

Cotton Matters. A Recognition and Comparison of the Cottonopolises in Central-Eastern Europe during the Industrial Revolution

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¹University of Lodz,
Faculty of Economics and Sociology,
Department of History of Economic Thought
and Economic History,
Lodz, Poland
* e-mail: kamil.kowalski@uni.lodz.pl

²University of Lodz,
Faculty of Economics and Sociology,
Department of Regional Economics
and the Environment,
Lodz, Poland

Abstract

The paper identifies the cities in Central-Eastern Europe which were often called Manchesters in the past, because of their similar path of development and the concentration on cotton production in the 19th century in the period of the industrial revolution. The significance of the cotton industry is underlined in the growth of the cities. Following Eric Hobsbawm's thesis, cotton is treated as the textile symbol of the industrial revolution. That is why the cities' comparison includes the role of geography, institutions and technology, which were conducive for cotton production. We claim that cotton production was decisive for the real "take-off" of these cities, and at the same time it was the institutional factor that conditioned the economic development. The primary measure is population change over more than 100 years in 5 Cottonopolises: Manchester – the original one, Chemnitz, Lodz, Tampere and Ivanovo.

Key words: cotton production, textile cities, Manchester, Chemnitz, Lodz, Ivanovo, Tampere.

Introduction and identification of the cities

Cotton was already a popular raw material for fabrics in ancient civilizations, but the conversion of raw cotton into fabric was time-consuming, labour intensive and the finished products were eventually very expensive. Only the wealthier groups in society could afford to buy cotton products. The situation started to change slowly in the 17th century in England where a new fabric – fustian – appeared. The producers of this new fabric decided to concentrate in the area of Manchester. The choice of the place was not random. One of the significant incentives for them to settle down was the suitable climate for the conversion of cotton into fabric. The humid air made the thin fibers of cotton stick together as they were spun into thread. However, the climatic conditions were not sufficient to give the English county of Lancashire and the city of Manchester a comparative advantage over India, where the cotton textile industry also functioned well, and where labour costs were much cheaper. Another strong incentive for the development of the new branch of industry was of an institutional nature. It derived from imposing or prohibiting new laws, regulations and tariffs. Finally the last piece of the puzzle of the real industrial revolution connected with cotton was mechanisation. Due to the appearance of new inventors, patents and inventions, labour costs could be reduced, and the advantage started to grow.

Hence we claim that geography, institutions and technological progress were the three main driving engines for the boom of the textile industry in England at the end of 18th century. Simultaneously the combination of these three factors led to favorable conditions in particular towns and cities. In the case of England, the best location factors for the cotton industry could be found primarily in Manchester. Thus we treat this city as the benchmark of the cotton industrial revolution in the whole of Europe.

The above mentioned factors played a key role in leading to the "take-off" of the cities, the subject of our research. It should be stressed. However, that the influence exerted differed. We claim that among the geography, technology and institutions, the last was of the biggest importance. While technology enabled economies of scale and high efficiency in textile production, and geographical factors decided about the benefits of access to water, energy and transport infrastructure in still a relatively large number of locations, institutions which were locally-specific limited this number to just a few. This assumption, typical for institutional economics, leads as to claim that specific social, relational or cultural conditions do indeed cause differences in the economic performance of not only enterprises and nation states but also cities and regions [1]. Such an institutional approach has much to offer to the analysis of our cities' development. This "place-focused" discourse can be consid-

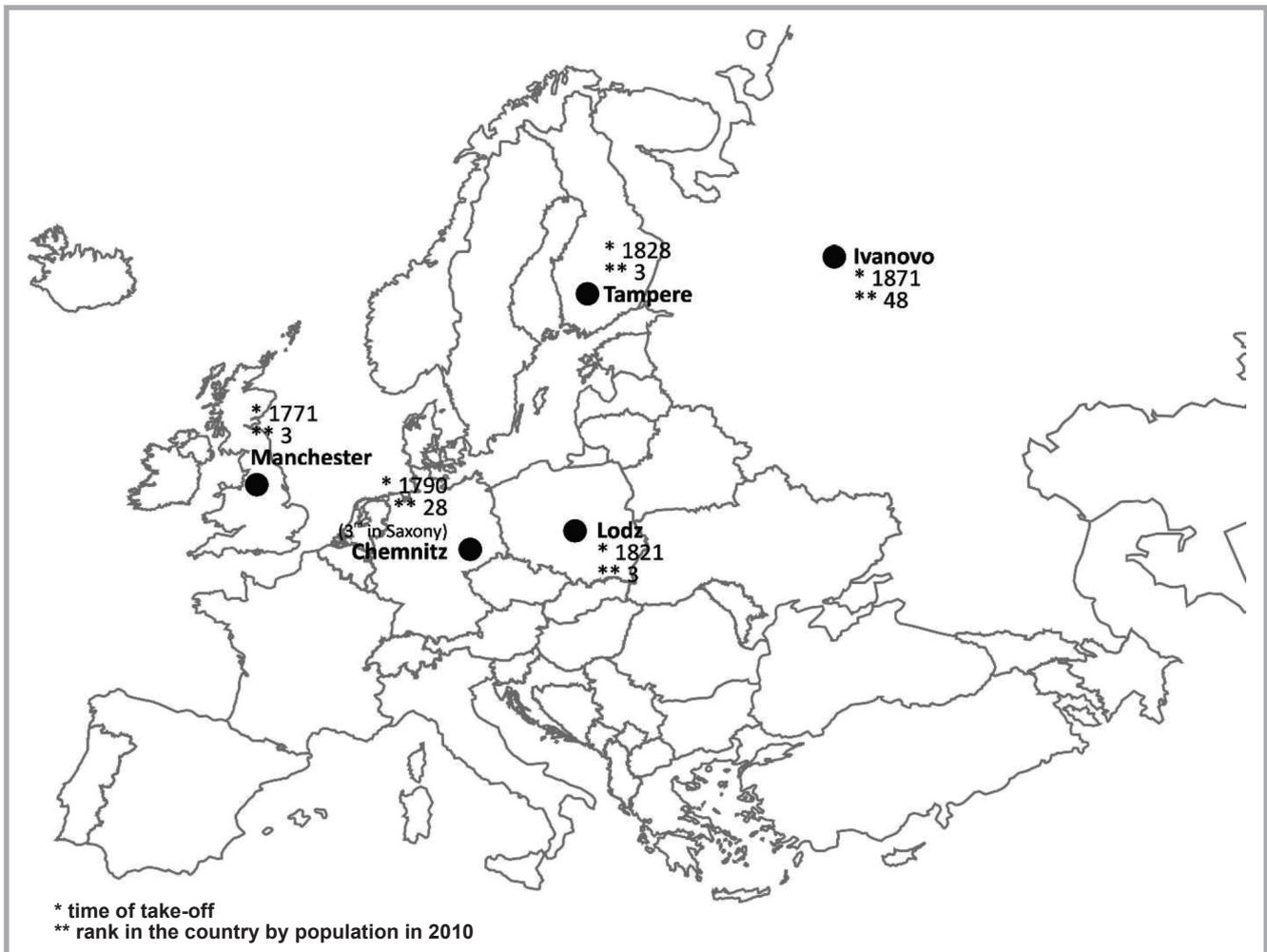


Figure 1. Location of the Cottonopolises studied (2018 borders). *Source:* Own study.

ered as the quintessence of the marriage of institutional local development approaches [2].

On this basis, we formulate a thesis that locally embedded institutional factors were key ones for the “take-off” and for the long-term development of such textile cities as Manchester, and its followers – Chemnitz, Lodz, Tampere, and Ivanovo. Such specific institutional arrangements are non-modifiable and hardly transferable, as they are rooted in the regional institutional environment [3]. In our case, such institutional arrangements as duties, tax exemptions and other pro-entrepreneurial legal regulations were consequent adaptations to economic changes in the 19th century in and also as a result of a conscious policy aimed at promoting the industrialisation of selected regions.

The subject of our studies are cities specialised in industrial textile production, with Manchester is a city-symbol of the industrial revolution and the development of the textile industry around the

world. It also used to be called a Cottonopolis or Cotton City, as cotton was the main raw production material. The name of Cottonopolis first appeared in a local newspaper (“The Manchester Times”) in the mid-19th century. From that point on, a few other European cities were informally baptised “Manchesters” due to their economic specialisation in cotton production. Their development can be compared with the development of the original Cottonopolis. In the case of Central-Eastern Europe (CEE), we recognised four such cities: 1. Chemnitz in Germany, 2. Lodz in Poland, 3. Tampere in Finland and 4. Ivanovo in Russia.

The aim of the paper is to recognize and compare the similarities and differences in the geographical, institutional and technological factors of these cotton textile centers in CEE. We identify to what extent these cities are similar to the generic Manchester and to what extent their development paths outperformed this benchmark due to their embeddedness in the local context. We also claim that

the institutional factor together with their local embeddedness played a key role in the “take-off” of these cities.

In the next section, we present a description of the subject of the study and the methodological approach. After presenting Manchester’s driving factors of development, we compare the situation in CEE cities by pointing out the similarities and differences in geographical, institutional and technological terms. Finally we present the dynamics of population growth in Manchester, Chemnitz, Tampere, Lodz and Ivanovo, and by using Walter Rostow’s approach, we identify the population “take-off” moment to compare it with the different turns that cotton took. The last section concludes.

Subject of the comparative studies

We compare the cotton centers mentioned with Manchester, and additionally the four CEE Cottonopolises with each other.

Table 1. General historical characteristics of the 5 case study cities. *Source:* Own elaboration based on Eurostat, Destatis, National Land Survey of Finland, National Land Survey of Finland.

	Manchester	Chemnitz	Lodz	Tampere	Ivanovo
Population during industrial revolution (1910)	714.000	281.000	450.000	45.500	140.000
Current population (2017)	549.000	246.000	690.000	234.000	406.000
First symbolic "take-off"	1771	1790	1821	1820	1871
Second "take-off"	1820	1870	1870	1870	1900
Leading founders of the industry	Richard Arkwright	Johann Esche	Ludwik Geyer, Traugott Grohman, Karl Scheibler, Israel K. Poznański	Carl Samuel Nottbeck, Georg Adolf Rauch, James Finlayson	Grigory Butrimov, Ivan Grachev, Ivan Yamanovsky, Ivan Garelin, Osip Stepanovich Sokov

Referring to Eric Hobsbawm’s statement “Whoever says Industrial Revolution, says cotton” we find all of the places studied as pure examples of industrial cities [4]. Unlike other places, where one industry did not dominate on such an extraordinary scale, these Cottonopolises were created and developed around industrial production principles in terms of economic, social and spatial terms, *Figure 1*.

Hence we focus on the fundamental conditions of the development of Manchester and, subsequently, Chemnitz, Lodz, Tampere and Ivanovo. The structure of our analysis is concentrated around three axes referring to the geographical, institutional and technological perspectives. As far as the methodology is concerned, we use critical content analysis based on the desk research of original scientific and historiographic materials from Great Britain, Germany, Finland, Poland and Russia. As the linking element, we use a comparative analysis, treating Manchester as a role model and the other CEE cities as “followers”.

■ Comparative analysis results

Manchester as a role model

The geographic conditions in Manchester were favorable for the development of industry of any kind. However, its location and water links predestined these areas particularly for the location of textile enterprises. The city was located midway between Liverpool and Sheffield, and its river network of the Irwell, Medlock, Irk and Mersey (including canals) made water power exploitation effective. The climate was also conducive to cotton production. The latter was imported from North America, and here the proximity of Manchester to the port of Liverpool was crucial, *Table 1*.

However, these geographical factors were not sufficient enough for the ex-

traordinary development of Manchester. What accelerated the textile industry’s development was the institutional (legal and administrative) arrangements set up at the beginning of the 18th century. Firstly there was economic protectionism, which took the form of tariffs and prohibitions on the importation of foreign cotton textiles. Secondly the decision of one of the first great inventors of the textile industry, Richard Arkwright, in 1771 to set up his first manufactory in his home village of Chorley, near Manchester, was supportive. Due to the imitation effect and agglomeration economies, other factories utilising the same geographical advantages quickly spread nearby. Last but not least, institutional support came from the lowering of wheat import tariffs by the Manchester authorities, which led to a decline in food prices and wages, preventing labour from relocating to the Continent and moving from agriculture into industry [5].

The last important progress was of a technological nature. Technological advances and a rash of inventors who perfected the system of cotton processing led to a reduction in production costs and an increase in its scale to an unprecedented level. In the 1730s, a rudimentary spinning jenny was patented which accelerated the difficult task of spinning cotton fiber. Subsequently, in 1769, Arkwright popularised the water frame, which drew out and spun threads of cotton strong enough to be used as the warp – the long thread – in weaving cloth [6]. In consequence, till the 1830s, cotton products belonged to the most valuable exported English products, and the Cottonopolis nickname popularised Manchester worldwide.

Geography of cotton

The impact of geographical factors on the development of Lodz is linked to its specific history. Its development did

not proceed gradually but by booms and slumps. Metaphorically one might talk about two births of the city. The first one was in 1423, when Lodz received the city charter. The second one appeared in the 1820s and was linked with the decision of the authorities of the Kingdom of Poland (KP) to designate Lodz as a new industrial centre [7].

The terrain where Lodz lies is situated on the watershed of the Vistula and Odra rivers – the two biggest rivers flowing through Poland. In the Middle Ages, it was an important barrier for agriculture (drainage basins). The town area was crisscrossed only by rivulets and brooks that flow into the tributaries of these rivers. Also the lack of fertile lands and valuable natural resources, as well as the long distance from important transportation routes and administrative centres, made Lodz an economically and politically insignificant settlement. However, at the beginning of the 19th century, small and never-freezing water courses proved to be a very effective energy source for watermills driving textile machines [8]. The streams provided the high-quality water necessary for the production of woollen, linen and cotton cloth [9]. Also it was not surrounded by heavily used agricultural areas but unexploited forests, which facilitated the easy planning of new city grids and city plots of a regular size and shape. More importantly, they provided unlimited access to wood as a cheap fuel and building material [10].

Another CEE Cottonopolis, Chemnitz was granted city status in 1165 from Friedrich Barbarossa. Here textile manufacturing became the city’s most important industry, along with other specialisations: long-distance trade and the mining industry. A considerable trade in woolen and linen yarns was attracted to Chemnitz due to the monopoly of bleaching that was granted to the town [11]. In

the case of Chemnitz, the most important geographical factors for the cotton industry were the streams (e.g. the Chemnitz river) as energy sources as well as the neighboring valley meadows, which could serve as bleaching areas [25]. Also the proximity to many nearby villages made it possible to find local producers willing to cooperate.

Finnish Tampere, founded in 1779 by Swedish king Gustavus III, was located on an isthmus between two lakes, the Näsijärvi and the Pyhäjärvi, connected by the Tammerkoski rapids, with a fall of 18 meters. The rapids were the defining geographical feature of Tampere as they provided a favorable location for a town. Before obtaining the town charter, the main occupation of the nearby rural people was salmon fishing.

Finally, Ivanovo was a small village till the beginning of the 19th century. The town formally received city rights in 1871. It was located on both banks of the Uvod River, encompassing two villages – southern Ivanovo and northern Voznesensk. The amount of wood and the convenient water links were very important geographical factors conducive to the development of this type of industry. Ivanovo was relatively close to Moscow, and at the same time, it quickly developed connections to eastern Russia, where potential internal and external markets were located. The climatic conditions were similar to Tampere. All environmental features were good for building new cotton mills.

Institutions for cotton

The opportunities of Lodz grew in 1815 after the creation of the Kingdom of Poland (KP), which was the outcome of the end of the Napoleonic wars and the decisions made at the Congress of Vienna. It meant that the Lodz region, which had formerly belonged to Prussia, became a part of the KP – dependent on Russia but with autonomy in many matters, including some economic policy aspects. Changes of frontiers resulted in cutting economic connections with German Prussia, and the textile industry in the KP had not been developed well enough to quickly increase its capacity so as to benefit from the unsatisfied demand. It created a necessity to provide a supply of textiles' on the eastern side of the new border. The decisive moment for Lodz's history took place at the beginning of the

1820s when the Governmental Commission on Internal Affairs and Police of the KP created a factorial settlement in this city. In July 1820, Lodz was pointed as the future centre of the textile industry. On behalf of the government, the chairman of the Commission of Mazowiecki Voivodship (part of KP), Rajmund Rembieliński, made an inspection and prepared a report that listed the advantages of Lodz [12]. These included favourable ownership (proximity of a vast governmental area near the city), the hydrographic conditions – the presence of numerous swift streams, ready wood supply, and its convenient location near the main routes [13]. The acceleration of cotton production came in two stages in the following years: the first thanks to the removal of the customs border with Russia in 1851, and the second after the resources crisis in the mid-1860s caused by the Civil War in the USA.

One of the most important institutional factors decisive for Lodz's long-term growth in the nineteenth century was the role of the German and Jewish minorities. A settlement decision made in the 1820s allowed the cities to designate certain districts for Jewish populations. Lodz imposed such a rule in 1825 and, as a result of this, this minority group was forced to move to a designated urban area. In 1862 Tsar Alexander II signed a bill that gave equal civil rights to all residents, and this decree gave members of the Jewish community the right to vote and stand for elections to municipal and county government positions. As with the prior Prussian regulations of a half-century earlier, closed areas were no longer closed, and access to corporate trade and crafts was open to all. Subsequent laws abolished the additional taxes and allowed Jewish people access to new professions [14]. Before the abolishment of the discriminatory legislation, the Germans were the most active economic agents. Once the playing field was levelled, the Jewish contribution to technological change was as large or even larger than that of the Germans (not to mention the other ethnic groups).

Chemnitz's history does not have such spectacular institutional milestones as Lodz does. In terms of the political economy, one should realize that from the mid-1780s onwards, Saxon textile manufacturers had to challenge the tendency of the governments of France, Austria and Russia to limit the import of Saxon

commodities (by closing their markets to cotton commodities or by imposing high duties). Furthermore Poland, an important market for Saxon traders, was under partition between 1772 and 1795, which significantly hampered business. On the other hand, many renowned instructors moved to Saxony due to the Napoleonic continental blockade, which excluded English cotton from competing for years in Europe.

Substantial progress in the development of the textile business was made after 1834 when Saxony joined the German Zollverein, which meant that a huge domestic market opened up for Chemnitz textile manufacturers. Only then did Chemnitz cotton spinners enjoy a minimum tariff protection (charges based on weight). It is significant that earlier there was virtually no protection policy for Saxon manufacturers, while their rivals enjoyed some state support (especially after 1815). The rapid industrialisation in the 19th century was supported by the early construction of railways. In 1852, tracks between Chemnitz and the Elbe port at Riesa were laid, which was a crucial connection, as from then on commodities were able to reach the world market, sent down the river, via Hamburg's port. It also enabled traders to reach two important Saxon cities: Dresden and Leipzig.

The institutional track record of Tampere resembles that of Lodz. In particular, they enjoyed a relatively longer span of freedom than other parts of the Russian Empire. In 1779, Tampere was founded as a "free city". That meant that every man was free to move in and start an enterprise. Among the many chartered privileges (such as lowered taxation), the most important one liberated the city from guild regulations. The townspeople were completely forbidden from taking part in agricultural activities [15]. The crown hoped to make Tampere primarily a center of iron production. Iron ore was expected to be found in the lakes and be smelted in furnaces fueled by the charcoal available in the surrounding forests. Luckily for the future development of the city, the "iron direction" failed.

Finland moved to Imperial Russia from the Kingdom of Sweden. Although Finland became a Grand Duchy after the Finnish War of 1808-1809, Swedish legislation stayed in force. Tsar Alexander I even reinforced the privileges of the

Table 2. Largest textile enterprises in Lodz (1857). Source: [29].

Enterprise	No. of workers	Production in roubles	No. of engines	Engine power in total (HP)
L. Geyer spinning mill	546	297.900	3	120
K. Scheibler spinning mill	115	206.100	1	60
J. Peters wool spinning mill	145	154.320	1	12
L. Fesser printing and dyeing plant	100	98800	1	10
D. Lande cotton spinning plant	162	94995	1	30
T. Grohman cotton spinning plant	103	81665	1	18

city (*Privilegium Tammerfors*), and it was possible to export and import industrial raw materials without state customs duties. Initially there were no capitalists in Tampere who could take advantage of these benefits – until Scottish engineer James Finlayson came to city in 1820. In this way, the industrialisation of Tampere depended on foreign businessmen [16]. Finlayson formulated a petition to the tsar in which he asked for the implementation of his plans for industrialization. The plan included a foundry for manufacturing different types of machinery and a license to set up a dye works, a calico printing works, a cloth factory, factories for fine iron, steel and metal work, as well as “other useful factory and manufacturing undertakings.” [17] Without these concessions, the development of Tampere, located 100 km from the nearest port in Pori, would not have been feasible at all [18].

A Tampere historian, Pertti Haapala, underlines that “without the conditions that benefited Finlayson & Company, most importantly the institutional position of Finland as a Grand Duchy of Russia, Tampere would not have industrialized as early or as quickly or in the way it did” [19]. According to Haapala, Tampere did not seem to be an ideal place for large-scale industries. There were rivers and rapids (but Finland was full of them), but nothing else: no raw materials, no specialists, no skilled labour force and poor transportation. The city was, however, favored by the powers of Sweden and Russia, which made Tampere – using a present term – a special economic zone.

One of the interesting phenomena paving Ivanovo’s way to becoming a textile center was already observed at the end of the 18th century. This time, unlike in the original Manchester or in the other “Eastern Europe Manchester”, Lodz, we can observe the active role of rich peasants,

who were accumulating capital by trading in materials and fabrics. These “capitalistic peasants,” as they were called, opened the first textile handcraft factories (e.g., Grigory Butrimov in 1742, Ivan Grachev in 1748, and later Ivan Yamansky and Ivan Garelin, as well as Osip Stepanovich Sokov after 1780) [20]. The most prosperous “capitalistic peasants” in the first decades of the 19th century began to buy their freedom from the nobility on which they depended. This form of capitalist class creation is distinguishable from the Western way, where future factory owners emerged mainly from merchant families.

The rapid industrial growth of the city was accelerated in the second half of the 19th century, which was possible due to the efforts of the above-mentioned factory owners, who also started cooperating with foreign capitalists and engineers. It resulted in the transfer of know-how to the local economy. Also, in 1861, serfdom was abolished in the Russian Empire, which freed huge amounts of the workforce for industry.

After the Revolution, the era of capitalist Ivanovo-Voznesensk was replaced by socialism’s socio-economic system. All the factories were nationalised, and the city was governed by the communist party’s local representatives. In such conditions, the city developed a monofunctional economic profile dominated by the textile industry. The city started to be called “the Red Manchester” [20].

Technology for cotton

One of the first mechanised cotton mills in Poland was founded in 1825 by Krystian Wendisch in Lodz. In 1839, Ludwik Geyer opened mechanised cotton mills with steam engines and the first steam mill in the KP. He imported over 7.500 spindles, a large steam engine and ancillary equipment from a factory in Belgium. At the same time, he made other investments, and in the 1840s he

equipped the so-called White Factory with selfactors – the most advanced mule spinning machines in Europe at that time. The development of the new industry in Lodz, cotton spinning, attracted craftsmen who were searching for work after small woollen mills went bankrupt in several small villages nearby. At the same time, the demand for cheaper products was rising among the poorer groups in society. The cotton manufacturers, in particular, were able to meet this demand, as technical progress in cotton production was faster than in the other branches of the textile industry. The first wave of the technical revolution in Lodz took place in the 1840s and 1850s. As a result 867 textile factories employed 6901 workers in 1860, which accounted for 21% of the total Lodz population. The cotton sector was the primary one, while the woollen industry was of a lesser importance. **Table 2.**

New investors became active next to Geyer’s factory. They invested a great deal and modernised their factories in order to keep up with the competition, thanks to which, cotton spinning in Lodz was able to advance as a fully mechanised production department from the very beginning. Within only 10 years, Geyer’s local competitors grew in number to at least 5 great manufacturers: Traugott Grohman, Dawid Lande, Jakub Peters, Karol Moess, and especially Karol Scheibler, who combined spinning with cotton weaving and who actuated 30 mechanical looms in 1844. From then on, smaller producers began to have problems with sales, while Scheibler’s products began to succeed, even outside the local market.

Cotton weaving and printing dynamically expanded in Saxony as early as 1770, although stocking items from cotton had been produced even as far back as 1728. Primarily Chemnitz’s manufacturers concentrated on high-quality goods, like piquées, but from 1790 Chemnitz became a center of calico printing, with weavers from small towns and the surrounding rural areas delivering raw cotton cloth to the printing works. The products were usually copies of fashionable articles made in England and France. This shift gave the producers an edge when competing with British cottons. It is important to note that the textile industry in Chemnitz was able to utilise new raw cotton material from Macedonia, which was cheaper than the American equivalent, within the production process. It ap-

parently gave rise to the textile machine industry. At the turn of the 18th/19th centuries, there were around 13,000 weaving looms in Chemnitz and nearby villages [21]. The most recognised manufacturer of that period was by far Johann Esche, the founder of the West-Saxon knitwear industry. He was the leading German stocking manufacturer, with his design of the first functional stocking maker's stool in Germany [22]. In 1799, the first spinning mill was installed in Harthau, on the outskirts of Chemnitz [23]. The construction of this English-made machine marks the technological acceleration of Saxony, which was speeded up by the transfer of technological advancements brought by numerous English and French instructors (e.g., the Jacquard spinning loom). In order to compete with state-supported competitors, the Chemnitz calico printers abstained from investing in costly machinery but instead switched to cloths with complicated patterns and higher-quality cloths. They aimed at finding handprinted articles often designed for regional tastes [24]. Non-German markets remained important for the sophisticated fabrics that the handloom weavers of the Chemnitz area had increasingly turned to after 1815. It was also characteristic of Saxon producers to concentrate on selected textile materials. Chemnitz together with Glachau specialised in cotton weaving and spinning.

In 1864 there were 64 machine factories (with 57 steam engines) in Chemnitz, employing ca. 6500 workers. It was then that the city was first called the "Saxon Manchester." In Saxony itself, the cotton spinning industry was by far the biggest of all German states in the 1850s. At the same time, Chemnitz was aptly called the cradle of industrialisation: steam engines and imported mechanical looms proved its reputation as an economic center. The productivity of power looms had been greatly enhanced since the 1840s, where old wooden weaving and knitting looms had been replaced by durable iron machinery.

The machines imported to Tampere by Finlayson were not subject to any duty, which was a clear emanation of the Tsar's will to import foreign technology. It was also expected that the know-how would be disseminated across Finland and other regions. In order to achieve it, craftsmen from England and Saxony brought to start up the machines were obliged to share their knowledge with the

Table 3. *Ivanovo-Voznesensk Factories' potential at the turn of the 19th and 20th centuries. Source: [30].*

Enterprise	No. of workers	Machinery
Factory potential		
N.Garelin: Print Weave	330 1,027	4 steam engines, 5 printing machines 5 engraving machines 18,664 spindles 468 weaving looms
I. Garelin: Print Weave	270 1,400	8 steam, 1,141 looms
Ia. Garelin	426	14 steam, 6 printing, 3 engraving
Burylin	350	6 steam
Kuvaev	1000	31 steam
Zubkov	900	–
Polushin	275	14 steam
Fokin	337	8 steam, 6 printing, 2 engraving
Vitov	276	9 steam, 5 printing, 3 engraving
P. Derbenev	228	6 steam, 3 printing, 2 engraving
A.M. Gandurin: Print Weave	172 450	340 looms
Ivanovo-Voznesensk: Weave	2,434	1,882 looms
Kokushkin and Marakushev: Print Weave	78 457	3 steam, 1 printing, 1 engraving 649 looms
N. Derbenev: Print Weave	245 1,000	806 looms

unqualified workforce in Tampere. Due to the lack of skilled domestic workers, in Finlayson's factories the engineers, foremen, and skilled workers came mainly from England. The selection of the final commodity and the technology which went into making it was a crucial point in Tampere's successful path, and after experimenting with the manufacture of woolen cloth, the core of the business was changed to cotton spinning in 1828 [25]. Abandoning the working preparation of linen in favor of cotton in that year is regarded as marking the point at which Finnish industry was born. In 1830, Finlayson abandoned the manufacture of woolen yarn, which meant that cotton was the only textile remaining.

Finlayson left for Scotland in 1835, selling the company to Carl Samuel Nottbeck and Georg Adolf Rauch (from then on, the enterprise was called Finlayson & Company), two Baltic-German businessmen from St Petersburg. In fact, they purchased the privileges of the company (and in return received the freedom of religious expression and exemption from taxes for foreign specialists). In 1843, the mill premises consisted of 12 separate buildings, but the business expanded. Before 1852 the

factory's commodities had been dyed in St Petersburg, but later it was done in its own dye works. The enterprise was on a truly international scale. It was initially credited by the state of Russia and some British investors, while machines for the new cotton mill were imported from Belgium and Germany. Cotton was imported from the American South, via Britain, and then using horses in Finland, with the finished products finding a market in Saint Petersburg.

Ivanovo did not distinguish itself in terms of know-how import or utilising extraordinary cotton production techniques. Some similarities with Lodz can be identified in terms of its development path, however. Economic problems deriving from the supply of raw material as an effect of the civil war in the USA resulted in a change of suppliers in both cities. In the case of Ivanovo, a switch towards Turkmenistan was mainly observed [27]. The crisis also led to the changing of the production structure in the city. The smallest enterprises were closed down while the corporatisation of cotton enterprises took place through mergers or takeovers (a list of the largest textile enterprises in Ivanovo-Voznesensk is given in **Table 3**).



Figure 2. Comparison of the population of the 5 Cottonopolises during the industrial revolution. 1790-1910. **Source:** Own graph based on the following data collected [31-36].

In consequence, in 1913, all cotton-paper enterprises were in the hands of 16 joint-stock companies [26]. The technical growth of the cotton industry of the city during the period of industrial capitalism can be illustrated by the following data: In 1868 there were 25 steam engines among a 482 workforce, 1176 weaving looms, and 12 printing machines in the enterprises of Ivanovo-Voznesensk. In 1913, the equipment consisted of 680 engines among a 34,509 workforce, 11,106 spinning spindles, 11,344 weaving looms and 150 printing machines [27].

Final measure: the population boom and the moments of “take-off”

Due to the fact that full data covering the 100 years of production, especially cotton production, in industrial centers mentioned are not available, we decided to collect more reliable population data [28]. These data are strictly linked with the volume of production, although they do not show a direct correlation with the cotton specialisation that we wanted to underline in the qualitative description in the previous three subsections cover-

ing geography, institutions and technology for cotton. However, the analysis of population data is still crucial to point to the moment or moments of “take-off” of all the Manchesters. At the end of the 18th century, there was one quite big city (Manchester), two cities (Chemnitz and Ivanovo) and two villages (Lodz and Tampere). As a result of the geographical and institutional factors connected with cotton specialisation, we can observe a more dynamic growth from the 1840s in the case of Lodz, Chemnitz and Tampere. The population of all the Manchesters accelerated from the 1870s, and another wave of growth is visible from the beginning of the 20th century.

Thus the first “take-off” was closely linked with the reorientation of the cities from having a general textile profile into a specialisation in cotton. The second “take-off” could be partly explained by the results of turbulences in the European-American cotton trade after the Civil War. In the late 1860s and in the 1870s, we can observe the establishment of new factories and the development of the cot-

Table 4. Gradation of the factors decisive for the development of the cotton industry in the 5 cities analysed. **Source:** Own study. **Note:** + low; ++ high; +++ very high.

	Geography (climate, resources, location)	Technology (availability of local and foreign capital)	Institutions (law, administrative incentives)
Manchester	+++	+++	+++
Lodz	+++	++	+++
Chemnitz	++	++	+++
Tampere	++	++	+++
Ivanovo	++	+	+++

ton industry in the cities analysed. Cotton specialisation in all the Manchesters was crucial for the growth of the labour market, the optimism of entrepreneurs, and for the final decisions of the new investments.

In terms of the long-term demographic aspects, it is worth emphasising that the development of the cities during the industrial revolution kept all Cottonopolises as economic and political centers, although the role of cotton as the main textile started to decline. The slow (in the case of Manchester and Tampere) and sudden (Lodz, Chemnitz and Ivanovo) decline of the role of the textile industry did not cause an automatic decrease in population. The real decline started to become visible from the beginning of the 1990s (compare the current population size in *Table 1* with the historical data in *Figure 2*).

Conclusions and further studies

We focused on the 3 driving factors decisive for the development of cotton production as well as the elements which brought about the general economic development of the cities. The geography and wider environmental factors were convenient for cotton processing. The climate, but especially access to water, was supportive. There were not very big rivers flowing through the cities. Instead, there were small rivers, mostly streams or lakes. However, there was permanent exploitation of this crucial resource for cotton. The geography of these cities was crucial, but it was the institutional factors that pushed forward their growth, affecting technological progress as well. In the history of the 5 cities, we can identify the important role of the entrepreneurs and politicians who engaged in the economic development. Their engagement was the result of good institutional circumstances connected with changes of borders, the appearance of a new country’s government, and new local management. The crucial institutional factor was strictly linked with changes in customs policy or extraordinary international situations (on the one hand, the Civil War, which destabilised cotton production and imports from the US, and on the other, new markets in deep Russia and the Far East appeared). Finally there is the aspect of technology, which was delayed compared with

Western Europe, especially with the UK; but the new machines were superbly adapted to the advantageous institutional conditions, **Table 4**.

To sum up, all 3 factors played an important role in each of the cities researched during the period of the industrial revolution. To conclude, we support the opinion that institutions mattered greatly in the development of all the Manchesters. This factor should be strictly analysed along with geographical frameworks and technological innovations. We assert that it is worth widening the research to different cities from various parts of Europe (like Elberfeld in Germany, or Lyon, Lille and Roubaix in France) or around the world. Following our path of this type of research, it is worth checking the 'cotton' status in a few modern Indian cities, often called Manchesters, like Kanpur – the Manchester of North India, Coimbatore – the Manchester of South India, as well as other Indian cities: Ahmedabad, Ramagundam, Solapur, and finally Faisalabad in Pakistan. Geographical, institutional and technological tools could be very useful to check the reasons for growth, not forgetting the role of cotton.



Editorial note:

According to Stefan Voigt "The time period chosen can also have an impact on the number of available observations. Although it might be interesting to look at the implementation record of some institution for the last 100 years, if accurate observations cannot be made over the entire period, it might be more productive to look at a shorter period with better data".

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