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INDUSTRIAL REVOLUTION IN THE TERRITORY OF RECENT SLOVAKIA AND KOŠICE

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Abstract: *Industrialisation as the period of social and economic change that transforms a society from an agrarian society into an industrial society started In Hungary later than in the west countries. At the turn of the 19th and 20th centuries, Hungary in order to accelerate this process used protection economic policy for industrial acceleration based on specific legislative measures, so-called industrial laws. The benefits of subsidy policy legislative attracted investments for domestic and foreign capital, which allowed the implementation of technical inventions and technologies of the first and incoming second industrial revolution. The result was the development of a modern infrastructure, mainly railways, the application of steam machines, the enforcement of factory machine production and mechanization. This development also affected the territory of today's Slovakia as the part of Hungary. For Slovakia, technical progress in the production activities typical of its territory and its raw material base was of particular importance. In addition to mining, metallurgy or wood processing, it was, food production or production of paper. Paper is dedicated to students of technology and everyone who has interest for the history of mining engineering in context of Central Europe.*

Keywords: History of science and technology**,** History of Hungary/Slovakia, Industrial revolution, Industrialisation.

1 INTRODUCTION

Modernization effort of the Habsburg state to transform the economy with the result to reduce difference in development between itself and the ideal, target west countries (in this case, not only England but also those countries, which were successfully in economy development). Hungary arrived at the threshold of modern industrialization at a relatively low level of economy development, behind those western and central European countries where the Industrial Revolution [1, 2] began at the end of the 18th or the first half of the 19th centuries. In the 19th century, the development of a modern and competitive manufacturing infrastructure required a relatively developed economic infrastructure (an extensive railway network, functional trade and bank system; significant entrepreneurial expertise and scientific and technical knowledge, sufficient workforce and last but not least, capital investment.

Although industrial revolution in Hungary on snap-through 19th and 20th century fall behind industrial countries, Hungarian government cannot fasten systematic support of foundation and development industry following package of legislative steps. [3]

Activities of Hungarian government circles in cited area are known under general marking as Hungarian industrialize politics (legislation approved in successive steps be in years 1881, 1890 and 1907, which supported coming of foreign capital). Austrian, French, English and German capital came to Hungary. In Slovakia, the greatest influence had Hungarian capital. [4] Period legislative and subsequent steps on accelerating of industrialization of country corresponds by period culminating of industrial revolution and formation so called second industrial revolution.

The revolution in industry has called for a revolution in transport, as old forms of transport were not enough to meet the new demands of production and the market. Practically in second half of 19th century that was only type of transport of raw materials and finished products. While plan of railway networks construction approved Hungarian parliament still in 30th years, building-up started by horse train first and next first rail with steam traction they put into operation till year 1848 (from Vienna to Bratislava with a connection to the Northern Railway line of Emperor Ferdinand). More technological changes came with political changes in 60th years of 19th century after great military defeat of monarchy, which culminate into Austro-Hungarian Compromise of 1867. It came fast development of economy, industry, railways and telegraphic networks and modern agriculture.

In the 60s and 70s of the 19th century, the Hungarian railways began to feed on the European rail network. The Košice - Bohumín Railroad was connected to the western railways (368 km, under construction 1869-1872) and it contributed to the formation of new industrial centres such as Žilina, Ružomberok, Liptovský Mikuláš and Poprad. Central Slovakia was connected by new the railway network via Pest - Šalgótarján - Lučenec - Zvolen - Vrútky, called “Uhorská severná dráha” (1867-1872), (Hungary Northern railway). Tisza Railway (Tiská železnica) operated the eastern part of Hungary with a branched railway network, which included the rail to the Košice (1871). Connection with Galicia and Przemyśl was realised by the eastern route when the Prešov - Tarnov railway was opened in 1876. [5]

The building of an extensive railway system in Austria-Hungary, similar in characteristics to western

European models, would not have been possible without foreign investment. Traditional internal sources of capital were insufficient to satisfy demand. Hungary, as part of the Habsburg Empire, later part of Austria-Hungary, was the target of a large volume of foreign investment since the beginning of the 19th century.

2 CONTEXT OF THE DEVELOPMENT OF INDUSTRIAL PRODUCTION IN THE SLOVAK PART OF THE MONARCHY

In Hungary, the industrial revolution began in those industrial sectors which offered comparative advantages due to plentiful, accessible raw materials and demand from more developed countries assured wide markets, which, in turn, attracted foreign and local capital in the hopes of certain and large profits.

So the food industries were primarily, which played the leading role in modern industrialization. The leading sector of food industry was flour milling, which retained its primary position after the 1860s, when Hungary exported more flour than all the other countries of Europe combined. In short, the high thanks the availability of local and Romanian wheat. [6]

Second significant role played the processing of noble and polymetallic ores in Gemer and Spiš. The most employed were in the clothing and food industry; at the least in chemical in that time. Gradually in last the last third of 19th factories of the processing industry - food, wood, paper, leather, textile and clothing industry - have went to industrial production.

Fig. 1 Graf Emanuel Andrássy built steel mill Etelka in 1867 in Nižná Slaná, even in 1877 he modernized the plant by construction of the power station. Photo of 1915.

As first in the last third of the 18th century, textile manufactories moved to machine factory production, which led to the industrial revolution and so the first industrial sector was born. Several textile manufactories were already working in Slovakia at that time too. The largest one was founded in 1736 by the husband of Maria Theresa Francis I Lorraine in Šaštín. Factory made cotton cloths. At the same time, the first wool processing factories were created. Large-scale machinery has been gradually expanding in other textile production sectors since the 70ties of 19th century. The International Mautner Group began production in 1894 in the new industrial plant for woolen and textile wear in Ružomberok. Two other key cotton factories, the Hungarian threads factory and the cotton spinning mill Danubius owned English capital, started production in 1902 and 1907. The strong rise of the textile industry was, besides domestic sources, also the result of the support of the Hungarian government.

Two centres of industry have developed in Hungary: around of the capital and in Slovak territory. From the 1870s was the age of the Hungarian industrial revolution, the benefits of witch were mainly concentrated in Budapest. The city attracted the majority of newly-founded banks, business associations and industrial enterprises. The city's growth was closely linked to the expansion of industry. In the territory of Slovakia there were companies of the heavy industry and they were mainly mines for coloured ores and coinage metals, but since the late 19th century thanks to cheaper Chilean copper and cheaper South African gold, Slovak mining slowed down. The emphasis was on iron mining - 1852 was founded in Rimavské Brezovo by "Gemerská rimamurárska železiarská spoločnosť" and in 1889 iron mill Krompachy, later iron mill in Podbrezová. Although the first atmospheric steam engine installed on the territory of Slovakia by the English designer Isaac Potter was put into operation in 1724, the first steam engine was put into operation only in 1832 in the souvenir factory in Galicia near of Lučenec - it was the first steam engine in production in Hungary. [7]

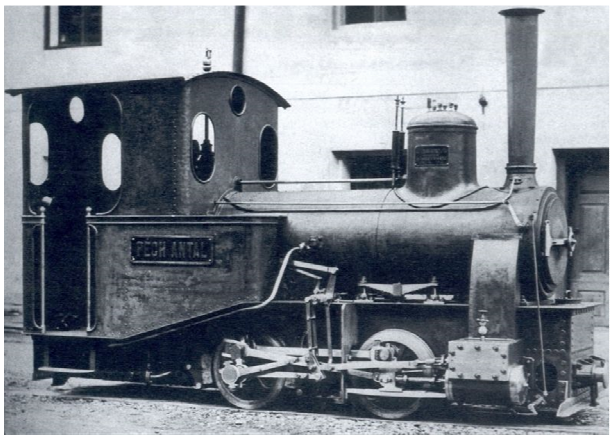

Fig. 2 On September 25, 1879, Kachelmann company built the first steam locomotive "Péch Antal" (named after an important pioneer in mining and metallurgy from Banská Bystrica and later also a member of the Hungarian Parliament) for the narrow-gauge railway between Podbrezová and Hronec. By 1883, for the state ironworks in Hronec, two similarly identical machines were built in the Kachelmann factory. The machines have not been preserved until today, this first produced locomotive was canceled in 1950.

In Slovakia was the dominant sector of iron production, using a rich supply of mineral raw materials. An important location in this regard was the region of Hronec, where there was a significant

concentration of the scattered iron production plants, later concentrated to plant in Podbrezová. The increasing production of this metallurgical complex has forced to improve the way of transport, reliant on low-performance horse carriages and rafts. The solution was to build a narrow-gauge railway. The headquarters of the State Ironworks in Hronec decided to build it in 1878, immediately started construction of the Podbrezová rail to Hronec and in half of 1878, the tender procedure for the purchase of the necessary locomotives began. In addition to renowned European locomotives, Karl Kachelmann & son was also asked to submit a tender. Though this company has not built up a steam locomotion anytime, it has been recommended by a good reputation, built since 1819 by the successful construction of steam boilers, pumping watercraft machines and other mining equipment. In addition, it was probably the usual effort to promote the development of Hungarian industrial enterprises (for example, through the award of public contracts), which caused the company to acquire the order.

However, the first steam locomotives on Slovak railways came from foreign manufacturers of locomotives (Wiener Neustädter Lokomotivfabrik, Maschinenbau-Gesellschaft Karlsruhe).

Besides mining, metallurgy or woodworking, on local raw material base, was based development of the production of paper, some building materials and more food productions. In papermaking, a historical breakthrough was made by the use of pulpwood treated as a raw material for paper production instead of old cloths used until half 19th century. Another step in improving cellulosic technology was the discovery of sulphite cellulose.

The importance of cellulose has grown in the following years, when it began to use the largest contemporary paper mills, such as Harmanci or Slavošovce.

Fig. 3 The furniture company was founded in 1874 by Harnisch et al. in Banská Bystrica, which produced bent furniture.

In the area of furniture production, it is worth mentioning the factory for bentwood furniture, which Michael Thonet founded in 1869 as one of his factories in Veľké Uherce, where the surrounding forests provided enough wood to produce of furniture. Bentwood furniture Thonet has become an icon of industrial design.

3 INDUSTRY IN THE SECOND HALF OF THE 19th CENTURY

In the 60s of the 19th century, the Industrial Revolution culminated in all in economically developed countries with all the characteristic marks of mass production: steam propulsion, propulsion in light industry, mining, metallurgy and the formation of new branch - mechanical engineering, the development of steam rail transport and water transport.

Industrialization had influence in the development of trade, banking, mechanization and agrotechnical methods in agriculture. The industrial revolution in the most economically developed countries subsequently caused changes in other areas of society and it had fundamental influence to the structure of society.

In the second half of the 19th century, the technological development in the all world has been booming on the basis of the modern knowledge of natural sciences. New technical inventions of revolutionary importance have emerged almost in all production activities. The technical progress of metallurgy (Bessemer and later Thomas converter and Siemens-Martin furnace) had significant influence to increasing of production and quality changes in mechanical engineering together. Improving of rolled sheet production and rails had essential influence to development of rail and water transportation.

Applied chemical research, particularly in inorganic chemistry, has led to the emergence of a completely new manufacturing industry - the chemical industry (synthetic colourings, industrial fertilizers, explosives, pharmaceuticals and new processes for the production of sulfuric acid, nitric acid, chlorine, ammonia and other chemicals). [8]

Fig. 4 Dynamit Nobel AG was a German chemical and weapons company founded in 1865 by Alfred Nobel. One of plants was situated in Bratislava.

Besides the inorganic chemical industry, the petrochemical industry was another important sector in our territory. The beginnings of industrial oil processing in the Austro-Hungarian Empire date back to the second half of the 19th century, with developments similar to developments in the world. The largest oil refineries in the monarchy (Bratislava, Pardubice, Kolin, Ostrava) first manufactured only kerosene, petrol, paraffin and lubricating oils and paint

thinners. The use of light gas for lighting has been of prime importance.

The first small refineries, where oil was processed, originated in the east of Slovakia in the end of 19th century. Regional significance was gained by the refinery in Strážske, which since 1894 has been processing oil to petroleum oil and later producing in limited quantities both petrol, lubricants and asphalt board.

The beginnings of oil processing and the development of the petrochemical industry in greater extent are linked directly with the mineral oil refinery in Apollo in Bratislava. A major chemical enterprise for the monarchy weapons industry was multinational chemical concern Dynamit-Nobel established in Bratislava.

Formation of the Second Industrial Revolution indicated the results of research in the field of electrical engineering (electromotor, electric generator or electric bulb). Therefore development of the production and use of turbines occurred.

The progress of the second industrial revolution was closely related to the further expansion of power production [9]. A substantial part of the power plants was still concentrated in new or upgraded industrial plants, where electric drive was already dominated or at least it has a significant share. However, the electricity production and transmission sector itself lagged far behind the most advanced world. Whereas in western Europe and the Austrian part of the monarchy the electrification in the early 20th century was in the higher regional phase, in Hungary the electrification process until 1918 was at an early stage of a local character. All the countryside therefore remained without electrification.

Power stations started to be built in Slovakia in the last decade of the 19th century. In eastern Slovakia, the first power station built the town of Gelnica (1892, first in the territory of present Slovakia supplying electricity to the public network), after it Kežmarok, Spišská Nová Ves, Prešov and Košice. In 1889, the first water power plant with a power of 22 kW was started in Krompachy. The branch office of the Helios Helios in Žilina (1893) produced telephones, electric signalling devices, dynamos and electric motors. One of the main chapters of the history of the construction and building materials industry from the 60s to the 80s of 19th century was the technological development of modern building material – cement. So-called Roman cement was replaced by Portland cement with a higher strength. Cement concrete, which together with steel created the foundations for the new construction branch, reinforced concrete structures, which became more prevalent in the 20th century.

In 1889 the construction of the first cement plant on the territory of Slovakia for the production of Portland cement in Ladce was started.

The development of the sugar industry in the second half of the 19th century supported the development of machinery and the use of steam engines (the output of steam machines in the sugar industry accounted for 40% of the total installed capacity). [10]

Technical education had to respond to the development of technology and industrial production. In addition to the Mining and Forestry Academy in Banská Štiavnica, 1872 [11] was founded the Higher Mechanical Industry School in Košice, 1872 [12], Hungarian Royal Entrepreneurial Academy in Košice [13], 1875 and in 1900 two-year Electrotechnical School in Bratislava.

Fig. 5 Building of the Higher Mechanical Industry School in Košice.

4 INDUSTRY IN KOŠICE IN THE SECOND HALF OF THE 19TH CENTURY

Although Košice were rich and powerful town in the middle ages, they entered the 19th century as a small rural town inhabited by around 6000 inhabitants. The first craft factory for the production of hats was established in 1781. Later were added craft factories for the production of earthenware and cloths. In the beginning of 19th century 460 craftsmen worked. In the 40's, the first small factories - the factory of nails and the sugar factory - were created. Until the 1848-49 revolution larger factories emerged, the yeast factory a mill on the flour, and the state-owned tobacco factory. Later the foundations of modern brewing and malting were laid.

Fig. 6 The Karol Poledniak Factory was the oldest factory for engineering manufacturing in Košice. Already in 1902 the factory was electrified.

To support the local industry, in 1857, the First Upper Hungary Industry Exhibition was organized in the area of the city's riding hall. Franz Joseph I was also participated at the occasion of his visit to Kosice. In spite of the rising industrialization, Košice did not attract for larger investments of heavy machinery and armaments, whose centre became Miskolc that was closer to the capitol.

The development of mechanical engineering is connected with the Karol Poledniak manufacturing company, which was founded in 1886 as a machine-building company dealing with the repair of weights and agricultural machinery. [14]

In November 1856, the first telegram (from Pest) came to Košice and in July 1867 the first cable from New York. July 5, 1860, on the eleventh afternoon, the first train arrived in the city.

Fig. 7 Košice railway station, from 1871. During the years 1859-1860 Tisza Railway Company built a line connecting Košice with the Hungarian Miskolc.

After the crisis in the early 1970s, the Franck coffee shop, which covered almost all consumption in Hungary and part of it was also on the foreign market, was put into operation. More than 300 workers worked for coffee making.

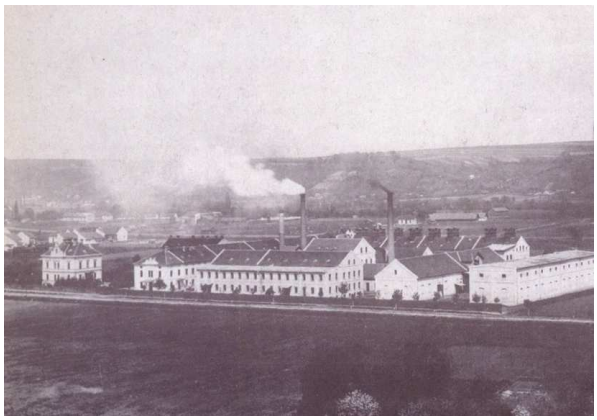

Fig. 8 Franck's factory in Košice. The headquarters of H. Franck and the sons were based in Linz, Austria. The factory produced substitutes for classic coffee beans – chicory (known as Melta).

In 1896, the "Augsburg Gas Company" built a small steam power plant with a steam engine in Košice. After 1919, after the establishment of commercial power plants, the foundations of electrification were laid.

Local development also was supported by large-scale investments in the construction of private, state-owned buildings and cultural institutions. Thus, in a relatively short time at the turn of the centuries, a number of important buildings was built in Košice, which changed the city's image: the Grandhotel Schalkház (1870-1872), the Iron Bridge over the Mill Channel (1885), the reconstruction of the Bishop's Office (1893), building of railway station (1896), the Museum (1898), the theatre building (1899), the Andrássy Palace (1899), the Jakab Palace (1899), the Military Command Building (1906-1908) and last but not least, many other smaller buildings. The reconstruction of the House of the Holy Alsace in 1877-1896 was also significant.

5 CONCLUSION

In the second half of the 19th century, on the territory of Hungary begins a period in which industrial activity in the economy plays a more important role instead of agriculture. Despite the development of industrial production in the last quarter of the 19th century, the territory of today's Slovakia was predominantly agricultural. Population engaged in agriculture was 61% of all population in Slovakia.

Hungary, as a predominantly agrarian country in all characteristics of the industrial revolution was late until the 60ties years of 19th century. In the territory of Slovakia, mining and metallurgical companies the first steam engines gradually introduced by since the beginning of the 19th century, but this progress was relatively slow. For comparison in the Czech lands, the number and power of steam engines was about 5 times higher.

The most important industrial regions of the 19th century Hungarian Kingdom were Budapest with its surroundings, the territory of Slovakia, and Transylvania. However, the industrial growth of the Slovak territory was faster than in the rest of the Hungary. The main reason for this was the rich raw material basis and an at least partially developed net of railways and water roads.

Hungary did not have enough of its own investment capital needed for the development of technologically and financially demanding braches of industry. Despite this, to the end of 19th century there were several modern metallurgical, electro technical and weapons factories, built with the help of foreign investors, operating in Slovakia.

For territory of Slovakia was technical progress in the production activities based at historical tradition of its territory and its raw material base. In addition to mining, metallurgy or wood processing, it was, for example, the production of paper, some building materials and several areas of food production.

The formation of industrialization in the territory of Slovakia and throughout Hungary at the

end of the 19th century slowed down the economic crisis (e.g. the Panic of 1873 in Europe, Panic of 1893 in USA). People most often went to Overseas – mainly to the USA. The emigration from Slovakia acquired so massive proportions that the Slovaks belonged to the nations with the highest share of emigrants at all, mainly since the 70s of the 19th century.

Since the second half of the 19th century, the number of inhabitants in the cities has also increased - especially where industry and trade have evolved, and where the railways have led. Industrialization has accelerated the development of urban services such as water supply, power stations or gasometers.

It can be said that land of Slovakia has completed the industrial revolution in the last third of the 19th century, its industrialization began and the preconditions for industrialization in the first half of the 20th century were created.

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