



SCIENTIFIC SCHOOLS IN LITHUANIA. METHODS OF IDENTIFICATION

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Abstract. The article is devoted to a fragment of history of Lithuanian science – to investigations of scientific schools in various branches of science at Vilnius University in 1980–2000 years. The paper submits for consideration a phenomenon of research school and its social-communicative model, was used for identification of scientific schools in Lithuania; bibliometrical methods: analysis of dissertations, research papers and citations, used for its realization. The results of investigations and papers, dealing with them, are given. The analyzed results revealed, that science of Lithuania had lost important possibility for improving of the management of scientific activities, prestige and popularization of Lithuanian science trend of scientific investigations, when the investigations of scientific schools were stopped.

Keywords: history of science, science of science, bibliometrics, scientometrics, analysis of dissertations, scientific publications, citations, physics, mathematics, chemistry, biology, technologies.

Preface

Science of Lithuania, which was born in the context of European science, is now recreating its traditional orientation to the creative personality. That is why the investigation of scientific schools is very urgent to the science of Lithuania.

Scientific school means first of all – Creator, Personality and Teacher – a gifted scientist, initiator of a new trend of science and a leader of long-term programme of researches, a bright organizer and teacher, who knows how to unite a creative group of scientists, to teach them solve complicated problems and to get distinguished results.

In scientometrical literature there is no strictly determined definition of scientific school. There are a lot of minds about this phenomenon of science and many various methods, proposed for its identification. There exist the most popular mind, that scientific schools must be investigated only by historians of some branches of science. It goes without saying, but what must be done, when in the branch of science nobody works on its history? It is also popular the next mind, that there is no need to investigate scientific schools, because this phenomenon is so subjective, that only scientists themselves can to say to what scientific school they belong and who is their teacher. Scientometricians can not agree with such opinions, because history of science shows that scientific schools are most positive form of organization of scientific researches, which gave to

the world the greatest amount of famous scientists and there is a great need to recognize formation of scientific school at the very beginning, cherish this social group and make for it the most favourable conditions in its way to scientific school. Besides it, our practice had show, that scientometric investigation of scientific schools gave an impulse for representatives of some branches of Lithuanian science to investigate their scientific schools by using traditional historical methods, in order to get the most objective outline of scientific school.

Scientometricians and historic of science had recognized already, that a scientific school is a complicated – logical, social and psychological phenomenon of collective scientific activities. For this reason scientific schools are investigated by specialists of various branches of science: historians of science, sociologists, psychologists, scientometricians. Every group of researchers looks at the scientific school from various viewpoints. Historians of science pays main attention to the development of main idea and to personality of a leader of scientific school, to scientific biographies of its members; for psychologists – the features of character of leader and members, style of their thinking and psychological climate in a social group are most important; scientometricians – solves problems of identification of scientific schools, of their typology and structure, are searching for the best forms and methods for organisation of their activities. All those investigations are necessary in order to reveal a scientific school comprehensively. However, this situation taking in consideration, scientometricians must be first researchers of every scientific school in order to gather all possible material for investigation and identification the general outlines and structure of scientific school for orientation of scientists, who will join to the next stages of investigation.

In Vilnius University at the faculty of Communication was managed a wide scientometric programme of investigations of scientific schools in the most of branches of Lithuanian science in 1980–2000. In those investigations priority was given from a lot of existing models of scientific schools to a social-communicative model of scientific school, created by scientists of that faculty and based on bibliometrical methods (Вовере, Шадуйкене 1986). Later this model of scientific school was widely used in Russia for investigation scientific schools in communication science.

The aim of this article is – to acquaint a new generation of scientists with a social communicative model of scientific school and practice of its using in the identification of scientific schools of Lithuanian scientists in 1945–2000.

A social-communicative model of scientific school

The idea itself was not new. Some of its basic features were borrowed from the publications of American scientometricians N. Mallins (Маллинс 1980); S. Uolgar (Уолгар 1980); Ukrainian scientists J. Chramov (Храмов 1982), G. Dobrov and A. Korennoj (Добров, Коренной 1977); Lithuanian scientometrician L. Malcienė (Малцене 1982), Russian historic of science M. G. Jaroševskij (Ярошевский 1973), etc.

According to the social-communicative model, scientific school is a social group of scientists, working in the same branch of science in its concrete trend, initiated and organized by a famous scientist and closely joint with the leader of group by his ideas and research methods.

A social group in any trend of science can be identified and recognized as a scientific school only then, when it joins some famous scientists (according to N. Mallins and S. Uolgar, not less than three; famous scientist, according to J. Chramov, is not less than professor), who were brought up in this social group or share ideas or research methods of leader of that group, or other members of that group of scientists.

Methods used in research project

For identification of scientific schools in Lithuanian science at the first stage was used method of analysis of dissertations, which were had written and defended under guidance of the leader of scientific group.

It is well-known, that in the former USSR not all scientists after defence of their dissertations had possibility to remain in science, because of many various social and economical reasons. That is why two types of communication between the leader of that social group and its members – formal (working in the same institution, when the leader of social group is official leader of department or chapter in that institution) and nonformal (associated only with ideas of leader of that group and working under his guidance) were existing. It means, that scientific school can unite scientists by both types of communication – formal and nonformal – with a leader of the group.

In the scientometrical literature, which are devoted to the phenomenon of scientific school, there are recognized some more types of communication between the leader of scientific group and its members and among them the most important are: 1) “teacher-pupil” and 2) collegial relations.

The first type of scientific communication is based on succession of ideas and methods of founder of scientific trend and is identified by citation of his publications in the works of his pupils from both levels – formal and nonformal communication. The second type of communication is based on a share of ideas and methods and it is identified by analysis of scientific articles or books, which had been written in collaboration of leader of that social group with its members.

Analysis of dissertations, citations and publications, written in the collaboration are used in the social-communicative model of identification scientific schools. Several scientific schools in physics, mathematics, medical sciences, biology, chemistry and other branches of science were identified using this social-communicative model and those bibliometrical methods. In our investigation as “famous scientist” was named doctor of science (now Dr Habil).

Results of investigation

There were gathered and analyzed hundreds authors abstracts of dissertations and some thousands of scientific papers and citations of Lithuanian scientists in physics, chemistry, mathematics, technical sciences, biology, biochemistry and medical sciences. At the first stage of investigation were identified a lot of social groups of scientists (more than hundred), who worked under guidance of famous leader in analyzed branches of science.

At the second stage of investigation were studied those social groups in order to find a main body of scientific school, consisting from three Dr Habil and their pupils. Only 28 such groups were found in the period of 1945–2000 years. Among those groups, named as scientific schools, the very first from the outset of occupation of our country in 1945 were brought up by Russian scientists – in Lithuanian linguistics by famous specialist in Baltic philology from Leningrad Prof. Boris Larin and in the technical sciences Prof. L. Kulikovskij. In Lithuania 12 candidate dissertations under guidance of Prof. B. Larin were written and successfully defended. Four of his former aspirants became famous scientists in Lithuanian linguistics and defended their doctoral dissertations (now Dr Habil) – Z. Zinkevičius (1966), A. Sabaliauskas (1974), V. Ambrazas (1978) and A. Valeckienė (1983). Prof. L. Kulikovskij brought up 11 candidates of technical sciences; 4 of them later defended doctor (now Dr Habil). Some of them had become leaders of their scientific schools later. In scientific school of Prof. L. Kulikovskij (theory and technologies of electrical engineering) were brought up 9 doctors (now Dr Habil) and 116 candidates (now Dr).

Among the social groups, which were initiated and created as scientific schools by Lithuanian scientists, most of them were in medical sciences. A scientific school of Prof. Juozas Kupčinskas (rheumatology and pathology of internal organs) joined 18 Dr Habil and 60 Dr of medical sciences. Even three scientific schools were brought up in Lithuanian cardiology. A scientific school of Prof. Algimantas Marcinkevičius (new methods of cardiologic surgery and transplantation of heart and other organs) joined 7 Dr Habil and 65 Dr of medical sciences. A scientific school of Prof. Zigmas Januškevičius (investigations of pathology of heart and blood vessels) joined 11 Dr Habil and 65 Dr of medical sciences. A scientific school of Prof. Jurgis Brėdikis (cardiological surgery and new methods of stimulation of heart by electrical shock) joined 8 Dr Habil and 15 Dr. In other trends of medical sciences become famous scientific schools of Prof. Pranas Norkūnas (a theory of ethiopathogenesis and methods of surgery, based on it) joined 5 Dr Habil and 16 Dr of medical sciences. A scientific school of Liubomiras Laucevičius (anesthesiology) joins 6 Dr Habil and 22 Dr of medical sciences and etc.

Dr Nijolė Šaduikienė in her scientific project under guidance of Prof. O. Voverienė identified 6 scientific schools, created by the famous Lithuanian physics: Prof. Adolfas Jucys (theoretical physics) – 12 Dr Habil and 111 Dr, Prof. Povilas Brazdžiūnas (physics

of semiconductors) – 6 Dr Habil and 60 Dr; Prof. J. Požela (hot electrons and plasma instabilities in the solid states) – 9 Dr Habil and 41 Dr; Prof. Jurgis Viščakas (optoelectronics) – 7 Dr Habil and 42 Dr; Juozas Vidmantas Vaitkus (laser technologies) – 6 Dr Habil and 15 Dr and Zenonas Rokus Rudzikas (theory of atom) – 3 Dr Habil and 24 Dr. In 1989 she defended candidates (now Dr) dissertation “A history of scientific schools in physics of Lithuania in 1940–1985”.

Dr Birutė Railienė in her research project identified 4 scientific schools in Lithuanian chemistry. Prof. Juozas Matulis created a scientific school in theory and technologies of elektrolitic extraction of mettals and their alloys (6 Dr Habil and 106 Dr). Prof. Jonas Janickis brought up scientific school in investigations of selenite and politionic acids (9 Dr Habil and 74 Dr), Prof. Aronas Prokopčikas – a scientific shool in investigations of mechanismus of plastic materials (5 Dr Habil and 24 Dr), Prof. A. Purėnas – insynthesis of biological active organic materials (5 Dr Habil and 7 Dr). Results of her investigations Birutė Railienė generalized in her doctoral dissertation “Scientific schools in chemistry of Lithuania”, which she defended in 1991. Later she investigated anxient scientific school, created by famous Vilnius University professor Andrius Sniadeckis.

Dr Giedrė Sasnauskaitė, also under guidance of Prof. O. Voverienė, identified 4 scientific schools in Lithuanian technical sciences; the already mentioned scientific school of L. Kulikovskij; the scientific school on precious mechanics (vibromechanics), created by prof. Kazimieras Ragulskis, which joined 215 scientists, among them 20 Dr Habil; scientific school (heat physics and heat exchanges) of Algirdas Žukauskas (8 Dr Habil and 59 Dr) and scientific school of Aleksandras Čyras (theory and methods of building). In this scientific school were brought up 3 Dr Habil and 43 Dr. Results of investigations of Giedrė Sasnauskaitė were succesfully defended in her dissertation “Scientific schools in Lithuanian technical sciences”, 2001.

Mgr. Vaida Vanagaitė identified three scientific scools ir Lithuanian mathematics: Prof. Jonas Kubilius created an international scientific school in the theory of probabilities, which joins scientists from Lithuania, Russia, Armenia, Belorussia, Latvija; Prof. Vytautas Statulevičius founded a scientific school on functions of probabilities, Prof. Bronius Grigelionis of the theory of accidental processes.

There were also identified some scientific schools, founded by Lithuanian scientists in biology, biotechnologies, linguistics, etc. Results of those investigations are generalized in the book “Lithuanian scientific schools. 1945–1990” (comp. O. Voverienė) (Lietuvos ... 2002).

All the mentioned scientific schools received the international recognition, which was identified by analysis of citation of their works in scientific literature of the world, registered in the “Science Citation Index”.

Conclusions

1. A scientific school is a complicated – logical, social and psychological phenomenon of the collective scientific creation. The most scientometricians and historians of science had recognized already, that scientific schools are one of the most progressive form of organization of science. They had the greatest influence on the development of science and bringing up the greatest number of famous scientists all over the world. Investigations of scientific schools, existing in the Lithuania, corroborated that conclusion: 72 % of scientists, whose works had got more than 100 citations in the world scientific literature, and are considered as famous scientists, belongs to scientific schools.
2. In Lithuania was used social-communicative model for identification and analysis of scientific schools in several branches of science – physics, chemistry, mathematics, medical sciences, biology, etc. The idea of this model is, that all scientists in a social group are associated with the leader of that group, generator of the main idea and initiator of a trend in a branch of science by communicative relations: formal and not formal; teacher and pupil; collegial relations. In science all those relations can be identified by analyzing scientific papers.
3. Bibliometrical methods, analysis of dissertations, scientific publications and citations, are the most important for the identification of scientific schools. Besides, the citation analysis is a very sensitive instrument, which does predict formation of a possible scientific school from its very beginning.
4. In Lithuania were identified several scientific schools, which were created in 1945–1990: 6 – in physics; 2 – in biology; 2 – in biochemistry; 4 – in chemistry; 4 – in technical sciences; 7 – in medical sciences; 3 – in mathematics.
5. Now all these scientific schools became a heritage of history of Lithuanian science. Researches of scientific schools were stopped in 2000. A lot of social groups, which were identified in the period of those investigations as potential to become scientific schools in various branches of Lithuanian sciences were left without further investigation.

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LIETUVOS MOKSLINĖS MOKYKLOS. IDENTIFIKAVIMO MODELIS

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Santrauka. Straipsnyje analizuojamas Lietuvos mokslo istorijos fragmentas – mokslinių mokyklų atsiradimas Vilniaus universitete 1980–2000 metais. Taip pat apžvelgiama mokslinių mokyklų identifikavimo praktika. Aprašomas socialinis-komunikacinis mokslinių mokyklų identifikavimo modelis, taikomas naudojant bibliometrinius metodus: vadovavimo disertacijoms, bendraautorystės ir citavimo analizę. Straipsnyje pateikiama literatūros šiuo klausimu apžvalga. Atlikti mokslinių mokyklų tyrinėjimai leido padaryti išvadą, kad Lietuvoje ši viena pažangiausių mokslo organizavimo formų nesulaukė pakankamo mokslo tyrininkų dėmesio, o nutrūkus mokslinių mokyklų tyrinėjimams, Lietuva prarado galimybę racionaliai optimizuoti mokslinės veiklos komunikacinę struktūrą.

Reikšminiai žodžiai: mokslo istorija, bibliometrija, vadovavimas disertacijoms, citavimas, mokslinės publikacijos, fizika, matematika, chemija, biologija, technologijos.

Prof. Dr Habil **Ona Voverienė** gave lectures on information sciences at Vilnius University from 1980 to 2000. Her PhD on the analysis of bibliographical references for the improvement of information service was maintained in 1979. Habil dissertation on the theory of information science in the curricula of library sciences was nostrificated in 1994. The main fields of interests are bibliometrics, the theory of scientific information and scientific heritage.

Prof. habil. dr. **Ona Voverienė** Vilniaus universitete 1980–2000 m. dėstė informatikos pagrindų kursą, vadovavo Informatikos problemų būreliui. Apgynė pedagogikos mokslų daktaro disertaciją „Bibliografinių nuorodų statistinės analizės metodo taikymas, vertinant mokslo darbų informacinio aprūpinimo efektyvumą“ (1979) ir habilituoto mokslų daktaro disertaciją „Informatikos teorija – bibliotekininkų ir bibliografų ruošimo metodologinis pagrindas“ (nostrifikuota 1994 m.). Mokslinių interesų sritis – bibliometrija, mokslinės informacijos teorija. O. Voverienė yra bibliometrijos krypties pradininkė Lietuvoje, jos suburtas mokslo tyrininkų kolektyvas ne vienerius metus tyrinėjo mokslines mokyklas. Buvo paskelbta straipsnių, skaityta pranešimų, tyrimai apibendrinti monografijoje „Lietuvos mokslinės mokyklos“ (2002). O. Voverienė rengia monografiją „Žymieji XX a. Lietuvos mokslininkai“. Lietuvos ir užsienio spaudoje paskelbė per 1400 straipsnių, išleido 36 knygas: monografijas, vardynus, bibliografijos rodykles ir kt.