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Greater Poland Crafts in the Light of the 1810 Census and in the Context of Multidimensional Grouping

Rzemiosło wielkopolskie w świetle spisu powszechnego z 1810 roku w kontekście grupowania wielowymiarowego

Abstract

The aim of the article is to present the professional and spatial craftsmanship structure within the Poznań Department, based on the results of a census conducted during the period of the Duchy of Warsaw. The analyses presented, which include quantitative ones using statistical methods, are therefore related to the pre-enfranchisement period, following which the Poznań Department definitively embarked on a “Prussian path of capitalistic development”. Therefore, the results may serve as a starting point for evaluating the economic changes that took place in the research area in the 19th century. Having used multidimensional methods, I shall be proposing regionalization of the Poznań Department, due to the structure of crafts in the early years of the 19th century.

Abstrakt

Celem artykułu jest zaprezentowanie możliwości i ograniczeń stosowania wybranych metod nieparametrycznych, a w szczególności metod grupowania, w badaniach historycznych. Badania, na podstawie danych statystycznych, uzyskanych w wyniku przeprowadzonego w Księstwie Warszawskim spisu ludności, dotyczą twórczości rzemieślniczo-przemysłowej na obszarze departamentu poznańskiego. Prezentowane analizy dotyczą zatem okresu przeduwłaszczeniowego, po którym poznańskie zdecydowanie wkroczyło na „pruską drogę rozwoju kapitalizmu”. Uzyskane wyniki mogą zatem służyć jako punkt wyjścia do oceny zmian gospodarczych, jakie nastąpiły na badanym obszarze w XIX wieku. W wyniku zastosowania metod wielowymiarowych zaprezentowana zostanie

Census data also allow for the identification of key crafts in the Poznań Department at the threshold of industrialization, as well as groups of interrelated branches. The research will also, indirectly, indicate the importance of historical awareness in the selection of grouping methods at subsequent stages of research that is based on historical quantitative data.

Keywords

crafts, census, multidimensional grouping, regionalization, Duchy of Warsaw, Poznań Department

propozycja regionalizacji departamentu poznańskiego ze względu na strukturę rzemiosła w pierwszych latach XIX stulecia. Dane spisowe pozwalają także na wskazanie kluczowych gałęzi rzemiosła w departamencie poznańskim u progu industrializacji oraz grup gałęzi wzajemnie ze sobą powiązanych. Przeprowadzone badania pośrednio wskażą także znaczenie świadomości historycznej w doborze metod grupowania na kolejnych etapach badania w oparciu na historycznych danych ilościowych.

Słowa kluczowe

rzemiosło, spis powszechny, grupowanie wielowymiarowe, regionalizacja, Księstwo Warszawskie, departament poznański

Introduction

For an economic history researcher, the turn of the 19th century in the Greater Poland region is a period of dynamic change. The development of crafts there was determined, not only by natural conditions and economic factors, but, above all, by political relations.¹ As a result of the second partition of Poland in 1793, Greater Poland found itself under Prussian rule and for a few years it functioned under a new economic reality. Greater Poland's craftsmen were forced to confront competition from the technically and organizationally more advanced Silesian and Saxon industries. It is believed that the Second Partition of Poland ended a golden period for, among others, Greater Poland drapery and linen manufacturing, two of the few branches exporting their products abroad.² Mainly thanks to the victorious Greater Poland Uprising in 1806, the Duchy of Warsaw was established. The new customs situation finally closed western markets to the craftsmen

¹ Czesław Łuczak, "Przemysł i rzemiosło," in *Dzieje Wielkopolski, Tom II, Lata 1793–1918*, ed. Witold Jakóbczyk (Poznań: Wydawnictwo Poznańskie, 1973): 96–97.

² Czesław Łuczak, *Położenie ekonomiczne rzemiosła wielkopolskiego w okresie zaborów (1793–1918)* (Poznań: Polskie Towarzystwo Historyczne, Oddział w Poznaniu, 1962): 22.

of Greater Poland.³ The political situation following the Vienna Congress, hence, determined the limitation of trade eastwards. This resulted in the reincorporation of Poznań into Prussia, and high import duties and transit fees were set by the newly created Kingdom of Poland.⁴

The subject of Greater Poland crafts in the late 18th century and early 19th century is also interesting due to the dynamically-changing management conditions. Research conducted in this area concerned the situation of crafts against a background of processes such as enfranchisement⁵ and colonization,⁶ as well as changes in the functioning of guilds⁷ in light of the inevitably approaching industrial revolution,⁸ which ultimately changed the economic significance of craftsmen as a social group. From the scarce literature on the subject matter one can still find publications on Greater Poland rural⁹ and urban crafts.¹⁰ The issues of Greater Poland crafts have been dealt with by prominent Poznań historians, among whom the most important are the professors Czesław Łuczak and Jerzy Topolski. Their use of a wide range of quantitative data, obtained through in-depth archival searches, is what characterizes their research.¹¹ It should be emphasized that each of them discussed a particular aspect of the Greater Poland craft production from a regional perspective. It seems, therefore, that an attempt at regionalization geared at synthesizing all branches of this type of production would complement

³ Antoni Mączak, ed., *Encyklopedia Historii Gospodarczej Polski do 1945 roku (O–Ż)* (Warszawa: Wiedza Powszechna, 1981): 242.

⁴ Czesław Łuczak, *Położenie ekonomiczne*, 38–39.

⁵ Witold Jakóbczyk, *Uwłaszczenie chłopów w Wielkopolsce w XIX w.* (Warszawa: Ludowa Spółdzielnia Wydawnicza, 1951): 10–11.

⁶ Jan Wąsicki, *Kolonizacja niemiecka w okresie Prus Południowych 1793–1806* (Poznań: Instytut Zachodni, 1953).

⁷ Dionizy Królikowski, *Kwestya rzemieślnicza jako kwestya społeczna* (Poznań: Drukarnia i Księgarnia św. Wojciecha, 1908): 23–24.

⁸ E.g., Czesław Łuczak, *Dzieje gospodarcze Wielkopolski w okresie zaborów (1815–1918)* (Poznań: PSO, 2001): 227–264.

⁹ Marian Szczepaniak, *Przemysł i rzemiosło wiejskie w Wielkopolsce w drugiej połowie XVIII wieku* (Poznań: Poznańskie Towarzystwo Przyjaciół Nauk, Wydział Historii i Nauk Społecznych, 1971); Szczepaniak, “Przemysł i rzemiosło wiejskie w powiecie kaliskim w drugiej połowie XVII i w XVIII w.,” *Rocznik Kaliski* IV (1971): 95–124.

¹⁰ Andrzej Szymański, *Rzemiosło i przemysł miejski w Wielkopolsce w drugiej połowie XVIII wieku* (Poznań: Zakład Graficzny UAM, Pleszewskie Towarzystwo Kulturalne, Muzeum Regionalne w Pleszewie, 2015): 58–661.

¹¹ Examples of this type of publication are listed in a table entitled “Struktura rzemiosła miejskiego w Wielkopolsce w końcu XVIII w. (the analysis concerns 126 cities including Poznań)” by Jerzy Topolski, “Wielkopolski model gospodarczy drugiej połowy XVIII w.,” in *Dzieje Wielkopolski, Tom I, do roku 1793*, ed. Jerzy Topolski (Poznań: Wydawnictwo Poznańskie, 1969): 836–837 or a table entitled “Liczba warsztatów w poszczególnych branżach rzemiosła w latach 1822–1907,” by Czesław Łuczak, *Położenie ekonomiczne*, 138–140.

their research, especially as they rarely made any references to the results of the 1810 census.

Subsequently, censuses conducted during the period of the Duchy of Warsaw became the subject of interest for many authors.¹² In terms of the quantitative information they provided, they were used by several authors, including Henryk Grossman¹³ and Mieczysław Kędelcki¹⁴ who, however, limited themselves to creating appropriate tables based on a huge amount of data. Historical census data, thanks to their detail, encourage the use of modern multidimensional methods. Taxonomic methods, which belong to this group, allow both the directions of craft production and the counties belonging to the area under research to be grouped together. However, the question arises as to what extent it is possible to compare the results of such methods with the results of previous research carried out with the help of the traditional historian's toolkit.

In reference to the research on Greater Poland crafts, the aim of the article is therefore to indicate the key branches of crafts in the Poznań Department, and groups of mutually-related branches. The paper will also present a proposal for the regionalization of the Poznań Department due to the structure of crafts in the early years of the nineteenth century. The research will be carried out using selected statistical methods, in particular methods of grouping based on data obtained from the 1810 census. Therefore, in addition to the cognitive purpose (typical for historical research), the task of this article is to present a methodical approach that could be used in subsequent studies, wider in terms of area, on regional economic history.

Different approaches to the use of quantitative methods, directly or indirectly, are made in historical research. The attitude towards including such methods in the historian's toolkit (especially that of an economic historian) was evaluated

¹² Stanisław Borowski, "Gospodarstwa rolne w Wielkopolsce w latach 1807–1823 w świetle współczesnej statystyki," *Studia i Materiały do Dziejów Wielkopolski i Pomorza* 14/7/2 (1962): 79–137; Stanisław Konferowicz, "Początki myśli statystycznej w Polsce (I)," *Wiadomości Statystyczne* 11 (1966): 13–20; Konferowicz, "Początki myśli statystycznej w Polsce (II)," *Wiadomości Statystyczne* 12 (1966): 7–13; Józef Żeglicki, "Badania statystyczne w Księstwie Warszawskim (III) – Wyniki drugiego spisu przeprowadzonego w 1810 r.," *Statystyk Terenowy* 8/103 (1967): 27–29; Jan Berger, "Statystyka w Księstwie Warszawskim," in *Historia Polski w liczbach. Statystyka Polska dawniej i dzisiaj*, ed. Franciszek Kubiczek (Warszawa: Główny Urząd Statystyczny, 2017): 75–84.

¹³ Henryk Grossman, "Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808 i 1810 r.," *Kwartalnik Statystyczny* II/1 (1925): 1–108.

¹⁴ Mieczysław Kędelcki, *Umieralność i trwanie życia ludności Wielkopolski w XIX w.* (Poznań: Akademia Ekonomiczna w Poznaniu, 1996): 25.

in the second half of the 20th century.¹⁵ Jan Marczewski characterized three approaches to this issue, i.e., historical narrative with statistical data, cliometry¹⁶ and quantitative history.¹⁷ In the first of these approaches, the use of quantitative data is subordinated to the historical thesis presented. The use of quantitative methods is limited here only to the necessary minimum, related to the tabular presentation of the research results.¹⁸ However, the starting point for cliometrists is usually economic theory, which is justified by available historical quantitative data, as well as the use of parametric methods.¹⁹ In turn, the last approach – quantitative history – also uses quantitative methods, both parametric and non-parametric, which allow the general relationships in economic phenomena to be discovered. However, this approach gives significant importance to historical events that can be assigned a specific time and place.

In view of the knowledge on the methodology of historical research and the questions and research objectives posed above, a working hypothesis may be formulated that quantitative methods in historical research have a subordinate function to the subject of such research. The verification of this hypothesis will be carried out on the basis of the results of the 1810 census concerning the professional structure of the inhabitants of particular counties in the Poznań Department. The grouping of individual branches of crafts and the subsequent regionalization of the counties in the Poznań Department on this basis will be carried out in two approaches. In the first, it was assumed that the assumptions underlying the grouping method are a priority in relation to the objectives set out in the historical research.

Under this assumption, census data concerning particular crafts will be grouped on the basis of selected grouping methods, and on the basis of these groups aggregates of variables will be constructed, which in turn will be used for the regionalization of counties in the Poznań Department. In the second approach, the importance of historical knowledge will be treated as a priority. In this case, the aggregation of individual craft occupations will be carried out based on

¹⁵ See e.g., David Herlihy, “Numerical and Formal Analysis in European History” “La Connaissance des Faits N’est Jamais Complète Sans Leur Analyse Numérique,” *Journal of Interdisciplinary History* 12/1/Quantifications in the 1980s (1981): 115–135.

¹⁶ In English literature, this approach functions also as “econometric history” or “new economic history”.

¹⁷ Jan Marczewski, “Quantitative History,” *Journal of Contemporary History* 3/2 (1968): 179–191.

¹⁸ In the traditional approach, only partial totals and positional measures are usually used, which are indispensable for building quantitative tabular lists.

¹⁹ The second concept was initiated by the publication of the following works: John R. Meyer and Alfred H. Conrad, “Economic Theory, Statistical Inference, and Economic History,” *The Journal of Economic History* 17/4 (1957): 524–544; Alfred H. Conrad and John R. Meyer, “The Economics of Slavery in the Ante Bellum South,” *Journal of Political Economy* 66/2 (1958): 95–130.

historical knowledge and literary studies from this area. One of the advantages of the second approach is that its results can be compared with the results of traditional historians' research. The results of the regionalization carried out in the second stage of each of the above-mentioned approaches will be compared on the basis of clustering quality indicators. The working hypothesis of the paper will be confirmed if the results of the assessment in the second approach turn out to be comparable or higher.

The research goals and hypotheses formulated in this way determine the layout of this article. The first chapter presents the area of research, with particular emphasis on the characteristics of archival sources of the aforementioned census. The next chapter is a brief description of the statistical methods used in the paper. The results obtained in both approaches are given in the succeeding chapter. However, the last chapter is a summary, along with conclusions based on the research.

Research area

The spatial professional structure of Greater Poland crafts in the period of the Duchy of Warsaw, determined on the basis of quantitative data concerning the number of people declaring themselves to be engaged in a specific profession connected with crafts in the 1810 census, is the subject of the research. The results of this census are available in the Main Archive of Old Records in Warsaw as part of the *Zamoyski Archive* complex, entitled „Statystyka Księstwa Warszawskiego i Królestwa Kongresowego z lat 1806–1812, 1817–1824, 1852 i wywozu gdańskiego 1691–1817” [Statistics of the Duchy of Warsaw and the Congressional Kingdom of 1806–1812, 1817–1824, 1852 and Gdańsk export 1691–1817].²⁰

From the beginning of the Duchy of Warsaw, a strong development in administrative statistics was observed, which served mainly to “discern the country's ability to undertake economic activity and the necessary military efforts”.²¹ These objectives were essential for the censuses in 1808 and 1810.²² In one of his

²⁰ Main Archive of Historical Records in Warsaw (hereafter AGAD): Archiwum Zamoyskich, sygn. 1/358/0/0/96, 344–421 (Statystyka Księstwa Warszawskiego i Królestwa Kongresowego z lat 1806–1812, 1817–1824, 1852 i wywozu gdańskiego 1691–1817, Tabela ludności ogółem Departamentu Poznańskiego).

²¹ Józef Żeglicki, “Badania statystyczne w Księstwie Warszawskim (I).” *Statystyk Terenowy* 6/101 (1967): 24; Jan Berger, “Statystyka w Księstwie Warszawskim 1807–1815,” in *Historia Polski w liczbach. Statystyka Polska dawniej i dzisiaj*, ed. Franciszek Kubiaczek (Warszawa: Główny Urząd Statystyczny, 2017): 80–81.

²² It should be emphasized that the censuses of the Duchy of Warsaw were not the first in Poland. The census called, in the records of the Grand Seym, “Lustration of smoke and addition of population”, which was to be conducted in 1789, is considered to be the first. The initiator of this

reviews, Jan Rutkowski made detailed comments on the manner in which these censuses were conducted and how precise they were.²³ Józef Żeglicki²⁴ argued that the methods for doing statistical work in the Duchy of Warsaw were inherited from the Prussian authorities, who conducted various types of statistical research on lands seized during the partitions of Poland.²⁵

Nowadays, a census must meet a number of conditions, the most important of which are universality, uniformity, name, directness, completeness, based on an adequate legal basis and the use of an appropriate census apparatus.²⁶ It is known that the 1810 census was the first complete personal survey to be prepared on the basis of a detailed instruction and form, as well as statistical scheme.²⁷ The Royal Decree of 25 March 1809 on the military distribution of the sacrifice enacted by the Sejm, is considered to be the legal basis for this census.²⁸ Moreover, based on Article 38 of the Royal Decree of 20 April 1808 on the organization of ministries, it was the responsibility of the Minister of the Interior to “annually provide statistical tables on population and economy, crafts and factories, and trade balance”.²⁹ It should be noted that the instructions sent to the particular prefectures contained

research and the person who prepared and presented the results was Fryderyk Józef Moszyński. However, the basic unit studied in that census was still smoke, and not individual people living in a given area, cf. Stanisław Konferowicz, “Początki myśli statystycznej w Polsce (II):” *Wiadomości Statystyczne* 12 (1966): 7–13.

²³ Jan Rutkowski, “Grossman Henryk: Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808–1810, Warszawa: 1925 (odbitka z Kwartalnika statystycznego) 4^e stron 108” (review): *Ruch Prawniczy, Ekonomiczny i Socjologiczny* 5 (1925): 1087–1099.

²⁴ This thesis, according to Józef Żeglicki, is confirmed both by the subject matter of research and by certain layouts and formulations on the forms used in the period of the Duchy of Warsaw, cf. Józef Żeglicki, “Badania statystyczne w Księstwie Warszawskim (I):” *Statystyk Terenowy* 6/101 (1967): 23–24.

²⁵ The results of several censuses are given in August Karl von Holsche, *Geographie und Statistik von West- Süd- und Neu- Ostpreußen: nebst einer kurzen Geschichte des Königreichs Polen bis zu dessen Zertheilung*. Volume 1 (Berlin: Friedrich Maurer, 1800); von Holsche, *Geographie und Statistik von West- Süd- und Neu- Ostpreußen: nebst einer kurzen Geschichte des Königreichs Polen bis zu dessen Zertheilung*. Volume 2 (Berlin: Friedrich Maurer, 1804).

²⁶ Czesław Kozłowski, *Powszechne spisy ludności* (Warszawa: Polskie Wydawnictwa Gospodarcze, 1951): 23.

²⁷ This is proved by archival documents from the Prefectures of Poznań and Bydgoszcz, Jan Rutkowski, cf. Rutkowski, “Grossman Henryk: Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808–1810, Warszawa: 1925 (odbitka z Kwartalnika statystycznego) 4^e stron 108”, 1097–1098.

²⁸ Decree pursuant to a law passed under the title of “Ofiara na Wojsko i celu uskutecznienia z dokładnością onegoż” of 25 March 1809, see *Dziennik Praw Księstwa Warszawskiego* 2/13 (Warszawa: Drukarnia Xięży Piarów, 1811): 11–19.

²⁹ Decree on the organisation of ministries of 20 April 1808, see in *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej* 1, 1807–1808, prepared by Wojciech M. Bartel, Jan Kosim, and Władysław Rostocki (Warszawa: Instytut Historii Polskiej Akademii Nauk, 1964): 90.

detailed provisions, which could be considered as an indication of the census apparatus: in the cities, the census was carried out under the responsibility of the presidents or mayors; in the villages, by parish priests of the Catholic faith or, if there was no Catholic population in a given locality, the census was to be carried out by clergy of other denominations.³⁰

Therefore, the only deviation of the 1810 census from the contemporary definition was the question of its timing. Jan Rutkowski emphasizes that “the marking of terms by the central authority did not, of course, prejudge the question of the time at which the census was actually carried out”.³¹ Henryk Grossman also stressed that this condition was not met.³² Moreover, the way the 1810 census was conducted does not exclude the possible problem of so-called double counting. Despite these remarks, both historians emphasize the usefulness of such sources in research on socio-economic structure. No wonder, therefore, that historians highly appreciate the first such detailed statistical research on Polish lands, covering the entire population without any state or national exclusions.³³ It is believed that “the results of the 1810 census concerning craftsmen are much more precise and richer in the subject matter of positions than the similar results for 1808. However, these results confirm each other”.³⁴ When assessing the accuracy of population data, Henry Grossman estimates that the degree of omissions in 1810 was 8.4%.³⁵ Józef Żeglicki, who compared the results of the census with the results of the censuses carried out by the Austrian authorities for comparable areas, is also in favor of the quality of the census.³⁶

The 1810 census included six departments in the Duchy of Warsaw as well as six in the so-called Western Galicia circulus (i.e., Kraków, Kielce, Radom, Lublin, Bielsko and Siedlce) which were incorporated in 1809, and the Zamoyski

³⁰ Jan Rutkowski, “Grossman Henryk: Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808–1810, Warszawa: 1925 (odbitka z Kwartalnika statystycznego) 4^o stron 108” (review): 1097.

³¹ Jan Rutkowski, “Grossman Henryk: Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808–1810, Warszawa: 1925 (odbitka z Kwartalnika statystycznego) 4^o stron 108” (review): 1098.

³² Henryk Grossman, “Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808 i 1810 r.,” 43.

³³ Franciszek Kubiczek, foreword to *Historia Polski w liczbach. Statystyka Polska dawniej i dzisiaj*, ed. Franciszek Kubiczek (Warszawa: Główny Urząd Statystyczny, 2017): 9.

³⁴ Józef Żeglicki, “Badania statystyczne w Księstwie Warszawskim (IV) – Charakterystyka rzemiosła oparta na wynikach spisu przeprowadzonego w 1810 r.,” *Statystyk Terenowy* 9/104 (1967): 20.

³⁵ Henryk Grossman, “Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808 i 1810 r.,” 45.

³⁶ Józef Żeglicki, “Badania statystyczne w Księstwie Warszawskim (III) – Wyniki drugiego spisu przeprowadzonego w 1810 r.,” *Statystyk Terenowy* 8/103 (1967): 27.

circulus from Eastern Galicia. The statistical tables for the 1810 census contained data indicating age, religion and strata, as well as information concerning “the profession of craftsman or another way of life”.³⁷ It is also worth noting that along with the number of people conducting their own manufacturing activity, information on the size of their families appeared, which can be considered an innovative approach for this period.

In the study presented in the article, among the individual departments of the Duchy of Warsaw, data concerning fourteen counties in the Poznań Department were included. It is worth noting that the area of this department is the result of the introduction by 19 December 1807 of the decree on the administrative division of the Duchy of Warsaw into counties and commune assemblies.³⁸ This structure was actually a duplication of the administrative division from the times of South Prussia, with the difference that the counties of Brześć, Kowalów and Radziejów joined the Bydgoszcz Department.³⁹

Before proceeding with the quantitative analyses, it is also worthwhile confronting the definition of crafts with the categories of data given in the results of the 1810 census. According to the *Encyclopedia of the Economic History of Poland until 1945*, craftsmanship meant independent economic activity conducted in small workshops by their owners, who had appropriate professional qualifications and usually had several assistants (journeymen and apprentices).⁴⁰ Historically, craftsmanship was the first form of industrial production based on qualified work and manual manufacturing techniques.⁴¹ Moreover, in the pre-industrial period the growth of craftsmanship was a determinant of economic development.

³⁷ In the table used to conduct the census, there were, eventually, only twelve headings: parish, town or village name, house number, number of consecutive people, name and surname of the resident, age of the resident, place of birth, place of penultimate residence, social status at birth, profession, craft or other way of life, religion, endorsements; see Jan Rutkowski, “Grossman Henryk: Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808–1810, Warszawa: 1925 (odbitka z Kwartalnika statystycznego) 4^e stron 108” (review): 1098.

³⁸ Decree on the temporary division of departments of the Duchy of Warsaw into districts and communal assemblies, see *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej, tom 1, 1807–1808*, prepared by Wojciech M. Bartel et al. (Warszawa: Instytut Historii Polskiej Akademii Nauk, 1964): 14; *Dziennik Praw Księstwa Warszawskiego* 1/2 (Warszawa: Drukarnia Xięży Piarów, 1810): 22–30.

³⁹ Resolution of the Council of State on suspending the implementation of the changes in the administrative division of Poznań and Bydgoszcz departments until 1 April 1808 due to difficulties in the implementation of the division of food supplies and forage for the army of 8 January 1808. Cf. *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej, tom 1, 1807–1808*, 24–25.

⁴⁰ Antoni Mączak, ed. *Encyklopedia Historii Gospodarczej*, 233.

⁴¹ Zenon Voelkel, *Rzemiosło i przemysł Krotoszyna okresu międzywojennego* (Poznań: Drukarnia Poznańska, 1996): 5.

The archival results from the 1810 census were compiled in such a way that it is not possible to indicate whether a particular workshop produced its products for individual customers or for a wider market. It should be stressed, however, that this list understands craftsmanship much more broadly than the above definition. In the 1810 census, craftsmen's professions, apart from the category "crafts", also appear in the following categories: "court craftsmen", "people who earn their living from industry", and "craftsmen without a declaration".

Marian Szczepaniak estimated that at the end of the 18th century, the economic and socio-legal dependence of rural craftsmen on the manor house was becoming more and more relaxed.⁴² The first of the above group in the list, i.e., court craftsmen, were to be treated as an integral part of a rural farm (manor farm).⁴³ The scope of professional activity for people declaring that they earned their living from industry requires further explanation. In the light of the 1810 census results, the category of industry should not be understood in the contemporary sense. This group includes "not-organized crafts, poorer crafts, and thus the emerging urban proletariat".⁴⁴ Examining the results of the 1810 census in detail, it can be concluded that this group includes all professions related to trade⁴⁵ (e.g., the trade in cattle, horse, grain or wool merchants, partial traders, stallholders, primitive craftsmen), transport (e.g., carters, skippers, carriers), the whole food industry (including millers, bakers, gingerbread makers, brewers, distillers, pâté makers, butchers) and providing other services (including printers, hairdressers, brokers, tobacco makers, tavern owners, seamstresses).⁴⁶ It should be remembered, however, that in the 19th century, a person who manufactured a given product often also sold it. Moreover, in some cases, the same professions are listed in the census

⁴² Those closely related to the manor house were no more than 20% of all rural craftsmen, cf. Szczepaniak, *Przemysł i rzemiosło wiejskie*, 158.

⁴³ Such an approach was proposed by, among others, Jerzy Topolski "Wielkopolski model gospodarczy drugiej połowy XVIII w.," in *Dzieje Wielkopolski. Tom 1. Do roku 1793*, ed. Jerzy Topolski (Poznań: Wydawnictwo Poznańskie, 1969): 822–824.

⁴⁴ Such an opinion was formulated by Henryk Grossman, "Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808 i 1810 r.," 64; it was also noted by Józef Żeglicki, "Badania statystyczne w Księstwie Warszawskim (III) – Wyniki drugiego spisu przeprowadzonego w 1810 r.," *Statystyk Terenowy* 8/103 (1967): 28.

⁴⁵ In his research, Henryk Grossman distinguished from those "living from industry", a group of people engaged in trade i.e., those who run taverns, restaurants, inns, cafés; and those who live from the propination industry, cf. Henryk Grossman, "Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808 i 1810 r.," 58–59.

⁴⁶ In his research on the socio-occupational structure of the Greater Poland population at the end of the 18th century, Jerzy Topolski used the term *crafts and industry* (including service crafts): cf. Jerzy Topolski, "Społeczeństwo Wielkopolskie w XVIII w. Konflikty społeczne. Elementy kultury materialnej," in *Dzieje Wielkopolski. Tom 1. Do roku 1793*, ed. Jerzy Topolski (Poznań: Wydawnictwo Poznańskie, 1969): 846.

under both the ‘living industry’ and the ‘craftsmen’ categories.⁴⁷ Both categories will, therefore, be included in the study presented in the article.

On the other hand, “craftsmen without a declaration” are mainly tenants, workmen and craftspeople. There are also relatively large numbers of people living on almsgiving in this group. The number of craftsmen “without a definite decision” is probably the result of the abolition of personal servitude in 1807, which opened up, at least in theory, the free choice of a job.⁴⁸ Most importantly, however, people belonging to this group do not meet the condition of independent manufacturing and professional qualifications, which is characteristic of the craft activity defined above.

Table 1. Structure of people declaring that they were engaged in craft and industrial activities in the Poznań Department in 1810 according to census categories

Selected census categories	In absolute numbers (people)			In relative values (%)		
	main people	their families	total	main people	their families	total
City of Poznań						
Manufacturers	18	45	63	0.4	0.6	0.5
Craftsmen	713	2,315	3,028	17.7	29.8	25.6
Earning their living from industry	1,159	2,884	4,118	28.8	37.1	34.9
Craftsmen without a declaration	2,141	2,532	4,598	53.1	32.6	38.9
Total	4,031	7,776	11,807	100.0	100.0	100.0
Poznań Department without the city of Poznań						
Manufacturers	2,588	7,224	9,812	4.3	4.8	4.6
Craftsmen	12,522	39,910	52,432	20.9	26.3	24.8
Earning their living from industry	9,606	31,421	41,760	16.1	20.7	19.7
Craftsmen without a declaration	35,100	73,211	107,578	58.7	48.2	50.8
Total	59,816	151,766	211,582	100.0	100.0	100.0

Source: own compilation based on the results of the 1810 census.

Henryk Grossman also included “manufacturers” in the craftsmanship and industry of the Duchy of Warsaw, whom he understood as “independent craftsmen”, as evidenced by the large number of people declaring that they earned their

⁴⁷ In both categories in the Poznań department, there were such professions as tanners and stocking weavers.

⁴⁸ Witold Szulc, “Tworzenie się klasy robotniczej oraz jej położenie ekonomiczne,” in *Dzieje Wielkopolski, Tom II, Lata 1793–1918*, ed. Witold Jakóbczyk (Poznań: Wydawnictwo Poznańskie, 1973): 132.

living that way.⁴⁹ There were 2,606 such people in the Poznań Department⁵⁰ and 9,875 including their families. The vast majority in this group were cloth manufacturers (2,427 main people).⁵¹ This group also included owners of oil factories and manufacturers of snuff, tar, paper, leather and starch. The list of population numbers which, in the light of the 1810 census, were included in the above-mentioned professional categories, is given in Table 1.

If we treat the main people as professionally active and do not take into account the group of “craftsmen without a declaration”, then, the people declaring themselves to be engaged in craft and industrial activities accounted for 31% in Poznań alone.⁵² Taking into account only data from counties (except for Poznań), 14% of professionally active people are those conducting craft and industrial activity.⁵³ The argument about the specificity of craftsmanship in the city is also confirmed by more detailed analyses of the census results. Such professions as bookshop assistants, sealers, inn owners, varnishers, bellfounders, well diggers, knife and file makers and umbrella makers, were found only in Poznań. On the other hand, the city was not inhabited by a single person classified under “factory owners”, nor by people engaged in such professions as horse traders, pilots, tobacco-keepers, fullers, stove fitters, weavers or wheelbarrow pushers, who lived in large numbers in the surrounding counties. Already, these preliminary studies show that the city of Poznań was characterized by a high distinctiveness and ought not be taken into account when grouping the counties of the Poznań Department.

Finally, the grouping of counties in the Poznań Department was based on the numbers of people engaged in craft and industrial production professions included in the 1810 census under the categories given in Table 1, with the exception of people treated as “craftsmen without a declaration”. The grouping of 14 counties in the Poznań Department was carried out on the basis of the number of 135

⁴⁹ Henryk Grossman, “Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808 i 1810 r.,” 62–63.

⁵⁰ Jan Wąsicki states, “According to estimates, in 1809 the number of clothiers (excluding families and journeymen) was, in the Poznań department, 2427,” (own translation) cf. Jan Wąsicki, “Wielkopolska w okresie Księstwa Warszawskiego. Administracja. Ludność. Gospodarka,” in *Dzieje Wielkopolski, Tom II, Lata 1793–1918*, ed. Witold Jakóbczyk (Poznań: Wydawnictwo Poznańskie, 1973): 58.

⁵¹ In light of the 1810 census, the Poznań Department had 581,210 inhabitants.

⁵² In light of the results of the 1810 census, Poznań was inhabited by a total of 6,283 main people (people declaring their profession): and in the remaining counties of the Poznań Department, the number of such people came to 183,347. Their families comprised 9,605 people (Poznań) and 366,867 people (the remaining counties): respectively.

⁵³ Józef Żeglicki, basing his calculations on Henryk Grossman’s lists mentioned above, calculated that the coefficient determined for the entire Duchy of Warsaw was 9.3%, cf. Józef Żeglicki, “Badania statystyczne w Księstwie Warszawskim (III) – Wyniki drugiego spisu przeprowadzonego w 1810 r.,” *Statystyk Terenowy* 8/103 (1967): 28.

craft and industrial professions, of which 56 were professions related to industry and 11 were factory owners. Due to the possibility for comparing the results with previous studies on Greater Poland crafts, only the numbers of main people were taken into account in this study.

Grouping methods and their evaluation

A synthetic approach to the regionalization of counties in the Poznań Department according to their professional activity requires the use of multidimensional grouping methods⁵⁴ which, in the literature, also function under the name of taxonomic methods. They belong to the group of non-parametric methods and allow objects to be grouped (in this case, counties) into clusters (groups of counties) based on many variables describing these objects (numbers of people declaring they carry out various types of craft activity). Among many studies, the most frequently used method types are hierarchical methods and optimization methods, which are based on the matrix of similarity or dissimilarity.⁵⁵

The process of grouping on the basis of taxonomic methods usually takes place in several stages.⁵⁶ In the first stage, the selection of objects, features and variables that characterize these objects, which is justified by the research problem, takes place.⁵⁷ Then the selected variables need to be normalized. Depending on the nature and number of variables, the stage of distance measures selection and the stage of taxonomic method selection, while the decision on the final number of clusters is also important. The application of taxonomic methods should close the stage at which the evaluation of the grouping results is carried out. Of course, apart from the quantitative assessment, the results require interpretation based on the substantive knowledge of the issue under analysis.

⁵⁴ A group of these methods in the literature is also called cluster analysis or numerical taxonomy, cf. Peter H.A. Sneath and Robert R. Sokal, *Numerical Taxonomy: the Principles and Practice of Numerical Classification* (San Francisco: W.H. Freeman & Company, 1973): 3.

⁵⁵ Multidimensional grouping methods are widely described in the literature on the subject. One of the first studies on the division and description of grouping methods is the article: Richard M. Cormack, "A Review of Classification (With Discussion)," *Journal of Royal Statistical Society, Series A* 134/3 (1971): 321–367.

⁵⁶ Cf. e.g., Aaron D. Gordon, *Classification. Methods for the Exploratory Analysis of Multivariate Data*, 2nd ed. (London: Chapman & Hall, 1999): 8.

⁵⁷ The importance of the individual craft and industrial professions occurring in their territory will be the characteristic feature describing the individual counties. Variables, on the other hand, are quantitative equivalents of the features expressed in the appropriate units. In the issue under analysis, these will be the numbers of main people, who, within the framework of the 1810 census, declared they were engaged in a specific craft profession, which was the basis for the livelihoods of these people and their families.

The selection of objects (counties in the Poznań Department) and variables (the number of 135 professions connected with craft activity, in particular counties at the beginning of the 19th century) was partially described in the previous chapter. If the grouping concerns spatial objects, it is important that the variables describing these objects are expressed in units that guarantee their comparability.⁵⁸ In the article, normalization was based in the conversion of the number of craftsmen performing a specific profession in a given county of the Poznań Department to the total number of inhabitants of this county.

Taxonomic methods have many advantages, the most important of which is the ability to group units (objects) described by many variables.⁵⁹ One of their few drawbacks is their relatively low resistance to correlation of variables describing grouped objects.⁶⁰ Based on the 1810 census, as many as 135 variables were identified (the original set of variables), each of which expresses the number of inhabitants of a given county who declared in the census that they were engaged in a specific profession related to craft and industrial activity. With such a large group of variables, their mutual correlation is almost inevitable. One of the recommended solutions in this type of situation is to group the variables and determine the aggregate variable for each of the selected groups.⁶¹

The grouping of variables can be done in different ways. In this example, there are no reasons to adopt a statistical data description scheme, so it is necessary to use deterministic methods.⁶² The paper presents the results of two approaches. The first – quantitative – should be based on one of the multidimensional methods. Usually, factor analysis is used to reduce the number of variables.⁶³ This leads to a reduction in the original set of variables to a much smaller number of factors. These factors are linear combinations of the original set of variables. The basic postulate of factorial analysis is to assume that there is a set of hidden

⁵⁸ Edward Nowak, *Metody taksonomiczne w klasyfikacji obiektów społeczno-gospodarczych* (Warszawa: Polskie Wydawnictwo Ekonomiczne, 1990): 17–22.

⁵⁹ Andrzej Balicki, *Statystyczna analiza wielowymiarowa i jej zastosowania społeczno-ekonomiczne* (Gdańsk: Wydawnictwo Uniwersytetu Gdańskiego, 2009): 17.

⁶⁰ Issues have been further analysed in Brian. S. Everitt, *Cluster Analysis*, 2nd ed. (London: Heinemann Educational Books, 1980): 9–10; Joseph F. Hair et al., *Multivariate Data Analysis With Readings* (London: Prentice Hall International, 1995): 436.

⁶¹ This approach was recommended by Wiesław Pluta, *Wielowymiarowa analiza porównawcza w badaniach ekonomicznych* (Warszawa: Państwowe Wydawnictwo Ekonomiczne, 1977): 77–88. Another solution is to choose the best representatives: Pluta, 41–42.

⁶² Wojciech Sobczak and Witold Malina, *Metody selekcji i redukcji informacji* (Warszawa: Wydawnictwa Naukowo-Techniczne, 1985): 146–153; Leonard Kaufman and Peter J. Rousseeuw, *Findings Groups in Data: an Introduction to Cluster Analysis* (Hoboken: John Wiley & Sons, 2005): 84–88.

⁶³ Thomas Hill and Paweł Lewicki, *Statistics Method and Applications. A comprehensive Reference for Science, Industry, and Data Mining* (Tulsa: StatSoft, 2006): 233–239.

factors. This causes the obtained factors to lose their interpretation, directly related to the group of variables, because each factor can be created by all variables belonging to the original set of variables. In the case of the goals set in the paper, it is crucial to determine separate groups of variables on the basis of which aggregate variables are created. It was therefore necessary to find another solution.

Wiesław Pluta stresses that the procedure for grouping variables based on non-parametric methods is the same as the previously discussed method of grouping objects. Only the matrix of distances of variables should be available for this method.⁶⁴ For this reason, out of a wide range of non-parametric methods available, the k-mean method was used in the present study. This belongs to the group of combinational methods which are recommended when working with large sets of variables.⁶⁵ It is a method whose algorithm is based on the selection of middle points and the assignment of individual objects (in our example of craft occupations) to the nearest middle point. After each stage, a new midpoint is determined, which in turn causes successive shifts in the grouped objects. The process ends if the next stage is not followed by a movement of the grouped objects.⁶⁶ Aggregation of variables was carried out on the basis of such grouping of variables.⁶⁷

In the second approach, the grouping of variables – craft occupations – was based on the industries to which they belong. Classifications adopted by other economic historians involved in the subject were, simply, the starting point for the latter ones. The comparison of results obtained in both approaches was the basis for the verification of the working hypothesis on the importance of quantitative methods in historical research in relation to the subject of this research. The implementation of this stage of the analysis also made it possible to find an answer to one of the research questions concerning the connection between particular

⁶⁴ Cf. Pluta, *Wielowymiarowa analiza*, 46.

⁶⁵ Cf. Hair et al., *Multivariate data analysis*, 441–442; Feliks Wysocki, *Metody taksonomiczne w rozpoznawaniu typów ekonomicznych rolnictwa i obszarów wiejskich* (Poznań: Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, 2010): 109.

⁶⁶ This method was used by, among others, Frank R. Hodson, “Numerical Typology and Pre-historic Archaeology,” in *Mathematics in the Archaeological and Historical Sciences*, eds. Frank R. Hodson at al. (Edinburgh: Edinburgh University Press, 1971): 30–45; Mirosława Gazińska and Krzysztof Dmytrów, “Statystyczna analiza nadumieralności ludności wiejskiej w Polsce,” *Przegląd Statystyczny* 47/1–2 (2000): 187–197. Bolesław Kopociński also wrote about the use of the k-mean method in spatial research “O podziale terytorialnym Polski na części,” *Zastosowania Matematyki* 5/2 (1960): 173–177 as well as Zbyszko Chojnicki and Teresa Czyż, *Metody taksonomii numerycznej w regionalizacji geograficznej* (Warszawa: Państwowe Wydawnictwo Naukowe, 1973): 72–81.

⁶⁷ A similar approach to the grouping of variables was presented by Jan Steczkowski, *Zasady i metody rejonizacji produkcji rolniczej* (Warszawa: PWRiL, 1966): 100–114 and Nowak, *Metody taksonomiczne*, 26–33 as well as Chojnicki and Czyż, *Metody taksonomii*, 33–34.

craft occupations and their branches in the Poznań Department in light of the 1810 census.

In the case of regionalization, the complete linkage method was chosen from a number of possible approaches to multidimensional grouping.⁶⁸ It leads to a hierarchical and separable division of grouped objects in their cluster. The choice of this method was determined by the fact that it is recommended when there is a suspicion that grouped objects naturally form separate clusters,⁶⁹ and such a conclusion can be drawn from the results of previous studies carried out for individual branches of a craft.⁷⁰ What is more, the complete linkage method has, besides the 'Ward method', the highest efficiency among hierarchical methods.⁷¹

The determination of the distance matrix is the starting point in multidimensional grouping with hierarchical methods. Euclidean distance was used in the research. The use of this commonly-known measure is justified by the fact that the variables have been expressed in a strong scale,⁷² and all of them are monomial.⁷³ Euclidean distance is recommended especially in situations where objects are compared due to their structure, and this kind of research is the case in this example.⁷⁴

As a result of using hierarchical methods, a dendrogram is created, which allows the process of merging individual objects into larger and larger clusters to be traced.⁷⁵ In order to obtain a separable cluster system, the process of building the agglomeration should be interrupted at the right moment. In this study the point was determined basing on the rule of the first significant pitch of the agglomeration distance.⁷⁶

⁶⁸ The algorithm of this method had already been described by the 1950s in Louis L. McQuitty, "Elementary Linkage Analysis for Isolating Orthogonal and Oblique Types and Typical Relevancies," *Educational Psychological Measurement* 17 (1957): 207–229.

⁶⁹ Balicki, *Statystyczna analiza wielowymiarowa*, p. 268.

⁷⁰ For example, Jerzy Topolski prepared maps showing the location of cloth and linen centers in Greater Poland in the second half of the 18th century, cf. Topolski "Wielkopolski model gospodarczy drugiej połowy XVIII w.," in *Dzieje Wielkopolski. Tom 1. Do roku 1793*, ed. Jerzy Topolski (Poznań: Wydawnictwo Poznańskie, 1969): 824, 832.

⁷¹ Such research was conducted by, among others, Antoni Smoluk, "Uwagi o dyskryminacji w zwartych przestrzeniach metrycznych," *Przegląd Statystyczny* 23/4 (1976): 483–489.

⁷² It depends on the measurement scale, for which operations on numbers assigned to variables give meaningful results with regard to the purpose of the study, cf. Marek Walesiak, *Metody analizy danych marketingowych* (Warszawa: Państwowe Wydawnictwo Naukowe, 1996): 23–24.

⁷³ Number of craftsmen of a given profession as per the number of inhabitants of a given district.

⁷⁴ Nowak, *Metody taksonomiczne*, 104–105.

⁷⁵ Brian J.L. Berry, "A Method for Deriving Multifactor Uniform Regions," *Przegląd Geograficzny* 33/2 (1961): 263–282.

⁷⁶ This is one of the approaches recommended from the beginning of hierarchical methods, see e.g., Robert L. Thorndike, "Who Belongs in a Family?," *Psychometrica* 18 (1953): 267–276.

In historical research, the final evaluation of the results is an extremely important stage of the grouping process. In the case of regionalization, the effect of grouping can be said to be positive if the objects belonging to the separated clusters are more similar to each other than to the objects belonging to other clusters. Such assumptions are the basis for the Caliński-Harabasz index (*ICH*)⁷⁷ and the total silhouette index (*GSI*).⁷⁸ In both cases, a higher evaluation of grouping results indicates a stronger cluster structure.⁷⁹ It needs to be highlighted that the substantive dimension of these indicators should be emphasized: the comparison of scores of grouping results will finally enable the working hypothesis referred to above to be resolved.

Both algorithms, both *k*-mean and complete linkage methods, are widely described in literature. Their widespread use is made possible by statistical software. In this article we used the possibilities offered by the *Statistica* program. On the other hand, the calculations necessary to obtain quantitative grouping assessments were carried out in *Excel*.⁸⁰

Results of quantitative tests

As mentioned earlier, the implementation of the research objectives and the need to verify the working hypothesis required quantitative analyses in two options. In the first, the variables expressed in the number of craftsmen per 1,000 inhabitants of the particular county were ordered using the quantitative method. On this basis, the agglomeration of variables was carried out. In turn, these variables were the starting point for the regionalization of the Poznań Department

Despite their simplicity, such approaches are still in current use, see e.g., Andrzej Sokołowski, "Empiryczne testy istotności w taksonomii," *Zeszyty Naukowe Akademii Ekonomicznej w Krakowie, Seria specjalna: monografie* 108 (1992): 29; Neil H. Timm, *Applied Multivariate Analysis* (New York: Springer-Verlag, 2002): 531. The description of the use of this approach, based on modern statistical software, was presented by, inter alia, Grzegorz Migut: Migut, "Zastosowanie technik analizy skupień i drzew decyzyjnych w segmentacji rynku," in *Zastosowanie nowoczesnej analizy danych w marketingu i badaniach rynku – materiały z seminarium*, ed. Janusz Wątroba (Kraków: StatSoft Polska, 2009): 77.

⁷⁷ Tadeusz Caliński and Jerzy S. Harabasz, "A Dendrite Method for Cluster Analysis," *Communications in Statistics* 3 (1974): 1–27.

⁷⁸ This indicator has been described, inter alia, in the publication: Kaufman, Rousseeuw, *Finding Groups*, 84–88.

⁷⁹ The GSI can also be used as an indicator to assess a single grouping. A value greater than 0.5 is assumed to indicate the correct structure of the grouping, cf. Kaufman, Rousseeuw, *Finding Groups*, 88.

⁸⁰ The method for determining both these indicators is given in detail in Lucyna Błażejczyk-Majka, *Zastosowanie wybranych metod taksonomicznych w badaniach historycznych* (Poznań: Uniwersytet im. Adama Mickiewicza w Poznaniu, 2018): 150–159.

counties due to the professional structure of the inhabitants declaring that they were engaged in craft and industrial activities as part of the 1810 census. In the second approach, agglomeration variables were obtained based on earlier solutions applied by economic historians. The results for both regionalizations were subjected to quantitative evaluation, which determined the scope for historical interpretation of the issue under analysis.

Table 2. Values of variables or their aggregates resulting from the k-medium method (number of craftsmen/1,000 inhabitants)

County	Millers	Part-time traders	Cloth manufacturers	Painters	Linen makers	Stallholders and carpenters	Blacksmiths, tailors and shoemakers	9 professions	Others
	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
Poznań	3.92	0.05	2.33	0.80	0.00	4.17	8.50	5.38	5.59
Babimost	4.30	2.08	6.49	0.43	0.45	1.30	13.92	14.48	5.33
Gniezno	4.09	1.11	1.57	0.98	0.83	1.08	12.71	9.33	5.11
Powidz	3.39	4.73	1.84	6.73	0.16	0.82	11.59	7.22	2.77
Wagrowiec	0.77	0.43	0.67	0.70	0.63	1.73	10.35	5.39	2.30
Kościan	4.38	0.81	0.20	0.53	3.75	0.55	10.82	7.07	4.56
Wschowa	10.18	3.03	7.69	0.65	4.02	4.91	9.95	10.24	8.11
Krobia	5.93	0.95	12.07	0.32	4.38	2.87	9.50	10.61	13.44
Krotoszyn	4.80	2.93	3.25	0.58	4.18	2.05	10.62	8.27	7.97
Międzyrzecz	3.08	1.08	6.00	1.15	0.58	16.21	13.08	7.08	7.65
Pyzdry	3.76	0.71	0.98	0.56	0.78	2.20	12.80	13.02	4.85
Środa Wlkp.	3.40	1.01	2.17	0.52	1.08	1.20	8.94	7.78	4.71
Oborniki	2.78	5.25	6.51	0.75	1.26	1.99	14.54	10.04	7.79
Śrem	3.77	1.45	1.86	0.64	3.19	2.99	12.38	8.26	2.35
Total	58.54	25.60	53.62	15.32	25.29	44.05	159.70	124.17	82.52
Number of variables	1	1	1	1	1	2	3	9	116

Source: own calculations based on the results of the 1810 census, where z_8 is an aggregate variable combining the number of horse traders, bakers, butchers, innkeepers, coopers, carpenters, potters, wheelwrights and furriers. Variable z_9 is the sum of the occurrence of the remaining professions in a given district of the Poznań Department.

The first approach was to use the k -mean method. This led to the identification of ten variables. As a result of such an agglomeration, five occupations can be considered crucial from the point of view of their distribution in the Poznań Department. These are millers, partial merchants (retailers), cloth manufacturers, painters and canvas makers. From the quantitative point of view, these were

variables that usually had values greater than zero for almost every object included in the study.⁸¹ The next four variables were aggregate variables, the values and components of which are listed in Table 2.

Table 3. Pearson correlation matrix of variables resulting from the *k*-means method (number of craftsmen/1,000 inhabitants)

Variable	Millers	Part-time traders	Cloth manufacturers	Painters	Linen makers	Stallholders and carpenters	Blacksmiths, tailors and shoemakers	9 professions	Others
	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
z_1	1.00	0.15	0.51	-0.14	0.62	0.04	-0.27	0.35	0.51
z_2	0.15	1.00	0.24	0.52	0.05	-0.16	0.41	0.19	0.09
z_3	0.51	0.24	1.00	-0.20	0.36	0.30	0.03	0.43	0.87
z_4	-0.14	0.52	-0.20	1.00	-0.34	-0.08	0.06	-0.23	-0.33
z_5	0.62	0.05	0.36	-0.34	1.00	-0.11	-0.29	0.08	0.50
z_6	0.04	-0.16	0.30	-0.08	-0.11	1.00	0.13	-0.19	0.28
z_7	-0.27	0.41	0.03	0.06	-0.29	0.13	1.00	0.51	-0.14
z_8	0.35	0.19	0.43	-0.23	0.08	-0.19	0.51	1.00	0.30
z_9	0.51	0.09	0.87	-0.33	0.5	0.28	-0.14	0.30	1.00

Source: own calculations based on the values of the variables given in Table 2.

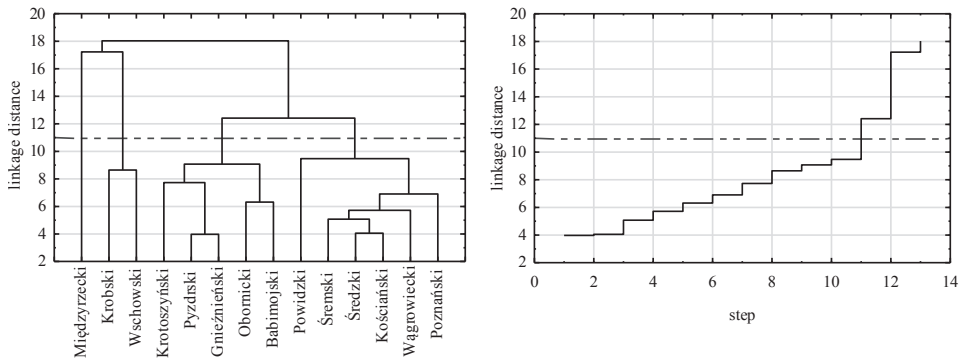
Analysis of the correlation (Table 3) of the variables obtained in this way indicates the only essential correlation between the cloth manufacturers (z_3) and the aggregate variable z_9 ($r_{39} = 0.87$). The remaining correlation coefficients did not exceed $r = 0.65$. It should be stressed that further reduction in the number of variables, possible using the *k*-means method, did not result in the combination of variables z_3 and z_9 with each other or with other variables. For this reason, nine of the variables listed in Table 2 were left for further analysis. The analysis of the correlation shows that it is prudent to state that the existence of bigger plants manufacturing cloth in the county was accompanied by many other smaller manufacturing plants engaged in various types of production.

The values of the variables given in Table 2 became the starting point for the regionalization of the counties of the Poznań Department in 1810 due to the structure of crafts in this area. The results for the complete linkage method based on Euclidean distances are given on a dendrogram. Its intersection at the level of the first significant pitch of the agglomeration distance (see Figure 1)

⁸¹ The only exception is the lack of canvas makers in the county of Poznań.

led to four separable clusters: (Międzyrzecz), (Krobia and Wschowa), (Krotoszyn, Pызdry, Oborniki and Babimost), (Powidz, Śrem, Kościam, Wągrowiec and Poznań). The evaluation coefficients of this division were, respectively, for the Caliński-Harabasz index ($ICH = 7.063$), and for the total silhouette index ($GSI = 0.403$). The value of the latter indicates a weak grouping structure.

Figure 1. Dendrogram presenting the results of the regionalization of counties in the Poznań Department (first approach) and a graph of amalgamation schedule



Source: own compilation based on Table 2.

In the second approach, the variables expressing the number of craftsmen per 1,000 inhabitants of a given county were grouped on the basis of previous solutions devised by economic historians. Initially, 135 variables referring to the number of craftsmen declaring their livelihood in particular occupations were divided into eleven branches. This division included textiles, construction, wood, trade, metal, paper, leather, food, transport, living services and other craft occupations. Their distinction was based on the lists of Greater Poland crafts drawn up by other researchers for similar historical periods.⁸² As a result of the correlation

⁸² The lists in the monographs Szymański, *Rzemiosło i przemysł*, 58–661 were used; the table entitled “Struktura rzemiosła miejskiego w Wielkopolsce w końcu XVIII w. (analiza dotyczy 126 miast wraz z Poznaniem)”, prepared by Jerzy Topolski: Topolski, “Wielkopolski model gospodarczy drugiej połowy XVIII w.,” in *Dzieje Wielkopolski, Tom I, do roku 1793*, ed. Jerzy Topolski (Poznań: Wydawnictwo Poznańskie, 1969): 836–837; the table entitled “Liczba warsztatów w poszczególnych branżach rzemiosła w latach 1822–1907,” made by Czesław Łuczak: Łuczak, *Położenie ekonomiczne*, 138–140. Industries did not always have identical names, e.g., depending on the list, there were mineral and construction industries, construction and ceramic industry and crafts, or construction industry. In some cases, the classification of craft and industrial occupations was also unclear, e.g., basket weavers were assigned, depending on ranking, to the wood industry or to the category “haberdashery, others including soap, musical instruments, paper industries, and

analysis, the number of aggregate variables separated in this way was reduced. The group of other craft occupations was extended to include the paper industry, livelihood, transport and trade services. Aggregate values of variables representing these industries in the form finally taken into account in further research are presented in Table 4.

Table 4. Values of aggregate variables by professional sector
(number of craftsmen/1,000 inhabitants)

County	Textiles	Foodstuff	Leather	Metal work	Construction	Wood work	Others
	z_1	z_2	z_3	z_4	z_5	z_6	z_7
Poznań	7.14	7.14	4.17	3.44	2.58	2.03	4.24
Babimost	12.67	10.65	7.72	3.22	2.31	3.20	9.00
Gniezno	6.68	9.60	6.96	4.28	3.32	2.68	3.29
Powidz	4.98	6.12	6.94	3.59	8.98	3.83	4.81
Wągrowiec	3.96	3.86	3.96	5.22	1.93	1.96	2.06
Kościan	7.60	9.29	6.07	3.83	2.74	1.89	1.26
Wschowa	17.26	15.53	6.05	3.37	2.15	2.59	11.82
Krobia	21.29	14.17	6.07	3.07	1.98	2.82	10.67
Krotoszyn	12.08	9.13	6.87	3.08	3.94	2.45	7.09
Międzyrzecz	13.51	6.95	6.18	4.13	4.20	8.03	12.91
Pyzdry	6.94	9.03	7.70	3.46	3.13	2.98	6.41
Środa Wlkp.	5.98	7.74	5.27	3.29	3.59	2.21	2.73
Oborniki	13.99	8.69	8.24	4.01	4.14	3.29	8.54
Śrem	9.54	7.57	7.63	2.75	3.19	2.67	3.54
Total	143.61	125.49	89.81	50.75	48.18	42.62	88.36
Number of variables	20	20	8	21	14	10	41

Source: own compilation based on the results of the 1810 census.

Similarly, as in the first approach, a relatively strong positive correlation (see Table 5) was observed between the aggregate variable concerning the textile industry z_1 and the aggregate variable z_7 ($r_{17} = 0.83$) and the food industry ($r_{12} = 0.79$). Despite the different distribution of the variables, the conclusion of the first approach can therefore be repeated, that the textile industry has a strong positive impact on economic activity and occupational diversification in the county. Therefore, further aggregation of variables was abandoned.

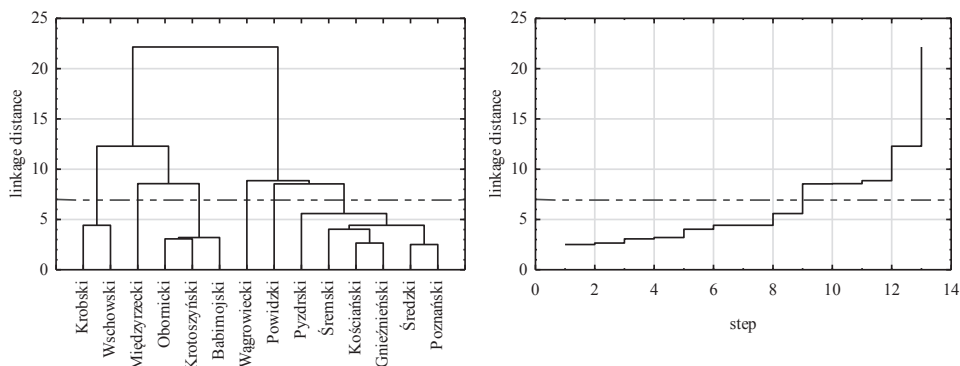
gardening and fishing activities". Eventually, after Łuczak, this profession was assigned to the wood industry.

Table 5. Pearson correlation matrix of variables by occupational sector (number of craftsmen/1,000 inhabitants)

Variables	Textiles	Foodstuff	Leather	Metal work	Construction	Wood work	Others
	z_1	z_2	z_3	z_4	z_5	z_6	z_7
z_1	1.00	0.79	0.26	-0.39	-0.31	0.25	0.83
z_2	0.79	1.00	0.26	-0.49	-0.38	-0.13	0.57
z_3	0.26	0.26	1.00	-0.38	0.29	0.21	0.29
z_4	-0.39	-0.49	-0.38	1.00	-0.03	0.13	-0.22
z_5	-0.31	-0.38	0.29	-0.03	1.00	0.34	-0.06
z_6	0.25	-0.13	0.21	0.13	0.34	1.00	0.61
z_7	0.83	0.57	0.29	-0.22	-0.06	0.61	1.00

Source: own compilation based on the values of the variables presented in Table 4.

Figure 2. Dendrogram presenting the results of regionalization of counties of the Poznań Department (second approach) and a graph of amalgamation schedule



Source: own compilation based on Table 4.

In the next step of the analysis, based on the variables given in Table 4, obtained on the basis of the application of the industry criterion, regionalization of the counties in the Poznań Department in 1810 was carried out. As with the first approach, the complete linkage method based on Euclidean distances was applied. The intersection of the dendrogram created in such a way, at the level of the first significant pitch of agglomeration distance (Figure 2): led to the obtaining of six separable clusters: (Międzyrzecz): (Krobia and Wschowa): (Krotoszyn, Oborniki and Babimost): (Powidz): (Wągrowiec): (Pyzdry, Śrem, Kościan, Gniezno and Poznań). The assessment coefficients for this division were, respectively, for the Caliński-Harabasz index ($ICH = 16.393$) and the total silhouette

index ($GSI = 0.744$). The value of the latter indicates a very strong structure in the obtained groups.

Summary and Conclusions

Comparison of the county grouping assessments obtained in both the quantitative approaches described in the previous chapter leads to the conclusion that the second approach, which was based on the division of variables according to the industry criterion used in previous historical researches, is predominant. Thus, analyzing the values of variables obtained in this way as given in Table 4, it can be said that in Greater Poland in 1810, despite functioning in a new political and economic situation within the Duchy of Warsaw, the largest number of craftsmen declared that they were engaged in the textile industry. Among them, the most important significance determining the specificity of particular counties is that of cloth manufacturers and linen manufacturers.

This conclusion confirms the opinions previously given in the literature. The key importance of textiles in the pre-industrial economy of Greater Poland is probably also a result of the protectionist policy of the Duchy of Warsaw, which supported the development of this industry. "Under the penalty of confiscation, the entry of goods and cotton yarn of Prussian handicraft was forbidden in the interest of the sprouting cloth industry".⁸³ What is more, "if we want, not only to keep factories and handicrafts in the Duchy of Warsaw, but also to encourage foreign artists, factory owners and craftsmen settling in Poland, and to facilitate the export of manufactured products, we will (...). A similar benefaction is to be used by merchants of the Duchy of Warsaw when sending abroad all the articles for which they have paid the consumption fee according to the tariff at the time of their introduction into the country".⁸⁴

⁸³ Józef Żeglicki, "Badania statystyczne w Księstwie Warszawskim (IV) – Charakterystyka rzemiosła oparta na wynikach spisu przeprowadzonego w 1810 r.," *Statystyk Terenowy* 9/104 (1967): 20.

⁸⁴ Decree on exemption from export duties of domestic dresses, creations of artists, factory owners and craftsmen in the Duchy of Warsaw. The decree also applies to merchants, provided that they have paid the anticipated charges of 20th December 1808 for the import of goods shipped abroad, cf. in: *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 1, 1807–1808*, prepared by Wojciech Bartel, Jan Kosim, and Władysław Rostocki (Warszawa: Instytut Historii Polskiej Akademii Nauk, 1964): 172–173.

Of course, preferential tariffs were established for French⁸⁵ and Saxon handi-craft products.⁸⁶ The Duchy of Warsaw also supported biological advancement in the cloth trade: “the hitherto existing facilities for customs duties on sheep introduced, without distinction, into the Duchy of Warsaw are a significant obstacle to the development of industry and the benefits, which may flow into the country from the introduction of better sheep species. Thus, in order to have better wool for use in factories, we have decided that the introduction of all sheep of better quality into the country of the Duchy of Warsaw shall, henceforth, be free of customs duties”.⁸⁷

However, based on the quantitative analyses carried out, it can be concluded that the textile sector had a positive impact on the economic development of the entire region and, above all, on the intensification and diversification of artisanal production in the region. Among the crafts whose number of professionally active people was positively linked to textile production, the food sector and the trade crafts stand out. The fact that the grouping based on the industry approach produced better results may also indicate that the individual craftsmen cooperated effectively, rather within their sector, which is undoubtedly related to the technological level of the establishments and the fragmentation of the production process between many craftsmen.⁸⁸

The results of regionalization based on the industry approach are given in Figure 3, while the average values of craftsmanship saturation in particular industries in separate groups of counties are shown in Table 6. Based on the latter, it can be said that the smallest variation⁸⁹ in craftsmanship saturation in the Poznań Department in 1810 was recorded in the case of the metal and leather industries. On the other hand, an uneven dispersion can be observed in the case of craftsmen dealing with manufacturing that satisfies higher-order needs, trade

⁸⁵ Decree on the privileges for French goods of 21 July 1810, see *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 2*, 1809–1810, prepared by Wojciech Bartel, Jan Kosim, and Władysław Rostocki (Warszawa: Instytut Historii Polskiej Akademii Nauk, 1964): 179.

⁸⁶ Decree relating to customs matters and the organisation of trade between Saxony and the Duchy of 19th September 1810, see: *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 2*, 1809–1810, prepared by Wojciech Bartel, Jan Kosim, and Władysław Rostocki (Warszawa: Instytut Historii Polskiej Akademii Nauk, 1964): 203.

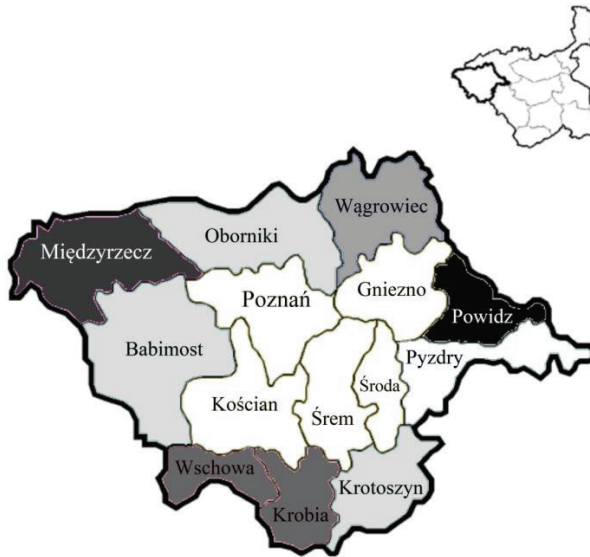
⁸⁷ Decree on exemption from customs duties of high-grade sheep imported into the Duchy of Warsaw on 20th December 1808, see in: *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 1*, 1807–1808, prepared by Wojciech Bartel, Jan Kosim and Władysław Rostocki (Warszawa: Instytut Historii Polskiej Akademii Nauk, 1964): 173.

⁸⁸ For example, the production of cloth was based on the activities of the following craftsmen: wool merchants, weavers, fullers, tanners, hoarders and cloth merchants.

⁸⁹ One of the basic measures of dispersion for variables expressed in the quotient scale was applied: coefficient of variation, cf. Mieczysław Sobczyk, *Statystyka* (Warszawa: Wydawnictwo Naukowe PWN, 1997): 50–51.

and transport.⁹⁰ Crafts in the construction, wood and textile sectors were also highly diversified in terms of geographical distribution.

Figure 3. Results of the regionalization of counties in the Poznań Department based on the industry approach



Source: own work based on regionalization results shown in Figure 2.

The most numerous group consists of counties occupying the central part of Poznań Department, concentrated around the main center of the research area, which was the city of Poznań. The saturation of individual craftsmen in this area was average or oscillated around the average. It is worth noting, however, that the share of craftsmen in this group of atypical professions is relatively low. Therefore, it can be concluded that the craftsmen living in the research area were somewhat focused on the production of goods serving to satisfy the basic needs of the population. Therefore, the grouping made it possible to specify the general opinion expressed by Żeglicki: “In the period of the Duchy of Warsaw, craftsmanship was in the hands of independent foremen, who employed a small degree of craftsmanship. Craftsmen who worked to satisfy the daily needs of the wide

⁹⁰ In table 6 this group was called “others”.

masses of the population came to the fore”.⁹¹ In light of quantitative research, this statement turned out to be true, but only in relation to the areas directly adjacent to the larger urban centers, which provided a stable outlet.

Table 6. Average craftsman saturation with craftsmen in the groups of counties selected as a result of regionalization [number of craftsmen/1,000 inhabitants]

Groups of counties	Textiles	Foodstuff	Leather	Metal work	Construction	Wood work	Others
	z_1	z_2	z_3	z_4	z_5	z_6	z_7
Międzyrzecz	13.51	6.95	6.18	4.13	4.20	8.03	12.91
Powidz	4.98	6.12	6.94	3.59	8.98	3.83	4.81
Wągrowiec	3.96	3.86	3.96	5.22	1.93	1.96	2.06
Wschowa and Krobia	19.28 [2.85]	14.85 [0.96]	6.06 [0.01]	3.22 [0.21]	2.07 [0.12]	2.70 [0.16]	11.24 [0.81]
Babimost, Krotoszyn and Oborniki	12.91 [0.98]	9.49 [1.03]	7.61 [0.69]	3.44 [0.50]	3.46 [1.01]	2.98 [0.46]	8.21 [1.00]
Poznań, Gniezno, Kościan, Pызdry, Środa Wlkp. and Śrem	7.31 [1.21]	8.40 [1.04]	6.30 [1.40]	3.51 [0.51]	3.09 [0.37]	2.41 [0.43]	3.58 [1.71]
All the counties	10.26 [5.05]	8.96 [3.02]	6.42 [1.29]	3.62 [0.63]	3.44 [1.77]	3.04 [1.54]	6.31 [3.78]

Source: own compilation based on the results of the 1810 census; standard deviations in square brackets.

The counties situated farthest away from the center, which in Poznań Department was undoubtedly Poznań, may be considered as having a specific distinction and specialization, with better adaptation to natural conditions as well as trade facilities, in contrast to the remaining clusters. Three of these turned out to be one-object clusters. Thus, the county of Międzyrzecz was characterized by a higher-than-average number of textile craftsmen per 1,000 inhabitants. In this county they were mainly cloth manufacturers and tailors. Międzyrzecz county was also distinguished by the relatively highest number of woodworking craftsmen in the Poznań department, which was undoubtedly influenced by the natural conditions of the area, having the relatively highest number of people declaring that they supported themselves and their families in carpentry.

⁹¹ Józef Żeglicki, “Badania statystyczne w Księstwie Warszawskim (IV) – Charakterystyka rzemiosła oparta na wynikach spisu przeprowadzonego w 1810 r.,” *Statystyk Terenowy* 9/104 (1967): 19.

What is more, in the westernmost county of the Duchy of Warsaw there was the highest number of craftsmen engaged in non-standard professions. The high share of this type of craftsmanship can be associated with the pro-development policy pursued by the authorities of the time.⁹² During the period of the Duchy of Warsaw, efforts were made to attract craftsmen from abroad, and in order to maintain the development of their craft, they were freed from numerous burdens for a period of 6 years (Decree of 20 March 1809), as well as from military service. The aim was “that in the Duchy of Warsaw, agriculture, factories, crafts and every kind of useful industry could be brought to the best possible condition”.⁹³ This policy was also continued in 1810: the privileged group was extended to include foreigners “who, as journeymen, stayed in the Duchy of Warsaw and after liberation wanted to settle down in the Duchy of Warsaw”.⁹⁴ At the same time, customs duties were raised on goods brought into the Duchy of Warsaw, e.g., candles and soaps,⁹⁵ clavichords and other tools.⁹⁶ Similar protection was introduced for rope-making and linen workshops.⁹⁷ The possibilities of paying lower import duties were also limited, e.g., in the case of wine.⁹⁸ Instead of a tenon and leather tax, a consumption tax on alcohol and slaughter was paid.⁹⁹

As a result of the multidimensional grouping, a one-object cluster was also created by the county of Powidz. In the early 19th century, the county was mainly characterized by the highest saturation of craftsmen from the construction

⁹² Józef Żeglicki, “Badania statystyczne w Księstwie Warszawskim (IV) – Charakterystyka rzemiosła oparta na wynikach spisu przeprowadzonego w 1810 r.,” 20.

⁹³ Decree on reliefs for craftsmen and farmers coming from abroad of 20 March 1809, see in *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 2, 1809–1810*, prepared by Wojciech Bartel, Jan Kosim, and Władysław Rostocki (Warszawa: Instytut Historii Polskiej Akademii Nauk, 1964): 31 and *Dziennik Praw Księstwa Warszawskiego 3/36* (Warszawa: Księgarnia Xięży Piiarów, 1811): 455–458.

⁹⁴ Decree extending the privileges of the Decree of 10 March 1809 to the apprentices of foreigners of 18 July 1810, in *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 2, 179*.

⁹⁵ Cf. Decree on customs duties on candles and soaps of 16 August 1809, see: *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 2, 84*.

⁹⁶ Cf. Decree on customs duties on musical instruments of 16 August 1809, see: *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 2, 84–85*.

⁹⁷ Cf. Decree on the development of ropemaking and cordage-making workshops of 19 September 1810, see in *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 2, 204–205*.

⁹⁸ Resolution of the Council of State on the customs duty on wine lager of 10 November 1809, see in *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 2, 1809–1810*, prepared by Wojciech Bartel, Jan Kosim, Władysław Rostocki (Warszawa: Instytut Historii Polskiej Akademii Nauk, 1964): 99.

⁹⁹ See e.g. Decree introducing a consumption tax and abolishing a tenon and leather tax in the territory annexed to the Duchy of Warsaw of 14 March 1810, see in *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 2, 123–124*.

industry: carpenters, painters, potters and glaziers. It is worth mentioning here that in Powidz there was a successful glass industry operating thanks to convenient natural conditions, such as high forest cover and access to sand deposits, at the turn of the 19th century. The small metal smelting plants produced lower quality, but cheaper everyday-use glass, meeting the needs of a wide range of customers.¹⁰⁰

Wągrowiec county (the third one-object cluster) is also among the distinguishing counties of the Poznań Department of 1810. However, this area was characterized by the lowest economic activity in relation to almost all the craft industries analyzed. The exception to this rule were manufacturers concentrated around the metal industry, in particular the above-average number of blacksmiths.

Usually, Krobów and Wschowa counties, which created a two-object cluster, are listed as the best-known areas in the Poznań Department in terms of textile production. In contrast to Międzyrzecz county, south of the Poznań Department, not only cloth making dominated, but also linen making. However, it should not be forgotten that, as confirmed by quantitative data, food craftsmen were very active in this area. This was based, primarily, on the best-developed milling industry in the region.

The last concentration connects three external counties of the Poznań Department: Krotoszyn, Babimost and Oborniki. Although they were not direct neighbors, these counties were connected by relatively high economic activity in the textile industry. Of course, in the northern counties, clothiers prevailed in terms of quantity, and in Krotoszyn county, situated in the south of the region, linen smiths. In all three counties, the leather industry was relatively well developed: a relatively high number of people supported themselves and their families by working professionally as shoemakers, furriers or tanners. The county of Krotoszyn was also famous for its developed wind milling.¹⁰¹ It should be stressed that the leather industry, apart from the textile industry, played a significant role in the period of the Duchy of Warsaw due to the needs of the army. Deliveries from 1809 were paid in the form of an advance payment for the purchase of leather. The remaining amount was to be paid in 1810. Poznań, Bydgoszcz and Kalisz departments supplied the shoes.¹⁰²

In addition to answering the questions about the importance and geographical distribution of Greater Poland crafts in the pre-industrial period, the comparison

¹⁰⁰ Maria Mucha, "Hutnictwo szkła we Wschodniej Wielkopolsce od XVII do początku XIX wieku," *Folia Prehistorica Posnaniensia* XII (2004): 318.

¹⁰¹ Voelkel, *Rzemiosło i przemysł*, 7.

¹⁰² Resolution of the Council of State on the requisitioning of cloth and shoes for the army of 1 May 1809 see in *Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej* 2, 54–55.

of assessments of the results of regionalization in the two proposed approaches allowed the verification of the working hypothesis presented in the introduction of this article. In the second approach, significantly better grouping results were obtained. On this basis, it can be concluded that quantitative methods in historical research play a subordinate role and should be precisely selected depending on the specificity of the historical subject under study. Such an attitude is consistent with the assumptions of the approach called quantitative history.

Bibliography

Sources

Archiwum Główne Akt Dawnych w Warszawie, Archiwum Zamoyskich, sygn. 1/358/0/0/96, k. 344–421 (Statystyka Księstwa Warszawskiego i Królestwa Kongresowego z lat 1806–1812, 1817–1824, 1852 i wywozu gdańskiego 1691–1817, Tabela ludności ogółem Departamentu Poznańskiego).

Legislative acts

Dziennik Praw Księstwa Warszawskiego 1. Warszawa: Drukarnia Xięży Piarów, 1810.

Dziennik Praw Księstwa Warszawskiego 2. Warszawa: Drukarnia Xięży Piarów, 1811.

Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 1, 1807–1808. Compiled by Wojciech M. Bartel, Jan Kosim, and Władysław Rostocki. Warszawa: Instytut Historii Polskiej Akademii Nauk, 1964.

Ustawodawstwo Księstwa Warszawskiego. Akty normatywne władzy najwyższej 2, 1809–1810, prepared by Wojciech Bartel, Jan Kosim, and Władysław Rostocki. Warszawa: Instytut Historii Polskiej Akademii Nauk, 1964.

Literature

Balicki, Andrzej. *Statystyczna analiza wielowymiarowa i jej zastosowania społeczno-ekonomiczne*. Gdańsk: Wydawnictwo Uniwersytetu Gdańskiego, 2009.

Berger, Jan. “Statystyka w Księstwie Warszawskim 1807–1815.” In *Historia Polski w liczbach. Statystyka Polska dawniej i dzisiaj*, edited by Franciszek Kubiczek, 75–84. Warszawa: Główny Urząd Statystyczny, 2017.

Berry, Brian J.L. “A Method for Deriving Multifactor Uniform Regions.” *Przegląd Geograficzny* 33/2 (1961): 263–282.

Błażejczyk-Majka, Lucyna. *Zastosowanie wybranych metod taksonomicznych w badaniach historycznych*. Poznań: Uniwersytet im. Adama Mickiewicza w Poznaniu, 2018.

Borowski, Stanisław. “Gospodarstwa rolne w Wielkopolsce w latach 1807–1823 w świetle współczesnej statystyki.” *Studia i Materiały do Dziejów Wielkopolski i Pomorza* 14/7/2 (1962): 79–137.

- Caliński, Tadeusz, and Jerzy Harabasz. "A dendrite method for cluster analysis." *Communications in Statistics* 3 (1974): 1–27.
- Chojnicki, Zbyszko, and Teresa Czyż. *Metody taksonomii numerycznej w regionalizacji geograficznej*. Warszawa: Państwowe Wydawnictwo Naukowe, 1973.
- Conrad, Alfred H., and John R. Meyer. "The Economics of Slavery in the Ante Bellum South." *Journal of Political Economy* 66/2 (1958): 95–130.
- Cormack, Richard M. "A Review of Classification (With Discussion)." *Journal of Royal Statistical Society, Series A* 134/3 (1971): 321–367.
- Everitt, Brian. S. *Cluster Analysis*, 2nd ed. New York: Heinemann Educational Books, 1980.
- Gazińska, Mirosława, and Krzysztof Dmytrów. "Statystyczna analiza nadumieralności ludności wiejskiej w Polsce." *Przegląd Statystyczny* 47/1–2 (2000): 187–197.
- Gordon, Aaron D. *Classification. Methods for the Exploratory Analysis of Multivariate Data*, 2nd ed. London: Chapman & Hall, 1999.
- Grossman, Henryk. "Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808 i 1810 r." *Kwartalnik Statystyczny* II/1 (1925): 1–108.
- Hair, Joseph F., Rolph E. Anderson, Ronald L. Tatham, and William C. Black. *Multivariate Data Analysis: With Readings*. London: Prentice Hall International, 1995.
- Herlihy, David. "Numerical and Formal Analysis in European History "La Connaissance des Faits N'est Jamais Complète Sans Leur Analyse Numérique."" *Journal of Interdisciplinary History* 12/1/ Quantifications in the 1980s (1981): 115–135.
- Hill, Thomas, and Paweł Lewicki. *Statistics Method and Applications. A comprehensive Reference for Science, Industry, and Data Mining*. Tulsa: StatSoft, 2006.
- Frank R. Hodson. "Numerical Typology and Prehistoric Archaeology." In *Mathematics in the Archaeological and Historical Sciences*, edited by Frank R. Hodson, David G. Kendall, and Petre Tăutu, 30–45. Edinburgh: Edinburgh University Press, 1971.
- Holsche, August K. (v.). *Geographie und Statistik von West- Süd- und Neu- Ostpreußen: nebst einer kurzen Geschichte des Königreichs Polen bis zu dessen Zertheilung*. Tom 1. Berlin: Friedrich Maurer, 1800.
- . *Geographie und Statistik von West- Süd- und Neu- Ostpreußen: nebst einer kurzen Geschichte des Königreichs Polen bis zu dessen Zertheilung*. Tom 2. Berlin: Friedrich Maurer, 1804.
- Jakóbczyk, Witold. *Uwłaszczenie chłopów w Wielkopolsce w XIX w.* Warszawa: Ludowa Spółdzielnia Wydawnicza, 1951.
- Kaufman, Leonard, Peter J. Rousseeuw. *Findings Groups in Data: an Introduction to Cluster Analysis*. Hoboken: John Wiley & Sons, 2005.
- Kędelski, Mieczysław. *Umieralność i trwanie życia ludności Wielkopolski w XIX w.* Poznań: Akademia Ekonomiczna w Poznaniu, 1996.
- Konferowicz, Stanisław. "Początki myśli statystycznej w Polsce (I)." *Wiadomości Statystyczne* 11 (1966): 13–20.

- . “Początki myśli statystycznej w Polsce (II).” *Wiadomości Statystyczne* 12 (1966): 7–13.
- Kopociński, Bolesław. “O podziale terytorialnym Polski na części.” *Zastosowania Matematyki* 5/2 (1960): 173–177.
- Kozłowski, Czesław. *Powszechne spisy ludności*. Warszawa: Polskie Wydawnictwa Gospodarcze, 1951.
- Królikowski, Dionizy. *Kwestya rzemieślnicza jako kwestya społeczna*. Poznań: Drukarnia i Księgarnia św. Wojciecha, 1908.
- Kubiczek, Franciszek. Przedmowa do *Historia Polski w liczbach. Statystyka Polska dawniej i dzisiaj*. Edited by Franciszek Kubiacek, Warszawa: Główny Urząd Statystyczny, 2017.
- Łuczak, Czesław. “Przemysł i rzemiosło.” In *Dzieje Wielkopolski, Tom II, Lata 1793–1918*. Edited by Witold Jakóbczyk, 96–110. Poznań: Wydawnictwo Poznańskie, 1973.
- . *Dzieje gospodarcze Wielkopolski w okresie zaborów (1815–1918)*. Poznań: PSO, 2001.
- . *Położenie ekonomiczne rzemiosła wielkopolskiego w okresie zaborów (1793–1918)*. Poznań: Polskie Towarzystwo Historyczne, Oddział w Poznaniu, 1962.
- Marczewski, Jan. “Quantitative History.” *Journal of Contemporary History* 3/2 (1968): 179–191.
- Mączak, Antoni. ed. *Encyklopedia Historii Gospodarczej Polski do 1945 roku (O–Ż)*. Warszawa: Wiedza Powszechna, 1981.
- McQuitty, Louis L. “Elementary Linkage Analysis for Isolating Orthogonal and Oblique Types and Typical Relevancies.” *Educational Psychological Measurement* 17 (1957): 207–229.
- Meyer, John R., and Alfred H. Conrad. “Economic Theory, Statistical Inference, and Economic History.” *The Journal of Economic History* 17/4 (1957): 524–544.
- Migut, Grzegorz. “Zastosowanie technik analizy skupień i drzew decyzyjnych w segmentacji rynku.” In *Zastosowanie nowoczesnej analizy danych w marketingu i badaniach rynku – materiały z seminarium*, edited by Janusz Wątroba, 75–92. Kraków: StatSoft Polska, 2009.
- Mucha, Maria. “Hutnictwo szkła we Wschodniej Wielkopolsce od XVII do początku XIX wieku.” *Folia Prehistorica Posnaniensia* XII (2004): 317–322.
- Nowak, Edward. *Metody taksonomiczne w klasyfikacji obiektów społeczno-gospodarczych*. Warszawa: Polskie Wydawnictwo Ekonomiczne, 1990.
- Pluta, Wiesław. *Wielowymiarowa analiza porównawcza w badaniach ekonomicznych*. Warszawa: Państwowe Wydawnictwo Ekonomiczne, 1977.
- Rutkowski, Jan. “Grossman Henryk: Struktura społeczna i gospodarcza Księstwa Warszawskiego na podstawie spisów ludności 1808–1810 Warszawie 1925 (odbitka z Kwartalnika statystycznego) 4^e stron 108.” (recenzja) *Ruch Prawniczy, Ekonomiczny i Socjologiczny* 5 (1925): 1087–1099.
- Smoluk, Antoni. “Uwagi o dyskryminacji w zwartych przestrzeniach metrycznych.” *Przegląd Statystyczny* 23/4 (1976): 483–489.

- Sneath, Peter H.A., and Robert R. Sokal. *Numerical Taxonomy: the Principles and Practice of Numerical Classification*. San Francisco: W.H. Freeman & Company, 1973.
- Sobczak, Wojciech, and Witold Malina. *Metody selekcji i redukcji informacji*. Warszawa: Wydawnictwa Naukowo-Techniczne, 1985.
- Sobczyk, Mieczysław. *Statystyka*. Warszawa: Wydawnictwo Naukowe PWN, 1997.
- Sokołowski, Andrzej. "Empiryczne testy istotności w taksonomii." *Zeszyty Naukowe Akademii Ekonomicznej w Krakowie, Seria specjalna: monografie* 108 (1992).
- Steczkowski, Jan. *Zasady i metody rejonizacji produkcji rolniczej*. Warszawa: PWRiL, 1966.
- Szczepaniak, Marian. "Przemysł i rzemiosło wiejskie w powiecie kaliskim w drugiej połowie XVII i w XVIII w." *Rocznik Kaliski* IV (1971): 95–124.
- . *Przemysł i rzemiosło wiejskie w Wielkopolsce w drugiej połowie XVIII wieku*. Poznań: Poznańskie Towarzystwo Przyjaciół Nauk, Wydział Historii i Nauk Społecznych, 1971.
- Zsulc, Witold. "Tworzenie się klasy robotniczej oraz jej położenie ekonomiczne." In *Dzieje Wielkopolski, Tom II, Lata 1793–1918*, edited by Witold Jakóbczyk, 132–139. Poznań: Wydawnictwo Poznańskie, 1973.
- Szymański, Andrzej. *Rzemiosło i przemysł miejski w Wielkopolsce w drugiej połowie XVIII wieku*. Poznań: Zakład Graficzny UAM, Pleszewskie Towarzystwo Kulturalne, Muzeum Regionalne w Pleszewie, 2015.
- Thorndike, Robert L. "Who Belongs in a Family?" *Psychometrica* 18 (1953): 267–276.
- Timm, Neil H. *Applied Multivariate Analysis*. New York: Springer-Verlag, 2002.
- Topolski, Jerzy. "Wielkopolski model gospodarczy drugiej połowy XVIII w." In *Dzieje Wielkopolski, Tom I, do roku 1793*, edited by Jerzy Topolski, 836–837. Poznań: Wydawnictwo Poznańskie, 1969.
- Voelkel, Zenon. *Rzemiosło i przemysł Krotoszyna okresu międzywojennego*. Poznań: Drukarnia Poznańska, 1996.
- Walesiak, Marek. *Metody analizy danych marketingowych*. Warszawa: Państwowe Wydawnictwo Naukowe, 1996.
- Wąsicki, Jan. *Kolonizacja niemiecka w okresie Prus Południowych 1793–1806*. Poznań: Instytut Zachodni, 1953.
- . "Wielkopolska w okresie Księstwa Warszawskiego. Administracja. Ludność. Gospodarka." In *Dzieje Wielkopolski, Vol II, Lata 1793–1918*, edited by Witold Jakóbczyk, 55–60. Poznań: Wydawnictwo Poznańskie, 1973.
- Wysocki, Feliks. *Metody taksonomiczne w rozpoznawaniu typów ekonomicznych rolnictwa i obszarów wiejskich*. Poznań: Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, 2010.
- Żeglicki, Józef. "Badania statystyczne w Księstwie Warszawskim (I)." *Statystyk Terenowy* 6/101 (1967): 23–25.
- . "Badania statystyczne w Księstwie Warszawskim (III) – Wyniki drugiego spisu przeprowadzonego w 1810 r." *Statystyk Terenowy* 8/103 (1967): 27–29.

———. “Badania statystyczne w Księstwie Warszawskim (IV) – Charakterystyka rzemiosł oparta na wynikach spisu przeprowadzonego w 1810 r.” *Statystyk Terenowy* 9/104 (1967): 19–20.

Greater Poland crafts in the light of the 1810 census and in the context of multidimensional grouping

Summary

The article complements the reflections of Czesław Łuczak and Jerzy Topolski on the Greater Poland crafts during the Partitions and generalizes the research of Henryk Grossman and Mieczysław Kędelski on the socio-economic structure of the Duchy of Warsaw. The article presents the method of applying selected quantitative methods in historical research on Poznań crafts at the beginning of the 19th century.

The results of one of the censuses that were carried out in the period of the Duchy of Warsaw were the main source of quantitative data, constituting the basis for the presented analyses. Mastering a significant number of data required the aggregation of variables in the first step. Only on its basis, the regionalization of the Poznań department took place due to the structure of craftsmanship.

The research confirmed the key importance of the textile industry in Greater Poland's economy in the pre-industrial period. However, the use of quantitative methods led to more far-reaching conclusions that the development of the textile industry and the canvas industry was accompanied by the economic development of the whole county. Moreover, the research carried out showed that the counties surrounding the main economic center of the region were focused on satisfying the basic needs of the population. The longer distance, supported by political decisions, natural conditions and border location determined the greater specialization of individual areas.

The comparison of results from the two approaches to the aggregation of variables indirectly allowed the formulation of methodological conclusions. The use of multidimensional methods, including those concerning grouping, can be treated as a tool supporting the work of contemporary economic historians. However, it is necessary to consciously adjust the successive stages of the research to the specificity of the historical data. Relatively more important than in other fields is the stage of statistical verification and substantive discussion of the results.

Rzemiosło wielkopolskie w świetle spisu powszechnego z 1810 roku w kontekście grupowania wielowymiarowego

Streszczenie

Przygotowany artykuł jest uzupełnieniem rozważań Czesława Łuczaka i Jerzego Topolskiego nad rzemiosłem wielkopolskim w okresie zaborów oraz uogólnieniem badań Henryka Grossmana i Mieczysława Kędelskiego nad strukturą społeczno-gospodarczą Księstwa Warszawskiego. W artykule zaprezentowano sposób zastosowania wybranych metod ilościowych w badaniach historycznych nad rzemiosłem departamentu poznańskiego na początku XIX wieku.

Głównym źródłem danych ilościowych, stanowiących podstawę prezentowanych analiz, były wyniki jednego ze spisów ludności, jakie zostały przeprowadzone w okresie Księstwa Warszawskiego. Opanowanie znaczącej liczby danych wymagało w pierwszym kroku agregacji zmiennych. Dopiero na jej podstawie przeprowadzono regionalizację departamentu poznańskiego ze względu na strukturę rzemiosła.

Badania potwierdziły kluczowe znaczenie przemysłu włókienniczego w gospodarce Wielkopolski w okresie przedindustrialnym. Zastosowanie metod ilościowych dowiodło jednak, że rozwojowi branży sukienniczej i płóciennictwu towarzyszył rozwój gospodarczy całego powiatu. Co więcej, przeprowadzone badania dowiodły, że powiaty otaczające główny ośrodek gospodarczy regionu skupione były na zaspokojeniu potrzeb podstawowych ludności. Większa odległość, wspomagana decyzjami politycznymi, warunkami naturalnymi i usytuowaniem przygranicznym, determinowała większą specjalizację poszczególnych terenów.

Porównanie wyników dwóch podejść do agregacji zmiennych pozwoliło pośrednio na sformułowanie konkluzji o charakterze metodologicznym. Zastosowanie metod wielowymiarowych, w tym tych dotyczących grupowania, można traktować jako narzędzie wspomagające pracę współczesnego historyka gospodarczego. Niezbędne jest jednak świadome dostosowanie kolejnych etapów badania do specyfiki danych historycznych. Relatywnie ważniejszym niż w innych dziedzinach jest etap weryfikacji statystycznej i dyskusji merytorycznej uzyskanych wyników.