# Ways of modernization of Russian economy

*E.Ya. Volynets-Russet*

UDC 338 (470)
LBC 65
V-88

Solution of the tasks, set by the president D.A. Medvedev and Prime-Minister V.V. Putin, on modernization of industrial and agricultural production of economy is necessary as soon as possible. Transition to market relations in the Russian Federation led to collapse of science, industry, agriculture and training of personnel for their normal operation. The country, ad rem, turned into raw-exports appendage of industrially developed countries. The position is keeping on worsening. We would like to hope that the business would not run to irreversible consequences, when Russia turns to the country retarded from scientific and technical progress, actively used in the interests of industrially developed countries and their TNCs.

Possible ways of solution of the set problems on modernization of industry, meaning, first of all, manufacture of instruments of labour for production of means of production and commodities – machine and technical products, which is highly important, are considered in this article.

The level of social and economic development of world countries is determined not by the level of their research and development works (R&D), but by the level and quality of applied new and modernized instruments of labour and means of production in compliance with the latest achievements of global science and engineering, and issue of competitive products on the basis thereof with the use of the latest global achievements.

If we make schemes of the level and quality of the applied engineering, technology and materials [1] and the level of social and economic development of any country, then, with rare exception, these schemes will coincide [2]. Social and economic condition of any country directly and indirectly depends on the level and quality of equipment (instruments of labour and means of production), but not on the higher level

of conducted R&D. Only after industrial development and application, R&D results may affect social and economic conditions of countries, which depend on previously developed and improved instruments of labour, actually applied in industrial production, but not on R&D developed or under development, of course, before their industrial development and use.

Thus, paying special attention and investing significant capital into creation of large scientific centers, one should pay not less, but greater significance to modernization of applied instruments of labour, means of production and issued machine and technical products. At this, it is not important, weather the instruments of labour and means of production and use developed in this country or purchased in other countries are applied. It is important that instruments of labour and means of production being in compliance with the latest achievements of global science and technics, no matter if they were received from internal or external sources, are applied.

In this connection, one should not expect that newly established scientific centers involved in solution of prospective problems of science and engineering will be able to assist modernization of industrial and agricultural production today.

First of all, it would be reasonable for the government and businessmen to recreate industrial R&D institutes, such as ENIMS, tractor engineering, mechanic engineering, instrument engineering, etc., which in the USSR were directly engaged in creation of new and upgrade of existing instruments of labour, means of production and use in national economy of the country. Only they, on the basis of foreign achievements (there are still no Russian ones), will be able to develop, create, modernize and introduce the latest achievements of global science and engineering into industrial production and, within the short term, rejuvenate primary capital of the country.

Even if we start to believe in miracles, that engineering objects of the highest level and quality will be developed in the newly established research centers, it will be impossible to exploit them at Russian enterprises, using morally old and physically depreciated instruments of labour and means of production. In this case, without expectance of moral depreciation of created engineering objects, their exploitation will be possible only abroad at the enterprises of industrially developed countries, using instruments of labour and means of production in compliance with the latest achievements of global science and engineering with all outcoming consequences for the Russian Federation.

Bearing in mind the exceptional importance of solution of the considered problems, it is necessary to determine, what the term “modernization” of instruments of labour, machinery and equipment for production of means of production and commodities means. Economic encyclopedia determines the term “modernization” as “renewal of the object, its bringing in compliance with new requirements and standards, technical conditions, quality indicators. Primarily, machinery, equipment and technological processes go through modernization”. [3]

According to S.I. Ozhegov dictionary, "to modernize… (upgrade)… – By means of improvements to do (make) in compliance with modern requirements".[4] According to encyclopedic dictionary "modernization" means "laying of modern image to something, transformation in compliance with modern requirements, for example M. of equipment, allowing to increase its capacity"[5] In the Dictionary of foreign words "to modernize" (fr. moderniser / moderne) – to make modern, to change in accordance with the requirements of modernity by introduction of various improvements, for example., M. of equipment, technological processes" [6]

In most cases the word "modernization" (to "modernize") is understood in the Russian Federation and other countries in accordance with the above specified definitions. Without contradiction to such definitions, this article specifies the understanding of modernization of industrial production and objects of engineering in relation to instruments of labour and means of production, as well as modernized engineering products produced with their application.

In the present article, modernization of equipment does not mean single cases of modernization of engineering objects, but modernization as a constant and integral process performed in the countries at various stages of improvement of certain engineering objects, previously developed and applied in industrial production of world countries.

Modernization processes – improvements of known engineering objects and processes of creation of new, not known to the science and practice engineering objects - are implemented with the use of similar stages of improvement and creation of new engineering objects.

Principal difference between modernization and creation of equipment lies in the fact, that at modernization previously developed engineering objects are improved, for example: drilling, turning machine, steam engine, electrical saw, and at development – new, unknown to the science and engineering, objects, for example: Earth satellite, space ship, continuous steel casting on the basis of research of the Siberian department of the Academy of Sciences – hydrohammer, on new principles are created.

Modernization is possible only in relation to previously created objects of engineering, really existing and applied in world countries. Thus, machines with program control were developed and created in several countries, then they were sold on markets and industrially applied. Even before moral depreciation, their modernization and creation of similar machines for the same purposes, but more perfect and competitive, take place.

Later on, these machines are multiply modernized from generation to generation, till "eternity". Steam engine is being modernized till now. Thus, modernization is an integral process, and if it is interrupted for any reasons, then gradual moral and physical depreciation of applied instruments of labour and means of production starts to happen, which affects decelerating and terminating rates of science and technological progress and social and economic situation in countries, what is happening in modern Russia, with morally and physically depreciated equipment and issue of uncompetitive products.

As of today, there are no developed plans (projects), methods and methodology of modernization as a process in industrial agricultural production and other sectors in the Russian Federation.

The results of modernization will depend on determination of scientifically grounded methods of modernization of industrial and agricultural production and their realization: prospects of improvement of social and economic situation in Russia and return of the country to the number of industrially developed countries, applying instruments of labour and means of production in compliance with the latest achievements of global science and engineering and issuing competitive modern products in compliance with the global achievements.

The level of applied new equipment and technology lies in the basis of scientific and technical progress. Acceleration ratio of scientific and technical progress and economic, social, scientific and research effects to be achieved in the nearest and prospective periods, depends on their level (in relation to achievements of global science and practice).

The core problem of scientific and technical policy on acceleration of scientific and technical progress rates, complying with modern scientific and technical revolution, lies not only in provision of application of new equipment and technology in compliance with the latest achievements of global science and practice, but by means of creation of new and modernization of existing equipment to provide systematic and timely creation of the newest equipment and technology of further generations, which would take advantage over the best global achievements, or at least not to come short of them in terms of level and quality.

When choosing the most efficient variant of receipt of technology from multiple alternatives, it is necessary to consider the possibility of reproduction of the acquired new technology within the terms of its moral depreciation and creation of more perfect further generations on the basis thereof.

Acquisition of the newest technology may be provided both due to internal and due to external sources. The only internal source of acquisition of a new technology is its production with application of modern equipment on the basis of Russian R&D. International practice shows that they allow to develop and apply new technology in compliance with the latest global achievements, if in this field of science and engineering the country anticipates achievements of other countries, or if the production and conducted R&D are, at least, at the level of global achievements of science and engineering, industrially developed in other countries.

If the country lacks behind in the level and quality of R&D and applied new technology in certain directions of scientific and technical progress, as it happens in the Russian Federation, then the necessity in the newest technology is usually satisfied in the global practice due to external sources of acquisition of the latest achievements of global science and engineering, industrially developed abroad, with application of instruments of labour, means of production for manufacture of means of production and products

in compliance with the latest global achievements to which, first of all, the following relates:

- acquisition of enterprises abroad;
- creation of joint enterprises;
- lease of enterprises with further purchase or without it (leasing);
- turnkey construction of objects;
- import of package equipment;
- import of separate instruments of labour and means of production;
- procurement of licenses for inventions and know-how for production of instruments of labour, means of production and products in compliance with the latest global achievements.

Acquisition of enterprises, creation of joint enterprises, lease of enterprises and turnkey construction of enterprises abroad, as international policy shows, is economically efficient only upon condition that these enterprises are included into TNCs, otherwise their efficiency is problematic. Apart from this, their cost is enormously high and exceeds the cost of organization of such enterprises within the national borders of countries.

Significant cost of such enterprises at their organization in the Russian Federation in case of absence of sufficient funds does not allow their acquisition within the short terms, at least for partial number of enterprises in primary directions of scientific and technical progress.

Similar situation happens at procurement of package equipment, import and other foreign economic operations. At this, all specified types of equipment are protected by patents for inventions, useful models, industrial samples and know-how, kept in secret from reproduction or borrowing of them and their constituent parts without authorization of patent holders and owners of know-how, which at specified foreign economic operations do not provide authorizations for their reproduction. Thus, the acquirer receives modern new equipment for production and industrial use for a short term before its moral depreciation and, without rights to its modernizations by own forces, is doomed to underrun.

In order to liquidate the evolving underrun, the acquirer will have to purchase the equipment of the next generation modernized abroad again. And again, without the right of its reproduction and modernization. At this, underrun in this direction of scientific and technical process will gain constant nature and at application of specified foreign trade operations will become irreversible. Among all forms of foreign trade and other foreign economic and scientific and technical relations, only purchase of foreign licenses for production of industrially applied objects of equipment, in compliance with the global level, allows not only to eliminate the evolved underrun in such direction of scientific and technical process at minimum costs, but also, in the course of moral depreciation, together with the license seller or by own forces, to modernize these objects of equipment from generation to generation.

Apart from this, purchase of licenses allows to the licensee in future to excel achievements of the licensor and occupy leading positions in development and application of achievements of global science and engineering, acquired under the license. It is achieved by the fact that rights to inventions, know-how and other industrial property are provided only under licenses. Moreover, contracting parties, after systematic analysis from the level of license, exchange the received improvements of the subject matter of license, and the contracting party which offers more efficient improvements, occupies leading positions in development of modernized objects of equipment and their sale on external markets and under licenses to the third parties.

Scientifically grounded analysis of global theory and practice of liquidation of scientific and technical underrun in developed countries by means of modernization of the objects of engineering, and in developing ones – by means of industrialization - irrefutably evidences that purchase of foreign licenses for production of new and modernized equipment is the most economically efficient variant of liquidation of outlined or evolved underrun in this or that direction of scientific and technical progress at minimal capital investments and within short period of time.

This process became objectively relevant for all countries of the world. As soon as underrun from global achievements appears, which is impossible to eliminate from internal sources, foreign licenses are bought from the USA, Japan, Germany, France and other countries for the purpose of underrun liquidation and further occupation by the licensee of leading positions in this direction of scientific and technical progress. The latter is provided due to own or joint R&D with the licensor from the level of achievements, acquired under the license. Developing countries also actively use foreign licenses for the purpose of industrialization, expansion of export, replacement of import by own production under licenses and issue of modern competitive products in compliance with the latest achievements of global science and engineering.

In global economy, this process became relevant for all countries, both industrially developed and developing ones, and is applied under all directions of scientific and technical progress.

Application of foreign licenses for the purpose of recovery of industrial production at the level of global achievements and its modernization was first implemented in Japan, the experience of which is actively used by all countries of the world except for the Russian Federation and CIS countries.

As a result of World War II, at almost completely crashed industry, Japan within the period from 1950 to 1978 purchased form the US, England, Germany, France, Italy and other countries over 33853 licenses, purchasing over 1000-2000 licenses per year [7]. If in 1950 Japan fell behind the USA in its technical level, according to estimates of the Japanese and American media, for 20-30 years, then by 1960 – for 10-15 years. At this, its expenses for research were 100 times lower than those of the US. [8]

Analysis of 88 largest companies of Japan evidences that if they conducted their own R&D, refusing from purchase of licenses, they would have required about 4.3 years and 12.8 million dollars for performance of every theme. Japanese companies spent about 800 thousand dollars for purchase of licenses instead of own R&D, thus saving 12 million dollars for each theme. [9]

From the beginning of 1960's about 20-30 % of all new investments of Japan were related to procurement of foreign licenses, production under licenses increased by 72%, which affected high development rates of the Japanese economy, which were equal to 20-21% per year. [10] At this 72.8% of licenses were used in mechanic engineering, chemical and electrotechnical sectors of industrial production of Japan. [11]

The practice of international trade of licenses evidences that procurement of foreign licenses allows to receive significant savings on own R&D. Thus, Japanese company Toyo-Rayon spent 10 million dollars for the license for production of nylon from the American firm Dupon, whereas development of this process would cost 27 million dollars [12]. Thus, Toyo-Rayon managed to save on own R&D, at least, 17 million dollars, and appeared on the market with new products within the shortest period.

International practice confirms that purchase of licenses, instead of own R&D, allows to save significant investments in R&D.

According to estimates of All-Russian scientific market research institute, each dollar, spent for purchase of foreign licenses, according to its economic result, is equal to: In USA – 6.2; England – 3.1; France – 5.4; Japan – 16 dollars, invested in own R&D for achievement of similar result without considering time factor.[13]

Unfortunately, there is no data on economic effect, received in Japan from the earlier introduction into operation of new equipment, manufactured under the license, at consumers of license products, as well as the economic effect received in conjugated fields, technologically related to fields of licensees. [14]

Economic effect in the USA, Europe and other countries from the earlier application of modernized equipment, as well as in conjugated segments, was undoubtedly lower than from the purchase of foreign licenses in Japan. Procurement of foreign licenses by Japan practically didn't encumber currency budgets of companies and the country. Japanese entrepreneurs from 1950 to 1961 (for 10 years) spent 1 billion dollars for purchase of foreign licenses and equipment for their development, and received 2 billion dollars from export of products, produced on the basis of those licenses. [15]

By 1970 Japan had almost eliminated underrun from industrially developed countries, and in terms of conduction of research from the level of achievements, gained under licenses, pulled away at several directions of scientific and technical process, excelling achievements of its licensors.

Global practice of developed and developing countries irrefutably evidences that at outlining or evolving underrun in several directions of scientific and technical process, purchase of foreign licenses, which is realized at minimal investments and allows to start

local production of equipment in compliance with the latest global achievements within the shortest terms, is the most efficient economic instrument.

Scientifically grounded purchase of foreign licenses allows the licensees:

1) To eliminate underrun in this direction of scientific and technical progress and satisfy the demand of the country for its own equipment in compliance with the latest global achievements, competitive ones, with high demand at external and internal markets, within short terms.

2) Not to encumber currency budgets of licensing firms and the country, by compensating costs for procurement of foreign licenses by export of goods, produced under their basis, to the markets of countries provided for the licensees and protected with patents of licensors, and later on – by patents of licensees.

3) To refuse from import of products, relevant for the country, by import replacement by product manufacturing under licenses, which is more cost-efficient.

4) From the moment of procurement of license, together with the licensor or by their own, to start R&D from the level of equipment, acquired under the license, on its modernization and creation of further generations in this direction of scientific and technical progress.

5) To save significant amounts of investments in R&D due to their conduction from the level of global achievements, acquired under the license;

6) In cooperation with the licensor, upon mutual supply of parts for issue of license products, to lower their self-cost, and by increasing their export to the licensor to receive additional source of currency funds, by means of decreasing license payments.

7) To successfully compete at sales of license products, protected with patents of contracting parties in the countries provided for by the licensee.

8) To purchase licenses at insignificant capital investments, using economic tools of pricing for licenses. In most cases licensees pay for the licenses by the agreed interest from the price of produced, and what is more important, sold products. This interest varies in different branches, comprising in average 4-5% from the price of sold products, produced under the license, which corresponds to less than 1/3 of income, paid to the licensors, and more then 2/3 of income stays at the licensees.

When purchasing foreign licenses, licensees acquire a number of other privileges, securing efficient use of purchased scientific and technical achievements in compliance with the latest global achievements of science and engineering.

Purchase of licenses is usually realized at insignificant primary payments to the licensor, the economic meaning of which is to cover expenses of the licensor on conclusion of license agreement. Other payments will be made by the licensor from the income gained from sale of license products. This allows to the licensees to concentrate capital investments for industrial exploitation of new licenses.

Thus, all countries of the world, developed and under development, apart from the Russian Federation and CIS countries, taking part in active international exchange of

technologies, purchase of licenses and conduction of modernization on their basis, not only eliminate evolving underruns from global achievements, but also secure future leading positions in these or those directions of scientific and technical progress.

*Table 1*

***The largest payers of royalties and license payments for import of foreign licenses in 2008****

| *No* | *Countries* | *Payments (mln USD)* | *Share in %* |
|---|---|---|---|
| | Total – 14<br>Total with EU – 40 | 180303.84 | 100 |
| 1 | EU (27)* | 76435 | 42.39 |
| 2 | USA | 26615 | 14.8 |
| 3 | Japan | 18311.5 | 10.15 |
| 4 | Switzerland* | 11174 | 6.2 |
| 5 | Singapore | 9147.53 | 5.07 |
| 6 | Canada | 8647.96 | 4.8 |
| 7 | China | 10319.5 | 5.72 |
| 8 | South Korea | 5655.9 | 3.13 |
| 9 | Australia | 3026.25 | 1.67 |
| 10 | Russia* | 2806.13 | 1.55 |
| 11 | Thailand* | 2287 | 1.26 |
| 12 | Brazil | 2697.17 | 1.5 |
| 13 | Hong-Kong* | 1504 | 0.83 |
| 14 | South Africa | 1676.9 | 0.93 |

**Source:**

*Calculated in accordance with: Access mode: Note Based on information available to the Secretariat. For more information on asymmetries, see the Matadata. No 1, 4, 10, 11 and 13 – 2007.

Among 27 countries of the EU, that spent 76435 million dollars for purchase of licenses, over 50% – 39038.81 million dollars were spent by 5 countries: Great Britain, Germany, the Netherlands, France and Switzerland [16].

Balance of license trade of the EU is negative (import – 76435 million dollars, export – 59647 million dollars), as well as of absolutely most countries of the world.

It is negative in the Russian Federation as well (import – 2806.13 million dollars, export - 396 million dollars). Positive balance of license trade is traced only at leaders of international trade of licenses in the USA (export – 82614 million dollars, import – 25048 million dollars) and Japan (export – 23229 million dollars, import – 16678 million dollars). One should consider, that negative balance of license trade should not restrain from purchase of foreign licenses, because export of products, produced under the license, as a rule, is 2.5 times more that the costs for acquisition of licenses. Therefore, purchase of licenses almost does not encumber currency budgets of countries and licensees.

Thus, Russia purchases licenses 27 times less than EU, 9 times less than the USA, 6.5 times less than Japan, 4 times less than Germany and Switzerland, and 2 times less than South Korea. Russia acquires achievements of global science and engineering at the level of Brazil. Of course, we gave the dust to Hong-Kong and South Africa [17]. How can we speak of modernization in the Russian Federation?

In all countries of the world, especially in industrially developed ones, the primary economic instrument of international technological exchange – purchase of foreign licenses – is applied for the purpose of liquidation of evolved or evolving underrun from global achievements and modernization. An opposite picture is observed in the Russian Federation. This happens due to the incompetence of those, from whom it depends on and thanks to the backstairs influence against scientifically grounded modernization in Russia.

Themes related to international technological exchange under licenses are excluded from all technical, economic and legal institutions of higher education. At specialized department in the field of foreign economic relations – that may not happen due to incompetency. Articles against use of foreign scientific and technical achievements started to appear more and more often in scientific literature and media.

Thus, statements that "scenario of modernization of advantages on the basis of import technologies is extremely undesirable, because it contains a danger of creation of modern industrial production instead of self-developing high-tech complexes" are the most typical. [18] Or worse "…any import, including of technologies and innovations, means a loss for economic growth; policy of innovative borrowing significantly decreases the degree of freedom of economic policy…; import policy and borrowing of innovations dooms to strategic underrun, policy of production of own innovations gives a chance to economic and technological boost". [19]

If we adhere to these points of view, then USA, Japan, Germany and France, actively advancing beyond other countries by purchase of foreign technology and innovations on licenses, strive to detain their economic growth and doom their countries to strategic underrun.

Scientific theory and longstanding practice of international trade of innovation technologies undoubtedly disprove the said point of view and confirm that borrowing of foreign innovation technology for liquidation of outlining and evolved underrun in certain directions of scientific and technical process by means of purchase of licenses for the latest achievements of global science and engineering is one of the primary scientific and technical and economic tools, allowing not only to eliminate underrun, but to pull away in creation and application of the latest achievements of global science and engineering, where there was an underrun, by means of conduction of research from the level of borrowed technology.

Foreign and Russian experience shows that elimination of evolved underrun in development and application of new equipment, technology and materials by conduction of own R&D under the principles, developed by competitors, is almost impossible, moreover, if there is no scientific capacities at other principles of equipment operation, which happens very seldom. Thus, if foreign counties face an outline or real underrun in development of certain objects of engineering, technology or materials, they do not set a challenge to chase for the competitors that moved far ahead by conduction of own R&D, but they solve an issue, where they can get a license from within the shortest period, in order to eliminate the underrun and by means of conduction of investigations from its level, to overcome achievements of competitors, by occupying leading positions in development and application of modernized license equipment.

If within the nearest time no measures on conduction of scientifically grounded modernization are taken, then the underrun from achievements of global science and engineering and application of morally and physically depreciated instruments of labour and means of production may be irreversible.

**NOTES:**

1. Hereinafter “engineering” means equipment, technology and materials.
2. Volynets-Russet E.Ya. Commercial realization of inventions and know-how. Students book. – M.: Jurist, 1999. P.21
3. Economic encyclopedia. Edited by L.I. Abalkin. - M.: Ekonomika, 1999. P. 439
4. S.I. Ozhegov. Russian language dictionary. Edited by academician S.P. Obnorsky. - M.: State publishing house of foreign and national dictionaries, 1953. Issue 3, p. 316
5. Encyclopedic dictionary. -M.: State scientific publishing house BES. M., vol. 2, p. 403
6. Dictionary of foreign words. Russian language. - M., 1986, p. 318
7. Volynets-Russet E.Ya. Organization and technology of international license trade - M.: VAVT, 1984. P. 69
8. Ivanov I.D., Sergeev Yu.A. Patents and licenses in international economic relations- M.: International relations, 1966. P. 67

9. Karnaukh Yu.Ya. International license trade and its impact on the market of engineering and technical publications. BIKI, 1972, annex 9, p. 115

10. Gorodinky M.L. Licenses in foreign trade of the USSR. - M.: International relations, 1972, p. 14-15

11. Markushina V.I. International scientific and engineering relations in the system of modern capitalism - M.: Mysl, 1972, p. 87

12. Ivanov I.D., Sergeev Yu.A. Patents and licenses in international economic relations- M.: International relations, 1966, p. 63

13. A jump of Japan from other specified countries is probably explained by the fact, that estimation of R&D partially included costs for their industrial implementation.

14. Beshsnkovsky V.L., Sergeev Yu.A., Volynets-Russet E.Ya. Problems of detection of national economic effect from acquisition of license in associated sectors - M.: SIIIPII, 1971

15. E.Ya. Volynets-Russet. Planning and calculation of license acquisition efficiency. - M.: Ekonomika, 1973, p. 57

16. Calculated according to: access mode, 2008

17. Note Based on information available to the Secretariat, 2008

18. Lepchuk E.B., Vlaskin G.A. Investment aspects of innovative growth: Global experience and Russian prospects. M.: Publishing house “Librokom”, 2009, p.p. 202, 213

19. Ivanber V.V., Uzyanov M.N. Innovations as a primary source and indicator of qualitative growth of modern economy// (Monography) innovative way of development for new Russia – M.: Nauka, 2005. – pp. 241-242.