Journal of Business and Economics, ISSN 2155-7950, USA
September 2020, Volume 11, No. 9, pp. 999-1023
DOI: 10.15341/jbe(2155-7950)/09.11.2020/003

http://www.academicstar.us

The Problems of Modern Science and the Development of Scientific Producing in Russia

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Abstract: The article introduces the innovative concept of scientific producing, which is viewed as a theoretical and practical field whose major aim is to manage projects in research and development and implement research results in a socio-culturally meaningful way. Scientific producing is described as a strategy and practice that encompasses all stages of research and development, as well as marketing the research results. An important aspect of science producing is the ability to take into consideration the open-endedness of research outcomes and plans. Scientific producing is regarded as a way to overcome the long-term destructive effects of state control and historical catastrophes on Russian science and economy, as well as the present-day problems of science in the country. The author offers an in-depth analysis of the historical development of the Russian science with a strong focus on the Soviet era and describes the topical structure and originality of modern Russian scientific research.

Key words: economy of education; education as an activity; the typology of universities
JEL code: O32

1. Science in Russia: The Beginnings/Science in Russia: Before 1917

A distinctive feature and simultaneously the most acute problem of science and culture in many countries, including Russia, is the state monopoly, at times total monopoly, on them.

In fact, science and culture in Russia have never been independent from the state, which turned them into a reflection of all the vices and crimes of the Russian state.

It is curious that from the outset science and culture were regarded by the state as something united: on the initiative of Emperor Peter I, the Academy of Sciences and Arts was established by the decree of the Governing Senate of January 26, 1724. It was only in 1803, in the course of the educational reform by Mikhail Speransky, that sciences were separated from arts and fine arts. This was the beginning of the Imperial Academy of Sciences, which, due to the abolition of the monarchy, was renamed the Russian Academy of Sciences in 1917.

This division had a very beneficial effect on Russian culture: the country's literature, painting, music, and theater have since enjoyed much greater independence from the state than science. Within an extremely short period of time, they blossomed into something unique and original, achieving a world-level status, on a par with Europe's leading countries — France, Germany, and England. This powerful impulse helped them to maintain their position in the 20th century, despite the tremendous pressure and repressions by the government.

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Unlike arts, unfortunately, Russian science was chasing the game (notwithstanding the brilliant exceptions, like Dmitri Mendeleyev, Lev Mechnikov and Ivan Pavlov), but it should be noted that the country developed world-class engineering, especially in the field of transport: in the 20s, Russian aviation engineers were undoubtedly the best in the American aviation industry.

It is also crucial that the Academy at that time was, according to its statutes, the country's supreme scientific institution, designed to be a meeting place for scientists, not a place of research, the latter being concentrated in universities.

2. Post-1917: Structuring the Soviet Science

It was only after the 1917 revolution that the vast majority of academic institutions were established to conduct fundamental scientific research in accordance with the State's assignment, leaving university science to support teaching, educational and training activities.

It should also be noted that the territorial and sectoral structure of the economy of the country was formed practically in parallel with the creation of the subject-territorial structure of the Academy of Sciences (for scientific subjects). On the one hand, this discrepancy in the basis of the structural division emphasized the independence of fundamental science from the direct servicing of the economy, on the other hand, it almost completely coincided with the university structure, and from yet another perspective, it served as the basis for the formation of sectoral science and sectoral universities, which were effectively exempt from educational functions and aimed almost exclusively at professional training.

In the 1930s, the accelerated industrialization created a need for large-scale research and design activities. This need was satisfied through the introduction of American design technology and project management principles. It was at this time that numerous sectoral research and design institutes were created, both centralized and more typical multiple-branch ones, which basically covered the entire territory of the country.

The success of the state monopoly was largely due to the success of the nuclear and space projects, which served as the foundation of the country's military industrial complex. However, one should not forget that both of these areas were to a great extent based on the reparations: the project documentation and engineers were either brought in from Germany or exported illegally from the US.

In all other spheres, the gaps between fundamental, applied (or sectoral) research, design, university education and professional training in sectoral (departmental) institutions increased dramatically and led to the formation of specific castes and closed territorial communities:

- academic science was given a green light to "search for the truth", i.e., to perform unnecessary work for very little money;
- sectoral science was reduced to serving the immediate needs of the ministries and departments it was affiliated with and swamped by their bureaucracy;
- the design and development, organized for the most part also by sectors, was only formally grounded in research, therefore it was obviously dominated by copying the available samples, quite often originating from abroad;
- university education focused on self-reproduction and the creation of "schools" (resulting in what may be termed inbreeding or "scientific incest");
- sectoral professional training in departmental higher education institutions was only marginally

concerned with the development of professions, focusing its efforts on training personnel for the existing set of professions.

3. Expelling and Exporting Scientists

In general, the overwhelming majority of scientists and academics, to their honor, did not accept the Bolshevik power. Among the rarest exceptions are Pavlov, Timiryazev and some others. Many left the country themselves. The flight continued until the early 30s (the last in this row was the theoretical physicist Gamov). In addition to Seversky and Sikorsky, the emigrants included the inventor of television Zvorykin (1919), the theoretical physicist Kapitsa (1921) and a number of other famous names. Libraries, archives, knowledge, and schools also went abroad.

4. The Philosopher's Steamboat

In 1922, all important philosophers were deported from the country by two steamers: "Oberbürgermeister Haken" (September 29-30) and "Prussia" (November 16-17), which brought more than 160 people from Petrograd to Stettin. The philosophers were gathered from all over the country. Among them were N. A. Berdyaev, S. L. Frank, I. A. Ilyin, S. E. Trubetskoy, B. P. Vysheslavtsev, A. A. Kiesewetter, M. A. Osorgin and many others, the cream of Russian philosophy. As it turned out, they were still lucky to have been banished to Europe. The remaining ones were sent to Siberia. The world resists change in every place and at the same time is vulnerable to changes in the very same spot. Nothing prevents us from throwing a stone into the pond, but very quickly the concentric waves from the thrown stone subside, and water goes back to the same calm and unruffled appearance.

5. The Sovietization of Science

This concurred with the beginning of the establishment of statism and sovietization in the country's science.

Predictably, these processes most seriously affected history and other humanities. The Bolsheviks began history with themselves, qualifying everything before as a sort of prehistory that deserved no attention or interest. Through the efforts of Lunacharsky (Ministry of Culture) and Krupskaya (Ministry of Education), such words as "patriot", "motherland", "fatherland" were excluded from the Soviet lexicon as outdated bourgeois notions.

A significant part of the "technical intelligentsia" was wiped out during World War I as they formed a large part of the Russian army's officer corps and its technical services in the navy, aviation and automobile troops. They also emigrated massively because of the red terror unleashed by the Bolsheviks on an incredible scale.

A field that proved to be very much in demand was Earth sciences, in particular geology. Geologist Karpinsky was appointed as the first president of the Academy of Sciences of the USSR. The most famous scientists in the country were not physicists and, of course, not humanities scholars, but geologists: Obruchev, Fersman, Gubkin etc. From the onset, the country aimed at complete self-sufficiency in natural resources, primarily minerals, which allowed it a considerable degree of independence and even the ability to put pressure on other countries. Actually, this strategy has been preserved up to now, which makes it a whole century old.

Another priority for Russia, as a predominantly agrarian country, has traditionally been agricultural sciences. The leading agricultural scientists Timiryazev, Michurin, Chayanov, Chizhevsky, Kropotkin, Rakitnikov and many more, having first-hand knowledge of the food situation in the country, were almost the first to start cooperating with the new government, especially since most of them were politically oriented towards the Esers (the Socialist-Revolutionary Party), ideologically close to the Bolsheviks.

Unfortunately, agriculture proved to be a favorite springboard for social and political experiments.

Among other sectors that received special attention were architecture and urban planning.

The victorious Soviet power, like fascism that emerged a little later, gravitated towards monumentality, which is characteristic of all pygmies and tyrants at all times. Architecture was given an unusual social purpose — the formation of a new type of person, *homo collectivus*, or what later A. A. Zinoviev will call *homo soveticus*. These factors and circumstances were most beneficial to the Russian architectural avant-garde, a protest against the eclecticism and decadence of the Russian art nouveau.

It is important to emphasize that while the issues of public utilities and municipal administration were thoroughly explored and developed in the works of Velikhov, Gurevich, Chayanov and others, soon after the establishment of the Soviet regime, these areas were taken over by the KGB, which completely blocked their further development. It did not help at all that in 1922 the KGB instigated the introduction of the so-called housing tax in kind, which gave rise to psychotic reactions to housing problems and the spread of dobbing.

The thirties were the years of industrialization and accelerated militarization of the country's economy and people's minds. This was happening with the strongest assistance of European countries, and especially the United States, which used it to overcome the consequences of the Great Depression.

The biggest contribution was made by Albert Cane, “the father of Detroit”.

Between 1929 and 1932, Albert Cane’s company designed from 521 to 571 industrial facilities in the USSR, organized the supply of equipment for the enterprises under construction, and thus created almost the entire Soviet military industry.

The key merit of A. Kan in the USSR is creating the system of standard design. In the mid- to late-30s, a special resolution of the Central Committee of the Communist Party of the Soviet Union (Bolshevik) banned all design activities, except for standard design: the Communist Party completely usurped the right for the vision of the future and fulfilling it.

As the country and its economy were becoming more and more militarized, the same was happening to science. Research and design were primarily commissioned for defense, espionage, or some other military purpose, which by default was anti-human and unsuitable for normal peaceful life.

The funding of science depended directly on its closeness and importance to the military-industrial complex: nuclear engineers, missile engineers, aircraft designers and the like were not denied even the most incredible amounts of funding, while the rest sat on a shoestring budget.

Fearful of the independent and critical minds of scientists, the Soviet regime, represented almost entirely by half-educated know-nothings, did everything possible to turn both science and higher education into a means of ideological indoctrination. Ideologically oriented subjects became the basis for pre-school, school and higher education. These subjects were generously financed and provided with the most advantageous publication opportunities, but were also subject to the strictest control and censorship. Discussions and differences in interpretation essential to science were completely eliminated here. The bouquet of ideological sciences which was mandatory for studying in all higher education institutions without exception included

- history of the CPSU
- historical materialism

- dialectical materialism
- political economy of capitalism
- political economy of socialism
- scientific communism
- scientific atheism
- In addition, there were regular and mandatory:
- political studies classes
- monthly political information day
- elementary political science groups
- days of campaigning

The lengthy list of the leading ideological institutions included but was not limited to the Industrial Academy, the Communist Academy, the Military and Political Academy (Lenin Military Academy), the cluster of institutes of social sciences, the Marxism-Leninism Institute, higher Bolshevist party schools, and Komsomol schools.

6. Institutionalization of Academic, Sectoral and University Science

This institutionalization started in the first Soviet years.

In the Soviet period, there was a fairly stable division of science into three sections: academic, sectoral and university.

Table 1 The Sections of Soviet Science

	Academic	Sectoral	University
Core content	Fundamental research	Applied research	Qualifying research papers
Accessibility of publications and international exchange	Moderate	Limited	Considerable
Location	Isolated, but contacts possible	Regional	Isolated
Financing	Budget	Industry/sectoral	Budget
Economic efficiency	Moderate	High	Minimal
Prestige	High	Moderate	Moderate
Major ordering customer	Central state authorities	Ministries and enterprises	Cities and regions

7. Academic Science

Academic science is located in the largest cities and scientific centers near them, and tends to be territorially concentrated. Regional academic centers are independent and competitive in comparison with those in the capital, institutes from different fields are generally inclined to cooperate with each other. Work in academia has always been considered highly prestigious and only open to the best professionals, although the funding and salaries have been the most modest. The low salaries were compensated for by the free schedule and extended leave, but the main incentive was, of course, the opportunity to pursue “real” science.

8. Sectoral Science

This section was fully consistent with the sectoral structure of centralized economic management.

Research in this section received commissions exclusively from the ministry it was affiliated with or its enterprises. The institutional structure usually included a head institute and multiple regional branches, which were typically closely connected in terms of methodology and human resources and involved in the same projects. It was common practice to appoint a ministerial top manager who had reached a certain age or had fallen into error as the head of a sectoral research and development institute.

The main drawback of sectoral science was its closedness and secrecy, and hence the noticeable falling behind the world achievements. We deliberately developed equipment and technologies that were incompatible with Western ones. However, it is impossible to win a competition without entering the ring, hiding behind the ropes of secrecy.

The crucial reasons for the inevitable defeat of the Soviet sectoral science in competition with the West (which also included the East represented by Japan, the South represented by Australia, and the North represented by Canada) were:

- almost total absence of intra-industry competition;
- the high degree of bureaucracy in research, which made many things meaningless and harmful.

Here, as a rule, there were high salaries (depending on the category and importance of the ministry), but also a strict discipline and work regime, which is incompatible with research. Therefore, the majority of people engaged in sectoral science, with the exception of those involved in military-industrial complex, just patiently endured the routine until the retirement.

9. University Science

Usually, studies conducted in universities, which served the needs of both the Ministry of Education and their city or region, were fictitious or merely served as a qualifying instrument (candidate and doctoral dissertations). In any case, science in universities was seen as an extra obligation for professors. This was also reinforced by the fact that most universities produced schoolteachers and doctors for whom research was unnecessary and difficult to understand. Unlike sectoral and academic science, university science was extremely isolated: a transition from one university to another, a move from one city to another under Soviet feudalism was exotic. Thus the family, semi-family and quasi-family clans were formed, mainly on the scale of the Department, where the selection was based not on ability and achievement, but on the level of loyalty to the department or the university. That is why universities were a place to settle for the party and Komsomol activists, snitches and informants, who introduced traditions, policies and customs of slander and scheming.

Regional top managers who had reached a certain age or had fallen into error were the most common type to be appointed university presidents.

While sectoral and academic science have dwindled and shriveled almost to nothing, university science has become almost the only form of research and is virtually flourishing.

This “virtuality” is manifested as:

- thriving inbreeding
- rampant corruption
- thriving fictionalization
- thriving slander and scheming
- thriving meaninglessness and bureaucratization

10. Corporate Science and Corporate Education

After 10-15 years of university science monopoly, it became clear that there is a need to revive and restore sectoral science in the form of corporate science.

Corporate universities and research and design institutes are founded on the remains of sectoral structures, sometimes on the scale of former ministries.

Unfortunately, corporate science (and education) has consolidated the worst features of sectoral and university science:

- secrecy and lack of communication
- subservience and favoritism
- fierce rejection of competition
- nepotism

However, it should be recognized that corporate science is much more effective than the previous Soviet-era forms of organization.

As for the state, it is now interested only in two spheres of science: ideology and armaments. This is unprecedented even compared with the Hitler-Stalin era.

11. Militarization and Classification of Science

Germany and Russia were the first to classify research and development and their results. The USSR introduced strict censorship and secrecy after 1927, Germany — after Hitler came to power in 1933. The anti-Hitler coalition countries made the decision to classify nuclear energy research only in 1940.

Secret departments and units were set up in all research institutes and higher education institutions to monitor the movement of research information and to prevent any possible information leaks.

Naturally, this immediately led to the impoverishment of research in fact, the cessation of interdepartmental information exchange, and the encapsulation of research institutes and teams.

12. Science and Gulag

The list of the Soviet scientists who passed through the Gulag, exile and prisons includes the brightest names in the Soviet and world science: N. Vavilov, S. Korolev, A. Tupolev, P. Kapitsa, L. Landau, I. Pavlov, A. Losev, A. Baev, D. Likhachev, D. Resovsky, A. Sakharov and many others. This list is almost endless. In most cases, they continued their research, but in very such conditions that were fundamentally incompatible with research and creativity: captivity, coercion and tough prison discipline. Sometimes, scientists were faced with impossible fantastic tasks, one of which is described in A. Solzhenitsyn's *In the First Circle* (identification of an individual by voice on the phone).

Separated from their families and familiar environment, from their colleagues and from communication with the professional community, including the world community, deprived of the opportunity to publish, the academic convicts, like any other convicts, were blowing smoke and producing zero results: science and slavery are incompatible. The practice of blowing smoke and doctoring results took roots all throughout the Soviet science, and is still maintained today as formulaic research reports, rewriting the same texts with minimal transformation of the research topics and titles from year to year, and so on.

The nature of the Gulag is described not only in fiction (Solzhenitsyn, Shalamov, Dombrovsky, Aleshkovsky, and others) and memoirs (Losev, Bayev, and others), but also in documentary studies, for example *Prisoners at the Communism Construction Sites* (2008). The latter work documents that arrests and sentences were imposed not for nothing, but on requests and applications from ministries, departments, and managers of major construction sites, often with specific directions about the professions and specializations of the required convicts. Naturally, this practice applied primarily to scientists and engineers, and highly qualified specialists.

A natural extension of the "Gulag science" were the so called ZATOs — closed administrative and territorial formations, secret cities of military and industrial purpose: nuclear energy (Dubna, Obninsk, Protvino, Sarov, Snezhinsk, Seversk, Balakovo, Kurchatov, Dimitrovgrad, Lesnoy Bor, Belushya Guba and others, some of which are now open and declassified), missile development (Baikonur, Plesetsk, Vostochny), biological weapons (Akhtubinsk, Obolensk, Gus Zhelezny, etc.), and other profiles.

Basically, these are the same research and development laboratories that were part of the Gulag system, commonly known as *sharashkas*, but upgraded and allowing families. As a rule, they are all located in comfortable natural and climatic areas.

13. Self-isolation of Soviet Science

The isolation of Soviet science and technology had several purposes:

- for military reasons; the Iron Curtain was set when the Trotskyist idea of the world revolution and world domination had to be abandoned — the whole outside world began to appear hostile and aggressive, even the so-called people's democracies;
- for technological reasons: the USSR intentionally went for the incompatibility of domestic and world technologies and standards;
- for political reasons: we invented our own authors of everything invented in the world and even generated our own scientific terminology;
- for reasons of prestige: to avoid acknowledging our apparent backwardness in many branches of science, especially the humanities;
- to avoid brain drain and information leakage.

Contacts with Western science were ceremonial in nature, and therefore did not go beyond the small talk. International scientific cooperation was purely ritualistic and declarative in nature.

14. Import of Brain and Technology

The self-isolation of science was accompanied by illegal or semi-legal imports of brains and technology. The most vivid and scandalous examples of this are the atomic bomb and rocket technology.

Nuclear research in the USSR began even before the war, but only after the testing and use of an atomic bomb in the summer of 1945 there began an intensive search for a solution to the nuclear problem. However the solution was found not through research but through espionage. It was not without reason that the atomic project was headed by the Minister of State Security L. Beria.

The nuclear secrets of the USA and Great Britain were obtained at the cost of the imprisonment of 400 agents, who were convicted by the American court for different terms (the scandalous "Process of 400" in Canada) (Damaskin, 2001; Antonov & Karpov, 2001; Kolapaki & Prokhorov, 2001). Another act that of similar nature was the kidnapping of Enrique Fermi's student Bruno Pontecorvo in 1950.

The role of academician Kurchatov in the nuclear project is very questionable, unlike the undoubtable and now officially recognized as fundamental role of Soviet spies in the U.S. the Mukasei spouses and the Cohen spouses.

However, the decisive role belonged to the German Baron von Ardenne[1].

His secret lab was guarded by an SS (Schutzstaffel) regiment. The Soviet troops would have lost three divisions to storm this facility — without a chance to get the documentation and to avoid blowing up or damaging the equipment, but in April 1945 the laboratory was handed over to the Soviet Union — clearly not without directions from above. All the scientists agreed to cooperate with the Soviet Union, turned over all the equipment, among them the uranium centrifuge, all the documentation and all the reagents, including 15 tons of metal uranium of German cleaning quality.

Von Ardenne went to Moscow with his wife, bringing along a magnificent grand piano, a SS parade uniform and a full-length oil painting by the Fuhrer's personal artist, where the Fuhrer presents von Ardenne with oak leaves for the Knight's Cross, the highest award of the Reich. He was accompanied by more than 200 prominent physicists, radio engineers and missile engineers. Among them are the Nobel Prize winner, creator of the V-3 cannon Gustav Hertz, Professor Werner Czulius, Günter Wirths, Nikolaus Riehl, Karl Zimmer, Dr. Robert Döpel, Peter Thiessen, Professor Heinz Pose and many others.

Von Ardenne also brought along trains of the best equipment from the Kaiser-Wilhelm Institute in Berlin and his own Ardenne-Lichterfelde-Ost laboratory. Even German transformers were there. There was documentation, reagents, film supplies, paper supplies for recorders, photorecorders, wire tape recorders for telemetry and optics.

Meanwhile, a unique and very comfortable concentration camp was being built in Moscow on October Field. Now it is the Kurchatov Institute. The Germans also brought proven schemes of an industrial nuclear reactor and a breeder reactor. After all, they were the pioneers in the nuclear field: the first mini-bomb test was detonated on the island of Rügen in the Baltic Sea and the second one in Pomerania, with a capacity of about 5 kilotons. During these tests, about 700 Soviet prisoners of war, the "guinea pigs", were killed.

Every German specialist was attached to 5-6 Soviet engineers — students, often German-speaking. Igor Kurchatov, an operative of the Ministry of Internal Affairs and brother to the physicist Boris Kurchatov, was attached to the institute. At the same time, plutonium for the first Soviet atomic bomb was produced in the industrial reactor of the object "Chelyabinsk-40"; after testing the latter, the German doctor N. Riehl was awarded the title of Hero of Socialist Labour. That was the beginning of the mass production of warheads and industrial purification of radioactive uranium.

Then von Ardenne was transferred to Sukhumi where a new scientific centre and a centrifuge for purifying uranium isotopes were built on the shore of the bay. The object carried code "A", then A-1009 of the Ministry of Medium Machine Building. Baron von Ardenne was the research director of this institute (SFTI, Sukhumi Physical-Technical Institute). An important role was also played by Austrian radio scientist Dr. Fritz. For this work the baron received his second Stalin State Prize in 1953 and in 1955 he was allowed to return to his homeland, but only to the German Democratic Republic.

At the end of the war in 1945, Germany had jet engines and serial jet aircraft, the first anti-aircraft missiles,

[1] https://en.wikipedia.org/wiki/Manfred_von_Ardenne;
https://begemot.media/news/kak-nemtsy-podarili-sssr-atomnuyu-bombu.

the first air-to-air missiles, as well as a nuclear industry. There were also infrared tank sights and naval artillery gyroscopic stabilization, radio detection and ranging equipment and interference selection stations, and excellent direction finders. There were aviation sights and gyrostabilized navigation devices of submarines, “blue” optics and 1.5 volt radiolamps the size of a pinky fingernail, cruise and ballistic missiles. All this went to the USSR.

Pitting the USSR with the United States and Great Britain in an arms race and escalating the Cold War gave Germany and Japan a chance to recover and turn into the second or third power in the world economy.

In 1937, von Braun launched the first ballistic guided missile V-2 (weight 13 tons, engine thrust 25, range 300 km). October 3, 1942 V-2 exceeded the speed of sound; February 17, 1943 it rose to an altitude of 190 km and thus was the first space object of Earth origin. German priority in space is recognized throughout the civilized world, including the United States.

Espionage also came into play in the missile project. Today, the contribution of the Zarubin spouses, the Soviet spies who were sent to Europe and after the beginning of the war to the United States, is officially recognized.

Von Brown and his closest aide, Dornberger, were captured by the US troops. Von Brown was openly in charge of the American space program, including the astronaut missions.

After the war, the documentation, samples of V-2 and missiles “Reintochter”, “Reinbote”, “Wasserfall”, “Typhoon”, engines and technological equipment arrived in the Soviet Union (and on an even larger scale in the U.S. and England). The first Soviet ballistic missile R-1 was a full analogue of the German missile V-2, but produced using Soviet drawings and Soviet materials.

In the first days of peace, the Soviet command, puzzled by the results of research of the huge ballistic missile parts found at the Polish testing range in 1944, began a hunt for German specialists. One of the first “head hunters” was B. Chertok (later the permanent deputy of S. Korolev). It turned out that in the Soviet occupation zone there was the missile center “Nordhausen”, an underground plant where concentration camp prisoners worked. Some important materials were found there. To study them, the Institute RABE was created. The head of the Institute was B. Chertock, the director was one of the employees of the German missile centre. But they really lacked a specialist with a command of the whole problem. And soon they found one — Helmut Gröttrup[2].

Gröttrup, in his turn, recruited the leading German specialists, professors and doctors of science. Teaching our future nuclear physics luminaries was so successful, and the prospects for improving V-2 so bright, that we had to significantly enlarge the organization. The project was headed by Lev Gaidukov, the architect of the rocket artillery, and he appointed S. Korolev as his deputy, whom he had freed from the *sharashka* in Kazan, bypassing Beria. In summer 1946, about 500 leading German specialists with their families were sent to the USSR “on a voluntary basis”, where some of them (about 150 people) were placed in strict isolation on the island of Gorodomlya in the middle of the picturesque Lake Seliger.

To manage missile developments in the USSR there was established Research Institute-88, headed by L. Gonor. It was the “Soviet” Germans under the leadership of H. Gröttrup who gave the world the now textbook technical solutions in “their” rocket designs: the detachable head units, the carrying tanks, the intermediate heads, the hot injection of fuel tanks, the flat nozzle heads of engines, the thrust vector control with the help of engines, etc., coming first in their race against the “American Germans”. With a plethora of world-renowned scientists, primarily such as Hoch (an authority on control systems, who died in the USSR under mysterious circumstances

[2] https://en.wikipedia.org/wiki/Helmut_Gr%C3%B6ttrup.

allegedly “from appendicitis”), Magnus (a specialist in gyroscopes), Umpfenbach, Albring, Mueller, Rudolph, it is not surprising that they were the ones who won all the government tenders to create a missile shield for the USSR. They designed ballistic missiles with a range of 600, 800, 2500 and 3000 km. for intercontinental range (an analogue of R-7), proposed an aerodynamic scheme for astronauts to fly to the Moon (later used in the project H-1). The conical compartments were a trademark of the German and ((un)surprisingly) Soviet rockets until the early 1960s. The Germans also succeeded in laying a solid foundation for the development of the Soviet anti-aircraft and cruise missiles (G-5 or R-15 with a range of 3000 km) (Sudoplatov, 1999).

The organization of work with German specialists quickly acquired a peculiar character. The German specialists presented a detailed report on the next missile project at research and engineering board meetings. Then the opponents took the floor. The report was considered and discussed in detail. The project was then recognized as the winner. After that, Soviet specialists came to the island, asked questions about the finer points and took away the documentation, in many cases, not even bothering to reprint it or change anything beyond erasing the German names. And most importantly, the “guests” were not allowed to test anything, this being explained away by the unavailability of free testing benches. Finally, after the German missile specialist had been completely milked for all their worth, they and their command were put in unbearable work conditions, and then sent back to the GDR, with the fact of their employment not even being recognized. To compensate for the “exodus of the Germans” in 1954, there were created four independent missile design bureaus, including the one in Dnepropetrovsk. Later, in August 1956, the Design Bureau of S. Korolev was also created. H. Gröttrup was the last to leave the USSR in late 1953, as becomes the team captain. Chertok wrote that he was too ashamed to look Helmut in the eyes[3].

15. Taboo Sciences

It is common knowledge, to the point of banality, that thought, progress and science cannot be stopped, but in the USSR and modern Russia this was and is not only possible but also widespread. There is a rather wide range of fields, primarily humanities, which have been tabooed at the state level for a long time (up to our days).

The true history of the Revolution of 1917, the true history of the Communist Party of the Soviet Union, the true history of the Second World War, even the true history of the Russian state are strictly forbidden or strictly censored. Research into these subjects is subject to severe criminal penalties. Archives are kept secret, information is carefully hidden and even destroyed. The history itself has been many times rewritten and deliberately distorted. There has been no Orwellian newspaper rewriting of yet, however the newspaper collection of the Institute of Scientific Information on Social Sciences of the Russian Academy of Sciences Library (the INION Library) was destroyed by a not-quite-random fire, and the newspaper collection of the Lenin Library in Khimki is no longer supplemented with local regional, city and district newspapers and is becoming less and less accessible.

For a long time, even in post-Stalin times, genetics was castigated as “the whore of imperialism”. The German scientist Mendel was referred to in no other way but the Austrian obscurant monk (after the amnesty of genetics he was rebranded as the great Czech scientist). The names of Weismann, Morgan, and also domestic geneticists and breeders Schmalhausen, N. Vavilov and others were anathemized and condemned to oblivion. The Soviet genetics, which was led down the wrong track by Nesmeyanov and Lysenko, fell behind the world for decades. And even the novel by V. Dudintsev *White Garments* was put in cold storage for many years.

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[3] http://www.akirama.co; https://fishki.net/2268578-samaja-bolyshaja-tajna-sovetskoj-raketnoj-tehniki.html

Cybernetics was also taboo, although Norbert Wiener emphasized that his teachings apply only to technical systems and do not apply to social systems.

As for economics, all “bourgeois” theories from the current and previous centuries could only be criticized without reading. There has been neither economics, nor economy as a system of trade and industry in our country for over a century. It has been replaced by political economy prescribed by the state.

All philosophical studies, except Marxist-Leninist, which was not a philosophical study at all, was to some extent taboo, with modern philosophy totally banned. Despite such names as Ilyenkov, Mamardashvili, Oyzerman, Losev, Asmus, Takho-Godi etc., in general, Soviet philosophy was a set of repetitions, quotations, ritualistic practices and spells produced by people deeply ignorant and even illiterate in philosophy. Unfortunately, many of them are still alive and are still a significant presence in the country’s philosophy.

Sociology was also unrecognized and forbidden for a long time as a harmful and unnecessary science, something like the enfant terrible of demography. Behind this was the deep conviction of the authorities that the ordinary people were a dark element with no right to their opinion, a kind of human material from which anything could be made — and this has been an still is the truth.

Psychology and psychiatry were tabooed as well. Psychology, together with logic, was removed from the school curricula in the mid-50s. The Department of Psychology of Moscow State University was restored as a department only in 1960. Soviet psychiatry was expelled from the world psychiatric community for forced confinement of dissidents with the trademark diagnosis of sluggish schizophrenia as a politically motivated “disease”. Nevertheless, psychology turned out to be one of the most productive and advanced sciences in the USSR: Lev Vygotsky, Alexei Leontiev, Vasily Davydov, Daniil Elkonin, Alexander Luria, Georgy Shchedrovitsky, Vladimir Lefebvre are most certainly world-level names.

The development of linguistics, both as a university discipline and a research area, was determined by the state-prescribed assumption that all foreign languages were the languages of enemies, and therefore linguistics should be focused mainly on translation. Only KGB servicemen, journalists, representatives of foreign trade associations and diplomats (also KGB servicemen) working abroad were allowed to speak foreign languages fluently. Such “truncated” linguistics (both socially and thematically) could not develop normally, and that is why it acquired some bizarre forms in our country.

Political science and related elitology, conflict studies, regional science, urban planning were so frightening to the party and research administration of the country that they were not even discussed and condemned. They simply did not exist.

Nature protection and ecology were also quite bizarre in their choice of subject. For a long time research articles and dissertations on ecology belonged almost exclusively to philosophers who diligently translated and commented on foreign works on this topic. Biologists, geologists, geographers and other representatives of natural sciences turned to environmental topics only in the second half of the 60s. Town-planning theory and the study of the interrelation of residential areas and industrial zones paid more attention to the transport factor than to the ecological one.

All environmental and conservation information was strictly confidential, with more than severe punishment for its disclosure. Environmental crimes were either silenced or their significance was greatly diminished. The silencing of the environmental situation and environmental crimes still persists in the mass media, state management and scientific research. The very environmental facilities to be protected, first of all, nature reserves and wildlife preserves, have long been turned into hunting grounds for the ruling elite of all calibers.

16. Pseudoscience

In parallel with tabooing certain research areas, the landscape of the national science is characterized by the virtual flourishing of pseudoscientific, quasi-scientific and parascientific activities.

17. Privatizing Science

The very fact of privatization in science is encouraging: many scientists have finally turned to what they wanted to do, new, unusual and previously impossible topics and studies have appeared, such as the research of P. Polyan (1996).

There appeared non-government research associations and institutions, for example, the Laboratory of Regional Studies and Municipal Programs in geography, the research and consulting firm "Geograkom" founded by V. N. Bugromenko. Unfortunately, at the same time and in parallel, numerous VTKs (temporary labor collectives) began to emerge, whose main purpose was to turn non-cash money obtained through funding into ready cash.

The mass outflow of professionals caused a lot of swindlers, impostors, charlatans and people sincerely deluded about their own professional identity to rush into science. The so-called psychologists of various persuasions rushed into regionalism and urbanism, plumbers and certified engineers into psychology, acrobats and clowns into management, commerce, politics and economics — everywhere.

Professional scientists in this chaos began to lapse into a cocoon of self-isolation and build impregnable ivory towers out of research that no-one would need, while the "new scientists" were ready to grab everything that they could lay their hands on and what was well paid for.

18. Provincial and Indigenous Science

The article by M. Sokolov and K. Titaev (2013) gives a fundamental conceptual distinction:

- indigenous science is sure that it is the most advanced and, in a sense, the only science in the world, while everything else is rotting and decaying (this view was common to all or almost all the Soviet science);
- provincial science is imbued with an inferiority complex, and therefore is timid, innocent in the worst sense of the word and totally non-aspiring (and this seems to be the mainstream idea of the current scientific sentiment and perception).

Modern geographical research is rather monotonous, empty and meaningless, although it is sometimes substantial. Here is the thirty-year dynamics of publications of MARS conferences by the novelty criterion (Levintov, 2017).

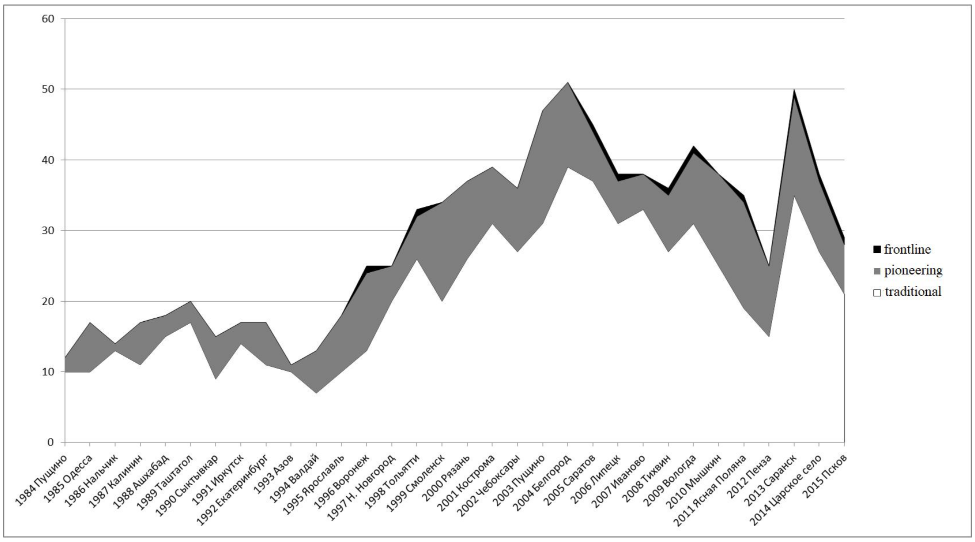

Figure 1 Scientific Originality of Publications in Geography[45]

White depicts "traditional", baseline research of no interest, gray is for "pioneering" research, with some novelty and black — for the frontline research, developing new trends.

The structure of modern Russian science is quite interesting.

The statistical series in Table 2 covers a period of 8 years, from 2007 to 2014, when nothing significant happened in science.

Table 2 The Structure of the Current Dissertation Corpus in the Russian Federation

	Candidate of Science Dissertations		Doctoral Dissertations		Doctoral Candidate Dissertations Ratio
	Total	%	Total	%	%
All research fields	168993	100	22125	100	13.1
Medicine	26322	15.58	4458	20.15	16.9
Engineering	27429	16.23	3432	15.51	12.5
Economics	26254	15.54	2836	12.82	10.7
Physics and Mathematics	9479	5.61	1924	8.70	20.3
Biology	9974	5.90	1644	7.43	16.5
Education	13614	8.06	1227	5.55	9.0
Linguistics and Literary Studies	10257	6.07	1125	5.08	11.0
History	5788	3.42	952	4.30	16.4
Law	10353	6.13	708	3.20	6.8
Philosophy	3632	2.15	688	3.11	18.9
Chemistry	5213	3.08	662	299	12.7
Agriculture	4395	2.60	603	2.73	13.7

[4] Research locations: 1984 Puschino, 1985 Odessa, 1986 Nalchik, 1987 Kalinin, 1988 Ashkhabad, 1989 Tashtagol, 1990 Syktyvkar, 1991 Irkutsk,1992 Ekaterinburg, 1993 Azov, 1994 Valdai, 1995 Yaroslavl, 1996 Voronoezh, 1997 Nizhny Novgorod, 1998 Tolyatti, 1999 Smolensk, 2000 Ryazan, 2001 Kostroma, 2002 Cheboksary, 2003 Puschino, 2004 Belgorod, 2005 Saratov, 2006 Lipetsk, 2007 Ivanovo, 2008 Tikhvin, 2009 Vologda, 2010 Myshkin, 2011 Yasnaya Polyana, 2012 Penza, 2013 Saransk, 2014 Tsarskoye Selo, 2015 Pskov.

[5] Novelty degrees: frontline, pioneering, traditional.

Sociology	2858	1.69	305	1.38	10.7
Psychology	3762	2.23	288	1.30	7.6
Geology and Mineralogy	1286	0.76	278	1.26	21.6
Politics	2561	1.52	268	1.21	10.5
History of Arts	1379	0.82	177	0.80	12.8
Veterinary Science	1289	0.76	168	0.76	13.0
Geography	1240	0.73	146	0.66	11.8
Culture Studies	845	0.50	121	0.55	14.3
Pharmacy	806	0.48	96	0.43	11.9
Architecture	257	0.15	19	0.09	7.4

So, as the table demonstrates, the three pillars of contemporary science are:

- medicine (15.58% of all candidate dissertations and 20.15% of doctoral dissertations),
- engineering (16.23% of candidate dissertations and 15.51% of doctoral dissertations)
- economics (15.54% of candidate dissertations and 12.82% of doctoral candidates).

In total, these three areas comprise 47.35% of candidate dissertations and 48.48% of doctoral dissertations, almost half of the total number of degree-qualifying research in Russia. Interestingly, it is in these three areas that the gap between Russia and the world level is particularly noticeable.

According to these data, all fields can be divided into "ambitious" ones (where the doctoral candidate dissertation ratio is above the average of 13.1) and the "non-ambitious" ones.

The least "ambitious" are lawyers (6.8), architects (7.4), psychologists (7.6), that is the people focused on practice, with no time for theorizing and sophistry, as they have to make money or at least look for funding. The same category includes education (9.0, also a very dubious but very broad and popular research field), represented primarily by pedagogical higher educational institutions and school principals.

The most "ambitious" areas are geology (21.6), a highly materialistic and empirical field; physics and mathematics, which have traditionally enjoyed intensive research and funding (20.3), as well as philosophy (18.9).

19. The Number of Nobel Prize Winners in Russia as an Indication of Its Position in the World Science

While a country's place in the world can be measured in square kilometers, Tel Aviv airport in the tiny state of Israel has a gallery of outstanding Jews who have marked a place for themselves in the modern world history — and it is an impressive list. The number of Nobel Prize winners is perhaps the most accurate indicator of any country's place in the world community. And Russia's role here is very modest:

The number of Nobel Prize winners per country[6]:

1) USA – 375.
2) United Kingdom – 131.
3) Germany – 108
4) France – 69.
5) Sweden – 32.
6) Russia/USSR – 31.

[6] https://zen.yandex.ru/media/map_mind/kolichestvo-nobelevskih-laureatov-po-stranam-.

7) Japan – 27.

The U.S. has more Nobel prize winners than the next five countries combined, leading by a huge margin in all categories, even in the Peace Prize, and it is only in literature that the UK is on a par with it. But the breakaway in economics is especially significant: 51 laureates from the USA. Britain has 10, and all the other countries have no more than one or two. So, when did America embark on the path leading to leadership in science? The answer is easy: from the very first step. *Ubi universitas, ibi Europa* — "where universities are, there is Europe", as the proverb says, but that is exactly where the colonists came from. Therefore, on September 8, 1636, just 16 years after the arrival of the "Mayflower", when there were no more than 35-40 thousand settlers, they founded a new college in Cambridge (future Harvard) "to search for knowledge and pass it on to their offspring, those afraid of this path, let them continue to rely ignorantly on the wonders of the church".

At the time in Russia, there were no higher or secondary schools at all.

In the United States, colleges were established one after another: William and Mary (1693), Yale University (1701), Pennsylvania (1740), Princeton (1746), Columbia (1754), Brown (1764), Rutgers (1766), Dartmouth College (1769). As a result, by the beginning of the XIX century there were 9 higher education institutions in the USA (in Russia there were only three). Now in the USA there are more than 4 thousand universities and colleges and more than 19 million students. The top ten best universities in the world include six American universities, and the first hundred have about forty of them.

In modern Russia science appears to be obviously out of favor, judging by how much is spent on it in different countries.

The top five countries with the biggest investment in research and development (R&D) in absolute terms are the United States, China, Japan, Germany and South Korea. However, if we consider expenditure on R&D as a percentage of GDP, the world leader is the Republic of Korea (4.3%), followed by Israel (4.1%), Japan (3.6%), Finland and Sweden. In the USA, this is 3%. In China, the average annual growth rate in R&D has reached an exceptional 18.3%, and although the expenditure is only 2% of GDP, this means that the country invests around $369 billion in the sector every year.

As for Russia, the successor of the country that was once a great academic powerhouse, is now lagging behind with a pitiful 1.2% (the 27th place in the world), and this figure is steadily declining every year. Soon, Russia will be overtaken by Brazil. Obviously, it is necessary to attract other, non-state sources of funding comparable to the state to stay in the limelight of the world science.

20. Problems of Modern Russian Science: Implications for the Future

To sum up:

1) For a century, the Russian science has been deprived of independent development and subject to the powerful pressure of the state, which dictates not only the goals, topics and directions of research, but even the course of research and its results. The science has been stripped of initiative for too long.
2) The science is bound by various regulations, norms, standards that leave no room for out-of-the-box thinking and search, creative and venture activities. As a result, research is increasingly linked to qualifying for degrees with deliberately designated results.
3) The Russian science is increasingly lagging behind the péleton of the world science, becoming secondary — native or provincial — and developing products intended solely "for the shelf". This fact

is aggravated by the direct or hidden export of scientists, which has been continuing for more than 30 years, a "brain drain", which is not prevented by the state machine, to say the least.

4) The "marketability" of science is massively understood only as its ability to be sold. The real market for scientific research in the country has never developed: there is no competition, no marketing of research, no promotion, no free pricing and no independent funding.
5) One of the means of overcoming these shortcomings and problems of Russian science is the development and introduction of the institute of scientific producing.

21. The Concept of Producing in the Modern World

Science in Russia, not unlike in many other countries, has lost public interest. Scientific research results are put in cold storage, and nobody is interested in them and or even knows about their existence, and scientists themselves have come to terms with their uselessness.

The purpose of scientific producing is to make research and design practical and actionable, as well as merchantable. The most important component of scientific producing is marketing. Marketing is not about selling what you can produce, but producing what you can sell.

Marketing of research and design is not about finding the consumer (as a rule, that is known in advance), but about identifying the consumer's problems, followed by hypothesizing solutions and verifying the hypotheses with the clients. The problem is that today's consumer has no problems because they have no goals (the problem as a shortage of funds in relation to goals): we live in the technologized world of people, who do not work but are employed, in other words people spending time in exchange for money. The only sensible solution to this typical problem is the substitution of goals with interests and interesting, and the problematization of interests.

This could be the strategy of Taiichi Ohno ("Toyota"): fighting losses. The following areas from Toyota experience are important for scientific production:

- due to waiting time
- due to overprocessing
- on account of unnecessary movements
- in the event of spoilage
- through untapped creativity.

Unfortunately, the idea of business angels popular and productive in the West is highly questionable for Russia because of the deep ethics and trust crisis.

Starting with the film industry, we can talk about producing as a process. And like any producing process, film producing breaks down into procedures and operations, so we process it:

- the general script
- the final screenplay
- the casting
- the shooting
- the editing
- the voice-over
- the release and distribution.

The producer is not involved in any of this — the producer's position in regards to this is entrepreneurial or managerial.

David Sarnov took the next step, or even two steps towards producing: in 1922 he launched radio broadcasting, radio theatre and radio concerts as a global socio-cultural phenomenon, and in 1939 he launched television broadcasting as a commercial project. And it was television producing that stimulated the diffusion of the idea of producing itself.

And the world froze in anticipation of further diffusion: there appeared museum and gallery producers, performance producers, sports producers. Everything that does not fit into the industrial, agricultural or material production, became actually or potentially subject to producing, including design (remember the American Albert Kahn in the USSR), education and research.

Undoubtedly, political, in particular, electoral producing is there and has the right to exist. Thus, producing can be spread to the whole sphere of creating new concepts and products in the humanities and develop its own humanitarian technologies, different from material technologies by spontaneity, protuberances of creativity, unpredictability, freedom and flexibility.

22. Structure of Scientific Producing. Scientific Producing as Process Control

Scientific producing begins well before the research itself and consists in forming some image of the researcher, as well as in finding a potential buyer/customer. At the same time, it quickly becomes clear that whoever the buyer/customer is, the consumer behind them is much more important, and that it is always a self-order, a researcher's initiative, much more exacting and demanding than any customer.

Of course, the customer is an extremely important figure:

- the customer has to be a solvent entity,
- the customer should be in a vitally important and acute situation, in need of help and support,
- they must be reasonable and understanding: they must understand that they are dealing with an intellectual process, not with material production, and their initial ideas about the final result, and the performer's ideas may differ greatly from the actual result, which may be negative at all.

The study itself as a technological process can be broken down into the following stages and procedures:

SEARCH (exploring and surveying)

- literary and bibliographic search: no matter how narrow or avant-garde a topic you are engaged in is, it quickly transpires that there is an infinite amount of literature on the subject to be found that can be classified in the following way:

(a) valuable information

(b) unexpected aspects and angles

c) theories and models (preferably a number of those)

d) lacunae and voids that need to be filled

(The completeness of literature review is an extraordinary value in itself; while working on the 'Program of Regional Development of the Crimea' in 1991-1993 the best Moscow librarians and bibliographers were involved, who collected several thousand sources of reference in Moscow, Kiev and Crimea).

- information search: strange as it may seem, the Internet in this sense is almost as empty as our domestic statistics; most often information and statistics have to be created by observation, surveys, polls, in-depth interviews, etc.,

- search for media coverage (including both the traditional media and the Internet),
- search for team members (the team of performers is never formed in advance or immediately).
- search for actual customers (besides and above the ordering customer) and distribution channels.

RESEARCH (research, reflection on the search)

Actually the Research can go in parallel with the Search: it is impossible to stop thinking. However, the research design still goes sequentially after the Search.

The Research has two independent and parallel directions:

Development	Mastering
- the emergence of new knowledge and ideas, models, theories and concepts - the emergence of new design and pre-design ideas - expanding and shifting the conceptual and operational framework	- the emergence of new methods, techniques, ways and means of research - the advent of the new methodology framework and toolkit - identifying research problems and compiling an R&D bug report - extension and refinement of the conceptual framework

Mastering is the second level of reflection, which is possible only if there is a first level of reflection in relation to the Search, i.e., the Development.

The end of the Research itself means the beginning of the next, implementation stage, which should also be quite technologically advanced:

- testing,
- implementing research results through education.

Sometimes these two types of implementations merge. For example, in the Altai Mountains there was developed and put into practice the Social-Ecological Monitoring system (SEM), while the construction of Katun Hydropower Station, which was the very reason for the SEM system, was postponed for an indefinite period. This was the start of Gorno-Altai Ecological University.

Another example of such a merger is “Moscow Silver University”.

23. The Place of Producing in Science

The producer is a key figure at the preliminary stage, but not the central figure: that one, and also the public image and authority, is the academic director, or scientific supervisor, of the research. It is this figure that is the key to success and the guarantee of quality for the customer.

The role of the producer is secondary in the R&D as such: he is responsible for the search for performers, for media coverage and for real consumers.

The producer becomes the crucial figure when the R&D is finished. His main concern is not to let the work be put in cold storage, but make sure it lives in the real world. His theatre of operation is PR and advertising, interviews and discussions, holding seminars and conferences, but most importantly — educational courses and programs to attract fresh, new and energetic human resources to the implementation of the R&D results. All this is more than reasonable but only — and that is absolutely vital — if the application areas and uses have not yet been identified. If the latter happened at the pre-research or research stage, the research should be given a confidential status or even secrecy in order to gain a competitive edge. And establishing the degree of secrecy is also the prerogative of the scientific producer.

24. Functions, Purpose and Uses of Scientific Producing

In our opinion, scientific producing should perform the following functions:

- management of research under the conditions of uncertainty of results and their practical applicability,
- marketing, primarily understood as sociologically-based implementation of R&D results,
- budgeting (time, financing, human and intellectual resources, materials and resources),
- goal-setting and reflection in the context of goals with an open-ended outcomes and ways to achieve them,
- PR and advertising in case the application areas and uses have not been identified before or during the research.

It is clear that in the state-planned and centralized economy, which is still predominant in Russia, the opportunities and need for scientific production are severely limited, but that is why significant efforts are needed for its development and advancement.

Scientific knowledge is a highly perishable commodity and cannot be stored for a long time. In addition, this product has an amazing property — to grow as you use it, but only under appropriate conditions. Nowadays, the object of trade is not scientific research results, designs and prototypes anymore, but well-established and sufficiently promoted businesses with mass and steady demand, self-developing and highly competitive.

Modern scientific production should answer the demand for fully-fledged and well-built teams that are able not only to run a business based on research, but also to reproduce and multiply themselves.

25. Producing Research Projects

Scientific producing is characterized by:

- "batching" of results,
- a shift not only in technology and engineering, but also in the social and cultural sphere, as well as in education.

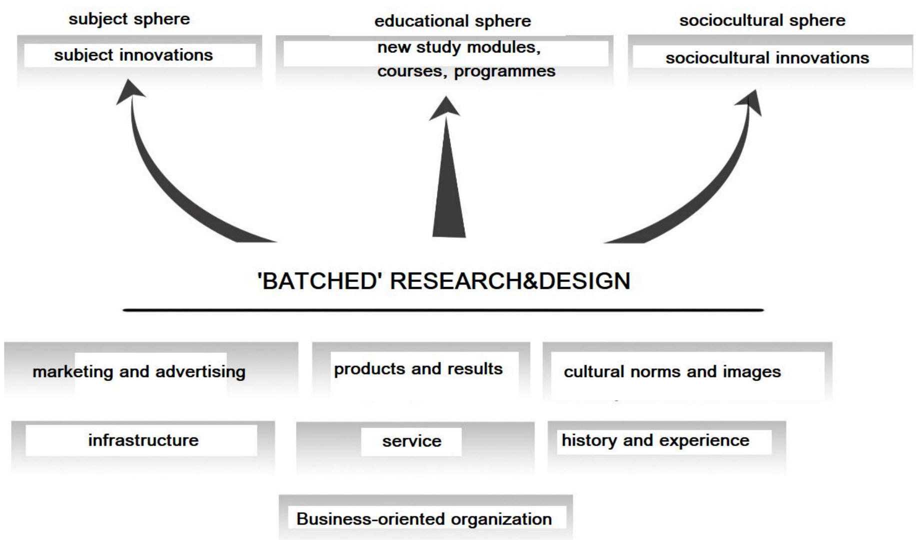

Figure 2 The Key Scheme of Scientific Producing

Apparently, this pattern or something close to it (considering the elasticity and flexibility of the humanities sphere) can and should be used to carry out any kind of projects, especially educational, regional, urban, and municipal ones, which are by their nature “package-friendly” and socio-cultural.

26. Global Experience

Science is an expensive institution in many countries. There are generally accepted forms of research funding beyond the budget, such as grants, contracts and venture capital. Corporations interested in innovations conclude contracts with universities. Bill Readings’ book *University in Ruins* (1996) published in the mid-1990s describes the shift in the university's function from the Cantian concept of reason and Humboldt's idea of culture to the modern technocratic idea of superiority. This work stated that the model of the classical university had become a thing of the past, with the entrepreneurial university taking its place.

Training and research and industrial complexes are being formed around research universities. New ideas are particularly important in a science oriented towards the future. A young talented team develops an innovative idea, but has no means to bring it to a finished product. The Technological Incubator program is being implemented. For the last 25 years, in regions with a high density of invention, one can observe a formerly non-existent phenomenon — serial technological entrepreneurship.

The notions of science producer/producing are not available in the English language literature. These notions can be regarded as “pseudoanglycisms”. It is also not quite precise to assume that a scientific producer can be translated as entrepreneur, impresario or, especially, a science-maker. It turned out that in large, highly developed countries there has long been a science-focused business (startups are part of the venture business). At the same time, at least for the last half a century there has been both monetized and logical connection between inventing, commercializing and investing. The whole Western culture was originally built on the work of geniuses, who combined the two most socially and humanly vital activities. It is worthwhile looking at book *The 100: A Ranking of the Most Influential Persons in History.*

The most active promotion of scientific producing began in the period of the first socio-political and scientific-technical revolutions that took place concurrently in the 19th century. At the end of the 19th century, instead of single producers, there began to emerge teams, in which instead of a single director and a producer there were two heads. In the highly developed countries of the world a scientific producer is the same profession as a film producer or an entrepreneur in a theatre or circus.

The most prominent type of entrepreneurial producers are business angels. Business angels most often launch startups. Thus, such activities can be useful in the form of research and production. The largest organization of business angels is the World Association of Business Angels[7].

A special Angel Investor Review platform has been created as a communication channel aimed at raising awareness and meeting the numerous needs of the key players in the early and subsequent stages of stock markets.

Here’s some literature on business angels.

Every business needs an angel: getting the money you need to make your business grow (May & Simmons, 2001);

The global Silicon Valley handbook: the official entrepreneur’s guide to the hottest startup scenes from around the globe (Moe, 2017).

[7] https://www.wbaforum.org/.

Considering the most successful startups of the world (unicorns, which are valued at more than 1 billion dollars each), out of the 250 registered by 2019 there is quite a number of those involved with scientific producing: VIPKid (China), Houzz (USA), SurveyMonkey (USA), Ucommune (China), Thumbtack (USA), Carta (USA), Mu Sigma (India), Asana (USA), 10X Genomics (USA), Icertis (USA), ABCmouse.com Early Learning Academy (USA), OCSiAl (Luxembourg-Russia), Rubicon Global (USA), Udacity (USA).

In the United States there are the so-called large-volume magazines called *(NAS Colloquium) Science, Technology and the Economy, Proceedings of the National Academy of Sciences*. These journals produce a significant number of articles (a few dozen) annually on producing as a business in education and science (Garcia, Ward, Hernandes, Flores, 2017).

Here also belong *Long-term change in the organization of inventive activity* (Lamoreaux & Sokoloff, 1996); *Flows of knowledge from universities and federal laboratories: Modeling the flow of patent citations over time and across institutional and geographic boundaries* (Jaffe & Trajtenberg, 1996).

The work *Pushing Scientists into the Marketplace: Promoting Science Entrepreneurship* (Lehrer & Asakawa, 2004) is a comparative study that explores the relationship between US high-tech sectors and attempts by Germany and Japan to catch up with the new high-tech sectors based on the concept of "scientific entrepreneurship". "Germany and Japan are examples of countries at two ends of the spectrum: Germany occupies the leading positions in research, but it does not encourage academic scientists to commercialize their discoveries; Japan is a country that does not give academic science the same political importance as the development of more applied, direct commercial applications". The reason why most industrialized countries have not succeeded in scientific entrepreneurship is clearly not just a lack of venture capital. This is due to the way the professional identity of scientists was defined in a market economy. Almost all national education and research systems suggest a more or less clear distinction between public and private knowledge production. Only ten years ago, it was almost inconceivable that a scientist could simultaneously conduct research and own a business based on that research. Nowadays, entrepreneurship is the main source of scientific progress as well as a mechanism for generating personal wealth. Today, this issue is not super innovative, but is of interest to various researchers around the world. First of all, we are talking about researchers from the USA, Germany and Japan, but scientific producing plays a significant role in less developed countries as well. Suddenly, for example, scientific producing is perceived as a significant aid to Nigeria's economy – there is a busload of articles, including joint articles with Nigerians studying in Europe, on the subject. Scientific entrepreneurship as an escape from poverty is a very interesting concept.

27. Producing in Russia

Producing is a phenomenon of market economy and entrepreneurship. In the USSR, entrepreneurial activity was criminalized (since the late 20s), severely prosecuted, up to and including capital punishment (Rokotov and Faibishenko case) and condemned by society. What is now called perestroika (the end of the 80s) was accompanied by a mass terror against enterprising businessmen: about 400 thousand were imprisoned for entrepreneurial activity, economic, and commercial initiatives. The so-called planned economy with its super-centralization, lack of competition, state monopoly on production, pricing and distribution also left no chance for entrepreneurship and one of the forms of entrepreneurship — producing.

Initially, the "market economy" in post-Soviet Russia acquired pseudomorphs only remotely similar to market mechanisms and institutions: exchanges, banks, insurance and pension companies, corporations, holdings, etc. The fact that the Sberbank Corporate University translates and publishes books by Western economists and financiers does not make Sberbank a bank, because the main function of this institution is deception and robbery of the population on grand and small scale. In the whole country there is practically not a single person who has not been cheated at least once by the Sberbank.

All this resembles a “Fijian plane” made of banana leaves with shamans around it, performing rituals and waiting beads, cigarettes, gum, condoms, lighters and cans of coca-cola to rain down from the plane.

By now there has formed a very peculiar kind of production in Russia focused on the usurpation and appropriation of some or other resources: monetary, financial, natural, powerful — anything. This practice is most likely to continue for an indefinitely long time, and it was not by chance or as a result of natural disasters that the supreme power has concentrated in the hands of one person — he produced it. The former Governor of the Krasnodar Territory and former Minister of Agriculture Tkachev is the world's largest landowner, and it was also produced by him. The Mayor of Moscow Sobyanin is producing his prosperity in the same way as his predecessor Luzhkov. The more useless are the actions of all these people, the more successful and long-lasting their business is. There has been a construction boom in Moscow for thirty years now, primarily in the construction of residential buildings, and living conditions for Muscovites have improved by 0.8 square meters per person over the decades.

In order to produce in Russia, it is quite enough to be the Russian president or a friend of the Russian president, or a friend of a friend, or a friend of a friend of a friend of a friend, but not further than the fifth handshake. Another option is to be a relative, or a relative of a relative, or a relative of a relative of a relative. And so until the end of this president’s rule. And then there will be elections again, or more precisely, a choice.

The actual scheme of Russian producing, or to be more precise antiproducing, is extremely simple: a resource is extracted from any source material, but not for the creation of something productive, but for the appropriation of that resource. The most important link of this technology is endless useless actions (changing street curbs, planting trees that can’t stand Moscow winters annually, “improvement” of streets and yards, laying paving tiles, sidewalks expansion, etc.), which generates endless extraction of resource for extraction of resource. Thus, a Kantian “thing in itself”, such as a Brazilian tree planted in a polished granite pod, becomes a “thing for yourself” on offshore accounts and tropical islands.

And this resource management technology is inevitably based on robbing of meaning everything it parasites on: meaningful things tend to require independent will and even rebellion, while meaningless things do not.

And this obedience leads to the formation of fixed platforms with zero tectonics.

And it is only in geosynclinal, or better — in anticlinal folds of rubbing platforms, in mountain caves and gorges, under the glaciers, that a quiet and inconspicuous run of jets of business and production is possible not in the Russian style, but in a form true to its idea.

28. Scientific Producing Technology

First of all, we need a conceptual description: what is an intellectual technology, including the technology of scientific producing:

- it is a logic (an algorithm) of consecutive procedures and operations (for example, advertising is possible only for an already finished product and result, based on legal requirements and advertising ethics, while PR can, and marketing should precede research),

- it is the irreversibility of the processes, their one-way movement, which makes the technology similar to the road map,
- it is the flexibility of technology that allows spontaneous creative interventions, insights, zigzags and digressions from the intended plan and path, what can be called “natural” (i.e., uncontrollable, unrestrained, unpredictable and unexpected) transformations,
- it is mandatory reflection on all procedures and operations.

The first procedure of scientific producing technology is ad hoc.

The concept of ad hoc was most comprehensively considered by P. Feyerabend (1986) and is spontaneous in itself and more intuitive than rational. Here are the most famous examples of ad hoc.

Archimedes was taking a bath while solving the problem of checking the specific weight of an object of a complex volumetric form (the golden crown) and discovered the way of such a measurement with the help of the law of Archimedes, now known to every schoolchild, which is much more general than the problem faced by Archimedes.

Galileo was working on the Prince’s task to create a device that would allow the Prince to participate in the battle at a safe distance, but as if in the thick of the event; quite by accident, Galileo moved his spyglass tube with his elbow and turned it upwards towards the starry sky: this is how the idea of the telescope appeared, and then, in the course of observing the movement of the stars, the heliocentric theory of Copernicus was confirmed. An apple fell on Newton’s head in the garden on his parents' farm, where he was seeking privacy to reflect on physics, which led to the discovery of the law of gravitation and all physics and mechanics.

J. R. Mayer was a doctor. Playing billiards is based on the collision of balls and the transfer of movement from one ball to another, which gave Mayer the idea of the law of preservation of motion. Ad hoc happened to him, a ship’s doctor, while sailing in the tropical latitudes, to Java. It was by accident that he discovered that the color of the sailors’ venous blood in the tropics is much lighter than in the northern latitudes. This change in the color of the venous blood led him to believe that there was a connection between the consumption of substance and the formation of heat. He also found that the amount of oxidized products in the human body increases with the work done by him. That’s how the law of transformation and energy conservation was discovered.

Hawking made significant amendments to Einstein’s ontology as a result of an accidental remark made by his compartment neighbor at the departure on the station platform, when the carriage was pushed in the process of car coupling. He deduced the gravitational singularity theorem from the general theory of relativity and theoretically predicted the possibility of black holes emitting radiation, thereby giving a multi-world interpretation of quantum mechanics. Hawking was the first to describe the cosmological theory, which combined the concepts of the general theory of relativity and quantum mechanics.

All these are examples of ad hoc, which serves as a starter for scientific production.

If ad hoc is a happy insight, a hunch, an intuitive breakthrough, then the search for a new framework beyond the existing ontology is the main component of the Search, anticipating or accompanying literary, information, statistical search etc.

Any ad hoc is generated or generates the Search for a new explanation of the universe or the world order (for example, cosmic, social, public, state, regional, urban) — this is the least that can be said. Grammatically, it is a construction of temporary verb forms simple past/presence while/during/in progress past/presence continuous, where continuous is the change of the ontological framework. What matters here is not the scale, but the limit of the framework, beyond which everything else is no longer important.

29. Replication of Scientific Producing

For this purpose, the Moscow City University is developing a master's program "Scientific Production".

References

Bordina L. (2017). "The biggest secret of the Soviet rockets", accessed in 2020, available online at: https://fishki.net/2268578-samaja-bolyshaja-tajna-sovetskoj-raketnoj-tehniki.html.

Damaskin I. (2001). *100 Great Spies*, Moscow: Veche.

Feyerabend P. (1986). "Against method", in: *Selected Works on Methodology of Science*, Moscow: Progress, pp. 125-467.

Hart M. (1993). *The 100: A Ranking of the Most Influential Persons in History*, Simon and Schuster.

Jaffe A. B. and Trajtenberg M. (2002). "Flows of knowledge from universities and federal laboratories: Modeling the flow of patent citations over time and across institutional and geographic boundaries", in: *Patents, Citations, and Innovations: A Window on the Knowledge Economy*, Cambridge, Massachusetts, London, England: the MIT Press, pp. 179-199.

Kolpakidi A. and Prokhorov D. (2001). *Russia's Foreign Intelligence Service*, Moscow: Olma-Press.

Lamoreaux N. R. and Sokoloff K. L. (1996). "Long-term change in the organization of inventive activity", in: *Proceedings of the National Academy of Sciences of the United States of America*, doi: 10.1073/pnas.93.23.12686.

Lehrer M. and Asakawa K. (2004). "Pushing scientists into the marketplace: Promoting science entrepreneurship", *California Management Review*, Vol. 46, No. 3, pp. 55-76.

Levintov A. (2017). "Study of geographical research: Based on the publications of the annual sessions of the Economic and Geographic Section of the MARS)", in: *Multi-vector Development in the Russian Regions: Resources, Strategies and New Trends*, Moscow: I. I. Matushkina's Private Printing House, pp. 467-482.

May J. and Simmons C. (2001). *Every Business Needs an Angel: Getting The Money You Need To Make Your Business Grow*, New York: Crown Business.

Moe M. (2017). *The Global Silicon Valley Handbook: The Official Entrepreneur's Guide to the Hottest Startup Scenes From Around the Globe*, Grand Central Publishing.

Nikolova-Alexieva V. and Angelova M. (2018). "Developing a conceptual model of entrepreneurial culture", Scientific works of the Union of Scientists, Plovdiv. Series B: Natural Sciences and Humanities.

Polyan P. (1996). *The Victims of Two Dictatorships: Soviet Prisoners-of-War and Ostarbeiters in the Third Reich and Their Repatriation*, Moscow: VASH VYBOR TSYRZ.

"Prisoners at the communism construction sites: Gulag and power engineering facilities", *A Collection of Documents and Photos*, 2008, Moscow: ROSSPEN.

Readings B. (1996). *The University in Ruins*, Cambrigdge, Massachusetts: Harvard University Press.

Ritsert C. J. (2018). *Leading your Reseach Team in Science*, Cambridge University Press.

Sanchez Garcia J. C., Ward A., Hernandes B. and Florez J. L. (2017). *Entrepreneurship Education: State of the Art*, Salamanca: Universidad de Salamanca.

Sokolov M. and Titayev K. (2013). "Provincial and indigenous science", *Anthropological Forum*, Vol. 19, pp. 239-275.

Sudoplatov P. (1999). *Special Operations*: *Lubyanka and the Kremlin 1930 -1950*, Moscow: Olma-Press.

World Business Angels Investment Forum. Resource document. Accessed 2020.

Available online at: http://www.akirama.co.

Available online at: https://begemot.media/news/kak-nemtsy-podarili-sssr-atomnuyu-bombu/.

Available online at: https://en.wikipedia.org/wiki/Manfred_von_Ardenne.

Available online at: https://en.wikipedia.org/wiki/Helmut_Gr%C3%B6ttrup.

Available online at: https://zen.yandex.ru/media/map_mind/kolichestvo-nobelevskih-laureatov-po-stranam.