

POZNAŃ SCHOOL OF SOCIO-ECONOMIC GEOGRAPHY (AND SPATIAL MANAGEMENT) OF ADAM MICKIEWICZ UNIVERSITY (IN POZNAŃ)

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ABSTRACT: This article presents the general characteristics of the Poznań school of socio-economic geography (and spatial management). Scientific school is usually understood as a community of scholars, representatives of a given scientific discipline, associated with a specific university (or universities) functioning in a given city, united by particular approaches to scientific problems and by accepted ideas, views, methods used etc., which has substantial achievements in a given scientific discipline. There is practically no scientific school without a master (or masters) who is an eminent scholar gathering a group of students and associates. The acknowledged output of this scholar – master, especially an innovative approach to solving research problems and also the influence of his/her scientific authority on students and associates, is usually an origin of a new scientific school. Professor Zbyszko Chojnicki, the founder of the Poznań school, was such a master. The article presents the creation of the School and its development, characterises the role of the Master, indicates the research approach and direction of the conducted studies he determined and discusses the scientific output of the Master and the three selected generations of students and, to a lesser extent, the auditing students. Emphasis is put on the achievements in the theory of geography and spatial management, methodology, paying particular attention to quantitative analysis methods and the innovative and original empirical research conducted as well as the significance of this output for Polish socio-economic geography and spatial management. What is also presented is the popularisation activity and the reflections on the future of the School. The article presents the author's point of view.

KEY WORDS: scientific school, socio-economic geography, spatial management, scientific research, scientific output

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Introduction

In the Polish language of science there is such a term as *scientific school*. This notion seems, however, to be overused in many cases concerning the Polish scientific community. This is so because *scientific school* is understood as a specific place (a scientific centre) in which research is conducted.

In this approach *scientific school* is simply a name for itself, replacing the official name of a particular scientific unit and its employees, such as: faculty, institute, chair, department, laboratory, etc., included in a given university or research institute. Thus, in the broadly understood Polish science, there are many scientific schools related to different disciplines and specialities studied

in various types of scientific and research units. Meanwhile, *scientific school* seems to be a very specific term and its use in relation to a specific research unit requires that a specific (research) unit should meet precise criteria, not always possible to be fulfilled. All this means that the number of real scientific schools in Polish science is rather limited.

However, Polish scientific and popular-science literature describes or mentions “real” scientific schools which are of major importance not only for Polish science. The unquestionable, world-class scientific school was the Lviv school of mathematics whose most prominent representatives were S. Banach, H. Steinhaus, S. Mazur, S. Ulam, L. Chwistek and in the beginning also K. Kuratowski who then moved to Warsaw, and many other distinguished mathematicians (Urbanek 2014). Another well-known Polish scientific school was the Lviv-Warsaw school of philosophy established by K. Twardowski whose representatives and successors were, among others, K. Ajdukiewicz, T. Kotarbiński, S. Leśniewski, J. Łukasiewicz, A. Tarski, W. Witwicki, M. Ossowska, S. Ossowski, W. Tatarkiewicz and also I. Dąbmska who later worked in Cracow alongside R. Ingarden, a student of E. Husserl (Woleński 1985; Kostrzewska-Będarkiewicz 2017).

As was stated earlier, there are many names of the more or less distinguished Polish scientific schools present in media¹. One of the former, well-known in the field of geographical sciences, is the Poznań school of socio-economic geography which was created, developing and operating at Adam Mickiewicz University in Poznań. (Czyż 2012a, 2012b, 2012c; Śleszyński 2013)².

The paper aims to characterise in rather general terms the Poznań school of socio-economic geography and since the end of the 20th century *socio-economic geography and spatial management*, on the basis of the scientific output of its Master and its main representatives as well as undertaken activities in broadly understood science³. It should be emphasised at this point that the evolution of theoretical-methodological orientations and scientific interests of representatives of scientific schools is a natural phenomenon and, consequently, the change in the character of these schools which also concerns the Poznań School to a certain extent. Yet, current orientations and trends in the conducted research will not be the subject of more detailed discussions. This article is the reflection of the present author’s more subjective point of view, which does not exclude a different perspective on the character, functioning and scientific achievements of the School, including the importance of these achievements in Polish socio-economic geography and spatial management. The author, however, is in a specific situation because he can feel included in the group of the first students of this School, which in this article are called the first-generation students⁴.

General characteristics of the Poznań School of socio-economic geography (and spatial management)

As has already been mentioned, a scientific school is usually a community of scholars, representatives of a given scientific discipline, associated with a specific university (or universities) functioning in a given city, united by particular approaches to scientific problems and by

¹ The author also uses short forms such as the Poznań School or the School in the following parts of the article.

² It is worth mentioning at this point that in the current Poznań University of Economics and Business, Prof. Domański also gathered a group of geographers, mainly graduates of the University, who can aspire to be recognised as the school of economic geography and spatial management. A great number of other graduates of geographical studies at Adam Mickiewicz University in Poznań have been working in other organisational units of Polish science for many years, not only associated with typical geographical subjects.

³ A certain profile of “the Poznań school of socio-economic geography” can be found in the articles of T. Czyż, and “spatial management” in the papers of J. Parysek, published in *Dzieje nauk geograficznych i geologicznych na Uniwersytecie w Poznaniu* (History of geographical and geological sciences at Adam Mickiewicz University in Poznań). Wydawnictwo Poznańskiego Towarzystwa Przyjaciół Nauk. Poznań 2012. Cf. T. Czyż 2012a, 2012b, 2012c; J. Parysek 2012.

⁴ The author was one of the first five MA students of the later professor, then Dr Zbyszko Chojnicki, Master of the School (who conducted the master’s seminar in 1962–1964 authorised by prof. F. Barciński).

accepted ideas, views, methods used etc., which has substantial achievements in a given scientific discipline. In other words, this is a community of academics accepting a particular paradigm⁵ within the presented viewpoints and conducted research. There is practically no scientific school without a master (and in certain cases also masters) who is (are) an eminent scholar(s) gathering a group of students and associates. The acknowledged output of this scholar – master, and especially an innovative approach to solving research problems and also the influence of his/her scientific authority on students and associates, is usually an origin of a new scientific school. Professor Zbyszko Chojnicki, the founder of the Poznań school of socio-economic geography, was such a master who was able to gather a group of pupils who adopted the formulated empirical-scientific model of contemporary socio-economic geography which constitutes a philosophical-methodological pattern of this scientific discipline, defining its character as an empirical science with its own theoretical base fulfilling all elementary cognitive functions, and who contributed to its application, enrichment and dissemination (Chojnicki 2012; Czyż, Parysek, Stryjakiewicz 2015a, 2015b; Parysek 1998). The students of the School successfully achieved this objective using considerable scientific achievements of the professor, his knowledge, help and the opportunities of joint work.

The factor that played a major part in the establishment of the Poznań School was undoubtedly the personality of Professor Zbyszko Chojnicki, his knowledge, authority and activity in the field of staff education. The suggested trends in research were also attractive, especially: (1) quantitative methods and models, and its application in geographical studies, (2) theory and methodology of geography and spatial management, (3) dynamic and structural research related to the

use of quantitative methods in determining the socio-economic spatial and regional structure of Poland, and also (4) the topicality and importance of undertaken research issues to gain knowledge of current events and processes (Chojnicki 1999, 2010; Czyż, Parysek, Stryjakiewicz 2015a, 2015b). The freedom in determining individual research interests accepted by the professor was encouraging, but on the other hand, he also imposed discipline in methodological order, terminological correctness and logic behind the conducted research and prepared texts. Each work had to include theoretical aspects, apply a specific methodological approach, e.g. correct methods of quantitative analysis, and also involve an interesting and important research issue. To be in the professor's research team, that is in the School, was an honour on the one hand, but also a great challenge and obligation on the other.

The knowledge which was the effect of his natural aptitude and work and also his stay in the USA was the magnet attracting students to their Master. What was particularly drawing attention was quantitative methods and their application, mainly learning the basics of the suggested and applied methods, which guaranteed the correctness of both, the use and interpretation of the obtained results. Not everybody in the School presented this kind of approach equally. For some, exploring the nature of the method was the essence of the conducted investigations, for others, effective application of a given method in the conducted research was more important. This kind of approach was typical of the so-called first-generation students. As time passed, some students of the School lost interest in only quantitative methods and were more engaged in, first, the effective use of these methods in conducted studies and then in the exploration of new, significant and up-to-date research issues or in theoretical and methodological discussions. There were scholars, however, for whom the search for new methods and possibilities of their application was never a secondary issue despite undertaking ever more up-to-date empirical research and theoretical-methodological discussions.

The cooperation of the School students with a group of Poznań statisticians and mathematicians played a pivotal role in the development of the application of quantitative methods in geography. Some of them were included

⁵ The term 'paradigm' is variously interpreted, often in an incorrect way. It was introduced into science by T.J. Kuhn (1970, 1985, 1993). In general terms, it is a way of perceiving reality accepted in a given discipline by certain communities of scholars, which characterises (creates) a set of adopted notions and theories fixed in tradition and existing practice (Kuhn 1970, 1985, 1993; Barbour 1984). Moreover, a paradigm is treated as a model for conducted research (Barbour 1984) or for solving scientific problems (Jodkowski 1990; Parysek 2017a, 2017b).

in the personnel of the Institute headed by the professor⁶.

The developed and tested methods did not belong exclusively to the scholars learning them, on the contrary, they were disseminated as part of the seminars on the application of quantitative methods and models in geography organised by Prof. Chojnicki, held with the participation of geographers from the majority of Polish geographical centres. As a result, numerous publications edited by Professor Chojnicki were issued as part of the editorial activity of the Poznań Branch of the Polish Academy of Sciences, Adam Mickiewicz University in Poznań and PWN (Polish Scientific Publishers⁷). After a few years of break these seminars were resumed and two of them took place under the directorship of Professor Rogacki, which is evidenced by two subsequent publications⁸. Other activities that popularised the application of quantitative methods in geography were also two workshops on quantitative methods organised and held in *Collegium Polonicum* in Słubice, with the attendance of young geographers from many Polish scientific centres who listened to the lectures given by the participants of the Poznań seminars (speakers), both geographers and statisticians⁹.

The output of the Master as well as his students regarding the theory and methodology of socio-economic geography and spatial management should be first of all included in the achievements of the Poznań School, with the professor's works playing a leading and major role. The studies of theoretical and methodological issues seem to be a logical consequence of the gained experience in the area of quantitative methods and their application. This is because the use of a particular

method required the good knowledge of both the general methodology of sciences and the methodology of geographical sciences, and later also spatial management which was Professor Chojnicki's new subject of interest being at the same time an inspiration for the activities of his associates. The professor's care for progress in the methodology of geography and its development was undoubtedly the reason why he organised the national Geographic Conference in 1983 in Rydzyna¹⁰. The meeting of Polish geographers resulted in the assessment of Polish geography as a science and determine the directions of its development. The professor was the author of an original organisational concept of the conference as well as its general moderator and organiser (Chojnicki 1991; Parysek 2014). The scientific conference in Słubice in 2003, organised and supervised by the professor as well, was also significant for the further development of Polish geography, especially in the area of theory and methodology but also for determining directions of the conducted research.

Since the beginning of the 1990s the professor and the students of the School started to be interested, as was mentioned earlier, in spatial management, in creating theoretical-methodological bases of which both the professor and some of his students played a major role. The development of this new research trend resulted in the opening of a new course of study in the academic year 1991/1992 as part of local management and spatial planning, termed spatial management before the graduation of the first students. It was a unique course of study, not only in the country, which exists in different forms to this day¹¹. For a certain period of time, Collegium Polonicum of Adam Mickiewicz University in Poznań, located in Słubice, conducted a unique course of studies in the field of *Development and renewal of cities and rural areas*, which "expired" after introducing a two-tier education system. This course of studies is continued within the speciality of urban renewal in the field of spatial management, conducted in Poznań (Parysek 2017a).

⁶ These were primarily the statisticians who were centred around Prof. Caliński of the then Agricultural Academy in Poznań, such as M. Krzyśko, T. Kaczmarek, M. Karoński and E. Malec and also B. Kotkowski and J. Hauke, employed in the Institute in various periods as well as cooperating A. Maćkiewicz (the Poznań University of Technology), to a lesser extent other scholars.

⁷ These publications, prepared under the editorship of Prof. Chojnicki are listed in the References at the end of this article.

⁸ These are some of the publications listed in the References.

⁹ The scientific and organisational matters of the workshops were managed by J. Parysek.

¹⁰ The present author was a co-organiser of both conferences in Rydzyna and in Słubice.

¹¹ At the same time a similar course of study was opened at the Faculty of Architecture of the Wrocław University of Science and Technology, cf. Parysek (2017a) and Zipser (2017).

All these events and initiatives constitute the achievements of the Poznań school of socio-economic geography and spatial management.

The functions which were fulfilled and are fulfilled in the field of spatial management by the Master and the students of the School in the scientific environment of geographers and specialists additionally justify the significance of the Poznań School of socio-economic geography and spatial management. Shown above are only selected, more important scientific and organisational achievements of the School. Their full picture can be seen in the scientific output of the Master and the students (to a lesser extent, the auditing students of this School), presented briefly, due to the limited space, in the further part of the study.

Professor Zbyszko Chojnicki - Master of the Poznań School

As was already stated, there is no scientific school without a master who, in the case of the Poznań school of socio-economic geography (and spatial management) was Professor Zbyszko Chojnicki. The professor was a lawyer and philosopher by education¹². He graduated from law at the University of Poznań in 1950 and from philosophy in 1952 receiving MA diplomas. In fact, he became a geographer by accident, as a consequence of the functioning of higher education in the Stalinist period. As a graduate of law and philosophy schools, despite his two attempts he was not employed as an assistant in the Faculty of Law, of the then University of Poznań. He was exceptionally well prepared to take this position, attending seminars of such excellent scholars as K. Ajdukiewicz and C. Znamierowski and being especially interested in scientific studies, gifted in this field and with the knowledge in: law, sociology, economics, logic, philosophy and the methodology of sciences as a graduate of university

studies. After a short period of employment in the department of investments in the parent university, he accepted the proposal of Professor Czekalski for assistantship in the Department of Economic Geography at the Faculty of Biology and Earth Sciences in 1953. A completely new field of science he was supposed to devote to, which was economic geography, required that his knowledge in this area be completed and extended. Diligence and ambition of the new assistant was helpful and so was the positive attitude of the head of the department to the research initiatives undertaken by his new associate. Not without significance in this area were also the modern, for that time, concept of economic geography adopted in the parent department and scientific contacts established (Parysek 1998; Czyż, Parysek, Stryjakiewicz 2015a, 2015b). A scholarship stay in the USA in the years 1961/1962 after obtaining the doctor's degree was of particular importance for the formation of the research profile of Z. Chojnicki. His stay in that scientific environment (Philadelphia, Evanston, Seattle) coincided with the creation of a new paradigm of economic geography and the birth and flourishing of *regional science*. That is where the professor had the opportunity to study the latest scientific literature (not only geographical and economic), get acquainted with the new idea that laid the foundations for the development of modern *regional science* and hold discussions with the leading representatives of both geographical sciences and this new scientific discipline. It should be remembered that *regional science* was created to take up the new issue of regional research and to supplement its existing, descriptive-cartographic model with theoretical conceptualisations as well as with statistical and mathematical aspects which turned out to be also important for the research conducted within socio-economic geography. It is within *regional science* that a new theory concerning the organisation, structure and functioning of cities and regions was about to be worked out, which was equally interesting for geographers. However, *regional science* developed its problematic and methodological separateness relatively quickly, obtaining the status of a new discipline (although not in Poland) of high practical usefulness (Chojnicki 1981; Domański 2002; Parysek 2006, 2018). The view is expressed that the development of *regional science* as a new

¹² This text is a subjective and for many reasons not complete presentation of the Master's and the Poznań School students' scientific achievements. It is based on Google Scholar publications, webpages of the Institute of Socio-Economic Geography and Spatial Management of Adam Mickiewicz University in Poznań and the publications: Czyż, Parysek, Stryjakiewicz (2015a, 2015b), Czyż (2012a, 2012b, 2012c) and Parysek (1998, 2012, 2018).

scientific discipline was determined primarily by the following factors: (1) opening a new field of research characterised by a high innovativeness of the problem approach, burdened to a limited extent with traditional approaches with a low level of innovativeness, and (2) attracting young, talented people, well-prepared in the area of theory and methodology with ambitious goals (Chojnicki 1981; Domański 2002; Parysek 2006, 2018).

It is highly probable that the same factors and also the new paradigm of socio-economic geography were instrumental in creating and developing the Poznań School of socio-economic geography (and spatial management). They were also important for the expansion of the field of geographical studies offered in the Poznań centre to include spatial management, which took place in the 1990s and in the next years (Parysek 2018).

Referring to the above-mentioned *regional science* development factors and their impact on the creation of the Poznań school, the following should be emphasised:

1. Professor Chojnicki's stay in the United States contributed, undoubtedly, to the opening of a new field of research interests characterised by a high innovativeness of the problem approach and also a gradual reduction in research conducted in traditional approaches with a low level of innovativeness. This is evidenced mainly by the scientific achievements of the professor, concerning especially¹³: [a] the application of statistical and mathematical methods and models in the conducted studies (Chojnicki 1966, 2011a, 2011b; Chojnicki, Czyż 1973; Chojnicki, Czyż, Parysek, Ratajczak 1979; Chojnicki, Czyż, Ratajczak 2011), [b] the theory and methodology of geography (Chojnicki 1999, 2000), and [c] the research on the spatial socio-economic and regional structure of Poland (Chojnicki 1961; Chojnicki, Czyż, Parysek, Ratajczak 1979).
2. Professor Chojnicki was able to gather a group of young scientists who adopted the new paradigm of socio-economic geography and

participated in its formation. Those are the Poznań School students whose contribution to geography and spatial management will be presented in the following pages of this article.

Quantitative methods were understood very broadly in the school, from balance and indicator methods, through statistical ones, particularly in the field of multivariate statistics, graph, econometric methods and those of so-called social physics up to mathematical and formal modelling. This is so because Professor Chojnicki regarded these methods as useful and effective tools for research and refinement of knowledge and also the way to give geographical knowledge more theoretical character. Special emphasis should be put on the achievements of Zbyszko Chojnicki in the area of conception and application of gravity and potential models (Chojnicki 1966, 2011a, 2011b), correlation and regression analyses, taxonomic methods (Chojnicki, Czyż 1973), methods of factor analysis and principal components analysis (Chojnicki, Czyż, Parysek, Ratajczak 1979), as well as the analyses of spatial distribution and Markov's chains in geographical research. He noticed both the benefits of using these methods and models and also the limitations and difficulties in their correct application and interpretation of results¹⁴.

In the theory and methodology of geography, the professor's considerable achievement was the presentation of a new methodological concept of socio-economic geography as a basis for determining the area of interests and aims of this scientific discipline from the point of view of its share in solving basic problems of contemporary science, including also practical ones. Particular attention should be paid to the discussions on the structure of geographical knowledge and its development models. Professor reconstructed and analysed the philosophical and methodological orientation of socio-economic geography and created cognitive models and theoretical

¹³ This text will present only the publications of crucial significance, in the opinion of the present author, for determining the character of the Poznań school of socio-economic geography and spatial management and its scientific output (with a certain preference for monographs and papers in English).

¹⁴ Only the works of major significance for the development of the School research profile are presented, especially those monographic in character, articles published in English, and also, although to a limited extent, other original works, both individual and with joint authorship recognised by the present author as the most important for the characteristics of the School, its Master and the students.

assumptions for the development of this scientific discipline. He formulated a systemic model of scientific discipline, which was the starting point for the methodological analysis of geography, and proposed adopting a systemic approach on the basis of which he presented the conception of a territorial social system. This conception became not only a new paradigm of the subject approach and research in geography, but has played a significant role in determining the subject matter of spatial management (Chojnicki 1985, 1988a, 1988b, 1992b, 1996; Parysek 2006). This conception was expanded into a systemic theory of the geographical region and a model of its development (Chojnicki 1996). Reflections on the development should be related to a philosophical analysis of time and space and also the indication of their importance for determining the geographical discipline¹⁵. This area of research also includes the previously mentioned methodological issue of regional science (Chojnicki 1981). After 1990, Z. Chojnicki often took up theoretical-methodological issues of spatial management, emphasising the role of geography in the research concerning this subject (Chojnicki 1990a, 1990b, 1992b)¹⁶.

The studies on the spatial socio-economic and regional structure of Poland carried out by Z. Chojnicki are characterised by originality and innovativeness which concerns equally the concepts of this research and its analytical aspect. They are still valid, as a research pattern, although currently less up-to-date in cognitive terms (the flow of time). The first study in this field was the analysis of the country's regional structure in railway freight flows (Chojnicki 1961). The professor also dealt with the analysis of the network of regional settlement systems, the standard of living of the population in reference to the economic development level, economic changes in Poland and the process of systemic transformation (Chojnicki, Czyż, Parysek 1997), post-modernist development (Chojnicki 1992a), the spatial structure of Polish science and education (Czyż, Chojnicki 1997) and a knowledge-based economy (Czyż, Chojnicki 2006, 2008a, 2008b).

¹⁵ E. Ostrom, the Nobel Prize winner in economics, invokes the opinion of Z. Chojnicki on this matter (Czyż, Parysek, Stryjakiewicz 2015a, 2015b).

¹⁶ The input of Prof. Chojnicki to the theory and methodology of spatial management has been described in a separate work by the present author (Parysek 2018).

As a distinguished scholar, Professor Chojnicki gathered, as was already mentioned, a group of young, talented colleagues who were attracted by his view on science, especially socio-economic geography and spatial management, determinants and trends in geographical development, theoretical-methodological bases and theoretical-methodological orientations in geography, the role of methods and quantitative models in conducted research, a systemic approach, etc. He strictly controlled his scientific work and expected that others also carefully consider their research, especially his students. He did not accept the terminological and conceptual chaos, authoritarian judgements, insufficiently documented views and opinions. Only thus, in his opinion, could an appropriate level of scientific papers be ensured. Along with friendly advice provided to his students, he expressed his reservations in a decisive manner, while being open to discussing and defending their own points of view. He took care of the correctness and accuracy of the scientific language applied. For his students he was a perfect guide on the paths of scientific development, open to new ideas and concepts. He did not impose scientific issues and ways of solving them, but he did not accept trivial problems and similar methods. He was an authority that he had established through his lasting scientific achievements. He will remain such an authority not only for his students.

Students and auditing students of the Poznań School of socio-economic geography (and spatial management)

Is not an easy and undisputable matter to compile a complete list of the students of the Poznań School (of socio-economic geography and spatial management) as well as a synthetic presentation of their contributions to its development and its position among scientific achievements. A certain distinguishing criterion can be the direct impact of the Master on the student, manifested in the role played by the professor on the path to scientific development being, e.g. the supervisor of MA theses and doctoral dissertations, reviewer in post-doctoral degree processes or in procedures for applying for the professor's title. It is worth remembering that masters were

not excluded from the procedures for academic promotion of their students, as is the case today. Another criterion of the proposed classification is whether the dominant influence on the scientific development of a particular person had the Master only, or also his students, or, above all, mainly the students. Moreover, in the compilation of the most important representatives of the School, what was also taken into account was if a particular person under the scientific supervision of another scholar (supervisor) used, and to what extent, the scientific achievements of Professor Chojnicki. However, it is hard to imagine that academics who practise science are immune to the views and scientific achievements of an outstanding scholar managing their scientific unit for many years. Priorities and evolution of individual scientific interests were also important. At this point, it is also necessary to emphasise that in recent years in the Poznań School there has been observed, though difficult to explain and understand, quite a clear decrease in references to the professor's scientific output, especially noticeable among the younger generation. These are first of all scholars who did not listen to his lectures before and did not participate in seminars, who adopt a different theoretical-methodological orientation, do not attach much importance to theory and methodology and are fascinated by a personality and work style of their academic supervisor, or take their own development path.

The adopted classification might be burdened with a too subjective approach, but each classification is better than none, especially when it is adequate and separate and when it concerns the situation in which many of the scholars employed in the Institute of Socio-Economic Geography and Spatial Management of Adam Mickiewicz University may feel or not the students of Professor Chojnicki or deserve this name¹⁷.

In this paper, just like in school, the following are distinguished: (1) first-generation students, (2) second-generation students, (3) students of the first-generation students, and (4) auditing students. Thus, the first-generation students are those who were fortunate to have Professor

Chojnicki as the supervisor of their MA theses and doctoral dissertations, the reviewer in their post-doctoral processes or during the application for professor's title and no one else exerted this almost exclusive, in a sense, influence on their scientific development, except for their own interests and engagement. These are also scholars whose scientific output is clearly part of the professor's academic activities. This is a generation born in the 'around war' period (1938–1946). The characteristic scientific activity of this group was seeking and learning quantitative analysis methods for the purpose of their effective application in the conducted scientific research. However, it was not about treating these methods as a means to an end, but about understanding their nature, bearing in mind the correct application of the method and the reliable interpretation of results. All those academics, together with the Master, were the precursors of the application of many statistical and mathematical methods in Polish geographical research. Apart from that, they undertook original research using these methods. To a greater or smaller degree, they were also interested in the methodological issues of socio-economic geography and spatial management.

The second-generation students are scholars whose MA theses and doctoral dissertations were also supervised by Professor Chojnicki, but the first-generation students, next to the professor, took part in their education process as well. They were born in the 1950s and were equipped with ready-made workshop methods which they adapted to the innovative scientific studies they conducted. A more serious interest in quantitative methods was replaced then by original research issues.

The students of the first-generation students are scholars whose scientific development was supervised by those first-generation students, but their approach to the undertaken issues is clearly related to the views and opinions of Professor Chojnicki, which were adopted directly, i.e. by the contact with the Master, and indirectly, by their scientific supervisors. These are academics born at the end of the 1960s and at the beginning of the 1970s. In their scientific research, they also employed quantitative analysis methods making use of both the output of the Poznań School and their own ideas. As was the school's tradition, they also explored innovative scientific issues

¹⁷ This work takes into account the output of those School students who greatly contributed to its development and functioning. The titles of a professor or a post-doctoral degree (dr hab.) were additional criteria of the selection (except for auditing students).

referring to the changing reality and to the widening interests of the Institute.

The students of the three distinguished categories of the Poznań School graduated from geographical studies and are (were) engaged in scientific, didactic and organisational activity at the present Institute of Socio-Economic Geography and Spatial Management of Adam Mickiewicz University directed by Professor Chojnicki for many years. As the time passed and generations changed, it is visible, however, that the focus of scientific interests of scholars shifted from the theoretical-methodological aspect to the empirical one without neglecting the former.

The auditing students of the School are the academics whose scientific development at the present Institute of Socio-Economic Geography and Spatial Management was supervised by other scholars, but who referred to the professor's research orientation and the output of his associates and also co-created this output. They contributed to the School by both searching for quantitative analysis methods and their application and undertaking important, up-to-date scientific issues. Some of them shaped their initial and further development outside the parent unit which was Adam Mickiewicz University in Poznań.

As was already emphasised, the classification, like the whole text, resulted from subjective considerations of the present author, who classified himself as a first-generation student because he meets all the requirements of the classification and in many cases (also concerning a theoretical-methodological correctness of the presented texts and a care for the purity of scientific language) refers to the opinion of the Master (Parysek 2016a, 2016b, 2018).

The first-generation students are undoubtedly: Teresa Czyż, Jerzy J. Parysek, the late Henryk Rogacki, and Waldemar Ratajczak¹⁸. The second-generation students are primarily: Roman Matykowski, Tadeusz Stryjakiewicz, Anna Tobolska and Krzysztof Stachowiak, whereas the following scholars can be classified as the students of the first-generation students: Paweł Churski, Lidia Mierzejewska and Magdalena

Wdowicka (to a much lesser extent Jacek Kotus and Sylwia Staszewska)¹⁹. The group of auditing students consists of Benicjusz Głębocki, Wiesław Maik, Tomasz Kaczmarek and the late Zdzisław Kamiński. The following scholars fall into this category as well: Roger Bivand (an Englishman), who was a member of the scientific community of the Institute for some time and is now a visiting professor, and Jan Hauke, a statistician, for a decade or so a member of this community²⁰.

First-generation students and their scientific achievements

Professor Teresa Czyż is undoubtedly the first and most important student of the School, and also the professor's associate. She is a co-author of many publications, important for the scientific output of Polish socio-economic geography. She became a member of the present Institute of Socio-Economic Geography and Spatial Management after a short period of pedagogical work, taking up the employment at the Department of Economic Geography directed by Professor Barciński. As a physical geographer, she decided to change her speciality of a climatologist and became a socio-economic geographer, achieving considerable successes in the field of science, didactics, staff education and organisation. Professor Chojnicki was a supervisor of her doctoral dissertation and a reviewer in the post-doctoral degree process. Just as the Master, Teresa Czyż examined issues in a broad and diverse way. Undoubtedly, she belongs to the pioneers in the application of more advanced quantitative analysis methods in Polish research in the field of socio-economic geography, including taxonomic

¹⁸ The promising pupil of the School was Kazimierz Polarczyk, whose professional activity (also political one before) took place and still does outside the sphere of science.

¹⁹ Jacek Kotus, a sociologist by education, despite obtaining a PhD degree and post-doctoral degree of Earth Sciences in the field of socio-economic geography, placed his scientific interests in sociology, similarly to Sylwia Staszewska, a graduate in spatial management of the Wrocław University of Science and Technology, also a PhD and Dr hab. of Earth Sciences in the field of socio-economic geography, interested mainly in urban issues, especially their technical aspects. Their links with the scientific thought of Prof. Chojnicki and the research directions of the School, owing to the education and undertaken issues, have not been too close.

²⁰ Perhaps other scholars may also feel the pupils of the Professor's School. In this article, however, the above mentioned limitations have been adopted.

ones, methods of factor analysis and principal components analysis, regression models, surface trend models, Markov's chain models, simplex Q methods, models of potentials, as well as entropy and convergence analysis. Many of these methods were related to the conducted research on the theory of the economic region, the regionalisation method and the analysis of spatial and regional structures. She carried out studies on the character and the role of the socio-economic region in the contemporary spatial organisation of Poland and Europe, regional development factors, the determination of methodological standards in the analysis of main dimensions and changeability of regional structures, polarised growth models and the core-periphery concept in the regional development of Poland, the regional structure of Poland in relation to the administrative division of the country, changes in the regional diversification of Poland, the convergence process, the processes of the system transformation and globalisation in Poland and their implications (unemployment, the standard of living, the spatial structure, a knowledge-based economy, the metropolitanisation process, competitiveness etc.). The scientific achievements of Professor Czyż present all the values introduced to the research of the Poznań School by Professor Chojnicki and these are: theoretical-methodological correctness, the originality of the approach and the topicality of the explored issues. They also refer to the three main research trends, i.e. quantitative analysis methods, the theory and methodology of geography and spatial and structural research (see References).

It was only after 10 years of his graduation that *Professor Jerzy J. Parysek* became a member of the professor's team as a full-time employee. His professional experience in the area of hydrogeology and then regional, socio-economic and spatial planning brought additional values to scientific work, which produced results mainly at the moment of expanding the research issues of the Institute into spatial management. Professor Chojnicki was an informal supervisor of the J. Parysek MA thesis (formal was Prof. Barciński), a supervisor of his doctoral dissertation and a reviewer in his post-doctoral degree process. Professional work influenced his scientific interests and, as befits a pupil of the Poznań School, he was interested in quantitative methods and

their application in geographical research, planning and regional analysis. In the first period of scientific activity he used indicator methods (those known and his own ones), *shift technique* by Dunn, centrographic methods as well as correlation analysis and multivariate regression. He was one of the precursors of using principal components analysis and cluster analysis, and also profile analysis in Polish geographical research. In the conducted studies he also applied canonical analysis and canonical correlation and additionally models and maps of potential, trajectories of development and graph indicators. Within the empirical studies conducted, the subjects of his interest were mainly spatial structures of industry, economic regions and regional structures, spatial development, cities and urbanisation processes, urban agglomerations, urban renewal, city life measured in terms of inhabitants' activity and the functioning of urban infrastructure, metropolises and metropolitanisation processes, globalisation, health and electoral issues, labour market, income and expenses of the population, factors and determinants of development, and also the language of science. In the scientific achievements of a theoretical-methodological nature, prominent place belongs to publications on geographical classification and regionalisation, theory and methodology of a local economy and spatial management, and also methods of regional analysis. Pioneer works in this field, especially monographs, are still cited by many authors and their content is still up-to-date (see References).

Professor Waldemar Ratajczak is the pupil of the School for whom searching for ever newer applications of quantitative methods in geography has always been a priority. However, it was not only about applying a method itself in the conducted research, but about its correct use and the correct interpretation of the results. He wrote MA and PhD theses under the scientific supervision of Professor Chojnicki who was also a reviewer in his post-doctoral degree process. Nevertheless, he got his doctoral degree in the Institute of Geography and Spatial Organization of Polish Academy of Sciences in Warsaw. In the area of quantitative analysis methods (mathematical, statistical, econometric) he is undoubtedly the greatest specialist among Polish geographers. His interests were, among others: graph theory and graph methods, fuzzy graphs, gravity

and potential models, multivariate analysis of correlation and regression, principal components analysis and canonical correlation analysis, discrete variables, surface trend, geometrics and fractal analysis, catastrophe theory, topological entropy, simulation models, spatial management, convergence and spatial self-organisation. He conducted research on the analysis of transport networks, spatial and transport accessibility of cities, spatial and regional structures, innovativeness and competitiveness of regions, convergence, spatial self-organisation and also socio-economic development of Poland, the effects of Poland's membership in the EU, development issues of regions etc. (see References).

A somewhat different approach than the one presented above was that by *Prof. Henryk Rogacki*, for whom the effective application of quantitative methods in the conducted research was of major importance. He wrote his MA and PhD theses under Prof. Chojnicki's supervision. He was particularly interested in the application of indicator methods and those of correlation and regression. The research issues undertaken included mainly studies on industrial structures, industrialisation and urbanisation, economic development and the role of industry in this process, inequalities in regional development, Polish foreign trade, tourism development etc. He also examined socio-economic changes after 1989 and the role of industry in the socio-economic transformation of Poland (see References).

Second-generation students and their achievements

As was already written, the second-generation students of Prof. Chojnicki's School are: R. Matykowski, T. Stryjakiewicz, K. Stachowiak and A. Tobolska.

The supervisor of MA and PhD theses of *Dr hab. Roman Matykowski* was Prof. Chojnicki, and Prof. Parysek was one of the reviewers in the doctoral and post-doctoral degree processes. The scientific output of R. Matykowski is characterised by great diversity and originality of the issues undertaken. In his workshop of quantitative methods the central place is occupied by centographic methods, correlation and regression, and principal components analysis. The research problems investigated by R. Matykowski include

primarily studies on spatial structures of cities and population dislocation, characteristics of urban social structures, demographics, borders and their significance, national minorities in Poland as well as their structures and spatial behaviour, economic emigration of Poles, election results in Poland and electoral behaviour of residents, broadly understood regionalism, internationalisation of industry and its functioning in the global economy etc. (see References).

Similarly to R. Matykowski, the supervisor of MA and PhD theses of *Prof. Tadeusz Stryjakiewicz* was Prof. Chojnicki. What is more, the professor was also a reviewer in his post-doctoral and professor degree processes. The main scientific interests of T. Stryjakiewicz revolve around new research issues. In his research workshop, he has a classic set of quantitative analysis methods. In this area, particular emphasis should be put into the application of game theory and network analysis in the conducted research, innovative in Polish geography. His early activity included studies on industrial geography and location factors of industries. He is a precursor in research on the spatial adaptation of industry and the formation of network structures and also industrial clusters. He studied capital groups and the role of foreign investors in the development of the Polish economy in the context of transformations taking place in the industry. He dealt with issues of the creative sector, its organisation, functioning and its impact on regional development, and also with the importance of a knowledge-based economy for economic development. In recent years, T. Stryjakiewicz has been interested in culture industries and the shrinkage of cities. His publications also involve regional policy, regional development and the development of border areas (see References).

The youngest student of Prof. Chojnicki, in terms of age and in the full sense of the word, is *Dr hab. Krzysztof Stachowiak*. He wrote the MA and PhD theses under the professor's supervision and took over his interest in the methodology of geography. The basic part of the scientific output of K. Stachowiak is research on: institutional determinants of foreign investment in Poland, the embeddedness concept, globalisation, its character and implications, studies on the relation between scientific units and a city together with

the consequences, creative and innovative cities and regions, specialisation as a factor in development dynamics, competitiveness of cities and others. He has a very good understanding of the research issues concerning socio-economic geography, currently undertaken in the world. His workshop includes basic quantitative analysis methods and, in addition, he has a good knowledge and experience in the application of GIS techniques (see References).

Prof. Chojnicki's second-generation student is also *Dr hab. Anna Tobolska*. She wrote both the MA and PhD theses under his supervision, but her post-doctoral degree process was reviewed by Prof. Parysek. A major role in shaping the research profile of A. Tobolska was played by Prof. Rogacki, which probably caused her to specialise in industrial geography. A. Tobolska conducted studies on changes in industrial branch, location factors of industries, including international cooperation units, the functioning of the Polish industry in the conditions of internationalisation and globalisation, global strategies and new organisational forms of industrial enterprises, and also behaviour patterns of international economic corporations. Moreover, she undertook the issues of local development and national minorities. She applied relatively simple quantitative methods, mainly in the classification and typology of industrial units, proposing own indicators in this area (see References).

Students of the first-generation students

The students of the first-generation students are represented (in the adopted, subjective formula of the presentation) so far by: P. Churski, L. Mierzejewska and M. Wdowicka.

Until obtaining the post-doctoral degree, *Dr hab. Paweł Churski* wrote his MA and PhD dissertations under the supervision of Prof. Czyż, whereas Prof. Parysek was one of the reviewers in his post-doctoral degree process. The scientific interests of P. Churski revolve primarily around the issues of broadly understood regional development and involve the following subjects, among others: regional development factors, changes in the regional policy in Poland and the EU, problem areas in local and regional development, cohesion and competitiveness of regions, regional specialisation, the state of and changes

in the labour market in the period of socio-economic transformation and the issues concerning the level and standard of living. He also carried out the research into the role of EU subsidies and structural funds in the economic development of Poland, and also other EU member states. Furthermore, he explored the issues of local development and tourism as a development factor. In the research he uses the analysis of correlation and regression, principal components analysis and also rank-size rule (distribution). He specialises in GIS and the application of IT mainly in the area management and in the analysis of spatial differences in the socio-economic development process (see References).

Dr hab. Lidia Mierzejewska is the student of Prof. Parysek under whose supervision she wrote her PhD dissertation. One of the reviewers in her post-doctoral degree process was Prof. Chojnicki. In the first period, her scientific interests involved the issues of the natural environment as a factor limiting growth and spatial development, especially of cities, and the function and importance of urban green areas. This resulted in a serious interest in sustainable development, first in its environmental aspects and then in urban sustainable development, and further, in the questions of spatial order and chaos in spatial development, the structure, functioning and models of urban development, public spaces, the security of people and property, city life (in terms of the urban infrastructure functioning), urbanisation processes and the problems of income and expenses of the population. In the research carried out she uses mainly descriptive statistics methods, principal components analysis and classification methods. The most important achievement in this area, however, is the application of models and maps of potential in the research on the accessibility of urban green areas (the surface area instead of points generating a potential) and the use of correlation in the research into subjects described with binary variables, which are pioneer studies in Polish geographical research (see References).

Dr hab. Magdalena Wdowicka belongs also to the students of Prof. Parysek. Under his supervision and in his department, she prepared MA and PhD theses. She is interested, among other things, in foreign investment in Poland and their significance in the transformation process,

economic globalisation processes, activity and spatial organisation of transnational corporations, the questions of urban development in the era of globalisation, cities and their competitiveness, urban agglomerations and their transformations as well as a local economy and spatial management. She uses principal components analysis and the analysis of clusters as tools of her research workshop (see References).

Auditing students

Prof. Benicjusz Głębocki opens the group of the School auditing students. His scientific development was influenced primarily by Prof. Barciński and Prof. Zajchowska. In the conducted research into agricultural and rural geography, he used indicator methods and also principal components analysis, being one of the pioneers of this method in Polish geography and specifically in agricultural geography. His scientific output is characterised by the innovativeness and originality of the questions undertaken, typical of the Poznań school of socio-economic geography and spatial management.

Prof. Wiesław Maik is a student of Prof. Zajchowska as well, but what is visible in his research, especially after moving to Toruń and Bydgoszcz, is the influence of Prof. Chojnicki. W. Maik is one of the few Polish geographers whose research profile includes the theoretical-methodological questions of socio-economic geography. The basic issues revolve around the problems of settlement, especially in cities and urbanisation processes.

The scientific development of *Prof. Tomasz Kaczmarek* up to the moment of obtaining the post-doctoral degree was supervised by Prof. Biderman. His research workshop was shaped by almost everything that happened in the Institute directed by Prof. Chojnicki. The relation to the Poznań School is visible in the methodological order which characterises his scientific publications and in the originality of the questions undertaken. The interests of T. Kaczmarek involve first of all the research on: systems and administrative-territorial structures, urban administrative functions, spatial structures of retail chains, creative regions as well as structures and functioning of urban agglomerations together with planning their growth and spatial development.

The English scholar *Prof. Roger Bivand*, presently employed in the Norwegian School of Economics in Bergen, was an active student of the Poznań School for a certain period of his scientific activity, bringing advanced quantitative analysis methods to the scientific output, especially simulation methods, geographic space-time modelling and autocorrelation analysis. He received the post-doctoral degree at Adam Mickiewicz University²¹. Currently, he is a high-class specialist in geographical spatial data and their analysis (R technique), in the research on spatial dependencies and statistical programming. He is a visiting professor in the Institute of Socio-Economic Geography and Spatial Management.

Dr hab. Jan Hauke joined the Institute community as a statistician and mathematician. He is, next to Prof. Ratajczak, an academic who is primarily interested in methods of statistical and spatial analysis and also mathematical analysis.

The late Dr Zdzisław Kamiński was also counted as an auditing student of the School, because first of all, he belonged to the precursors of the research on spatial diffusion of innovation (agricultural innovations) in Polish geography. He was a student of Prof. Zajchowska and dealt with the problems of settlement, economic and planning cartography as well as spatial planning cartography at the local scale (local plans).

Summing-up

We live in rapidly changing times and the observed changes also involve science. Different paradigms, ideas, conceptions and models of scientific development are assumed and various, completely new research problems relating to the observed changes are undertaken; approaches and scientific methods vary. Scientific schools also change. New ones are created, whereas the existing schools alter their character or fail. A lot of factors make the Poznań School of socio-economic geography and spatial management transform over time. Professor Zbyszko Chojnicki, the

²¹ Unfortunately, during martial law he had to leave Poland and his further scientific development took place outside Poland. Undoubtedly, this politically enforced decision meant loss for the Poznań School, especially when it comes to the application of advanced quantitative analysis methods.

creator of the School and master of the three generations of students, is no longer among the scientific community of the Institute of Socio-Economic Geography and Spatial Management of Adam Mickiewicz University. The living first-generation students have been in well-deserved retirement for several years now. And although they did not stop their scientific activity, their role in staff education is decidedly smaller than in the previous years and in some cases negligible. Although the research issues undertaken by the first associates of the professor and their scientific interests are somewhat different than they used to be, quantitative methods and theoretical-methodological questions as well as original research issues are characteristic of their creative output up to now. Some students of the second generation approach the retirement age, but their scientific activity has not waned and new, attractive issues for research appear. The direction in which the School will develop and the position it will take in Polish socio-economic geography and spatial management will depend on these few scholars, the students of the first-generation students and also on others, young, talented Institute employees. Today, the School is different than at the time when Prof. Chojnicki and his most faithful students and associates, later teachers of the School, decided about its creation, development and importance. It is the School whose contemporary character is shaped by a group of academics, employees of the Institute, focused around the second-generation students and the students of the first-generation students. In comparison to the situation from the initial years, i.e. 1970–1980, the staff potential of the School has clearly increased to the number that many geographical centres in the world can only dream about. Even though a handful of scholars find quantitative methods and theoretical-methodological reflections scientifically engaging, the research issues are continually extended into new, up-to-date, important and attractive topics²². A subject that is particularly interesting is the one concerning changes in social and economic spheres taking place in Poland, the EU countries, in Europe and in the world. The question of socio-economic development and the methodology

of planning such development in the integrated approach are chosen increasingly often. What is developing is: social research on strategic planning, revitalisation of cities and rural settlements, new forms of production organisation, management, international cooperation. This all creates additional cognitive value to the output of the Master and his first students and first teachers at the same time. The present state allows the positive assessment of the further development and functioning of the School. There are many indications that it will be a different school from the one “radiating” in Polish socio-economic geography at the turn of the 21st century and determining the directions of its development. And what will it be like? Everything will depend on the skillful combination of the present and tradition, especially on the care of its current teachers for the greatest values of this School for which the present author considers theoretical-methodological correctness, quantitative methods of the conducted research and innovativeness of the issues undertaken. For a long time Poznań and other places have not hosted nationwide seminars and workshops devoted to quantitative methods and their use in geographical research organised by the Institute before. There are also no nationwide methodological conferences, once organised by Prof. Chojnicki. However, there is ongoing, multi-faceted education of the Institute staff, mainly young scholars, but not only, also in quantitative research methods contemporary problems of socio-economic geography research, conducted by our academics and also by eminent representatives of broadly understood socio-economic geography and spatial management (Prof. Nijkamp, Prof. Bivand – an auditing student of the School and others). It is only one step from this activity to resume nationwide or maybe international education in this area, with a full awareness of the fact that scientific knowledge is increasingly a commodity. The harbinger of activities in the right direction was the conference organised in June 11–12, 2018 *New research issues of socio-economic geography and spatial management* dedicated to the memory of Professor Zbyszko Chojnicki, the inspirer and creator of the methodological programme of Polish socio-economic geography, and at the same time the creator and Master of the Poznań School. May this conference be the beginning of a return to the good tradition of organising similar regular meetings.

²² A lower interest in quantitative methods is certainly caused by greater availability of computer calculation programmes and the development of GIS techniques.

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