools, and social facilities, and formed a model settlement. Then, irregular urbanization started in the city with the establishment of bloomeries right in the middle of the city [4]. These new establishments converted the fire dog, which was produced by the Iron-Steel Factory, into construction iron. The bloomeries in the city center were merged to one another with the houses, commercial centers; and the unplanned construction was not prevented in the city. Since there was no place to cover the need of housing in the city center, there appeared new settlements in the hills that surrounded the city center. The number of the houses which were built with cheap materials of poor quality increased much, and slum housing proliferated because of the far distance to health services and due to the insufficient infrastructure where public transportation vehicles could not travel. The establishment of bloomeries in the city -except for the KISF- turned Karabük into a heavy industry center. Small private enterprises dealing with iron and steel among 10 groups that were registered in the Chamber of Commerce, which was established in 1955, had important roles in Karabük. It was written in the report prepared by the Chamber that there were 12 bloomeries in Karabük. The annual capacity of these bloomeries was 100-120 thousand tons [5].

2.2. 1960 and Later

In this period, Housing Construction Cooperatives were established in order to prevent the slum housing in Karabük and to regulate the scattered settlements. The most important of these were the 5000 Houses Project. This project was planned to be completed in three years; however, 3.109 houses could be built in 15 years. The base of the remaining 2.000 houses was laid in 1985 when the 48th establishment anniversary of Karabük was celebrated, and these houses could only be delivered to the owners in 10 years' time [3].

In Karabük, commercial activities have generally intensified on industrial equipment produced by companies in the iron-steel sector, metal goods and machinery equipment, forestry products, ready-made clothing, cement, animal husbandry, and agricultural products. Depending on the historical wealth, the revival in tourism in recent years has had positive influences on the commercial life in Karabük. The number of the companies registered in Industrial Registry in Karabük is 169. It is among the cities whose industry is developing with a rate of 0.2% in total industrial businesses. The year 1995 was an important year for the economy of the city. KISF was constantly having losses in financial terms, and was converted into Karabük Iron Steel Factories Corporation on 13.01.1995. It was transferred to Karabük Iron Steel Factories Corporation (KARDEMIR CO), which had 12.700 partners consisting of the employees of the factory, the people living around, tradesmen, and industrialists [6].

There are 35 facilities in Karabük, which can perform production on hot mill, except for KARDEMIR CO, and the majority of these facilities have modernized their plants because of the increase in capacity. 3.458 employees worked in 1995 in these facilities, while the number of the employees in 2010 regressed to 1645. Round bar (construction), wire drawing, square iron, metal sheet, erasing, wire rod, transmission rod, elevator guide and nails are produced in these facilities, which work on hot mill. In addition, another sub-industry branch in iron and steel sector is the facilities that work on cold mill [6].

The important urban developments in Karabük between 1934 and 2007 are listed in Table 1. The railway crossing in the city (1934), the establishment of Karabük Iron and Steel Factories (1937), and the establishment of the first municipal organization in the city are important developments in terms of urban development. The other developments are given according to years.

Table 1. Urban Developments in Karabük

Urban developments	Year
1. Railroad transportation	
1.1 Ankara-Zonguldak railway passes through Karabük	1934
2. Local Government	
2.1 The Municipality established	1939
2.2 Became a sub-district dependant to town of Safranbolu.	1941
2.3 Became a District dependant to the city of Zonguldak	1953
2. Became the 78 th city of Turkey	1995
3. Iron and Steel Industry	
3.1 The establishment of Karabük Iron and Steel Works (KISF)	1937
3.2 The first production of iron at KISF	1939
3.3 after privatization of KISF, it became KARDEMİR Corp.	1995
4. Electricity: The first Electricity for the county went into service	1944
5. House construction: 1011 houses were built by the KISF	1939-1955
6. Sport: Town's football team first played in Turkish 3rd League	1969
7. Strike: The workers of the KISF first went on strike.	1989
8. University : Karabük University was established	2007

III. Urban And Industrial Developments In Sheffield

Sheffield is known as the city where steel sector was born and prospered in England, and is mentioned as an important trade center. Until 1296, the streets were used as market places in Sheffield [7]. In 13th Century, Sheffield was famous for cutting tools; however, the majority of the people who visited it said that it was a trade city. For this reason, it was the attraction for the surrounding cities and counties, and started to receive migration from surrounding villages and other settlements. For this reason, the population in Sheffield was inclined to increase constantly. The period in which the migration was at the highest level was the 1736-1750 period. In this period, new techniques developed in steel production and led to an increase in the population of the city at a rate of more than 100%. The population was 9.595 in 1735, and it increased to 20.000 in 1750.

Sheffield witnessed the 18th Century as a commercial center. However, a war started in 1794 between France and England; and for this reason, Sheffield also experienced a downsizing in terms of foreign trade. However, the trade with Germany continued during the war years. In 1815, the war with France ended; however, the city lived a downsizing again in economic terms, and the people lived in poverty. The only thing that threatened the city was not the economic problems. Environmental and public health was the other important problems. A traveler who visited Sheffield in 1768 described the city as a very big one with a very big population, extremely filthy and unhealthy; and said that the city was covered with black smoke coming from many iron manufacturing facilities [7]. Cholera epidemic, which started in 1832, was added to the crisis that happened due to the war and the downsizing. 402 people died in Sheffield from cholera in those years. The garbage areas and sewers being in the backyards of the houses increased the epidemic. The average life expectancy in Sheffield was 24 years in this period [8]. A tourist who visited Sheffield narrated his impressions in Sheffield Independent Newspaper released in January 4, 1871 as follows: "The location of the city is extremely beautiful, it is surrounded by many hills, like Rome; however, when I looked at the city from the railway bridge, the scenery was not pleasant. Intense smoke was coming from thousands of chimneys most of which sent flames to the sky, and the Sun was desperately trying to reach the city among these smokes" [9]. In order to prevent air pollution in Sheffield, a commission was established in 1843 with the name "Smoke Prevention". John Roebuck, who represented Sheffield in 1849, gave a parliamentary question in order to prohibit the smoke with the name "Smoke Prohibition Bill". In 1853, Sheffield City Council proclaimed a decision in order to take the air pollution under control [2].

Sheffield was proclaimed as a city with local administration (borough) in 1843. Sheffield was accepted as a province in 1893, and started a planned urbanization process as of this year. The living conditions were improved in the city, which showed an enormous development; and hospitals, churches, schools, parks were built. The Town Hall of Sheffield was opened for service in 1897 [10]. Although there were thousands of houses in the city center belonging to the low-incomers, new and planned settlements intensified in the forests near the hills, and in Nether Edge, Broomhall, Broomhill, Ranmoor and Fulwood [8]. In 1870, land reclamation was performed for parks and recreation areas. Since Sheffield experienced a fast urbanization process, there were no areas that were open to public. Botanic Garden belonged to private sector until 1898, and therefore it was opened for public use after this year. Norfolk Park was opened to public in 1847; however, the possession of it

remained in the Duke of Norfolk until 1909. As of 1900, there were 112-hectare parks and 19-hectare recreation areas in Sheffield, and they were open for public use [10].

In addition to green area arrangements, which are part of planned urbanization, unplanned construction was prevented. A need for more houses emerged in Sheffield with the fast-increasing population. Planned construction and building houses were the responsibility of Health Commission in 1893, and the first work to be done in the same year was intended for preventing unplanned construction and slum housing [11]. The planned works were continued despite the problems experienced with the public during road expansion works and pulling down of some buildings in the center of Sheffield. The first houses were built in 1895 in the areas where the buildings were pulled down. The infrastructure works for the new settlements and the construction of new roads continued and the commission determined the house prices and the amounts of the rents.

In early 20th Century, Sheffield City Council showed a definite attitude to prevent unplanned urbanization and extreme population increase that was observed in the city center. Housing and Town Planning Act made it compulsory to work on the issue in 1909. In late 1912, the Local Administration Board started planned activities in an area of 1850 hectare in addition to the areas that were not developed within the border of the city [10].

War years influenced England and Sheffield at an extremely large scale. Since Sheffield was one of the most important cities that produced weapons and weaponry in England, it was subject to the bombardments of the German Army. After the ceasefire in 1918; however, Sheffield had market problems because it had worked for the army during the war years. American and European rivals completed the technological distance between them and Sheffield during this time. The prices that were applied by America made the export of Sheffield to Germany, France and Russia difficult. These countries started not to purchase any steel products that were produced in Sheffield. After the 1st World War, the population of the city reached nearly half a million people. In 1919, the city center was extremely crowded, and the people of the city had difficulties in terms of bad and unhealthy houses. The City Council conducted a new urban plan and made it start in Sheffield. This plan covered the issues like pulling down the slum houses in the city center, and moving 125.000 people from their then-current places to the areas, where the population was not crowded, with Satellite City projects. The City Council was in the front line in the field of housing as the public sector between the years 1919 and 1940, and 27.000 houses were built in this period [12]. The economic recession in 1921 influenced Sheffield in a negative manner due to the decreasing foreign and domestic demand for steel and steel products produced in Sheffield. Unemployment in this period reached 49.500, and reached its peak value in 1932, and became 58.100 [7].

After the 1st World War, while England was struggling to cope with the negative influences, the 2nd World War started in 1939. The state took the control of steel production all over the country. Sheffield was again in the front line in producing military materials for the army in this war as well. For this reason, the German planes attacked the city and caused great damage. On December 12, 1940, German bombardment planes bombed the city at an intense level from 10.38 at night until 2.15 in the morning. 2.906 houses and business places were ruined due to the bombardments which continued on the following days, and 83.413 buildings in total were damaged. 589 people died in these attacks, and 488 people were wounded [7]. The second biggest airborne attack was in December 15. There were great material losses and the number of the human casualties was 668 in total, and the number of the injured was 513 [13]. In 1936, the Public Health Law was enacted. According to the law, the prevention of the air pollution was planned to be performed in Sheffield in 1939-1945 period. However, the intense smoke and air pollution in Sheffield prevented the sight during bombardments; and for this reason, the air pollution control was postponed in Sheffield [2].

After 1952, a planned urbanization started in Sheffield, which was a city of manufacturing; and important steps were taken for clean air and regular traffic system. The pulling down process for the slum houses and the houses which did not have bathrooms in them was started in this period. J. Lewis Womersley was assigned as the city architect in 1953, and the slum houses were pulled down in certain areas. The houses in Park Hill, Woodside, Netherthorpe, Burngreave and Norfolk Park were pulled down, and new houses were built instead of them. New settlement plans were created in Gleadless, Greenhill, Norton and Woodhouse. The dumping grounds in open areas were rehabilitated, the houses that did not comply with construction plan were pulled down, and the roads were expanded. The Brook Hill Site was built in the idle slum area near the university (Hington and Bar, 1965:858). In late 1950s, the construction of 12.500 new houses was completed [7].

Environmental pollution increased in the years when the population increase and the housing works continued. The intense air pollution in Sheffield disturbed the public health in those years. The environmental pollution, which emerged due to the city's being a heavy industry center, and therefore, the prevention measures were at the top priority in the agenda of the City Council. Legal measures were taken to make Sheffield a livable city in terms of air quality. The "Clean Air Commission for the People of Sheffield" was established in 1955 [2]. In 1956, the Clean Air Law was enacted. The testing and sanctions about the smokes coming out of the chimneys in the city were applied under the power of this law, and after the results were obtained, the City

Council defined the city of Sheffield as the cleanest industrial city in Europe [14]. In 1959, it was reported that there was a decrease in the amount of the fly ash in Attercliffe, where the heavy industry was intense when compared with the previous year [10]. The City Council also took measures for the main road traffic that passed through the city center and transferred it to side roads in 1970s and 1980s, and the city center and malls became safer [7].

Since the population reached 577.000 in 1951, the housing projects were started again between the years 1950 and 1960. In Don Valley, where iron and steel sector was intense, the houses that were built near the factories were pulled down [12]. Between 1951 and 1991, 100.900 new houses were built, and more than 55.000 were pulled down. In the same years, the City Council had 90.000 houses, and this number constituted 45% of the housing stock. This rate was a high rate for an industrial city. After the war, small houses that were typical examples of the traditional construction were built in Gleadless Valley, and modern multi-storey houses were built in Park Hill. The biggest success in the city was observed in preventing the industrial air pollution and intense smoke. With the help of the developments observed in steel industry, the coal and fossil-based fuels that were used in the factories as energy sources were replaced with electricity and industrial fuels. The bigger production factories established units that collected the particles and dust, which joined the air. As of 1966, it was claimed that Sheffield was the cleanest industrial city in the world [15]. Planned urbanization works and housing continued between 1950 and 1960. The houses that were located in a few kilometers away from the city center in Lower Don Valley, where heavy industry factories and houses were located together, were pulled down. The area was redesigned as a completely industrial area. Modern buildings were established with reinforced concrete in and near the city center with the control of the City Council, and thus the slum housing was prevented [16].

Until 1970s, Sheffield had high employment rates, and unemployment rate was extremely lower than the national rates. The oil crisis which emerged in 1973, and the increasing competition, together with the globalizing production and trade conditions, influenced the industrial cities, among which Sheffield was also included, in a negative way. The companies, which dealt with steel production in Sheffield, started to go bankrupt because they could not keep pace with the changing commercial and economic conditions, and the rate of unemployment grew fast. In the national economic recession period, Margaret Thatcher, who was the leader of the Conservative Party, won the elections in 1979, and the Government planned the privatization of the big companies that dealt with steel production and coal mining as the first order of business. As a result of this, the number of the factories who closed down in Sheffield grew bigger, and local unemployment rates were over the national rates for the first time in history. This rate was 4% in 1978, and increased to 11% in 1981 [12].

In late 1970s, the problems which emerged with the collapse of steel industry and the depending sectors, were discussed in the City Council. The industrial areas and the deserted buildings in the Valley of Don near the city center were made use of in terms of urban transformation. The urban renewal and investment plans made by the City Council of Sheffield were in conflict with the market-based policies of the new Government. The Thatcher Government increased its audits and limitations over the expenses and investment of local administrations. For this reason, Sheffield City Council established the Department for Employment and Economic Development in 1981. After the crisis, the idle production facilities in the city center, workshops and buildings were converted into Cultural Industries Quarters, and were designed in such a way that would enable the people make use of these areas in social and commercial terms [12]. In early 1988, plans were made on issues like a new shopping center to be established in Meadowhall, which would host the World Student Games in 1991, and opening the Valley of Don, where steel industry was heavily located, after the rehabilitation works [10]. The City Council provided jobs for 21.000 people with the project that had a budget of 250 million Pounds in mid-1980s. This number was five-fold more of the number of the people who worked in private sector in the city [12].

The City Council continued its works together with the other NGOs for the purpose of increasing the livability level of the city. Plans were made to ensure that the buildings that were deserted and therefore were idle in economic and physical terms to offer them to the service of the public. The City Council, Sheffield Development Corporation, Chamber of Commerce, two universities and other relevant institutions came together and formed the City Union Group. Representatives in various topics were determined in this group and plans were made to attract the public investments to Sheffield. At least 300 million Pounds were allocated for the design of the city center between the years 1990 and 1996. The investment budgets made by the Group was as follows; 100 million pounds for Supertram, 72 million pounds for the Universities, 52 million pounds for Ponds Forge, 14 million pounds for Sheaff Heat and Power and 10 million pounds for Transport Interchange [7]. The two universities in the city took active roles in the cultural development and activities in the city [17].

The urban and economic side of the city also developed with the local projects and investments. The 20 companies that were active in Sheffield in 1993 were in the field of steel production and other related industries. The local economy started to show variety with the plans, and new production units were formed.

There were 3200 small companies in Sheffield in 1995 [7]. The investments continued in the areas that were deserted after the collapse of the steel industry in Sheffield. Arena and Valley Centertainment were also included in “Icesheffield”, which were the sub-areas of the Don Valley, and 12.7 million pounds were invested in this area; and 26 million Pounds were invested for English Institute of Sport. In 1994, the City Council developed the “Heart of the City” Project. This project covered the establishment of high-quality working areas and offices, the Millennium Circus, the Art Gallery, and the Winter Garden.

In 2005 Spring, the British Land (the Ministry of Public Works in England) and the City Council allocated a budget of 1 billion Pounds for the master plan to be realized within the following 20 years to ensure a better life in the valley [18]. In April 2007, Sheffield One merged with Creative Sheffield Company, which was established for the purpose of the revival of the city economy. Today, with the elimination of the gap that occurred due to the termination of the steel industry in the city, the relevant employees continue the Sheffield First Partnership (SFP), in which the Creative Sheffield was included [19].

The economy of Sheffield, which depended on production, is developing with the service sector because the heavy industry ended in the city at a great deal. While the rate of the employees who worked in service sector in 1995 was 75,7%; this rate rose to 82,8% in 2006. The labor force in the production sector in the same period was 19,8%; however, today, it has declined to 12% [16]. The social and commercial structure of Sheffield is changing day by day. The city is proceeding in the direction of becoming an art, culture and science center, and the students studying at universities contribute to this formation. The number of the students in the city in the 2011-12 Academic Year was 25.000 at the University of Sheffield, 8.000 of whom were from overseas countries; and 29.500 at the Sheffield Hallam University [20].

The urban development of Sheffield between 1434 and 1991 is given in Table 2 in historical dimension. In this context, a drinking water tank was built in Sheffield in 1434. In 1604, the Free Grammar School started education, and the first doctor started to serve in the city in 1650. In the following years, the important developments may be summarized as follows.

Table 2. Urban Developments in Sheffield

Urban Developments	Year
1. Drinking water	
1.1 Barker's Pool The drinking water reservoir was built.	1434
1.2 The first reservoir to supply water to Sheffield went into service	1712
2. Health	
2.1 The first doctor Thomas Martin gave people health service.	1650
2.2 The first hospital, The General Infirmary was founded.	1797
2.3 The Medical School was founded.	1829
2.4 In July Cholera Epidemic claimed about 1347 lives.	1832
2.5 The Children's Hospital was founded.	1876
3. Transportation	
3.1 Passenger transportation by stage-coaches from Leeds to London and Sheffield had started.	1760
3.2 Railway was built between Sheffield and Rotterham	1838
3.3 The Horse Omnibus started to use.	1838
3.4 The first three-cycle engine cars.	1895
3.5 Electric Tramcar	1899
3.6 The first owned car	1900
3.7 Motor Buses	1913
3.8 The Diesel Bus were used in public transport	1930
3.9 The Bus Station was built.	1936
3.10 Trams that were driven by steam locomotive	1877
4. Parks and Green Areas	
4.1 The Botanical Garden went into service.	1836
4.2 Total park area 687.990 m ²	1893
5. Museums and Libraries	
5.1 The City Museum was opened.	1875
5.2 New City Museum was built.	1937
5.3 The Central Library was built	1856
6. Local Government	
6.1 Sheffield became a Borough.	1843
6.2 Sheffield became a city.	1893
7. Air Pollution	
7.1 Sheffield Council appointed its first Smoke Inspector, William Nicholson.	1890
7.2 Sheffield Citizen's Committee for Clean Air established.	1955

8. Press, publishing, Communication	
8.1 Joseph Gales started publishing his own newspaper in Sheffield.	1787
8.2 BBC started broadcasting.	1923
8.3 The first independent station Radio Hallam went on air.	1974
8.4 The first telephone was started to use.	1879
9. Various	
9.1 Police force can be said to date from 1818 with Improvement Act was passed	1818
9.2 Noise Ban, not to talk loudly in the streets from 9.00 pm to 3.00 am.	1609
9.3 Rice James started the first postal service.	1790
9.4 The Fire Brigade	1807
9. 1347 were killed because of Cholera Epidemic on 5th, July	1832
9.6 The Dale Dyke Dam broke as its reservoir was being filled for the first time. At least 270 people died	1864
9.7 Sanderson Brothers, had been the first steel producing company	1869
9.8 Air Quality Monitorin Station was built.	1883
9.9 Entrepreneur John Tasker installed the first electrical generating plant	1886
9.9 Sheffield United FC was established.	1889
9.10 Sheffield hosted the Universiade, otherwise known as the World Student Games.	1991

IV. Research Methodology

This study is based both on qualitative and quantitative analyses. The changes in the city and its surroundings since the establishment of the iron-steel sector have been examined with the Content Analysis Method. In addition, quantitative analyses have been made for the cities of Sheffield and Karabük with urban and quantitative environmental parameters. For this purpose, the year of establishment of the iron-steel sectors in both cities were calculated in the light of the parameters that were available; when the data were not available, the first year for which data were available, the value was taken as 100, and the index values have been calculated.

For example, the index calculation method for population is as follows:

$$Ep = (It / It-1) * 100 - 100 \quad (1)$$

In this formula;

Ep = Population Index Number,

It = Current Period,

It-1 = The data of the previous period.

V. Analysis of The Study Findings

In this section, the data that were available for Karabük and Sheffield have been examined in a comparative manner in terms of the relevant parameters. The urban and environmental data, which were comparable, are given in relevant sections for both cities.

When Sheffield is compared with Karabük as a residential area, it is observed that it is extremely old. Its name is mentioned as a residential area since the 13th Century, and has shown a fast development with improving commercial activity and the production of iron-steel products. Economic liveliness that contributed to the urban development, and the migration to the city led to the fast increase in population and construction in the city center.

Parallel to these developments, when the local administration structure in Sheffield is compared with that of Karabük, it is observed that the industrial revolution occurred in England earlier, and this led to a fast acceleration in Sheffield in terms of industrialization and urbanization. These developments led to negative results like environmental pollution and unplanned urbanization, and legal sanctions were started to overcome them. With the local administration becoming more active in early 20th Century, the City Council took measures to prevent unplanned urbanization in Sheffield. The unplanned urbanization in Sheffield was prevented with the precautions taken by the City council. A planned urbanization was applied in Sheffield, and environmental pollution was decreased to a least level with the developments in infrastructure services. The narrowing in the iron-steel sector in England in 1970s and the decreasing employment caused that Sheffield was converted into a university city where service sector was developing from a heavy industry city. Today, with the works conducted by the City Council, Sheffield has become a city of modern culture and art with the rehabilitation of the buildings and areas where heavy industry facilities were established before.

5.1. Air Pollution

The air pollution in Karabük occurs generally due to the emissions of the industrial institutions being released into the atmosphere without adequate precautions, the particles, smoke, fumes, sulphur, nitrogen, oxides, hydrocarbons, the exhaust gasses from the transportation vehicles being released to the atmosphere, and the dust of the roads and open areas due to the movements of the vehicles on the roads. Another factor in air pollution is the topographic structure of the city. Atmospheric dispersion cannot occur due to the mountains surrounding the city, and due to the bowl-like structure of the city, and this causes air pollution at a high level especially during winter and in evening hours [21]. The biggest reasons of the air pollution in Karabük are the fuels of poor quality used in industry and heating, the exhaust gasses stemming from engines of the vehicles, and other industrial pollutants (R.T, 2013). The Particle Matter (PM) Concentration Index for Karabük and Sheffield are shown in a comparative style in Fig. 1. The PN Concentration Index was 77 in Sheffield when 2007 value is accepted as 100; however, it was 88 in Karabük. In this context, Sheffield was more successful in reducing the PN concentration in the air in 2007-2010 period.

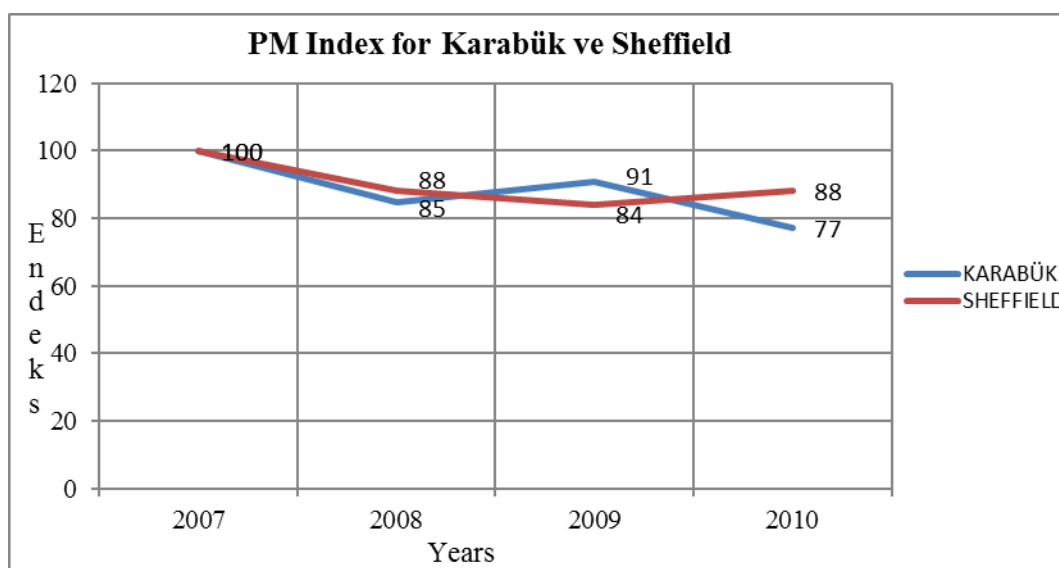


Figure 1. The Particle Matter (PM) Index for Karabük and Sheffield. Source: [1,2].

5.2. Solid Wastes

20% of the total amount of the wastes in the city of Karabük consists of package wastes. The data received from the solid waste characterization works in the city center of Karabük are classified as follows with an error rate of 1%.

- 1- Waste Amount in Winter Months: 96.142 kg/day
- 2- Waste Amount in Summer Months: 85.000 kg/day

In 2007, the amount of the medical wastes in Karabük was 210.743 kg. This amount decreased to 206.353 kg in 2011. The area where wastes are collected belongs to the Karabük Municipality, and this area is 5 km far to the city center and 2 km far from the nearest settlement. There is only one waste deposit area, and the wastes are stored in a disorganized manner [21]. As it is observed in Fig. 2, the solid waste amounts have been calculated for Karabük and Sheffield for the years 2001-2011 for which data are available. The solid waste index of Sheffield followed a horizontal progression and was 99; and this index showed an increase for Karabük and became 122.

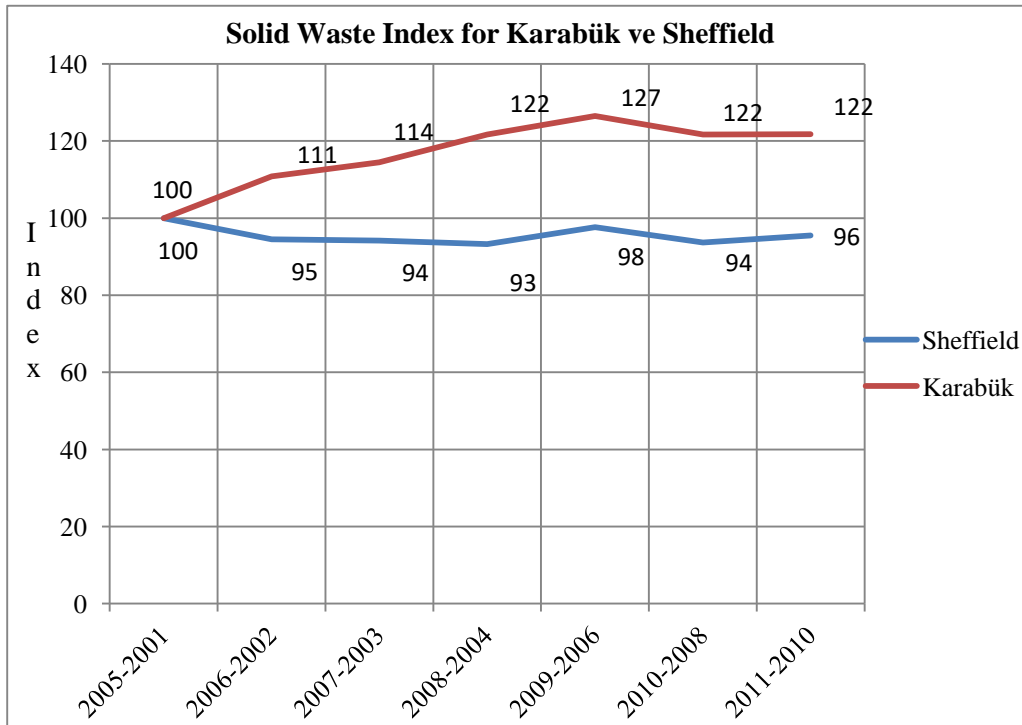


Figure 2. Solid Waste Index for Karabük and Sheffield by Years.

5.3. Population

The cities of Karabük and Sheffield are two cities that have experienced urbanization process with the influence of industrialization. There were fast population increases in both cities due to increasing migration waves. The population index is given in Fig. 3. The index value of the increasing population, which showed a steady increase since 1937 when KISF was established, was 110537 for the year 2012. The index number being so high stems from the fact that the population of Karabük, which was no more than a village in those times, was only 100 people in 1937 when KISF was established.

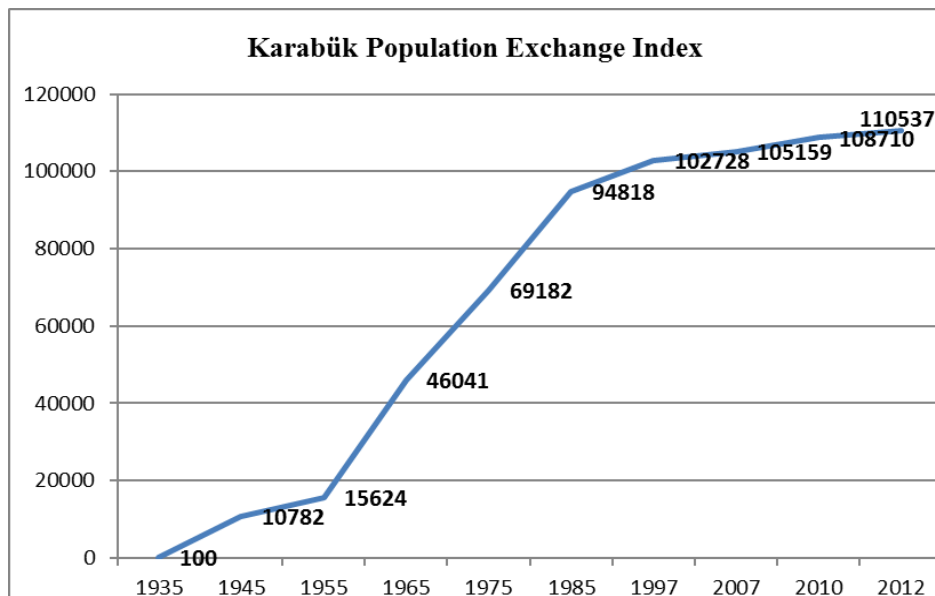


Figure 3. The Population Exchange Index for Karabük Source: [1,3]

As observed in Fig. 4, the population has increased in Sheffield since the year 1851 when iron-steel industry was established; and the population index value was 336 for the year 2011. The lower index value of Sheffield when compared with Karabük may be explained with the Sheffield's being an important settlement before 1851 as well.

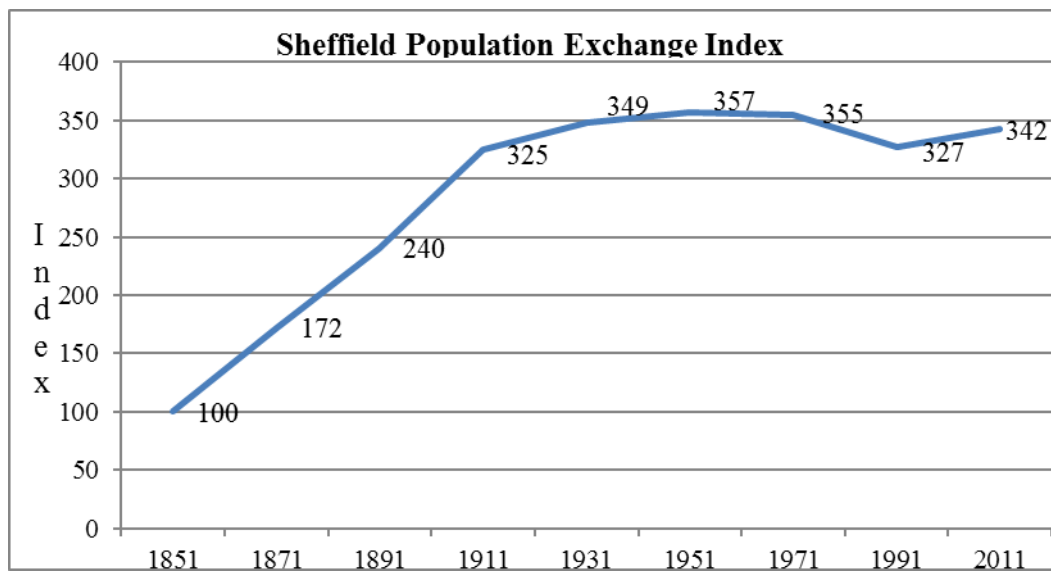


Figure 4. The Population Exchange Index for Sheffield. Source: [1]

5.4. The Number of the Vehicles

The number of the motor vehicles in Karabük increased; whereas, this number is not inclined to increase in Sheffield. As it is observed in Figure 5, the motor vehicle index has been formed for Karabük and Sheffield for the years 2008 and 2011. Because of the increasing number of vehicles in Karabük, the index value was 116 for the year 2011, and this index value for Sheffield was 103 as a result of a horizontal progression.

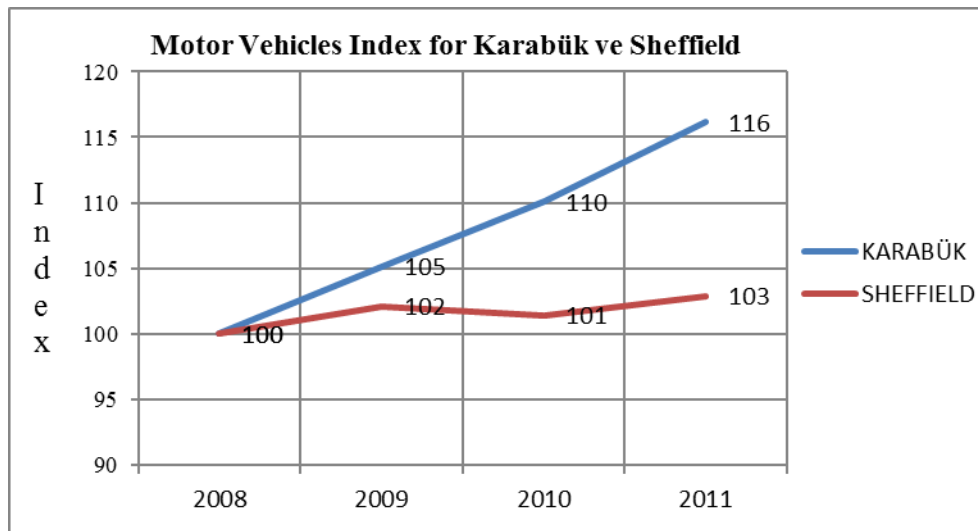


Figure 5. Motor Vehicles Index for Karabük and Sheffield (2008-2011) Source:[1]

5.5. Employment

The Participation to Labor Force for Karabük was 53,5% in 2009; and it was 51,4% in 2010 with a decrease of 2,1 points. The Participation to Labor Force in 2009 and 2010 was observed as being over the average values of Turkey. The employment rate became 45,5% in 2010, whereas it was 49,0% in 2009 with a decrease of 3,5 points. The employment rate was observed as being over the average values of Turkey for 2009 and 2010. In addition, the Unemployment Rate in 2009 was 8,4; however, in 2010 it became 11,5 with an increase of 3,1 points. The unemployment rate in Karabük was observed to be below the unemployment rate of the whole country both for 2009 and for 2010. In 2011, the employment rate in Karabük was 37,3%, and the unemployment rate was 8,6% [22].

In Sheffield, on the other hand, the rate of employment is inclined to decrease. While the rate of employment for the 16-64 age group was 69,1% for the period between July 2008 and June 2009; it regressed to 67,9% for the July 2012 - June 2013 period.

VI. Conclusion

The urbanization process, which started with the industrialization, showed its influences in the whole world as of 19th Century. As the industrial cities' populations grew, the need for well-planned cities grew too. When this process is compared between the urban areas and rural areas, it is observed that this process has led to a fast conversion of the industrialized centers into settlements, since there is a more comfortable life; and thus, a lifestyle which was preferred by societies emerged. In recent years, the urbanization process is in progress mostly in developing countries with an increasing speed. People, who made a living with agriculture and animal husbandry before, started to migrate to the cities, which were converted into economic and socio-cultural attraction centers with the emergence of agricultural machinery which required less human labor force. As a result, the cities have become attraction centers due to the opportunities they provide to people.

Sheffield was the leading steel producing city both in the UK and in the world in 1960s and 1970s. But the political, economic changes and technological developments throughout the world designated the old industrial city into a newer form of a modern city in 1980s. Hence, urban and economic regeneration schemes were started in the late 1980s and 1990s by the local government. Today, since the developing countries are the greatest iron and steel producing countries in the world, Karabük still struggles to increase its capacity to keep up with the developments and to cope with stiff competition. From an urban point of view, the profound effects of the iron and steel industry in the city still goes on and the experiences that Sheffield had through its industrial background might shed light to Karabük's urban, economic and social future.

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