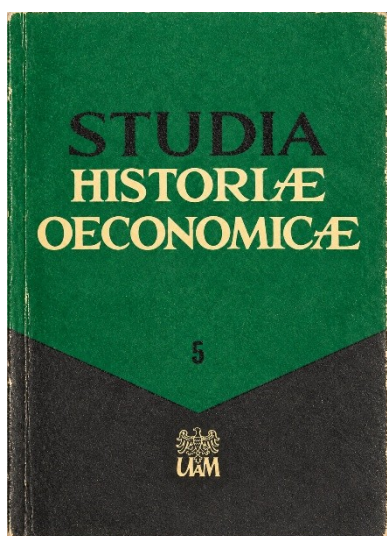




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THE PRE-CAPITALISTIC AND EARLY-CAPITALISTIC IRON INDUSTRY IN POLAND IN THE LIGHT OF THE LATEST RESEARCHES

INTRODUCTION

The purpose of the article is a recapitulation of Polish literature on economic history published in the course of recent years. I do not present the views of individual authors and their opinions* but I rather aim at the possibly most synthetic presentation of problems described in their works.

The attainment of Polish history of metallurgy of XVIIth, XVIIIth and of first half of XIXth century, seems to be sufficiently large and universal in order to try and make such a presentation. My aim is not only to compare basic facts or indexes which can be found in every manual of Polish economic history, but I would rather like to present the main problems of development of Polish metallurgy emphasizing its specific features which distinguish it from the history of this branch of production in Europe. The research in history of metallurgy in Poland has a long and good tradition, dating from XIXth century¹. Between the two world wars it was continued by N. Gąsiorowska-Grabowska, M. Orłowski, F. Popiołek². A rapid development took

* The basic bibliography, first of all the books, is to be found in the footnotes, which in this article have not the feature of references but rather of a presentation of principal works referring to a given problem or to chronological period.

¹ Compare particularly with H. Łabęcki: *Górnictwo w Polsce. Opis kopalnictwa i hutnictwa polskiego pod względem technicznym, historyczno-statystycznym i prawnym (Mining in Poland — The Description of Polish Mining and Metallurgy with Reference to its Technical, Historical, Statistical and Legal Aspects)*. Vol. 1-2. Warszawa 1841; W. Choroszewski: *Rozwój górnictwa krajowego. Krótki rys historyczny i statystyczny rozwoju przemysłu górniczego w Królestwie Polskim (The Development of National Mining. A brief historical and statistic essay on mining industry development in the Kingdom of Poland)*. In: *Przegląd Techniczny* 1/1875 and 2/1876.

² N. Gąsiorowska-Grabowska: *Górnictwo i hutnictwo w Królestwie Polskim 1815 - 1830 (The Mining and Iron Industries in the Kingdom of Poland 1815 - 1830)*. Warszawa 1922; M. Orłowski: *Żelazny przemysł hutniczy na ziemiach polskich do*

place after 1945. Since then historians and technicians have become more and more interested in the development of metallurgy³. Several monographic works concerning metallurgy in feudal times have been published⁴, but first of all research analysing the iron metallurgy development from economic point of view have been carried on and developed by Prof. Kula's team⁵. They were limited to iron metallurgy in so called "Congress Kingdom" and covered the period from 1815 to 1914. The largest Polish region of metallurgy — Upper Silesia was the subject of only several individual monographic works by Z. Kwaśny, K. Popiołek, J. Popkiewicz and F. Ryszka⁶. The latest team-work researches concerning the history of founders movement firmly emphasize the problem of employment and workers' class situation⁷. The Polish economist S. Kurowski, who wrote on the historical analysis of economic growth, compared the development of iron and steel industry in different periods and in different parts of the world. He regarded this branch of production as an index of

r. 1914 (*The Iron Industry in Polish Territories till 1914*). Warszawa 1931; F. Popiołek: *Dzieje hutnictwa żelaznego na ziemiach polskich (The History of Iron Industry in Polish Territories)*. Katowice 1947 - edition prepared before the World War II.

³ With reference to this subject compare: J. Pazdur: *Problematyka badań dziejów techniki górniczo-hutniczej w epoce kapitalizmu (The Problems of Researches into History of Mining and Metallurgy Techniques in the Capitalist Epoch)*. In: *Kwartalnik Historii Kultury Materialnej* 1/1953; the studies of history of mining and metallurgy have appeared since 1957 in the columns of "Studia z Dziejów Górnictwa i Hutnictwa" edited by J. Pazdur; as far as books are concerned refer to J. Pazdur's: *Zakłady metalowe w Białogonie 1614 - 1914 (The Metal-Works at Bialogon 1614 - 1914)*. Wrocław 1957; M. Radwan: *Rudy, kuźnie i huty żelaza w Polsce (The Ore Deposits, Forges and Iron Foundries in Poland)*. Warszawa 1963.

⁴ B. Zientara: *Dzieje małopolskiego hutnictwa żelaznego XIV - XVII w. (The Little Poland Iron Industry History in the Period of XIVth till XVIIth Century)*. Warszawa 1954; W. Kula: *Szkice o manufakturach w Polsce XVIII wieku (Essays on Manufactures in XVIIIth Century Poland)*. Warszawa 1956; W. Długoborski: *Ekonomika górnośląskiego hutnictwa w XVIII wieku (The Economics of Upper Silesian Iron Industry in the XVIIIth Century)*. In: *Zeszyty Naukowe WSE Katowice* 19/1963.

⁵ S. Kowalska, J. Jedlicki, A. Jezierski: *Ekonomika górnictwa i hutnictwa w Królestwie Polskim 1831 - 1864 (The Economics of Mining and Iron Industry in the Kingdom of Poland 1831 - 1864)*. Warszawa 1958; A. Jezierski, E. Kaczyńska, S. Kowalska, K. Piesowicz: *Ekonomika górnictwa i hutnictwa w Królestwie Polskim 1840 - 1910 (The Economics of Mining and Iron Industry in the Kingdom of Poland 1840 - 1910)*. Warszawa 1961.

⁶ Z. Kwaśny: *Hutnictwo żelaza na Górnym Śląsku w pierwszej połowie XIX wieku (Upper Silesia's Iron Industry in the First Half of the XIXth Century)*. Wrocław 1968; K. Popiołek: *Górnośląski przemysł górniczo-hutniczy w drugiej połowie XIX wieku (The Upper Silesia's Mining and Iron Industry in the Second Half of the XIXth Century)*. Katowice-Kraków 1965; J. Popkiewicz, F. Ryszka: *Przemysł ciężki Górnego Śląska w gospodarce Polski międzywojennej 1922 - 1939 (The Upper Silesia's Heavy Industry of Interwar Period 1922 - 1939 in Polish National Economy)*. Opole 1959.

⁷ W. Boreych, I. Figa, J. Jares, H. Rola, J. Ziemia: *Historia ruchu zawodowego hutników (The History of Founders' Labour Movement)*. Vol. 1. Katowice 1968-

economic level of individual countries operating with methods based on mathematics and economics⁸.

Poland belongs to a group of countries borders of which were subjected to frequent alterations and the state area was different from ethnic area. The country was deprived of independence for nearly 125 years and had been divided between three invading powers. All that had been the reason of serious economic consequences such as restrain of inner market development or connection of individual annexed territories with economic life of neighbouring countries⁹.

Such a situation had a great effect upon the development of industry particularly of heavy industry. It is also a reason of difficulties of methodological nature: what area ought to be the subject of historical analysis? In the present paper I deal with the area being Polish territory in the present state of frontiers. I leave aside the eastern territories which belonged to Poland before 1939, and take into consideration the territories regained by Poland after 1945.

THE PRE-PARTITION PERIOD TILL THE END OF THE XVIIIth CENTURY

Until the middle of the XVIIIth century metallurgy in Polish territories has been only of local importance. The individual iron works were producing for very small markets in one district or estate and in narrow scope of products, furnishing peasants with agricultural tools and rural or municipal craftsmen with raw materials. Only some centres were expanding their markets on all province or voivodeship as e.g. the established on Odra forges situated in South Silesian counties of Pszczyna and Racibórz and which already in the XVIth and at the beginning of XVIIth century supplied iron by river to Wrocław and southward to Karniów, Opawa and to Bohemia. On northern slopes of the Sudety Mountains in the region of Kowary (Schmiedeberg) and Kamienna Góra (Landeshut) a very specialized way of steel production was developed. From there steel was sent, among other countries, also to the Polish Commonwealth. On the other hand, iron produced near Częstochowa was carried to Silesia, from where it returned in form of ready tools¹⁰. Contacts

⁸ S. Kurowski: Historyczny proces wzrostu gospodarczego. Analiza trendów sekularnych na podstawie produkcji żelaza i stali (*The Historical Process of Economic Growth. Secular Trends' Analysis on the Basis of Iron and Steel Production*). Warszawa 1962.

⁹ Compare to W. Kula: Kształtowanie się kapitalizmu w Polsce (*The Formation of Capitalism in Poland*). Warszawa 1955, p. 20 et seq.

¹⁰ M. Wolański: Związki handlowe Śląska z Rzeczpospolitą w XVII wieku ze szczególnym uwzględnieniem Wrocławia (*The Trade Links Between the Polish Commonwealth and Silesia in the XVIIth Century with Special Regard to the City of Wrocław*).

of such type were neither on great scale nor very durable. This fact was caused by the depression of demand for iron and iron made tools. The situation of the serf, who was the main customer, was continuously growing worse, in Eastern and Central Europe in the course of the XVIth and XVIIth centuries. A considerable increase of sales of iron and steel expanding beyond local markets took place only in the years of war. The South Silesian forges producing for the imperial army during the wars in 1618 - 1642 may be a good example of that. So the iron works in Świętokrzyskie Mountains, where the war between Poland and Moscow at the beginning of the XVIIth century as well as war plans of Władysław IVth in early forties (XVIIth century) and Cossack wars — were all the reason for the extension of production.

In the field of technology Polish metallurgy did not reach the level of West European countries where the centres of iron production were situated. Hence the initiators and pioneers of new methods were foreign founders. That is connected with two essential innovations in those times: the introduction of water energy to iron production which was still obtained from ore in direct way (small blast furnaces and forges) and the changeover from direct to indirect melting (great blast furnace on charcoal). The water driven bellows and hammers appear on Polish territory in the XIVth century. The Cistercian monks in Świętokrzyskie Mountains introduced them in their estates. Afterwards they were brought by Saxon founders to Lower Silesia (Kowary, Żagań) and then to Upper Silesia, from where they were spread to Southern Little Poland. The German founders' families were quickly polonized and their methods of work assimilated and adapted to local conditions.

Similarly to forges and small blast furnaces the great furnaces appeared and were in general use one and a half century later than in Italy, France or in German countries. About 1640 (although some historians declare it was 30 years later) the Italian founders from Bergamo, one of the places where this method was first introduced established first great furnaces in Świętokrzyskie Mountains. The first great furnace in Upper Silesia was built in 1703. It was built by Saxon master-founders and put in service by Saxon workers who were brought here by the Saxon count J. H. Flemming, the owner of properties in the region of Gliwice and Koźle.

The location was similar to that in other countries. The iron works were dissipated, where there were deposits of bog-iron ore and woods in abundance. When the water wheel was introduced the iron works began to concentrate along rapid rivers¹¹. This type of location existed together with

Wrocław 1961, p. 188 et seq.; for the supplementary information refer to B. Zientara: *Dzieje...*, passim, and W. Długoborski: *Ekonomika...*, p. 4 et seq.

¹¹ L. Musioł, S. Płuszczewski: *Wykaz zakładów dawnego hutnictwa żelaza*

the introduction of great furnace, in which ore richer in *Fe* than bog-iron ore was smelted. It was the reason for tendency of connecting the iron works with ore deposits. It concerned Świętokrzyskie Mountains, some parts of borderland between Little Poland and Silesia and certain parts of the Carpathian Mountains. In XVIIth and XVIIIth centuries this territory was covered with large forests so most iron-works and then bloomeries and great furnaces concentrate here. On the edges of this area — upon the river Liswarta in Little Poland or upon the river Mała Panew in Upper Silesia — the foundries still used bog-iron ores with small addition of mine ores. Remains of ancient foundry have been preserved: in the region of Szprotawa and Żagań in Lower Silesia and of Elbląg in former East Prussia.

Different conditions of the location had influenced in different degree of profit in these three groups of foundries. The foundries which had to transport mine ore through long distances or were smelting only bog-iron ores had difficulties in competing with foundries of optimal location. In spite of this, some of them were operative till the XIXth century competing even with foundries using coke and steam engines.

There were two reasons for such a situation: a limited and closed local market for iron and iron made products, mainly agriculture tools (in Świętokrzyskie Mountains just before the World War II traditional forges were still in use producing parts of ploughs, harrows, rakes, hoes and also iron for blacksmiths and peasants in surrounding villages) as well as the possibility of using feudal or semifeudal methods of calculation.

The competition between old iron centres both in age and technology or social production organization with the "new" due to feudal elements of economics was not exceptional in the history of economic development in Europe. Moreover, in the XVIIth century such elements made the way for Ural's iron to the West European markets and for Upper Silesia's iron to Central Europe. So in Poland, a poorly developed country where landownership was dominant, the feudal way of production could be easily introduced, and the creation of economic links was blocked by invaders' borders.

The feudal way of production was not introduced in Polish metallurgy at once. The introducing of water power to iron process and blast-furnaces-forge type ironworks in the XVth and XVIth centuries is connected with petty capitalistic way of production. The former "ore men" and "hammer-smiths" or their successors enlarge their plants and sometimes they establish settlements nearby. It is connected with capital expenditures. They begin to use a hired labour on greater scale than it was before. As a result sometimes production complexes were built. Those were iron-works, blast-furnaces

na Górnym Śląsku od XIV do połowy XIX wieku (*The List of Old-Time Iron Industry Plants in Upper Silesia from the Period of the XIVth till the Middle of the XIXth Century*). In: *Studia z Dziejów Górnictwa i Hutnictwa* 5/1960.

with tossing hammers, very specialized plants as sheet iron works or wire works. The employment in such complex works was very large. The techniques of Polish metallurgy in these times reached average European level, not different from the patterns described by Agricola. The number of ironworks in use on Polish territory in the second half of the XVIth century was estimated to be near 400¹².

Already in the same time, and in the beginning of XVIIth century the situation of petty capitalistic producers called "free forgers" becomes more and more difficult. Their economic and legal status was out of frame of socio-economic relations and social standing of Polish Commonwealth of the Gentry or imperial Silesia. They suffered from that dualism, which had begun in the turn of XVth and XVIth centuries and established different ways of development in Eastern and Western Europe. In the West from little iron-mining plants, owned by middle-class merchants or even peasants, resembling mentioned above "free forgers" grew up capitalistic mines and metallurgies. In the East this class was destroyed by the nobility.

The forgers as a rule did not own any land, and even when they took it by lease, then like peasants they were subjects to law which left supremacy to land in feudal hands. Others leased only the land where forges were built. With the increase of production they all needed more and more wood which belonged only to the feudal owners. The workers were brought from surrounding villages which was the reason of weakening of the man-power reservoir in noblemen's farms, which just in second half of the XVIth century passed nearly completely on the *corvée* or compulsory labour of their own serfs. The increase of production and profits were the reason of noblemen's envy and the desire to possess such a profitable branch of production. This process was favoured by two circumstances:

1. Thanks to the increasing political predominance, the nobility passed laws which strengthened their political and economic position and weakened that of peasants and middle class, the Seyms issued laws unfavourable for forgers e.g. the laws from 1520 and 1552 about increasing taxes and more important one about the right of noblemen to compulsory redemption of forges.

2. The forgers did not belong to any particular class and they formed an intermediate group between nobility and peasants or middle class. They did not form any organization which could defend their rights as did the miners. The forgers worked dispersed and, destituted of protection of law, frequently were the victims of autocratic feudal lords.

The forges were often taken away (seldom bought out) from their proprietors by the nobility and run on their own account. The former owners were made only administrators, paid hired work was replaced by unpaid *corvée*

¹² M. Radwan: Rudy, kuźnice... p. 101.

work¹³. The feudal lords owning woodlands and ore deposits could lower cost of production because of free raw materials gained in an extensive and wasteful way. At the beginning of the XVIIth century — in metallurgy methods of feudal calculation were introduced: The most means of production — raw materials, fuel and unskilled labour — were obtained free from own estates. As a result, the production, even the most careless and inefficient or technically primitive one, was profitable. So long as enfranchising reforms did not definitely abolish the *corvée* and technical progress did not lead to such differences in costs and quality of "new" and "traditional" production, so that could not be compensated by advantages of links with feudal ownership of land.

It would be a great simplification to carry on relations from the turn of the XVIth and XVIIth centuries, when process of taking forges over to feudal property was leading to economic stagnation and decline of production, in all periods and all regions with feudal metallurgy. The feudal lords, especially magnates, who concentrated the greatest number of forges, were able to introduce great-furnaces-technology having for this purpose enough financial or material means. It depended on iron conjuncture circumstances. One may regret that the establishing of great furnaces was not done by bourgeois entrepreneurs — which could give a capitalistic character to the rising plants, but this class was economically too weak in East European circumstances. And they were deprived of any privileges to venture such expensive and hazardous investments.

The coincidence in opinions about the role and economic activity of feudal lords in the field of metallurgy development of German economic historian of Upper Silesia's industry B. Knochenhauer and Polish author W. Kula about manufactories of Polish Commonwealth in the XVIIIth century is astonishing: "Das Magnatentum mit seinem Grundbesitz und seinen Vorrechten war hier von vornherein der berufene Unternehmer. Gab der Grundbesitz die Mittel, so waren die Vorrechte die treibende Kraft"¹⁴. "In the circumstances when greater part of the means of production of the country was in feudal hands and land, resources were monopolized, when the feudal lords had at their disposal free labour and the shortage of long-term credits was characteristic for this period ... they had supremacy in manufacture investment"¹⁵.

¹³ To illustrate this process the Little Poland relations were analysed by B. Zientara: *Dzieje...*, p. 190 et seq., and by J. Pazdur: *Zakłady metalowe...*, p. 33 et seq.; J. Pazdur called freeforgers' plants "guild forges"; (Treatise on the expulsion of forgers in Silesia have not appeared in Poland yet, but it was described by F. Kaminsky: *Kampf um Eisen in Oberschlesien an der Schwelle des 17. Jahrhunderts*. In: *Deutsche Monatshefte* 7/1941.

¹⁴ W. Knochenhauer: *Die oberschlesische Montanindustrie*. Gotha 1927, p. 107.

¹⁵ W. Kula: *Szkice o manufakturach...*, p. 23.

THE ORIGINS AND THE ASSUMPTIONS OF UPPER SILESIA'S INDUSTRIALIZATION

The two essential reasons induced magnates-entrepreneurs to make improvements in technology of production. The first one was the introduction of great furnaces and bloomeries, and the second one — their improvements. It was not only tendency to increase production but to attain a more rational exploitation of ore and fuel (in blast furnace three times more of charcoal was required as compared with great furnace for the same quantity of ore). It was so important because of woodlands exhaustion around the blast furnaces¹⁶. The same considerations induced the Upper-Silesian magnates to first attempts at using coal in ironworks, when it was found in their possessions and afterwards, already at the first half of the XIXth century — to build the great furnaces on coke and puddlers. But first permanent and successful introduction of such methods of production in Upper Silesia followed by the feudal lords afterwards, took place as a result of Prussian state activities. In these changes, called colloquial "industrial revolution" the magnates-entrepreneurs have not played only passive, second role. Their importance in the starting of that revolution in metallurgy may be summed up as follows:

1. The first attempts at using coke in 1775 - 1790 mentioned above cleared the way for experiments in state plants as well as for permanent introduction of coking coal, first in Wałbrzych Basin (Lower Silesia) and next in Upper Silesian Basin¹⁷.

2. The introduction of Upper Silesian iron in Central-European markets (also Polish and Bohemian), which was the basis for later expansion of Upper Silesian products.

3. The tendency after the first "Saxon" period to employ local manpower after sufficient training in work with great furnaces on coke.

4. "Old" metallurgy beside other branches of the feudal lords' economy was the source of capital formation for investment based on new technology¹⁸.

The reasons of the interest of the Prussian state in the industry of Upper Silesia annexed in 1741, were for a long time subject of researches for his-

¹⁶ W. Długoborski: *Ekonomika...*, p. 18 et seq.; in properties with greater woodland stretches the relations were different — compare with L. Wiatrowski: *Ekonomika hutnictwa żelaza w Księstwie Pszczyńskim od XVII do początków XIX wieku (The Economics of Iron Metallurgy in the County of Pszczyna in the Period from the XVIIIth till the Beginning of the XIXth Centuries)*. In: *Acta Universitatis Vratislaviensis* No. 37 (Historia X), pp. 24 - 26.

¹⁷ S. Michalkiewicz: *Początki koksowania węgla na Śląsku — do połowy lat trzydziestych XIX wieku (The Introduction of Coking Process in Silesia — till the Mid-Thirties in the XIXth Century)*. In: *Studia z Dziejów Górnictwa i Hutnictwa* 4/1960, p. 78 et seq., p. 109 et seq.

¹⁸ W. Długoborski: *Geneza industrializacji Górnego Śląska (The Genesis of Upper Silesia's Industrialization)*. In: *Zaranie Śląskie* 23/1960 pp. 164 - 165.

torians¹⁹. They rightly indicated Prussian army needs and tendency of mercantilism to improve trade balance which was necessary for the limitation of Swedish import as well as for export of pig-iron and iron products. In my opinion to those reasons one more should be added: tendency to economic activation of this part of Silesia, where natural wealth has been in abundance, but because of backwardness of the social conditions (e.g. the domination of feudal grange in agriculture) were not properly used.

The Prussian state has begun metallurgy investment in Upper Silesia already in the middle of the XVIIIth century but they were rather imitating local feudal enterprises. The works were located far from the later coal basin, in the royal domains of northern Opole region with the use of the labour of local serfs²⁰.

The new industrial investments from turn of the XVIIIth and XIXth centuries were full of innovation in all respects, they introduced the up-to-day English iron technology: coke-heated great furnaces with hot blast (Gliwice 1796 and Królewska Huta 1802) driven by steam engines and puddlers were also introduced. The production was based on capitalistic calculation and free, hired labour. The plants were located in direct neighbourhood of new fuel resources, as well as coal deposits, creating fundamentals for so characteristic for modern iron-works vertical structure — coal and ore mines, great furnace and manufacturing plants.

It is difficult not to overestimate this, speaking in modern terms, "Upper-Silesian experiment". It was not most important that the rest of Central European basins in application of metallurgic technology were outdistanced 25 to 50 years, but the fact of successful and permanent industrialization of nonindustrialized and feudal-structured region which at that time was treated as the most backward part of Prussia.

The accuracy of location is striking as well. The triangle created by state plants in Gliwice — Tarnowskie Góry and Zabrze — Królewska Huta corresponds to the now established borders of the Upper-Silesian Industrial

¹⁹ Of numerous German works of special importance are the following: G. Felsch: *Die Wirtschaftspolitik des preußischen Staates bei der Gründung der oberschlesischen Kohlen- und Eisenindustrie (1741 bis 1871)*. Berlin 1919; V. Loewe: *Oberschlesien und der preußische Staat*. Teil I: 1740 - 1815. Breslau 1940; in English literature the problem was described by W. O. Henderson: *The State and the Industrial Revolution in Prussia 1740 - 1870*. Liverpool 1958, pp. 1 - 21; compare also Polish polemic with that work by W. Długoborski: Rola Prus w industrializacji Górnego Śląska (*The Role of Prussia in Upper Silesia's Industrialization*). In: *Zaranie Śląskie* 25/1962.

²⁰ J. Rajman: Rozwój ośrodków przemysłowych nad Małą Panwią (*The Industrial Centres Development upon the Mala Panew River*). Katowice 1962; I. Nalepa-Orłowska: Fryderycjańskie osadnictwo hutnicze na Opolszczyźnie — 1754 - 1803 (*The Iron-colonization in Opole region in the Times of Frederic II.*) In: *Studia i materiały z dziejów Śląska* 5/1963.

District (Górnośląski Okręg Przemysłowy — so called GOP "A")²¹. The Prussian authorities undertook a great deal of ancillary investments, schools and hospitals, acting with admirable consistency, which makes the state policies of industrialization of Upper Silesia different from that in the other parts of Prussia or from industrial policy in the neighbouring countries — Kingdom of Poland, Russia or Austria. Till the middle of the XIXth century the state plants enjoyed supremacy in Upper Silesia's metallurgy and mining technology, economics and organization of production. These plants served as a model of a new technology or as the source of purchase of the new machines and metallurgy installations for neighbouring countries.

For the constructions of new metallurgy English technicians and engineers were contracted and amongst them the famous I. Baildon, well known from activity also in Bohemia (one of metallurgies bears his name until the present day). Trained workmen and many skilled workers were brought from Germany, unskilled workers were coming from other parts of Poland. But the main source of man power was local population²² from which the class of trained founders formed very rapidly. Gradually, this class became transformed into the group of trained workmen, very much sought after in the basins of Dąbrowa and Ostrawa.

THE BEGINNINGS OF TECHNICAL REVOLUTION IN UPPER SILESIA'S METALLURGY

The advantages of new technology were doubtless: a weekly output of coke-heated great furnace increased from about 20,6 t in 1810 to above 31 t in 1845, while output of charcoal-heated furnaces was between 10,3 and 15,5 t²³.

It was a reason for industry magnates to construct the furnaces of new type at the beginning of the XIXth century. This process was broken by the Napoleonic wars, so the furnaces of new type became common in private plants just after 1830. In 1846 of 18 great coke-heated furnaces, 13 belonged

²¹ B. Kaczmarek: Rozmieszczenie hutnictwa żelaznego na Śląsku w okresie 1740 - 1806 (*The Iron Industry Arrangement in Silesia in the Period 1740 - 1806*). In: *Zaranie Śląskie* 24/1962, p. 766 et seq.

²² W. Długoborski: Rekrutacja górników w Zagłębiu Górnośląskim w okresie przed zniesieniem poddaństwa. Na przykładzie państwowej kopalni rud ołowianych „Friedrichsgrube” w Tarnowskich Górach (*The Miners Recruitment before the Abolition of the Corvée. With lead ore mine "Friedrichsgrube" at Tarnowskie Góry taken to illustrate this point*). In: *Przegląd Zachodni* 6/1950; W. Długoborski: Początki kształtowania się klasy robotniczej na Górnym Śląsku (*The Beginnings of Working Class Formation in Upper Silesia*). In: *Kwartalnik Historyczny* 61/1954.

²³ Z. Kwaśny: *Hutnictwo żelaza...*, pp. 72 - 74; also other data presented in this chapter are taken chiefly from this book.

to magnates and 5 to the state. At that time there were still nearly 40 charcoal-heated furnaces. Their existence was favoured by above mentioned economic and social factors: by market limitations and by feudal privileges. As a result, still in 1838 pig-iron produced in coke process amounted to 30% of all Upper Silesian production, and in early fifties it formed above 50% share of all production. In the course of the next twenty years coke furnaces displaced nearly all charcoal furnaces. As a result of the 1873 crisis a few of the last charcoal furnaces have been liquidated.

In similar rate, the new technology of melt bar iron from pig-iron was introduced. The first attempts of blooming on pit coal were made in some state metallurgy already in 1804. But the first puddlers were no earlier in use than at the close of the twenties of the XIXth century. Among private entrepreneurs introducing the new method there was count Henckel v. Donnersmarck who introduced it in plant "Laura" in 1842. Up to this moment the share of puddling in bar iron-production was not reaching even 25%. In 1843 it reached 37% and in 1854 — 51%.

Mineral fuel was most widespread in castings production (nearly 70% in 1846). Next to the old method of casting directly from ore, the new one is introduced — casting from pig-iron effected on coke at the close of the XVIIIth century in Gliwice metallurgy. Its products of common use and art products in first half of the XIXth century were accepted gladly by large circle of customers nearly in the whole of Central Europe. Together with the mineral fuel, the steam engine was wide spread which was used both for hot blasting and driving different technical appliances, instead of water power.

In all Upper Silesian industry, so in mining and in both branches of metallurgy, the power of steam machines increased from nearly 200 HP about 1800 to 772 HP in 1830 and at last to 2161 HP in 1843. At the same time as I mentioned hot blasting became more popular not only in metallurgy coke based, but in plants of old type where blasting was introduced for pig-iron smelting and blooming. According to estimate of one of the best known Upper-Silesian founders from the middle of the XIXth century — L. Wachler — introduction of hot blasting increased the great furnace output above 20%, giving at the same time a dozen or so per cent of savings in fuel²⁴. In this instance is seen one more element of durability of technology based on traditional fuel: in old type plants, even without fundamental alterations new method elements were introduced. These new elements were: hot blasting, use of steam machine instead of water energy and mixed fuels (charcoal mixed with coke and pit coal or even peat).

²⁴ L. Wachler: *Die Eisen-Erzeugung Oberschlesiens*. Heft III, Opole 1849, pp. 65 - 67, cited after Z. Kwaśny: *Hutnictwo żelaza...*, p. 64.

But those were only palliatives unable to compensate advantages thanks to use of mineral fuel. Long distances between pit-coal mines and ironworks made impossible the use of mineral fuel on larger scale. To illustrate the hopelessness of those semi-efforts the state iron-works at Zagwizdziej may be taken. Situated in north-eastern part of Upper Silesia, the work still used, in spite of all innovation, charcoal. To produce 51,5 kg of pig-iron, about 1845 it needed above 154 kg of ore and 1/3 basket of charcoal, so the same amount used in the beginning of century. In the same period, the iron-work at Królewska Huta and at Gliwice where production was based on coke, output increase during the same period has been very considerable (Data in ton and kg) ²⁵.

year	pig-iron	ore	coke
about 1805	1	3,1	3,7
about 1845	1	2,9	1,2

Analogical changes took place in replacing of traditional bloomery process by puddling or blooming.

The productivity increase was to be seen more explicitly on annual scale. The application of steam engine made the production process independent on changes of weather. Even in state iron-works in Opole region (at Ozimek, Zagwizdziej, Jedlice) possessing developed irrigation system, production stoppages caused by frost, high or low water level or wood rafting lasted from 35 to 85 days a year. In private iron-works they lasted even longer.

The technical progress was introduced with different intensity in different regions. From the first application of any particular innovation to its wide-spreading a few or even several years had to pass. After all, it is the correctness of development of iron-production technique common in that period for most European countries. In Upper Silesia this correctness was especially clear, at the turn of the XVIIIth and the XIXth centuries the modern state centre was established there together with the mines producing for its use. It advanced other countries of Central Europe (in Bohemia the first great coke furnace was blown in in 1821, in Rhineland, Saxony and Kingdom of Poland — at the beginning of the forties). After that for over 30 years nothing was done more. In the leading Upper Silesia's works — Królewska Huta and Gliwice — the progress was impeded. There were not introduced new English conquests of science, only the already existing installations were improved and enlarged. Only the most active entrepreneurs followed the state achievements. Other achievements such as e.g. puddling were later introduced away from the future coal basin.

The situation changed at the end of the thirties. In Królewska Huta iron-works puddlers and bloomeries were installed and Henckels v. Donnersmarck established plant "Laura" which in its modernness and basing on own coal-

²⁵ Z. Kwaśny: *Hutnictwo żelaza...*, pp. 77 - 78.

-mines was resembling the model state achievements of Reden and Heinitz period²⁶. The fact should be mentioned that in the beginning of forties new fuel and new production techniques are gaining a dominant position in great furnace- and iron-industry, we can date from this moment the industrial revolution followed by economic changes in this branch.

Besides the above mentioned indices such revolution is proved by the increase of number of modern investments undertaken by private entrepreneurs whose aims were strictly of economic nature — such as profit maximalization while the state investments sometimes had, beside economic, also non-economic aspects. The markets for Upper Silesian iron after 1840 were greatly enlarged. The reason for it was the development of railroad system, constitution of German Customs Union (Deutscher Zollverband — 1834) and at last, mechanization of other branches and development of agriculture which increased the role of iron in the country's economy.

Another for Upper Silesia specific reason should be added: the perturbations in zinc industry²⁷. After the Napoleonic wars Upper Silesia was covering over 40% of world's demand of zinc, absorbing capitals which were necessary for iron industry. The investments for zinc-industry were less capital-absorptive and very promptly giving profit. Sometimes these were the reasons of rapid careers as in the case of the "zinc king" K. Godula, who from industrial magnate's unimportant employee became during 25 years one of the richest entrepreneurs and land-lords in Upper Silesia. The zinc boom has been broken after 1825 because of economic crisis in England and overseas markets' satiation. So the greater attention was paid to iron industry. Of its increasing role the best manifestation is the fact that in the forties it becomes the greatest consumer of local coal, the position earlier occupied by zinc²⁸.

The 1848/1849 revolution puts definitively the end to the use of feudal semi-corr  e forms of labour, which lasted longest in ore and ready product and fuel transport. The cost of wood transport is increasing because of the wood shortage in next vicinity of foundries. It had to be transported from more distant places, sometimes from the Kingdom of Poland. The wood has been common fuel (coal will gain this position after 1870) and this together with advancing industrialization and urbanization was a reason for the price increase. The forests which still at the close of XVIIIth century

²⁶ W. Długoborski: Typy przedsiębiorstw w g  rnictwie i hutnictwie G  rnego   laska — do 1939 r. (*The Types of Enterprises in Upper-Silesian Mining and Iron Industry — until 1939*). In: Zakłady przemysłowe w Polsce XIX i XX wieku. Studia i Materiały, Wrocław 1967, pp. 50 - 51.

²⁷ K. Popiołek: G  rno  laski przemysł..., p. 65 et seq.

²⁸ J. Jares: Historia g  rnictwa w  glowego w Zag  biu G  rno  laskim do 1914 roku (*The Coal Mining History in Upper Silesian Basin until 1914*). Wrocław 1965, p. 14 et seq.

in some parts of Upper Silesia were considered *toter Schatz* (dead treasure) and iron-works being sole possibility of their utilization, were becoming similarly as in the case of agriculture, the rationally cultivated branch of the land-owners' economy. Wood was becoming more and more expensive both as a fuel or as timber.

Upper Silesia held priority in great furnaces development only, with the exclusion of other domain of metallurgy. For instance, the first puddlers in our part of Europe were introduced simultaneously at Vitkovice near Ostrawa (Bohemia) (1828) and in the region of Katowice of to-day. In bloomery Upper Silesia considerably lagged behind if compared with England, France or Belgium and soon with Rhineland too. In spite of this fact, in the first half of the XIXth century Upper Silesia's ranked exceptionally high among European metallurgy. This region has been the greatest pig-iron producer in Prussia, and that country held the leading position in Central and Eastern Europe, being ahead of Russia and the Habsburg Empire with Bohemia after 1840.

The Upper Silesian foundries' domination was not a permanent one. Their technical and economic domination over Rhineland will last up to the mid-century, but then gradually will be reduced. In 1804 Upper Silesia was producing about 50% of pig-iron production of the whole German Customs Union region. In 1850 it produced a little over 25%. The participation of Upper Silesia in Prussia's production in the same time increased from 31% (1825) to over 50% (1846) and afterwards it began to decrease. The mentioned increase was caused by the competition between imported English and Belgium pig-iron on the markets in West Germany. It was more profitable for Rhineland iron-works to use imported pig-iron than to produce it for themselves. Silesia being apart from competing territories did not feel the results of competition, thanks to condition of contemporary transport technique levelling the consequences of competition. Upper Silesia held also the firm position in iron bar production (30 - 40% of whole Prussia's production). But in higher stages of manufacturing its share was much lower, decreasing from year to year: in steel sheets production it decreased from 28% in 1826 to about 10% in the forties, in steel wire production — from 9% in 1824 to merely 0,5% after 1840 and at last in steel production Upper Silesian share was during the whole period of 1815 - 1850 between 1 to 4%²⁹.

Then, the Upper Silesia supremacy was only in the semi-finished products particularly pig-iron. This supremacy was a result of chronological priority in introduction of some innovations and of particular government activity. The railroad development in the second half of century levelling the preference

²⁹ According to S. Kurowski's calculations: *Historyczny proces...*, p. 97, and *Z. Kwaśny: Hutnictwo żelaza...*, p. 105 et seq.

of the metallurgy centres on local markets as well as the introduction of protective import duties against English competition together with the development of transport media were the reasons of Upper Silesian pig-iron share decrease in the country's production from 19% in 1871 to 11% in 1890 and 9% in 1900.

The know-how in the old type metallurgy was the result of a tradition handed over from one generation to another, sometimes within the circle of inhabitants of one region or locality, the progress was a result of experiences based exclusively on good knowledge of production practice. A role which in the industrial revolution in XVIIIth century England the science and practice played still is disputable. But it is doubtless that the technical progress in the next century was more and more connected with development of exact sciences and their iron industry application, especially of physics and chemistry development. As early as in the first half of the century the theoretical stock of knowledge could be only mastered by a very talented technician-engineer, such like the above mentioned L. Wachler or the well known and very respected in whole Germany C.J.B. Karsten, the iron-metallurgy manual author, or at least, like Wedding and Eck — engineers in modern meaning from Królewska Huta. But as times passed by, it was more difficult to create new technology conception without assistance from academic centres of exact sciences. Upper Silesia lacked such centres and thus many of its prominent iron and mining theoreticians moved to Berlin³⁰.

FIRST ATTEMPTS AT AN ETATISTIC INDUSTRIALIZATION IN THE KINGDOM OF POLAND

Upper Silesia hold a dominant position in Polish metallurgy during the whole epoch of capitalism and so it continues to do. In the forges and blast furnaces era Upper Silesian metallurgy did not differ so much from the metallurgy in the rest of the Polish territories. Little Poland and Upper Silesia were not separated by any geographic or economic borders, on the contrary, they were strongly connected by technological, commercial and personal links. It is enough to mention the first Polish or even Slavic poem about founders (*Officina Ferraria*) written by W. Roździeński, "free forger" from present-day Katowice region who was related with founders from Little Poland where he moved at the beginning of the XVIIth century. The links were weakened when iron works had gone into magnates' hands. But even then, technology and its level on each side of the border were the same. This situation was emphasized by Røden and v. Stein while writing about their

³⁰ Compare with S. Michalkiewicz: *Początki koksowania...*, p. 80 et seq.

impressions from travel through mining-metallurgic centres in Poland in 1781³¹. Moreover, Upper Silesia as well as Poland's territories in the second half of XVIIIth century faced iron industry boom, connected here and there with local markets and manufacturies development. The fact was expressed by the growth of the number of great furnaces and bloomeries.

Towards the end of the century the development routes of the two iron centres distinctly parted. After Poland's fall and partition the links between the annexed territories were broken and the home market was shrinking, the first efforts of industrialization made by the government were turned to nought. On the contrary, in Upper Silesia the turn of the century brought further magnates' traditional great furnace industry development, but, as we already know, it was the beginning of technical and socio-economic revolution in this industry. About 1780 the pig-iron production in Upper Silesia and in Poland (mainly in Little Poland, in so called Old Polish Basin in Świętokrzyskie Mountains) was nearly the same — 5000 tons a year, but already at the beginning of the XIXth century, Upper Silesia's production was over 20 000 tons a year, while the other parts of the country have the production on much lower level than in pre-partition period³².

The creation of the Kingdom of Poland in 1815 (called also „Congress Kingdom”) changed the situation. The Kingdom was, however in personal union with Russia, but in spite of that fact it conducted the internal policies of its own. It comprised also western part of Little Poland, called later „Dąbrowa Basin”, where the Prussian government had made some mine and metallurgy investments in the years 1796 - 1806, and the mentioned above, Old Polish Basin. The government of the Kingdom, like other Central and East European countries, initiated and promoted the development of metallurgy. Motives of its industrial policy were similar to those of Prussia: the army requirements and tendency leading to general development of the country. Some of the writers gave it inspiration in praising Upper Silesian achievements. On European scale the Kingdom metallurgy ranked much lower than Upper Silesian one. From the historical point of view, we can observe there in the period 1815-about 1870 many interesting ideas of iron industry development. These ideas, although unfulfilled, led to the creation of technical and economic models of various kinds. The comparison of such models may conclude in some interesting observations, not only from Polish point of view, but providing general historical conclusions as well.

The first iron industry enlivening conception arose shortly after the creation of the Kingdom. It was prepared by the reverend S. Staszic, director of iron mining department at that time, known publicist and reformer of Polish

³¹ W. Kula: *Szkice o manufakturach...*, p. 480 et seq.

³² According to S. Kurowski's estimations in: *Historyczny proces...* p. 90 et seq.

Enlightenment epoch³³. He considered mining, especially ore mining as essential branch of each country's economy. The development of metallurgy was the indispensable condition for ore deposits exploitation. So the metallurgy development was one of the basic duties of the state. The state activities should be carried out in the most direct way, like those of count Reden in Upper Silesia. In Staszic's opinion, private entrepreneurs neither had sufficient capitals nor gave any guarantee of maintaining the proper course in iron industry development to keep pace with the needs of the community. Consequently, the Kingdom government, after taking over bishops' properties, the largest ones situated in Old Polish Basin, reorganized and developed plants situated in this area. In spite of efforts and financial expenditures great for the limited possibilities of the Kingdom the achieved results were not so considerable as they were in Upper Silesia. Staszic's conceptions were outdated nearly in every aspect, as far as technology, location and economics are concerned:

1. considering ore deposits as the greatest wealth of the country he wished to establish metallurgies in the close neighbourhood of ore deposits, regardless of fuel and of the importance of pit-coal in production process. He focussed his attention on Old Polish Basin ore region, where wood was a sole fuel and on planned iron production investments near Inowrocław and Augustów (Polish-Lithuanian borderland) after bog iron discovery in that region.

2. His assumptions were based upon XVIIIth century technological patterns — great furnace and bloomery driven by water energy. These patterns were modified and modernized by long lasting irrigation investments aimed to make foundries independent of weather conditions and water level. Experienced Saxon iron masters were brought from abroad. These moves increased average blast furnaces output from 232 t per furnace in 1818 to 282 t per furnace in 1825. However, this output was still on lower level than in Upper Silesia with average output (half of the furnaces) of 500 t and more per furnace in 1822.

3. Traditional technology was corresponding to semi-feudal socio-economic relations: the metallurgies (also private ones), were tied up with great land

³³ Based on N. Gąsiorowska-Grabowska's: *Górnictwo i Hutnictwo w Królestwie Polskim 1815 - 1830* (1922) (*The Mining and Iron Industry in the Kingdom of Poland 1815 - 1830* (1922)); the same author: *Z dziejów przemysłu w Królestwie Polskim 1815 - 1918* (*From the History of Industry in the Kingdom of Poland 1815 - 1918*). Warszawa 1965, pp. 180 - 261; J. Pazdur: *Zakłady metalowe...*, p. 60 et seq.; J. Zieliński: *Staropolskie Zagłębie Przemysłowe (The Old Polish Industrial Basin)*. Wrocław 1965, pp. 64 - 74; J. Grzywicka: *Ekonomiczne poglądy Stanisława Staszica (The Economic views of S. Staszic)*. Warszawa 1957; the Upper Silesian patterns influence was evidenced in the publication by one of the managers of Higher Mining Office in Wrocław — C. J. B. Karsten: *Rozprawa o wartości górnictwa i o obowiązkach rządu w utrzymywaniu takowego...* (*The Treatise on the Importance of Mining and of State Duties to Maintain it...*). In: *Izys Polska* 4/1821.

properties and with large stretches of forests. Frequently, iron works were allocated to villages with their inhabitants obliged to do low paid ancillary works (ore, charcoal and pig ore transportation), and those deprived of land, were obliged to work always in iron and mining industry. The skilled workers belonged to the established in 1817 Mining Corps which secured them certain privileges such as military service dispensation, medical assistance or disability and widow's pensions, but on the other side it limited the free choice of labour or the work conditions making of the miners a group of a population living in semi-military, cast-guild conditions. The Corps was organized similarly to the institutions of the same activity profile established in both Silesian basins already in 1769 (Schlesische Knappschaft).

The Staszic's heavy industry development model have not yielded the expected results. The pioneer plant at Białogon, beside the introduction of imported installations i.a. used steam pumps for ore drainage. It was built with the assumption to supply the whole Kingdom industry with modern equipment but in the 9 years of existence it brought over 1 million zlotys deficit. Ore deposits prognosis concerning closest neighbourhood did not meet expectations. Water pressure and workers inexperience in new machines made exploitation a very difficult task. The project's failure was a reason for S. Staszic's dismissal.

The other state metallurgies were profitable only to some extent, but none had greater productivity nor higher income as compared with private plants.

Lower technical level, lower financial expenditures, worse administration were compensated by ruthless feudal privileges given to magnates (as gratuitous corvée for industry). As a result the rate of growth in two groups of plants was nearly the same (it increased in 1818 - 1829 about 50%). The state produced 1/3 of pig-iron in the Kingdom. The total production was also lower than expected by Staszic — it exceeded 50% the pre-partition production level. As in the turn of XVIIIth century iron industry development was broken by the partition, so now by the failure of the Polish Insurrection against Russia in 1830/31. Some of the Staszic projects were still under realization after 1831 but the main efforts concerning iron industry have been based upon different assumptions.

THE METALLURGIC INVESTMENTS OF THE BANK OF POLAND AND THEIR BREAKDOWN

This kind of investment emerged for the first time in the twenties of XIXth century. This idea was promoted by the prince Ksawery Drucki-Lubecki — the minister of the treasury of the Kingdom.

It should be the task of Bank of Poland to invest capital expenditure together with private entrepreneurs to support metallurgy projects. In Lubecki's

opinion direct government investment should take place only temporarily and it should be considered as interventional measures: "The government ought to remove all hindrances impeding production development, it ought to encourage private persons to try arts and handicrafts and be of assistance to those people... The government should attract people fit for arts and handicrafts, it should establish certain enterprises to be later sold, even at a reduced price"³⁴.

The Bank projects concerning metallurgy were planned as a large-scale task, as great as never before in Central Europe took place. Those projects were scheduled to be on greater scale than total government investment expenditures. They should be based in Upper Silesia on new technology adopted directly from Upper Silesia and from England and this meant on new fuel, new location and new socio-economic assumptions. In Dąbrowa Basin, where after 1815 coal mines and zinc works, mainly state ones, were developing prosperously, eight coke great furnaces, 16 puddlars and three ore smelting furnaces, then two bloomeries were established about 1834. The works were to be equipped with mechanical lifts and steam driven blowing machines. They were situated nearby ore and coal deposits only a few miles away from Upper Silesia, serving in future as skilled workers and modern installations' source for Dąbrowa Basin. Dąbrowa Basin had some industrial traditions and the facility of hired man power recruitment. Moreover, the mastering of the home market of the Kingdom perspectives to export on Russian imperial markets as well as future projects to construct railroad network connecting the main industrial centres with the Basin would also favour the development of iron works financed by the Bank of Poland. But reality did not confirm these hopes. The industrialization policy of the post-insurrection epoch (after 1831), with the main role ascribed to iron industry, finished in a failure. The pig iron production in the Kingdom after putting in service the Huta Bankowa iron work in 1842 increased from 15,000 tons to nearly 20,000 tons, but after some years it decreased to below 15,000 tons level and when it increased again in the sixties, the participation of state works was not significant. These works played greater role in booming

³⁴ Cited after J. Górski: *Polska myśl ekonomiczna a rozwój gospodarczy 1807 - 1830. Studia nad początkami teorii zacofania gospodarczego (The Polish Economic Thought and Economic Development 1807 - 1830. Studies on the genesis of the theory of economic underdevelopment)*. Warszawa 1963 — ref. especially to p. 219; the Polish Bank investments were presented with full particulars by J. Jedlicki: *Nieudana próba kapitalistycznej industrializacji. Analiza państwowego gospodarstwa przemysłowego w Królestwie Polskim XIX w. (The Failure of a Capitalist Industrialization. The state industrial economy analysis in the Kingdom of Poland in XIXth century)*. Warszawa 1964, pp. 57 - 132; J.' Jedlicki: *O efektywności państwowych inwestycji hutniczych w Królestwie Polskim (1831 - 1864) (The Effectiveness of Iron Investments of the state in the Kingdom of Poland in the 1831 - 1864 period)*. In: *Ekonomika górnictwa...*, p. 231 et seq.

bloomery production. But it was not this kind of production that decided about the position of iron industry of the Kingdom.

We can observe there a strange by appearances and tragic fact — the waste of the so difficult to obtain capital, waste of efforts of talented people involved in state undertakings. The great furnaces of Huta Bankowa were one by one put out. They will be once more in service but after adaptation to charcoal use. Some of the puddlers and bloomeries will also switch to this kind of fuel. After 1870, the state metallurgy began to limit its production till complete closing about 1875. The iron industry in Kingdom was showing contrary development tendency than the Upper Silesian industry. The Kingdom, after rapid increase of production on pit coal in the forties, faced its production decrease until 1880, what was connected with traditionally modelled Old Polish Basin supremacy, while in the same time we may observe in Silesia the systematically growing interest in pit coal (coke) application as well as in a new plant model in Upper Silesia Basin. The old iron centres in the Opole region became inoperative. The importance of Upper Silesia was growing also on the scale of all Polish territories. Its pig iron production was growing from about 65% in 1838 to nearly 80% in 1855 and in 1877 to 90% of all pig iron production.

What were the reasons for breakdown of technical revolution in the Kingdom? What were the reasons for the fall of modern works in the Dąbrowa Basin?

Many technical errors had been committed during the works' construction. It was obvious that from the local pit coal minor quality coke was obtained which created the necessity of Upper Silesian import thus increasing production costs. Too high percentage of sulphur contained in pig iron required its secondary purification: pig iron obtained in charcoal furnaces had to be added to reach higher quality standard qualifying it for further technological treatment or for sale. But that was just the trouble for the Kingdom market unable to consume the whole new iron works production. Capitalism was developing there in so called "Prussian way" — the facility of maintaining feudal and semi-feudal forms in agriculture limited technical progress and demand for agricultural tools and machines. Also slow technical revolution was carried through in metal and textile industry — the main iron industry customers. Hope connected with the Russian imperial market differed from reality. The demand for iron products there advanced lower than in the Kingdom: about 1850 pig iron consumption in Russia amounted to 9.7 pounds per capita, while at the same time in Prussia it amounted to 36.3 pounds and in England to 138.4 pounds per capita³⁵.

Those were the difficulties faced many times in the past also in other

³⁵ According to estimation by M. L. Tęgoborski dating from 1851 cited after M. Orłowski's: *Żelazny przemysł...*, p. 91.

non industrialized countries, where efforts were made for "take-off", beginning the "take off" from establishing their own means of production — iron and steel industries first of all. In Kingdom the attitude and the aspirations of people responsible for the Polish policies and industrialization process were a source of additional difficulties.

The followers and realizers of Lubecki's industrial ideas, with H. Łubieński, Bank of Poland chairman, led astray the idea of the country's economic recovery. They treated government funds for investment expenditure as a source of personal advantages, as the source to flow considerable sums from government deposits to personal ones. All entrepreneurs acting in the process of construction, installation and transport connected with investment and after its accomplishment leaseholders too (state plants were leased to private persons) belonged to family circles, friends or associates of the Bank management; sometimes they were dummies³⁶. All of them received great amounts in advance and the bills of quantities were carried out to obtain higher costs while minimalized bank supervision was only a formality. As a result, sub-standard constructions had to be frequently corrected, thus constituting a new facility for additional contracts and advanced payment.

We have already mentioned that the Bank of Poland as a state bank was a residual institution. In ordinary governmental body there should exist several institutions controlling government investments. But in the Kingdom such institutions after the insurrection's fall were dissolved and tsar's authorities were in course of establishing the new ones. The authorities intervened only when Łubieński's and his associates' malversations had repercussions throughout the country, investments carried out by them were nearly completed. On the other hand, in Central and East European countries the role of state was not only limited to direct participation in industry development, but it also created markets, acting at the same time as main iron products' customer to supply the army and railroad constructions.

After the abolition of the autonomy of the Kingdom, Russian state succeeded in fact former Polish state functions. Russia did not intend to maintain this kind of policy in Polish territories. So the modern iron industry of Dąbrowa Basin, carrying misconception and wrong realization burden did not obtain any assistance from the state as it would be the case in other countries or in case of Polish statehood as it had been settled on Vienna Congress. The situation remained unaltered in the sixties when iron industry of the

³⁶ Besides the publication cited in footnote 34 refer also to R. Kołodziejczyk: *Kształtowanie się burżuazji w Królestwie Polskim 1815 - 1850 (The Bourgeois Class Formation in the Kingdom of Poland 1815 - 1850)*. Warszawa 1957, p. 99 et seq.; R. Kołodziejczyk: *Piotr Steinkeller, kupiec i przemysłowiec 1799 - 1854 (Peter Steinkeller — the Merchant and Businessman 1799 - 1854)*. Warszawa 1963, p. 82 et seq.

Kingdom including modern state works began to recover. This process was also accelerated by railroad network construction. The tsarist government instead of protecting the iron industry by the introduction of protective duties, decreased duties on pig iron, steel and bloom. The reduction duty of rate made local industry falling an easy prey to competing Upper Silesia's industry. The Upper Silesia's exports increased in the years 1870 - 1876 over three times, covering nearly 2/3 of total iron demand. Even slight changes in customs policy could have saved the industry of the Kingdom. But just in sixties, after the fall of the 1863 Insurrection, the tsarist policy had become more ruthless. The remnants of autonomy were abolished together with the dismissal of Polish metallurgy and mining management. The deliberately indifferent tsarist government doomed state works to closure, especially because of deteriorating situation of state coal mines which had supplied fuel so far³⁷.

Meanwhile, a large number of private metallurgies were closed because of Upper Silesian competition. When the corvée and other feudal means of production were in 1864 at last removed, and the inner market development led to the increase of demand and prices of wood, so the majority of these iron works was not profitable any more. The other reason for the decline of the traditional state iron works was the rupture of connections with treasury estates, which became private ones or were subject to agricultural and forester activity³⁸. All of it constituted in iron industry of the Kingdom in middle of the seventies a kind of vacuum, the more paradoxical that alongside with rapid — reforms introduction after 1864 — technical progress in agriculture, and just as quick textile or metal industry mechanization and the new railroad network construction — the iron demand was increasing. The vacuum to be fulfilled by foreign capitals³⁹.

³⁷ J. Jedlicki: Nieudana próba..., p. 201 et seq.; J. Łukasiewicz: Przewrót techniczny w przemyśle Królestwa Polskiego 1852 - 1886 (*The Technical Revolution in the Industry of the Kingdom of Poland 1852 - 1886*). Warszawa 1963, p. 48 et seq., p. 128 et seq.

³⁸ Compare with J. Pazdur: Górnictwo i hutnictwo Zagłębia Staropolskiego w połowie XIX w. (1846 - 1864) (*The Mining and Metallurgy of Old Polish Basin in the Mid XIXth Century — 1846 - 1864*). In: Kwartalnik Historii Kultury Materialnej 4/1956; J. Broda, H. Błaszyk: Wpływ rządowego górnictwa i hutnictwa na rozwój wczesnokapitalistycznej gospodarki w lasach górniczych Królestwa Polskiego (*The Influence of State Mining and Iron Plants on the Development of Early Capitalistic Economy in the Woodlands of the Minings of the Kingdom of Poland*). In: Roczniki Dziejów Społecznych i Gospodarczych 21/1959.

³⁹ About their influx into Kingdom, which took place in period not covered by this article, several interesting works have been published within the last ten years; especially refer to I. Pietrzak-Pawłowska: Rozwój stosunków kapitalistycznych w przemyśle Królestwa Polskiego 1870 - 1900 (zagłębia górniczo-hutnicze) (*The Capitalistic Relations' Development of the Kingdom of Poland Industry 1870 - 1900 — Mining-Iron Basins*). Published in: Wiek XIX. Prace ofiarowane Stefanowi Kieniewiczowi w 60 rocznicę urodzin. Warszawa 1967, where the author presents i.a. the influx forms' evolution;

CONCLUSIONS

The above illustrated development irregularity of the main metallurgy centres on Polish territories is striking. In spite of investments carried out in the Kingdom in the thirties, aimed to transform local iron industry to be similar to Upper Silesian model, the aim was not reached and ended in failure. The Upper Silesian metallurgy held definitely dominant position as far as size of production (in 1841 — 40,600 tons of pig iron compared with 6,200 tons produced by the industry of the Kingdom) was concerned, then the regularity of production increase and first of all, its technical and economic level providing the guarantee of holding firm position.

The production irregularity ensued from political partition of Polish territories and absence of own sovereign statehood⁴⁰. Prior to manufacturing industry establishment in Poland and before the manufactures reached production level close to that of Prussia, Saxony, Bohemia or Austria, before the interregional trade links formed the general market, Poland became a victim of the partition cataclysm. The old latifundian metallurgic centres producing only for local markets requirements found themselves within new state borders (it concerns to some extent also Silesia which passed under Prussian domination after 1741). The further development of the centres was continued in different economic and political conditions. The hitherto existing wider economic links were distorted by partition borders with the tendency of the partitioning powers to integrate Polish territories with the rest of their countries.

There were many factors which until the middle of the XIXth century (in some countries it lasted longer) slowed down technical revolution and industrialization process in all "east of Elbe" territories. These factors are known in literature of the subject, their genesis dates back from the turn of XVth and XVIth centuries, when a future division of Europe into commercial and industrial Western sector and agricultural supplying raw materials Eastern sector was outlined⁴¹. Poland's specific politic situation deepened and prolonged

and Z. Pustuła: Początki kapitału monopolistycznego w przemyśle hutniczo-metalowym Królestwa Polskiego 1882 - 1900 (*The Beginnings of Monopolistic Capitalism in Metallurgy and Metal Industry of the Kingdom of Poland 1882 - 1900*). Warszawa 1968, pp. 78 - 118 — who critically summed up researches done so far.

⁴⁰ The synthetic presentation of state role in East European industrialization is to be found in W. Kula's work: Przewrót przemysłowy. Historia i perspektywy. Klasyfikacja udanych procesów industrializacyjnych (*The Industrial Revolution. Its history and perspectives. The classification of successful industrial processes*). In: Kwartalnik Historyczny 70/1963, especially p. 9 et seq.

⁴¹ Ref. e.g. I. Pietrzak-Pawłowska: Industrializacja opóźnionych obszarów Europy w XIX i XX wieku (*The Retarded European Regions' Industrialization in the XIXth and XXth Centuries*). In: Kwartalnik Historyczny 75/1968.

the influence of these factors. When Germany and Russia undertook in 1870 some measures to speed up the growth of their industries, especially of heavy industry, the mining and iron industry in Polish territories belonging to them would be excluded from benefits of such a policy. It influenced the country negatively — causing delay in industrialization and in general economic development. On the other hand, it had also some positive aspects. The iron industry of the Kingdom and of Upper Silesia, rolled away from partitioning states' markets⁴², deprived of state orders, handicapped by railroad fares, exposed even on its traditional local markets to competition with the invaders' iron centres growing stronger and stronger every year — searched the compensation in neighbouring Polish territories, constituting thus, in spite of separating borders, circumstances for their integration⁴³.

Translated by:
M. SARAPUK

⁴² The common fate of the two metallurgy centres caused by attachment to different state bodies was already emphasized by W. Gliwie "as iron industry of Dąbrowa Basin was threaten by competition of better equipped iron works of Southern Russia, so Upper Silesia's iron industry development... was limited by competition from the side of rich Rhine-Westphalien Basin". *Polska w czasie Wielkiej Wojny 1914 - 1918. T. III: Historia ekonomiczna (Poland during the Great War 1914 - 1918. Volume III. The History of Economics)*. Warszawa 1936, p. 167.

⁴³ The beginnings of economic integration of Polish territories before 1914 also on the plane if individual branches of industry, being an essential researches' problem in our country's conditions was marked during the latest congress of the Polish historians. I. Pietrzak-Pawłowska: *Pozycja ziem polskich w międzynarodowej wymianie gospodarczej na przełomie XIX i XX wieku (The Position of Polish Territories in International Economic Relations at the Turn of the XIXth and XXth Centuries)*. In: VIII Powszechny Zjazd Historyków Polskich — 1958. T. IV: *Historia gospodarcza Polski*. Warszawa 1960, especially p. 387 et seq.; J. Żarnowski: *Procesy integracyjne w Polsce międzywojennej (Integration Processes in Interwar Poland)*. In: *Pamiętnik X Powszechnego Zjazdu Historyków Polskich w Lublinie 1968. Referaty cz. II*. Warszawa 1968, pp. 96 - 99.