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**Comparing National Academies of
Sciences in Central and Eastern Europe:
Current State and Perspectives for the
Development of the National Academy of
Sciences, Ukraine**

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Comparing National Academies of Sciences in Central and Eastern Europe: Current State and Perspectives for the Development of the National Academy of Sciences, Ukraine³

Abstract

From a historical point of view, the National Academy in the USSR was created as a scientific institution from the end of the 1920s to the early 1930s. The goal was to collect "social aliens" and use their work for the needs of the "Proletarian (Communist) State". The Ukraine Government stabilized the structure of scientific institutions, with scientific researchers and those in higher education working separately. The National Academy of Sciences of Ukraine is most powerful of all National Academies in the country. Therefore, this Academy is described in detail. All financing for scientific research from the state budget is directed to the Academy.

The Academy could be considered as a "bad" (or "predatory", following Acemoglu's classification) institution in Ukraine, operating like a "feudalist" system. The non-member researchers can be described as the "serfs" or "vassals". This is illustrated by an occurrence described by Striha (2015): at a meeting of the General Assembly following the election of Boris Paton as Academy President, over which Striha notes he presided in the Soviet style, "one of the academicians burst out earnestly from the podium: "Paton is a god! To vote against him is to vote against God!" We find this anecdote a disturbingly accurate description.

In the future, the Academy can choose from three paths for development. First, the Academy can maintain its present state as a "bad" or "predatory" institution. Result: government institutions must kill off any "predatory" institution in the country and the Academy will die. Second, the Academy can work in cooperation with foreign grants. That is, the Academy will be integrated with R&D institutions in foreign countries. Result: the Academy will transition to a state such as that of business firms and the government will start to collect taxes from the Academy. Third, the Academy can transition to the development of R&D institutions in Ukraine. Of these, only the third option is attractive as only in this way can the Academy be maintained as a domestic institution.

1. Introduction

In the 1980s, Ukraine had a considerable share of R&D in Europe. Scientific results were continuously obtained and were then applied to products, which were primarily of a military

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nature. As military products can easily be converted into products for the population, the Ukrainian institutions had good prospects.

However, when government and public funding for science fell in the 1990s, the level of development of scientific institutions in Ukraine rapidly decreased. Science as a social phenomenon remained almost exclusively within the framework of the National Academy of Sciences (NAS) of Ukraine. Two issues arise from this:

- It is necessary to describe the current state of NAS.
- It is necessary to identify possible ways for NAS to develop in the future.

The purpose of this article is to submit an overall description of the current state of science at NAS and to identify potential routes for the future development of the Academy.

The paper is organized as follows. In section 2 the literature is briefly described. Section 3 describes the historical reasons for the rise of NAS as a specific science institution in the USSR. Section 4 describes the current state of NAS. Section 5 briefly describes three potential directions for the future development of the Academy. Section 6 concludes.

2. Literature

There are separate (isolated) papers devoted to the description of research activities in NAS (see, e.g., Schiermeier, 2006). However, they do not investigate the reasons for the state of scientific institutions or quantify the characteristics of this state. In addition, there are no papers in which the activities of NAS are described in the frame of a separate social and economic institution.

There are also descriptions of the scientific results of NAS in some scientific fields – for example, in the economy (Coupé, 2008).

3. Historical reasons for the rise of the National Academy of Sciences as a specific science institution in the USSR

This section employs the results from Shiyan and Nikiforova (2011a, 2011b, 2012) as an underpinning for the discussion.

Ukraine inherited a system of higher education from the Soviet Union which is significantly different from that prevailing in developed economies. Oddly, the historical roots – that is, the rules of the game that are laid in the foundation of such an institute (institute of higher education) – have not yet attracted the attention of researchers. Therefore, when we investigated the institutional directions for restructuring higher education in Russia and the Ukraine, we first studied the rules of game, norms and rules of operation to understand the basis of the institute as it exists today.

Let us start to identify the problems of the higher education system by considering them at the very beginning of its formation – shortly after the revolution of 1917. Initially, we noticed that the educational system of the part of the Russian Empire that was Ukraine did not differ from the educational system of Europe. But what happened after the revolution of 1917? What gave rise to the need for the reorganization of the educational system inherited from the Russian Empire? The answer to these questions will allow us to

understand the rules of the game that underpinned the foundation of “the Soviet high school”.

Here we would like to note that our task does not concern the creation of a text within the frames of historical science. Therefore, in this paper the references to historical documents analysing this situation are omitted; however, the historical study of this problem will be the subject of further research.

A method for further research is the formation of a system characterizing the rational behaviour of key players, those who make decisions. That is, all “actors” make conscious decisions. Thus, arguments such as “misanthropic decision making” or similar are not considered because they do not relate to the explanation of events but emotional perceptions: they concern emotion, not science.

Thus, let us consider the education system obtained by the Bolsheviks in the early 1920s. First, the existing education system was aimed at the “enemy classes” – the bourgeoisie and nobility:

1. A high-school education was a requirement and this could be obtained only in specialized institutions (the proletariat had no such education).
2. Those studying should each have an adviser of inherited nobility (either he/she belonged to this class from birth, or received it as an adjunct to the Master's diploma, which exclusively gave the opportunity to teach in higher educational establishments).
3. Graduate students obtained personal nobility, equal to joining the former ruling class.
4. Graduate students became engineers, equal to entering the bourgeois class.

Thus, from the class point of view, higher education institutions had to be changed. The scope of changes was as follows.

First, only those socially close to the proletariat could teach in higher education. However, in reality, there were people used by Bolsheviks for limited teaching activities only. Typically, it was necessary to monitor their activities and especially their contacts: these “red specialists” must not disseminate “bourgeois views” among the proletarians. The institution of commissioners was used to exert control (the most famous one was in the military sphere, within which the commissioner had the right to murder a “Red Commander”).

Second, only those socially close to the proletariat – workers and peasants and their children – could become students of higher education. However, there were no such students because they tended to obtain an education either at parish schools for an average 2–4 years of training, or through specific educational courses (campaign against illiteracy – a programme that provided only a basic knowledge of language and arithmetic).

Third, there was need for industrialization, which required dozens more engineers and other specialists within higher education than there were higher educational institutions. At the same time, teachers were especially needed because the existing

teachers were oriented towards training students in “bourgeois values”, but this was unacceptable for the Bolshevik USSR.

From the 1920s to the early 1930s, the optimal organization of higher education institutions for the contemporary Soviet Union was found using trial and error. This took several forms.

A new component in higher education was founded, termed Rabfak (“department for workers”, combining two words: workers and department, in Ukrainian). Rabfak took workers for a course of study of 1–2 years, preparing them to master the first year of higher education. Such structures were preserved until the end of the 1980s (over which time they served the purpose of resuming the education of demobilized soldiers from the Soviet Army and graduates of previous years who had not entered a university immediately). Rabfak teachers were considered equal to university teachers.

The “Institute of the Red Professors” was established and a new scientific degree “Candidate of Sciences” was created. University graduates, “devoted to the ideals of communism”, completed their education in this Institute to serve in the future as the “scientific commissioners” for scientists (see below). The academic rank of “docent” was introduced for similar reasons.

State control and public documentation were established to award academic degrees and titles, filtering out “social aliens” from those “socially close” to the proletariat. Simultaneously, an appropriate registration centre was created (note: this was long before the establishment of the Higher Attestation Committee – VAK – in Ukraine). We should also call attention to a very important peculiarity: there was always an article in the appropriate law on the subject of the cancellation of scientific ranks or academic degrees awarded in that case that a person “broke the rules of socialist life”...

Naturally, teachers’ salaries were established by the state and the amount depended on the academic degree or scientific rank that a teacher held.

“Old” professors, albeit a very limited number, were allowed to teach at universities usually located in urban centres (Moscow, Leningrad, Kiev and several other cities). These teachers were constantly monitored and supervised under the watchful eye of “proletarian Bolshevik” docents. At the same time, considerable numbers of “old scientists” were hidden within specially created organizations, the main aim of which was to “undertake science” under the direction of the Central Committee of the Communist Party, which was named at that time the All-Union Communist Party (Bolsheviks).

Let us investigate this point in greater depth. Why was science to be excluded from the university framework, where it had been located “in the time of the tsar”? This was done to isolate the “old life” retainers from a new generation, to interrupt the heritage of education! Only new teachers, the carriers of the proletarian spirit, had the right to teach in the universities. But of course the quality of the “proletarian staff” was too low (save for a few exceptions). Therefore, in the same years, a particular system of education came to life: professors and docents in the “peripheral” universities were constrained to teaching from a textbook, which they simply “dictated” to students and then tested the students’

competence. Such textbooks were written by “bourgeois professors”, but now socially correct “proletarian docents” were standing between them and the students. Thus, from the class point of view, everything was “fine”.

This learning technology allowed the preparation of a large number of specialists in a very short period of time because the industrialization of the USSR was so desperately needed. There was no discussion concerning the quality of education, but then no-one cared. The universities simply undertook the theoretical study of excessive amounts of materials. This was needed for several reasons:

- Every engineer (the universities were established mainly in technical fields) should be given the opportunity to learn “defence specialty” over the short term (recall that the task of the industrialization to create the USSR’s defence complex).
- Engineers were directed to enterprises (one might say “enslaved”) that contained technological capabilities of various origin (for example, bought from different countries); therefore, they should be able to proceed with their study via playing a role in the specific technological process (i.e. become “attuned” to it).
- The engineer must have the opportunity to master the new technologies without additional retraining.

In the late 1960s, students in the Soviet Union were sent to “collective farms” (“kolhoz”) for harvesting for at least one month of the autumn every year. Thus, the “safety margin” of such a training system was so high that it was painless for student education.

The principal importance of this educational system should also be underlined, specifically that the training of one engineer in the USSR lasted for at least 7–8 years, which included 5 years of extensive theoretical learning within a university and an additional 2–3 years of practical training as a “young specialist” in enterprise. The committee of the Communist Party in enterprise, the Komsomol committee (“Young Communists”), the Trade Union Committee and the Head of the 1st Division (secrecy division of the KGB) carefully supervised the actual process of the training of young specialists during this period (after three years later they would be sent to do agricultural work with other engineers).

Finally, we discuss the Academy of Sciences of the USSR and its “scientific institutions”. As previously mentioned, the main task of the Academy of Sciences of the USSR was to use the potential of the “bourgeois scientists”, but it did not give them opportunities to communicate with the next generation of scientists. Therefore, the role of Communist Party committees was extremely strong and especially critical for a scientist’s career.

Thus, the outcome of our excursion into history leads to the following conclusions:

1. The system of higher education and science in the USSR was modified to solve the perceived problems of the existing structure from the end of the 1920s to the early 1930s.

2. The system of scientific degrees and academic titles (note that “docent” – associate professor – and “professor” were not scientific titles but they carried the status of teacher!) was established from the late 1920s to the early 1930s to solve problems of a systemic nature.
3. The system of the “scientific institutions of the USSR Academy of Sciences” was created from the late 1920s to the early 1930s to solve problems with the existing framework.
4. The system of higher education was established from the late 1920s to the early 1930s to solve problems with the existing system.

Thus Ukraine inherited a system of educational and scientific institutions which had not been effective since the early 1950s, when the reasons for its establishment disappeared due to both the natural extinction of the “carriers of the bourgeois culture” and forced extinction in Soviet concentration camps. In the early 1990s, the independent Ukraine found itself with a very ineffective system of higher education based on individual social coding. The reorganization of the higher education system and science of Ukraine needs to be undertaken immediately, without delay. Each year in Ukraine, nearly half a million people enter the economy and they are not equipped to work in the conditions of a developed economy.

4. Current state of the National Academy of Sciences in Ukraine

4.1. Preliminary considerations

Here we focus only on the state of the National Academy of Sciences (NAS). The situation in higher education will be analysed separately. From an institutional point of view, NAS is a “bad” or “predatory” institution (Acemoglu, n.d.). Its institutions contain some 500–1,000 old and ailing people, who have not personally produced scientific results for 15–20 years, who are afraid of losing power and who fear losing access to money and higher quality health care.

The national state academies are slowly dying in Ukraine. The salary of young researchers at the academies is not sufficient for them to rent housing. Academy institutions are located only in large cities, where rents are higher than the salary of a young researcher. For young researchers to buy a home, their entire salary must set aside for more than 20 years.

4.2. General perception and position of the National Academy

There are six state academies in Ukraine, in which members and correspondent members have high (for Ukraine) supplements augmenting their salaries and pensions. These are: the National Academy of Sciences, the National Academy of Pedagogical Sciences, the National Academy of Agricultural Sciences, the National Academy of Medical Sciences, the National Academy of Legal Sciences and the National Academy of Arts. The state properties are owned and disposed by the Academies and their activities are funded by the state.

The value of lifelong scholarship is defined in Resolution of the Cabinet of Ministers of Ukraine. A fragment of the current Ordinance is cited here (Resolution of the Cabinet of Ministers, 2014):

Resolution of the Cabinet of Ministers of 17 October 2007 g. N 1229 Kyiv.

To increase the lifetime fee for the title of a current member and correspondent member of the National Academy of Sciences and specialized academies {amended according to KM N 597 (597-2014-P) on 11.05.2014}.

According to part three of Article 23 of the Law of Ukraine "On scientific and technical activity", the Cabinet of Ministers of Ukraine resolves:

1. To increase as of 1 January 2008 the monthly lifetime payment:

for the title of a current member and correspondent member of the National Academy of Sciences, setting it at the amount of UAH 5112 and UAH 3400 (Ukrainian hryvnia);

for the title of a current member and correspondent member of the National Academy of Agricultural Sciences, the National Academy of Medical Sciences, the National Academy of Pedagogical Sciences, the National Academy of Sciences, the National Academy of Arts, setting it at the amount of 4601 hryvnia and 3060 hryvnia. {Paragraph three of paragraph 1 as amended according to KM N 597 (597-2014-P) on 11.05.2014}.

In the case that the scientist is elected a full member (academician) or a correspondent member of two or more National Academies, the lifetime fee is payable for one full member (academician) or correspondent member of the Academy of Sciences in accordance with his/her statement. {Paragraph 1 amended by KM N 597 (597-2014-P) on 11.05.2014}.

For comparison, a lifelong supplemented member's salary roughly corresponds to that of a Professor and a correspondent member's corresponds to that of an Assistant Professor.

In general, a member of the Academy (academician and correspondent member) can obtain the following pay: a lifetime payment + pay for the position (usually Director/Deputy Director of the Institute of Science) + a surcharge for the intensity of labour + payment for teaching (often taught by staff instead) + pension (90% of salary) + a package of benefits for housing, transportation and health care (not without reason: the average age of members exceeds the average life expectancy in Ukraine and the President of the Academy, Boris Paton, soon became the oldest man in Ukraine).

Non-state academies do not have any effect on research activities or researchers. We describe only the most important academy – NAS – because the other five exert a smaller effect.

The importance of NAS lies in the fact that it is used by the President, the government and the parliament to provide "experts for administrative acts". Also, it is used to support the activities of the authorities in the country. For scientists, the prestige of NAS

is only due to the fact that the academicians and correspondent members have sufficiently high (for Ukraine) supplements augmenting their salaries. They have complete power to dispose of the property of the Academy and thus determine the fields of science investigation and the salaries of researchers of the Academy.

The reputation of NAS in the world of science is extremely low. In contrast, for state administrators the reputation and prestige of NAS is high. This is due to the fact that the Academy always supports any government action and provides proofs for them. The different means of development of economic and social processes in Ukraine employed by Kravchuk, Kuchma, Yushchenko, Yanukovych and Poroshenko were equally supported by the Academy. All financing of scientific research from the state budget is directed to the Academy. Below is a quotation from Schiermeier (2006):

The focal point of criticism is the National Academy of Sciences of Ukraine (NASU), which runs 174 institutes and employs around 28,000 researchers. This powerful academy, a relic of the Soviet science complex, dominates Ukrainian science. The average age of the academicians is about 71; the President, Boris Paton, an expert in electrical welding and the son of the former president, is 85.

The bulk of the academy's activities relate to mechanics, material sciences and physics – euphemisms, according to critics, for former military-oriented engineering institutes. And productivity is low. According to Thomson Scientific (ISI) statistics, academy scientists publish around 1,500 papers a year – roughly one-third of the output of Britain's University of Manchester alone.

But critics say the academy is not interested in carrying out an independent review of its scientific performance. There are also claims of widespread corruption. For example, an attempt to create closer ties between Ukraine and western European institutions by linking Ukraine to GÉANT, the high-speed European data communication network, was allegedly hindered by academy members demanding bribes. Another complaint is that the academy leaders, fearing competition and loss of influence, are blocking attempts to facilitate Ukraine's participation in research programmes funded by the European Union (EU), by deliberately holding back information and generally failing to cooperate with EU authorities.

"The Academy is not interested in any reform whatsoever," says Aleksei Boyarski, a theoretical physicist at CERN, the European laboratory for particle physics in Geneva, Switzerland. "Nothing will change in Ukrainian science as long as this system exists."

Today, the situation regarding scientific work has only worsened.

4.3. Description of the Academy as socio-economic institution

The Academy has not changed since the socialist era. Moreover, several additional academies have been created during the years of Ukrainian independence. From an institutional perspective, the state academies of Ukraine as a whole are all echelon-based institutions. The highest echelon consists of the President of the Academy and the Presidium of the Academy: they are the owners of all property and of the Academy and all

other tiers (which can be considered their property – serfs or vassals). Academics are just below this tier: they are the owners of the individual scientific institutes of the Academy and of a limited quantity of “vassals”. Correspondent members are even lower: they are the owners of separate sub-structures of the Academy (as a rule, laboratories) and the owners of even fewer “serfs”.

The upper echelon at NAS numbers approximately 200 academicians and 370 correspondent members. Today (as of 2015) the number of employees is more than 20,000 throughout the Academy. They have no impact on the management of property, or on the choice of research topics for state financing (or financing from companies).

The transition between the echelons is performed through the mechanism of “initiation”: the candidate is conducted through a number of procedures which are not related to research activities. At each stage of the initiation, the candidate must demonstrate devotion: 1) to all high echelons generally and 2) to the specific group of this higher tier. A few academics are members of several national (state) academies at the same time.

Individual researchers are completely dependent on the head of the laboratory (and “higher” administrators who hold the degree of “Doctor of Science”). In particular, they are forced to acknowledge their “administrator” among their co-authors (violation of copyright and intellectual property). Administrators have considerable power as they may deny researchers the opportunity to defend their PhD thesis or postpone its defence for several years. If a researcher receives a grant for attaining scientific results, administrators often require that they are appointed as managers of the work. If researchers attempt any resistance against their servile positions, they can be fired from their jobs. An administrator has a large number of channels for influencing researchers. If a researcher is fired for “resistance”, he/she will find it very difficult to obtain work in other laboratories or other research institutes or universities.

Reforms are not endorsed by all the state (national) academies. There are articles in the media exclaiming that “the scientific potential of academies must necessarily be preserved” and that there is “the need to increase state funding for academies”. However, although future reforms are declared, concrete projects for reform have not yet been put forward.

Thus, researchers are dissatisfied with the situation in NAS (and in other academies), but they are powerless. Moreover, the entire system is riddled with partiality and partisanship. The members of NAS may be elected only by existing members. Correspondent members may be elected by members of the Academy and correspondent members. In addition, the number of members and correspondent members in Ukrainian state academies is determined by the Ministry of Finance, based on the number of “lifetime payments”.

Candidates are nominated by the academy of scientific institutions of Ukraine. They are chosen by secret ballot: members by members, correspondent members by members and correspondent members. The rights of members and correspondent members comprise

the capacity to dispose of the property of the Academy and determine public funding. Their status is normally full time. However, members and correspondent members receive only the lifetime payment. Thus, the motivation for continuing research is lacking. Members and correspondent members must die in situ. This is due to the fact that they want to have more power and get more money. This motivation has nothing to do with the motivation to research. Non-working members of the Academy in Ukraine do not exist.

The motivational factors for academic researchers working at NAS are as follows:

- Researchers have more time to carry out scientific research in the Academy (in contrast to university in which employees spend more than half their time on training).
- Researchers have the ability to use scientific equipment. A number of laboratories have access to modern scientific equipment (when there are foreign grants). In universities, scientific equipment is absent as a rule.
- There are no research laboratories in public and private companies.
- An individual can forge an administrative career more easily at the Academy than at university.
- An individual who works at the Academy can work part time and also at a university (undertaking “laboratory work”).
- Researchers find scientific “emigration” easier.

Boris Paton is the President of the Academy. He is over 96 years old and has held the position of President of the Academy since 1962 (when he was 44). Moreover, the regional offices of NAS are often run by people who became leaders during the Soviet era. For example, Sergey Andronati has directed the Southern Branch of the Academy since 1988 (he is now 75 years old).

Striha's (2015) paper shows data for NAS, specifically related to the deputy Minister of Science and Education. On 16–17 April 2015, new correspondent members and members were elected to the Academy. Boris Paton, aged 96 years, was elected as President. The two first Vice-Presidents elected were Anton Naymovets (Chair of the Section of Technical Physics and Mathematical Sciences), aged 79 years, and Volodimir Gorbulin, aged 76 years. In the Web of Knowledge database, Anton Naymovets (Department of Physics and Astronomy) has 127 scientific papers, 1,516 citations and an h-index of 21 (Index of Citations for Members, 2013). In the Web of Knowledge database, Volodimir Gorbulin (Department of Informatics) has no scientific papers (Index of Citations for Members, 2013).

4.4. Role of the Academy in the academic community.

Scientific degrees and titles in Ukraine are conferred by the Ministry of Education and Science. In the first stage, there is the defence of the dissertation in a specialist area within the Scientific Council of the Academy of Sciences; in the second stage, the Ministry approves or does not approve this decision. In the new “Law on Higher Education” (as of autumn

2014) the PhD degree is finally conferred by a Specialist Scientific Council. However, the Ministry continues to assign the degree of “Doctor of Science”.

Voting on a Specialist Scientific Council is by secret ballot. It is subjective. In most cases there is tacit agreement between the members of the Specialist Scientific Council. Also, there is corruption in the defence of PhD and doctoral theses, which tends to demand considerable expenses from candidates seeking a degree. Members of the Specialist Scientific Council, who are not specialists in the field of the thesis, often vote. This is due to the fact that the Specialist Academic Councils, as a rule, are approved by the Ministry in two or three different specialties that are often poorly linked. There is a minimum of six members on a Specialist Scientific Council for each scientific field: therefore 1/2 or 2/3 of members are non-experts in the scientific field of the thesis being defended. There will be a reform of the procedure for thesis defence. However, at this point the type and timing of the change are being kept secret by the Ministry.

Currently, NAS has only to represent the interests of (in descending order of representation) 1) the President and the Presidium of the Academy, 2) members, 3) correspondent members, 4) Directors of research institutes (if such Directors are not members or correspondent members). Thus, the interests of more than 20,000 researchers of NAS are not represented.

The main part of the budget of Ukraine allocated to science is sent to NAS. The Presidium of the Academy then distributes these finances independently. The Presidium is not accountable to either the state or the researchers of the Academy. There are no other competitors for state finances in Ukraine. For example, universities are not competitors for academy funding. Indeed, the universities of science take very little, yet classroom work comprises 900 hours or more per year. This causes fatigue for teachers. A great deal of time is taken up with the need to prepare and complete a huge number of documents of no use to teachers (only to administrators). In addition, universities are not modern scientific instruments. Finally, the state does not provide finance for scientific investigations at university.

Therefore, the status of NAS as the primary research institute in Ukraine was created artificially and unfairly. The “elected” heads of scientific institutions as a rule are only members or correspondent members. Elections are usually implemented using a corrupt scheme: the candidate makes promises to the head of the laboratory, who then makes promises to the employees, who are in turn forced to vote “based on need”, and so on.

The financial aspects of the activities of the Academy are as follows:

1. The state almost entirely forms the foundation of NAS, with funding distributed by the Presidium of the Academy. The justification for the distribution is not published. As a rule, NAS funds only ongoing scientific themes rather than new scientific topics. This is due to the fact that new themes involve new people. Members of the Academy do not admit new people to funding as they do not want to share the finance or power.

New scientific themes in the Academy can be proffered only in the case that they are conjoined by a member of NAS. However, for this the researcher must convince a member of the Academy of the theme's prospects. As academicians are on average more than 70 years old and as a rule have personally only generated scientific results more than 20–30 years ago (when head of the laboratory), they tend to know nothing about state of modern science... Therefore, new themes are hardly ever generated in NAS.

2. A number of individual laboratories within NAS institutes work on foreign grants. They are engaged in theoretical research (e.g. theoretical physics), or the repetition of experiments undertaken in foreign laboratories (e.g. biology, chemistry, etc.). Also, certain groups of scientists in a laboratory may be in receipt of foreign grants when it is necessary to produce a large amount of routine research within already known approaches (e.g. in the field of cancer research). In such cases, a small amount is offered in foreign grants (theoretical studies) or for the purchase of equipment. However, on this basis, it is impossible to carry out pioneering research. Indeed, within the framework of foreign grants, Ukrainian researchers tend to be used as "cheap labour" to carry out routine work. But they do not use for pioneering research.

Nonetheless, this channel allows young researchers to master modern equipment and methods of scientific activity, then enabling them to travel abroad for doctoral programmes. They may of course remain abroad.

The channel of funding is decreasing as there is a natural decline in qualified researchers because of their age (leaving for retirement or through death).

3. Connections between the Academy and business are almost entirely lacking. As an example, consider the welding tool for living tissues in surgery. This was developed by a group under the auspices of the President of the Academy (Boris Paton), that is, the most used administrative resources of the Academy. This equipment dates back more than 10–15 years, but a total of nearly 60 units for hospitals were produced during this period.

NAS is controlled only by the Presidium and does not interact with universities. Only individual researchers interact with universities. This interaction is mainly through teaching. In universities, these researchers are able to receive the title of professor (accorded by the Ministry). The motivation is: 1) the additional salary and 2) the higher pension.

4.5. The role of the Academy as the expert for methods for the development of Ukraine

NAS always provides the conclusions the government wishes to hear. It is thus not in a position to develop scientific expertise concerning the effects of political, legal, social and economic decisions. Objective data on these issues can be obtained from sources such as

the Index of Citing for Members (2013) and the Index of Citing for Correspondent Members (2013). For example, the Department of Informatics in the Academy (which should, in theory, provide a scientific level of information security) contained 15 members, but only 7 have more than 10 citations for their publications and only one has more than 100. For the correspondent members, the situation is even worse: 13 of them have fewer than 10 citations (8 have none) and no-one has more than 100 citations. Interestingly, the new members and correspondent members of NAS swell the group of “outsiders”.

There is an especially problematic situation in the sphere of humanitarian sciences: this is where Ukraine should make the most dramatic transformation. Of Academy members, only 2 (of 35) and for correspondent members only 4 (of 59) have citations (generally 6 in 94). Moreover, they have only one or two citations (only one correspondent member has 9 citations). In the field of economics (see Coupé, 2008): from 1969 to 2005, inclusive, the contribution of Ukrainian scientists to world economic science was 121 scientific papers in total (cf. EconLit database). Moreover, in 2006, not a single teacher was working at the university who had papers in Economic scientific journals specialized in economic databases.

Today, the situation in economic research has not changed. Our research group published the first textbook (Shiyan, 2010) and monograph (Shiyan and Nikiforova, 2011a) using the mathematical apparatus of the modern economy. We also had to initiate the creation in 2009 of the first and still the only research group to use formal models in politics (Kornienko, Denysyuk and Shiyan, 2009).

5. Three paths for the future development of the National Academy of Sciences in Ukraine

Today the Academy is a “bad” institution: its scientific results do not have the channels for socialization. That is, there are few or no connections with business or the market in Ukraine. In the future, there are three potential routes for the development of NAS or academies more broadly:

1. The Academy will maintain its present state as a “bad” or “predatory” institution.

Result: government institutions must terminate any “predatory” institution in the country and the Academy will cease to exist.

2. The Academy will work in cooperation with foreign grants. That is, the Academy will be integrated with R&D institutions in foreign countries. In this way the Academy will no longer be domestic.

Result: the Academy will transition to a state similar to that of a business firm and the government will start to collect taxes from the Academy.

3. The Academy will transition to the development of R&D institutions in Ukraine. Only in this way can the Academy continue to obtain the benefits from its domestic status. Thus, new institutions and infrastructures must be developed in

Ukraine. Moreover, the Academy must associate with universities; for the proof, see Shiyan and Nikiforova (2012) and Shiyan and Nikiforova (2013).

Only the third way is attractive as it is only by this means that the Academy will remain within Ukraine.

6. Conclusion

From a historical point of view, the National Academies of the USSR as scientific institutions were created from the end of the 1920s to the early 1930s. The goal was to collect “social aliens” and use their work for the needs of the “proletarian (Communist) state”. This was considered a stopgap measure, but it remained in place on a long-term basis. The Ukrainian government has stabilized this structure of scientific institution, maintaining a separation between the work of scientific researchers and those in higher education. The National Academy of Sciences of Ukraine is most powerful of all the country’s national academies. Therefore, this academy has been described in detail.

All financing for scientific research from the state budget is directed towards the Academy. Thus, the Academy is a “bad” or “predatory” institution (Acemoglu, n.d.), based on a “caste-like” or “feudalist-type” structure. The non-member researchers can be described as the “serfs” or “vassals”. We have noted the advanced age of key members of the Academy and their lack of output in terms of publications, particularly recent work. Of especial concern is the role of Paton, a President styled on the Soviet model.

There are three potential paths for the Academy in the future: first, it can maintain its present state as a “predatory” institution, risking death as the government will not countenance the survival of such a body; second, it can work in cooperation with foreign grants, becoming integrated within R&D institutions in foreign countries, in which case it will incur government taxes in the same way as businesses; third and finally, it could develop R&D institutions in Ukraine. Only by this means can it retain its domestic status.

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