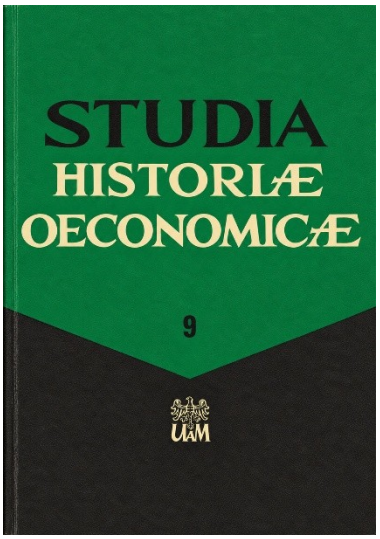


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FEATURES OF INDUSTRIALIZATION OF AGRICULTURAL COUNTRIES IN EUROPE
(up to 1918)

I. The industrial revolution in Western and Central Europe was a resultant of two systems of factors, viz., (a) international economic and social relations existing in the period of transition of single countries from late-feudal to capitalist relations; (b) external factors, viz., the development of the European market and the expansion of a universal pattern of the British technology; the latter will be extensively discussed in the present study[1].

Various attempts at classification have been made in universal historiography on the ground of the adaptation by other countries of the classic pattern of the British industrial revolution of the late 18th century. Technological criteria serve to divide countries into initiators and non-initiators of modern technology[2]. Economic criteria are applied to divide countries into: the group of advanced as a result of the first industrial revolution and the group of retarded agrarian countries. Chronological caesuras determining the period of technological revolution in the industry of various countries also determine the place of those countries in the order of technological and economic progress[3].

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[1] *The Cambridge Economic History of Europe.* Vol. VI (1 - 2) The industrial revolutions and after: incomes, population and technological change, ed. H. J. Habakkuk, M. M. Postan. Cambridge 1965. In the same work D. S. Landes characterizes the industrial revolution on p. 274.

The rich literature dealing with the industrial revolution in Europe (definitions, chronology, methods, advancement of studies) has been the subject of separate publications: E. Power, *The Industrial Revolution. 1750 - 1850. A select Bibliography.* London 1929; T. S. Ashton, *The Industrial Revolution. A study in Bibliography.* London 1937; W. Rusiński, *Pierwsza rewolucja przemysłowa z perspektywy dwóch stuleci* (The First Industrial Revolution in the Perspective of Two Centuries), Roczniki Dziejów Społecznych i Gospodarczych. Vol. 31, 1970.

[2] M. Daumas (dir.), *Histoire Générale des Techniques*; vol. I: *Les origines de la civilisation technique.* vol. II: *Les premières étapes du machinisme.* vol. III. *L'expansion du machinisme.* vol. IV: *La civilisation industrielle.* Paris 1962, 1965, 1968; M. Daumas, *Le mythe de la révolution technique.* Revue d'histoire des sciences, vol. XVI 1963 no 4; Cf. Ch. Singer, E. J. Holmayrd, *History of Technology*, vol. IV: *The Industrial Revolution c. 1750 — c. 1850*; vol. V: *The late nineteenth Century c. 1850 — c. 1900.* Oxford 1958.

[3] Cf. P. Mantoux, *The Industrial Revolution in the eighteenth century*, London,

All the mentioned attempts at classification are based on the principle of opposing to each other the conditions in which industrialization took place in the two zones of Europe. The aim of the present study is to analyse the correlations in the transformations of the economic structure of European countries in the period of their industrialization (up to 1918).

The first technological revolution no doubt marked the beginning of modern industrialization, that is, a dynamic development of industry attained by means of applying the pattern of the British technology and its later progress which guaranteed, with the help of investments, an intense increase of labour productivity and the growth of social income.

Industrialization based on new technology had a manifold effect on the transformations of economic and social relations in the 19th century. It helped to bridle natural forces and to transform natural environment in order to increase the amount of material goods; it brought in its wake technical improvements in production, transportation and exchange on world markets.

The main methodical lines of research have been outlined in the studies on the structure of industrialization. The microanalytic line of studies centred its attention on basic production units: enterprises, their management, development and structural transformations as the basic link in the study of the entire economy. Microanalysis has brought a substantial contribution to the studies on technological progress. But the traditional historiography of this type ("Firmengeschichte") is of a descriptive nature and does not result in making syntheses[4]. In the American "Business-History" an evolution of methods is seen, viz., efforts to make a wider-scope analysis of the function of the enterprise in the national economy[5].

Another methodical line: macro-analysis, was based on a complex analysis of development factors (i. e. qualitative changes) in the national economy; it assigned a predominant role to industrialization (sometimes as early as the 18th century).

Synthetic studies on the European industrial revolution as well as monographic studies on the industrialization of single countries have been more and more closely linked in the modern economic history with the use of quantitative methods.

The basic controversial problems in the studies on the industrial revolution in the countries of Western and East-Central Europe boil down to the fol-

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ed. 1964; T. S. Ashton, *The Industrial Revolution 1760 - 1830*, London, ed. 1968; A. L. Dunham, *La révolution industrielle en France (1815 - 1848)*. Paris 1953; Ph. Deane, *The First Industrial Revolution*. Cambridge 1965.

[4] "Tradition", Zeitschrift für Firmengeschichte und Unternehmerbiographie, 18. Jg.: 1973, dir. W. Treue (Göttingen).

[5] A. H. Cole, *Business Enterprise in its Social Setting*. Cambridge 1959. Cf. series of essays: *Explorations in Enterpreneurial History*, ed. A. H. Cole (Harvard University).

lowing problems:

1. the universal character of technological revolution (the British pattern) and the different internal relations to which it was adapted, as well as its different economic and social effects in countries situated in various zones of Europe,

2. the rate of technological revolution and the structure of industrialization, as criteria used in the classification of types of the economy in European countries,

3. the share of agricultural countries in the industrialization of the 19th century Europe; the chance for the acceleration of the rate of their technological progress and economic growth in the second half of the 19th century.

ad 1. A universal pattern of industrialization consisting in the launching of new technologies into practice, presented by W. W. Rostow at the First Congress of Economic History held in 1960, was a demonstration of the author's conception of five stages of growth; it was of a retrospective nature and approached the successive stages in a general way[6]. According to Rostow, the stage of maturing to a continuous economic growth is attained by societies after an earlier removal of the barriers of traditional economy. Western countries attained the stage of maturity for industrialization through internal accumulation of capital, and they began to launch technological progress in agriculture and industry. On the other hand, the "underdeveloped" countries took advantage of imported technological devices which were adapted to the local conditions, and they benefited from the participation of foreign capital in industrial investments and infra-structural investments (railways, power transmission, etc.).

The above mentioned theses have gained popularity in economic literatures, but they have also aroused reservations on the part of historians[7]. The latter look for different methodological solutions adapted to the studies on long-range developmental trends.

[6] W. W. Rostow, *Industrialization and Economic Growth.* In: Première Conférence Internationale d'Histoire Economique. Stockholm 1960, pp. 17 - 34; The same author, *The Stages of Economic Development.* New Haven 1958, or, in French translation, *Les étapes de la croissance économique.* Paris 1960.

The author distinguishes in general five stages of growth for all the countries: (1) a traditional society, (2) preliminary conditions for take-off, (3) the take-off during which brakes and barriers hampering regular growth are being removed, (4) progress towards maturity, lasting for about 60 years during which, along with the launching of new technologies into practice in all economic sectors, the national income continues to increase and the economic structure is more and more advanced, (5) the period of mass consumption which corresponds to the present abundance of production goods and the development of services.

[7] W. W. Rostow's ideas were confronted at the First Congress of Economic History with those contained in: V. Vilar, *Croissance économique et analyse historique*; D. Landes, *Industrialization and economic development in nineteenth century Germany*; P. Léon,

Economists, authors of several-stage development patterns, have formulated their theses on the ground of experience gained by the initiator countries and they approached the non-initiator states first of all as an area of industrial expansion of new technologies. (The respective terminology lays emphasis on factors acting as brakes on progress: barriers, thresholds, enforced technological progress, etc.).

It seems right to take into consideration two lines of development of technology in the non-initiator countries: (a) the evolution of the traditional technologies (use of tools) applied to exploit natural resources, and (b) the penetration of machine technology from outside, both as a result of its spontaneous expansion on the European market and owing to support granted by private enterpreneurs and the government of countries adapting foreign technologies. It should be added here that migrations of specialist engineers from the west to the south and east took place earlier than trade with investment goods; this was the result of bands on export and restrictions applied by Great Britain before the year 1842.

ad 2. At the Second International Congress of Economic History (1962) the range of observations was extended to embrace the retarded countries and new proposals were put forward related to the methods of studies. A. Gerschenkron presented alternative criteria of classification of the types of industrialization[8] according to the following eight features which are characteristic of technological progress:

— autochtonous or derived, — autonomous or forced, — concentrating on producers' goods or consumer goods, — occurring within an inflationary or a stable monetary environment, — involving merely quantitative changes or also far-reaching structural transformations, — proceeding continuously or discontinuously, — accompanied by progress in agriculture, or proceeding in conditions of agricultural stagnation or retrogression, — motivated primarily by economic or by political aims.

The above pattern relates to the macrostructure, i.e. the national economy; it is based on selected contrasting factors and envisages two opposed types of industrialization.

Economic historians have set themselves the aim of analysing many transition patterns; considerable progress has been achieved in this field in recent years, by means of co-ordinating studies on industrialization (with regard to the source base) and by popularizing quantitative methods. This is helpful

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L'industrialisation en France en tant que facteur de croissance économique; V. K. Jacuński, *Main features of industrialization in Russia before 1917*. Ière Conférence Internationale..., as above.

[8] A. Gerschenkron, *Typology of Industrial Development as a Tool of Analyses*, in: Deuxième Conférence Internationale d'Histoire Economique (1962 Aix-en-Provence). Paris 1965, pp. 497 - 505.

in combining micro- and macroanalytical studies, in making observations of long chronological trends and of cycle fluctuations, in observations of the dynamics and structure of correlated economic and social transformations.

An international conference on the industrialization of European countries in the 19th century, held in Lyons in 1970, was attended by a numerous group of specialists and this helped to consolidate regular working contacts. It also contributed to an improvement of comparative methods of study and extension of the spatial range of studies by means of including observations of local centres (industrial cities) and regional centres, and their classification on the scale of whole countries and zones of Europe[9].

A serious methodological gap in the studies on the industrial revolution and industrialization was the result of little interest taken in this problem by historians of technology. The initiative in this domain was submitted to the 11th International Congress of Science historians held in Warsaw in 1965, at which an association of researchers was set up, named International Cooperation in History of Technology Committee (ICOHTEC).

The successive international conferences of ICOHTEC held in France (Pont-à-Mousson) in 1970, and in Moscow in 1971, discussed the subject of adaptation of the British technological pattern by non-initiator countries[10]. The third conference, held in Jabłonna near Warsaw in 1973, focused its attention on the functions of modern technology in the acceleration of industrialization in less developed countries. The next conference, due to take place in Tokyo in 1974, is to discuss problems of transformation of less developed countries into leading ones in the 20th century.

Progress of studies on the history of industrialization in the early 20th century imposes the need of extending the range of observations so as to include non-European continents. All the more urgent is thus the establishment of close contacts between representatives of all countries concerned and of all historical sciences.

ad 3. The basic lines of studies on the technological revolution in East-Central Europe were marked by a trend towards the development of genetical analysis. It concerned the transformation of traditional technologies and production processes and systems (manufactures), the accumulation of financial means (by big landowners and businessmen), and the development of the home market (goods and labour markets). In the Polish history these factors were considered to be the premises for the development of capitalist industrial

[9] Colloque International: *L'industrialisation en Europe au XIX-me siècle. Cartographie et typologie* (Lyon 1970), publiés sous la direction de P. Léon, F. Crouzet, R. Gascon, ed. CRN, Paris 1973; Cf. *Publikationen zur Geschichte der Industrialisierung.* Einzelveröffentlichungen der Historischen Kommission zu Berlin. Bd. 1 - 6, Berlin 1960 - 1971.

[10] I^er^ Colloque International de l'ICOHTEC et CNRS: *L'acquisition des techniques par les pays noninitiateurs.* (dir. M. Daumas) Paris 1973.

economy based on own resources and allowing of continuous adaptation of new technological patterns (the British pattern)[11].

In the present stage of studies on the situation of retarded agricultural European countries in the 19th century, not only the observation of the removal of the barriers of traditional economy, but also of progress in the rational exploitation of natural resources acquires particular importance. Not less important is the analysis of the acceleration of the rate of launching new technologies into production by means of applying (after the year 1860) even more modern technologies than those represented by the British pattern (e.g. in the iron and steel industry)[12].

In the new German Marxist historiography J. Kuczynski put forth the thesis about the so-called Prussian road of industrial revolution in the agricultural countries of East-Central Europe. As regards the period of take-off for the industrial revolution he emphasized the decisive role of the state policy in the field of investments and protectionism, a policy of support for the technological revolution and mechanization. The author laid emphasis on the long duration of the industrial revolution which, according to him, continued up to the end of the 19th century; as a criterion of determining the end of this process he adopted the tendency towards harmony between the development of production forces in Germany and the changes in the structure of the capitalist society[13].

This thesis puts into relief the weight of the late-feudal ownership relations in agricultural countries situated east of the Elbe, in the 19th century. But it

[11] Among others W. Kula, *Szkice z dziejów manufaktury* (Essays on the history of manufactures) Part I (1728 - 1764), Part II (1764 - 1780), Part III (1780 - 1795). Warszawa 1956. *Badania nad dziejami przemysłu i klasy robotniczej w Polsce* (Studies on the history of industry and the working class in Poland) Vol. 1 - 7, Warszawa 1956 - 1968; G. Missalowa, *Studia nad powstaniem łódzkiego okręgu przemysłowego 1815 - 1870* (Studdies on the formation of the Łódź industrial region 1815 - 1870), Vol. I - II, Łódź 1965, 1967; Z. Kwaśny, *Hutnictwo żelaza na Górnym Śląsku w pierwszej połowie XIX w.* (The ron and steel industry in Upper Silesia in the first half of the 19th century). Wrocław 1968; J. Jaros, *Historia górnictwa węglowego w Zagłębiu Górnośląskim do 1914 r.* (History of Coal mining in the Upper Silesian Coal Basin up to 1914). Wrocław 1965.

[12] J. Łukasiewicz, *Przewrót techniczny w przemyśle Królestwa Polskiego 1852 - 1886* (Technological revolution in the industry of the Kingdom of Poland 1852 - 1886). Warszawa 1963; I. Pietrzak-Pawłowska (ed.) *Uprzemysłowienie ziem polskich w XIX i XX wieku. Studia i materiały* (Industrialisation of Polish territories in the 19 th and 20 th centuries. Studies and materials). Parts 1 - 3. Wrocław 1970; Ibidem, *Materiały do bibliografii historii przemysłu na ziemiach polskich* (Materials for the bibliography of the history of industry in Polish territories, 1815 - 1869).

[13] J. Kuczynski, *Zum Problem der industriellen Revolution.* Zeitschrift für Geschichtswissenschaft 1956 H. 3; Cf. different theses in the series: *Studien zur Geschichte der industriellen Revolution. Die deutsche Maschinenbauindustrie in der industriellen Revolution.* Veröffentlichungen des Instituts für Wirtschaftsgeschichte an der Hochschule für Oeconomie Berlin-Karlhorst. Bd. 1 - 2, Berlin 1960, 1962.

does not sufficiently take into consideration factors that accelerated the rate of the technological revolution in Germany and resulted in its quick industrialization. The thesis about the "Prussian road of industrial revolution" was criticized by many economists.

From the point of view of the present study it is interesting to see how Germany, from an "underdeveloped" country in the early 19th century, advanced to the group of highly industrialized states after the year 1870, although agriculture continued to be the leading economic sector in the eastern part of that country.

The internal diversification of the regional structure of agricultural-industrial countries in East-Central Europe and South Europe, has been studied by many research centres in Italy, Czechoslovakia, Hungary and Poland; reference to them will be made later.

II. Was the British pattern of technological revolution universal as regards its nature? In the historical studies on the industrial revolution and the industrialization process in the 19th century the reare still many problems to be solved[14].

Was the British pattern of technological revolution (in industry and transportation) the first pattern of a universal nature? Did it invariably function as the main driving force of the European industrial revolution in agricultural regions encompassed by industrialization in the second half of the 19th century?

The notion of the British technological pattern includes several elements, as has already been mentioned earlier. Mechanization of production was the decisive and universal factor. The period of experiments with the practical use of steam engine and the development of the engineering industry in the West European countries lasted until mid 19th century. The formation of a single complex system of technology and production and the popularization of the new technologies by means of applying them to produce over 50 per cent of total output of the basic production branches (in terms of quantity or value) has been adopted as the moment of the victory of the technological revolution. Its economic and social effects are analysed seporately as elements of the structure of industrialization.

Reference will not be made here to the controversial matter of quantitative criteria used to determine technological revolutions in the past and today. The notion "second technological revolution" has been applied here as a conventional notion to define changes electrification brought to the power supply system in the late 19th century.

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[14] M. Daumas, *La conception de la révolution industrielle*; *le mythe de la révolution industrielle*. In: Histoire générale des techniques, Vol. III, as above, pp. XIV - XVIII; C. Fohlen, *Qu'est-ce que la révolution industrielle*? Paris 1971. Ch. I: *Le cheminement d'une expression*. Ch. II: *Révolution industrielle et croissance économique*.

The features of the mentioned 19th century technological revolutions have been defined as follows by E. Olszewski from the point of view of the history of technology: The mechanization revolution, by means of applying new types of working machines and a new type of engine, viz., the steam engine (according to the British pattern) has changed the position of the worker in the process of production. On the other hand, the electrification revolution consisted in the launching of a new system of supplying power to productive machines, vehicles, for industrial chemical processes and also for the household equipment. The electrification of production has not changed the position of the worker but it has had an essential influence on the change of the living conditions; it paved the way to the development of means of communication and mass information media. So it played a truly "revolutionary" part in the shaping of social relations and civilization in the 20th century[15].

When watching the course and rate of the technological revolution one looks for a gauge (a predominant feature) that could be used as a criterion for the making of comparisons and determining the chronology and asynchronization of the period of study[16]. The indices of development of the mining and iron-and-steel industry which characterized the development of production forces in various countries, have been adopted as a point of departure. The results of a comparative analysis have revealed an accelerated rate of growth of these branches in the "underdeveloped" regions during the last 25 years of the 19th century. The same trend was also observed in the Polish territories, viz., in the province of Galicia after the year 1890[17].

The conclusions that can be drawn from the after-mentioned table serve as an argument in favour of the thesis that the accelerated rate of growth of production potential in mining was the result of the following factors: a simultaneous technological revolution in industry and transportation (increased demand for coal and iron) and the convergence of the dynamic growth of the iron and steel production with the so-called second technological revolution.

[15] E. Olszewski, *Od rewolucji naukowych i technicznych do rewolucji naukowo-technicznej* (From scientific and technological revolutions to a scientific-technological revolution), in: Człowiek i Światopogląd, no 11 - 12/1972.

[16] W. O. Henderson, *Britain and Industrial Europe 1750 - 1870.* Studies in British Influence on the Industrial Revolution in Western Europe. Liverpool 1954; D. S. Landes, *Technological Change and Development in Western Europe 1750 - 1914*, in: The Cambridge Economic History Vol. VI, as above; Cf. *Documents of European Economic History*, vol. I: *The process of industrialization 1750 - 1870*, vol. II: *1870 - 1939* ed. S. Polland and C. Holmes, London, year of publication not given; *Quellen zur Geschichte der industriellen Revolution*, ed. W. Treue, Göttingen.

[17] L'Acquisition des techniques par les pays non-initiateurs as above, papers: I. Pietrzak-Pawłowska and J. Łukasiewicz. Cf. J. Łukasiewicz, *Przewrót techniczny* Cz. Łuczak, *Przemysł Wielkopolski w latach 1871 - 1914* (The Industry of Great Poland in the years 1871 - 1914). Poznań 1960.

Table 1. Rate of production growth of power generating materials on the Polish lands in the years 1873 - 1913

Province	Average rate of growth	
	1873 - 1913	1873 - 1891
The Polish Kingdom	6.8%	9.8%
Upper Silesia	4.2%	4.8%
The Poznań Province	2.7%	8.6%
Galicia	3.3%	0.0%

Source: cf. List of basic statistical data in: a) *Uprzemysłowienie ziem polskich w XIX i XX wieku* (Industrialization of the Polish territories in the 19th and 20th centuries) Ed. by I. Pietrzak-Pawłowska, Warszawa 1970, pp. 41 - 55. b) The index of industrial output was prepared by the Commission of Industrial History at the Committee for Historical Sciences of the Polish Academy of Sciences, under the guidance of J. Łukasiewicz.

The technological revolution in the countries of Central Europe, started on the basis of the British technological pattern, attained a quicker rate of growth after the year 1880 owing to the adaptation of more modern technologies in the steel industry (the launching into practice of the Bessemer process, and later the Martin-Siemens and Thomas technologies).

Is it possible to determine not only the development trends but also the gap dividing various countries from the earliest industrialized west European countries in the 19th century as regards the industrialization of Europe?

The method of analysis of the asynchronization of technological revolution applied by J. Purś is based on a single factor, viz., progress in the use of steam engines and increase of their capacity[18]. In the light of such analysis characterizing the power system in industry it is possible to obtain apparently universal indices. Yet the accelerated rate of technological revolution is also associated with the period of the so-called second technological revolution in the power system; after 1880, its structure changed, because, alongside steam engines (the British pattern), modern engines were applied, driven by other power suppliers: gas and electricity (apart from internal combustion engines). Thus, in the period of the second technological revolution, i.e. after the year 1880, the criterion of technological progress was no longer limited to the quantitative growth of mechanical potential in industry and transportation, but also included the increased share of power generated by new sources of energy. The power transmission system at an inter-regional and national scale was connected with the use of power in new branches: telecommunications, public economy, etc. The dynamic rate of transformation of the power supply system in the late 19th century had a direct or indirect impact on the course of the industrial revolution in the countries of Central and South Europe.

[18] J. Purš, *La traction à vapeur dans l'industrie en tant que l'indice du développement dans cycles économiques au 19e siècle.* in: L'Acquisition des techniques par les pays non-initiateurs, as above; The same. *Przemyslova revoluce v českych zemich.* Praha 1961.

Various countries (Germany, Bohemia, Italy) took advantage of this chance of accelerating their economic growth, but to a different extent.

The problems of the so-called second technological revolution have been the subject of only few methodological and monographic studies[19].

Historical (source) investigation of the tranformation of technological and production systems in that period is still in its initial stage; it is necessary to establish a number of facts which will serve a motivation of final conclusions.

Putting aside arguments related to notions, emphasis is being laid here on the development of further studies on the conditions that fostered the acceleration of technological progress. Following this road, some industrially underdeveloped countries succeeded in catching up with the advanced ones and even took the lead in industrialization.

On the other hand, the intensified rate of transformations in the power supply and transmission system and the quick growth of production in modern industrial branches changed the distribution of production forces all over Europe, Germany outpaced Britain and France. The geography of leading industrial centres and of the trends of expansion of modern technology has changed[20].

The attempts discussed earlier to apply criteria based on a single factor of changes, viz., the rate of growth of mechanical production forces, suffice to make observations of general trends of the first technological revolution. They can result in the fixing of exact chronological caesuras of the revolution and distinguishing at least two stages of the revolution, viz,. the first, experimental stage, i.e., the launching of various mechanical production technologies into practice (machines, steam engine and mineral fuels). The second stage, which marked the peak of the technological revolution, was characterized by the taking of the upper hand by machines in the basic production branches (over 50 per cent of the total output was produced in machine-operated plants). The table below shows the position of the countries that adopted new technological patterns in the second half of the 19th century. The rate of growth of industrial production in the Polish territories in the years 1870 - 1913 was sometimes even higher than in the countries bordering on Poland.

The first technological and mechanization revolution, with its economic and social effects, was the essence of the industrial revolution in the initiator

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[19] H. Pastermadzjan, *La deuxième révolution industrielle*, Préface par A. Siegfried, Paris 1959; P. Horská-Vrbova, *Česky prumysl a tak zvaná druhá prumyslova revoluce*, Praha 1965.

[20] W. O. Henderson, *The Industrial Revolution of the Continent: Germany, France, Russia 1800 - 1914*. London 1961. A. L. Levine, *Industrial Retardation in Britain 1880 - - 1914*. N. York 1967. R. Romeo, *Breve storia della grande industria in Italia*. 3 ed. Bologna 1972.

Table 2. The rate of growth of industrial production in the Polish territories and in some European countries in the years 1870 - 1913 (annual growth in percentages)

Country	Annual increase	
	total	per capita
The Polish Kingdom	5.3	3.5
Russia	5.0	3.5
Hungary	4.2	3.5
Austria	3.9	3.1

Sources and elaboration as in Table 1. b. The indices of industrial production have been based on 20 indices in five branch groups: mining, iron-and-steel industry, metal industry, textile industry, and food industry.

countries. In the second half of the 19th century, after the victory of liberal economic policy in international market relations, industrial revolution spread over the whole of the continent through trade exchange of investment goods and the exploitation of natural resources and labour in agricultural areas[21].

When interpreting the industrial revolution, historians emphasize its complex nature: the correlation and relative chronological concurrence of technological, economic and social transformations. In the retarded regions of Central and South Europe the concurrence of the above three factors was less striking, the rate of transformations of technological and production system was ahead of changes in the economic and social structure.

III. Differentiated structures of industrialization, their typology

The European industrial revolution marked the beginning of modern industrialization, encompassing not only the sphere of industrial production, but also the development of infra-structure (transportation, communications, town planning), and of modern civilization[22]. Progress along this road was diversified both inside the western countries and in South and Central Europe.

[21] P. Mathias, *The First Industrial Nation. An Economic History of Britain 1700 - - 1914.* London 1969; Cf. Ph. Deane, W. A. Cole, *British Economic Growth 1688 - 1959. Trends and Structure.* Cambridge 1960; As regards countries of Central and South Europe cf. W. Kula, *Some observations on the Industrial Revolution in Eastern Countries*, Ergon 1958; S. G. Strumilin, *Promyshlennyi perevorot v Rossii.* Moscow 1944; P. P. Liashchenko, *Istoria narodnovo khozyaystva SSSR.* Vol. II *Cepitalism.* Moscow 1952; V. I. Bovykin, *Problèmes de l'histoire de la révolution industrielle, des crises et des banques en Russie.* Histoire des entreprises 1959 no 4. K. N. Tarnovskiy, *Sovetskaya istoriografiya rossiyskovo imperializma.* Moscow 1964. Cf. critical review of historiography on the same subject in: Voprosy Istorii, 1957, fasc. 4; I. N. Olegina, *Industrializatsiya SSSR v angliyskoy i amerikanskoy istoriografii.* Leningrad 1971.

[22] M. Daumas formulated the following definition from the standpoint of historian of technology: "Quand nous parlons d'industrialisation nous entendons aussi bien l'apparition des procédés de production moderne que l'implantation des chemins de fer ou la distribution du courant électrique; l'industrialisation s'est faite par des emprunts de façon

In agricultural countries of Central Europe there were specific conditions and mode of industrial revolution in the second half and at the end of the 19th century: (1) the process of popularization of the classic pattern of the British technology on the base of internal accumulation (extensive industrialization) and (2) penetration of modern technology and power supply connected with an infiltration of foreign capitals (intensive industrialization). Below is an analysis of these conditions (both heterogeneous and exogenous).

In connection with the progress of spatial concentration, big industrial and urban agglomerations with highly developed technical and economic structures were formed, while traditional forms of agricultural economy continued to exist in other regions.

The putting into relief of a single universal factor does not suffice, according to the present author's opinion, to characterize industrialization as a complex process encompassing technology and production as well as economic and social problems. Thus a search for complex criteria encompassing several factors seems justified.

An analysis of industrial branch structure was thus applied in the classification of economic changes in the process of industrialization and in distinguishing types of industrialization. In agricultural countries of Central Europe the types of industrialization were determined on the basis of industries based on the local natural resources (plant or mineral raw materials).

A. The type of industrialization in which agricultural and food industry predominate, has been presented on the example of Hungary. A comparative analysis with other countries served as an argument motivating the general thesis that this type was characteristic of the industrialization in the countries of East-Central Europe[23]. This thesis has often been expounded in economic literature and supported by the argument that, e.g. the land rent was one of the sources of accumulation in the period of correlated development of agriculture and early capitalist industry. As a result of technological revolution certain lines of the food industry, e.g. the sugar industry, developed export production.

B. The type of industrialization with the predominant function of the textile industry based on the home raw material (wool) and traditional genuine technology became the basis for the formation of many developed industrial

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suffisamment complète pour que le pays en question prenne rang à son tour de pays initiateur". In: Histoire Générale des Techniques Vol. III p. XVI. It is difficult to agree with the last thesis.

[23] *Social-Economic Researches on the History of East-Central Europe.* Studia Historica Academiae Scientiarum hungaricae Vol. 62, Budapest 1970: J. T. Berend-Gy. Ránki, *Nationaleinkommen und Kapitalakkumulation in Ungarn 1867 - 1914*, pp. 11 - 34; L. Katuš, *Economic Growth in Hungary during the Age of Dualism (1867 - 1913). A Quantitative Analysis*, pp. 35 - 127.

regions in agricultural countries. The production economy based on commercial capital later became closely linked with the European market. In the period of technological revolution a predominant position was taken by the modern cotton industry based on imported raw material, along with the wool industry (carded wool). Big industrial textile regions, e.g. the region of Łódź in Poland, attained a highly advanced economic structure and joined in the system of international exchange.

The above two types of industrialization were considered extensive, that is, absorbing the surplus of labour in agricultural countries and sometimes it was maintained that they satisfied the needs of economic growth in the respective areas also in the early 20th century[24].

C. The type of industrialization based on the exploitation of mineral resources developed in the southern regions viz., in the foot-hills of the Carpathians. The mining and the iron-and-steel and non-ferrous metal industries were created there and developed very quickly; when the manorial ownership rights to mineral resources had been abolished (1865 - 1870), they became a base of power generating raw materials (coal) and of the iron-and-steel and non-ferrous metals industries. The countries that were exploiting mineral resources of Silesia (Prussia, Bohemia, Poland), could pass from the production of consumer goods to the production of investment goods in the period of technological revolution.

The transformation of the industrial branch structure and transition to the stage of development of the production of investment goods coincided in time with the stage of the so-called second technological revolution (which took place after the year 1880). The rate and effects of structural transformations depended, however, on general economic and social relations and the international market relations.

The after-montioned table characterizes the structure of industry in the ethnically Polish territories, attained on the eve of the First World War. Nearly all over the area taken as a whole employment in the heavy industry (mining, iron-and- steel and non-ferrous metals, and metal industries 37.1 per cent in all) was predominant. This was the result of the high rate of employment in the heavy industry in the province of Silesia (47.8 per cent).

On the other hand, as regards industrial structure, various Polish provinces considerably differed from each other; Silesia was predominantly a region of mining, iron-and-steel and metal industries; in Galicia, the high employment in the oil industry and metal industries was a counterbalance to the employment in the food industry, which was predominant in the earlier period. In the

[24] P. George, *L'économie de l'Europe Centrale, slave et danubienne*, Paris 1949. P. N. Rosenstein-Rodan, *Problems of Industrialization of Eastern and South-Eastern Europe.* The Economic Journal 1943 no 3. Cf. C. Colin, *The conditions of economic progress.* London 1957. G. Myrdal, *Economic theory and underdeveloped regions.* London 1963.

Table 3. Industrial branch structure in the Polish territories according to employment in the years 1907 - 1911 (in percentages)

Industries	The Polish territories (whole)	Provinces			
		Silesia	Poznań and Pomerania	Polish Kingdom	Galicia
	1907 - 1910	1907	1907	1911	1910
Mining, iron and steel	19.3	31.7	2.6	13.0	13.5
Metal	17.8	16.1	28.8	13.2	18.7
Textile	22.6	16.0	7.1	46.2	6.7
Food	10.5	8.7	11.8	10.6	16.3
Other industries	29.8	27.5	49.7	17.0	44.8
	100.0	100.0	100.0	100.0	100.0

Sources and explanations concerning areas: cf. *Uprzemysłowienie ziem polskich w XIX i XX wieku* (Industrialization of the Polish territories in the 19th and 20th centuries). Studia i Materiały, Wrocław 1970, Table 3, p. 104.

Polish Kingdom during the whole of the second half of the 19th century and the early 20th century, employment in the textile industry was predominant (in the Łódź, Częstochowa, Żyrardów, Zawiercie and other textile regions).

The observation of the progress attained in industrialization after the technological revolution in the 19th century provides examples of the evolution of industrial branch structure. The characteristic feature of that period was the penetration of foreign capitals to the mining and the iron-and-steel and non-ferrous metals industries and to the modern industrial branches[25].

The high rate of growth of the iron-and-steel and metal industries in the "underdeveloped" countries suggests that it is necessary to revise the generally adopted opinions about the mono-structure of agricultural and food industry in the countries of Central and South Europe[26]. The share of the mentioned basic industrial branches in the total industrial output of those countries characterizes the type of their industrialization in the early 20th century.

[25] M. Lévy-Levoyer, *Les banques européennes et l'industrialisation internationale dans la première moitié du XIX*e *siècle*. Paris 1964. A. Gerschenkron, op. cit., p. 499, gave general criteria of transition of retarded countries to intense industrialization (as pattern D) in six points: (1) the rate of take-off, (2) priority of the production of means of production over consumer goods, (3) higher degree of concentration, (4) pressure on the level of consumption of the population, (5) limited share of agriculture in the economy, (6) active part played by banks and the state policy in industrialization.

[26] Cf. H. Mauersberg, *Deutsche Industrien im Zeitgeschehen eines Jahrhunderts*. Stuttgart (1966); G. Mari, *La rivoluzione industriale*, Studia storici, VIII, 1967. R. Morandi, *Storia della grande Industria in Italia*. 1931; G. Luzatto, *Storia economica dell'éra moderna e contemporena*, vol. 1 - 2, 1952; J. Skolar, *Geschichte der oesterreichischen Industrie und ihrer Förderung unter Kaiser Franz I.* (Vienna) 1914.

The share of agricultural countries in the European industrial revolution in the 19th century was manifested not only in the indices of their technical and industrial production potential. Their function in the general division of labour in the European market and the exploitation of their natural resources, became a factor of economic growth of western Europe as well.

The progress of industrialization achieved by the mentioned countries is a proof that the range of influence of the European industrial revolution encompassed the whole of Europe, and those countries were transformed into agricultural-industrial. But their transition to a more advanced economic structure in the period of the so-called second technological revolution was checked by the outbreak of the First World War. Sn the areas from which production equipment was removed and transported en masse to other regions in the years 1914 - 1918, as was the case over the Polish territories, an economic retrogression took place in the years of war.

At the threshold of the 20th century, the amount of goods produced by the industrial economic sector, constituted the most essential part of the social income, the latter being regarded as a synthetic criterion of the economic growth of the respective country.

Comparative studies in this domain were started by historians in those countries, in which necessary statistical data are available. In the light of an analysis of the structure of social income in selected countries historians have demonstrated the economic results of the division of labour which was the result of the industrial revolution in different zones of western, central and southern Europe.

A further analysis of the structure and level of the social income in different parts of Europe requires that the population structure and relations are also taken into consideration.

The rate of population growth in Europe was on the average 51 per cent over the whole of the second half of the 19th century; it was above this mean value in the central zone (53 per cent) and in the north (57 per cent), and particularly in the east (83 per cent). On the other hand, the population increase was much below the mean in the industrialized regions of western Europe (32 per cent) and in south-western Europe (37 per cent). The above trends explain the differences in the social conditions of industrialization in the developing countries[27]. Also per capita statistical data which illustrate the relation of the level of social income in western Europe to that in the remaining part of the continent, must be explained and commented.

[27] Cf. I. Pietrzak-Pawłowska, *Industrialisation des territoires européens arriérés au XIX*e *siècle*. Studia Historiae Oeconomicae, vol. 3, 1968, Poznań 1969; Cf. *Social-Economic Researches on the History of East-Central Europe*, as above; E. A. Hobsbawn, *Révolution industrielle et vie matérielle des classes populaires*, Annales ESC 1962, no 6. L. H. Parias (dir.), Histoire Générale du Travail, vol. III - IV, Paris.

The quick population growth in the mentioned zones of Europe caused a surplus of manpower on the labour market and the emigration of the most productive groups of the population to the western industrialized regions. The unsettled balance: increased labour supply and the surplus of the demand on the market for the consumer goods, were the specific features of industrialization in the agricultural countries which were the subject of the present study.

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