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# Conference «Peculiarities, problems and prospects of economic development of countries and regions in the East (Asia and North Africa)»: Technology and development session

The national conference of orientalist-economists "Peculiarties, problems and prospects of economic development of countries and regions in the East (Asia and North Africa)" was held in the Institute of Oriental studies 20 March 2017. The conference was subdivided into two sessions: technological and socio-economic.

Technological session was devoted to technology influence on economic development of Asian and North African states in the 21 century. The first issue in discussion was the role of high-tech technologies in the modern economy. All the speakers agree that these technologies have a significant positive impact on economic development. Presented reports show that impact both on developed and developing economies.

*O. Mosolova* (Institute of Oriental Studies, RAS) in her report ***The experience of Australia in science and technology policy*** says that the Australian government committed itself to developing the innovation culture, in particular, to ensuring the best possible development of the national and international information networks, to fostering creativity in all forms of research, as well as to maintaining cooperation between the university research and the industry.

Scientific development is funded both with federal grants and many research programs are coordinated by the Australian research and technology resources to ensure implementation of the general innovation, industrial, and research policies. These programs also purport to develop new products and technologies in various areas of manufacturing industry and in the service industry to ensure their more efficient deployment and enhancement of competitiveness of such products on the global market.

*N. Tsvetkova* (Institute of Oriental Studies, RAS) in her report ***Positive and negative effects of new labor saving technologies on economic development*** divides positive and negative effects of the new technologies. Positive effects of new labor saving technologies are quite obvious: in the first place, it is a significant productivity growth, which can increase value added produced in the country and its gross domestic product. After technological singularity is achieved, the growth can become explosive: the volume of production is said to increase twice every month! But the problem is: who gets the revenue, the profits from using robots – those who own robots or take them on lease. As a result, income distribution which is characterized by increased differentiation, with high Gini indexes, today may aggravate the situation, it may result in greater inequality.

Robotics is not a future forecast; it is the present already happening in some countries. The development of robotics, automation, artificial intellect, drones and additive technologies has greatly accelerated.

Asian countries are also involved in robotics development. The spread of robotics and automation may result in significant unemployment growth. According to Millennium Project (Turku School of Economics, the Turku University, Finland, 2015), in 2050 unemployment rate may reach 20–25 per cent in Europe and North America. These forecasts seem too optimistic already today.

The Project participants concluded that in case of unemployment guaranteed minimal income should be paid. Sources of Government incomes to ensure funding for paying guaranteed minimal income were proposed. They include such things as licensing and a tax on employed robots; a suggestion to impose Tobin tax on international financial transfers; to eliminate tax havens; to impose universal minimum corporate tax. The following occupations for the "idle" workforce were proposed: hobbies, national service or minimum annual public work, volunteers work, crowdsourcing, do-it-yourself movement. the importance of local economy has been also emphasized. It may mean the end of consumerism, mass consumption society with its demonstration effect and rapid change of models. But in this case, an aggregate demand which is a driver of economic growth would be reduced.

*A. Akimov* (Institute of Oriental Studies, RAS) in his report ***How Robotics Influences Economic Development of Asian and North African States: the Main Trends*** the author emphasizes the cumulative effect of different technologies' development for several decades that had resulted in a great number of enterprises and even industries which need very few personnel. The new reality greatly changes the existing social and economic relations.

Robotics is the most popular element of new labor-saving technologies but there are several other technologies that influence labor market in the same way. Among them are numerical control tools (NCT), artificial intelligence (AI), additive technologies, and also big production complexes in mining and bulk cargo transshipment. Besides, accustomed technologies that were revolutionary several decades ago now have become widely spread.

Thus, there are many technologies in modern economy that replace human hands, greatly increase productivity and quality of output, eliminating at the same time human mistakes.

It is evident that export oriented industrialization and catch-up development models are now under the threat since labor-saving technologies devaluate one of the main competitive advantages of developing countries – their cheap labor force. Catch-up development may turn to home market or to South-South cooperation.

At the same time Eastern Asia is becoming the manufacturing center that is not only competitive to Europe and the USA but surpasses them in important technologies.

New technologies need much funding and *L. Friedman (IAAS, MSU) and E. Imamkulieva (*Institute of Oriental Studies, RAS) presented a report ***Science in China in the 21st century (financial and economic resources).***

The research deals with the comparison of country groups based on two indicators: GDP per capita and percentage of expenditures on research and development (R&D) in GDP. The data are given for about 103 states and territories, for which statistical indicators were available. Despite the fact that in general the statistical data confirm the overall trend of increasing the allocations on R&D as GDP per capita grows, but it is shown that there is a multiplicity of cases of "exit" out of this overall trend. Among them are the two most heavily-populated countries of the world: China and India. And as a result these "exception countries" cover 40–50 per cent of the world population.

The authors insist that the analysis shows that the attempt to determine the optimal level of appropriations on R&D by arithmetic calculations way based on direct comparisons of such indicators as GDP per capita and of the share of expenditures on R&D as a percentage of GDP will be clearly oversimplified.

Such comparisons could be a meaningful cognitive tool but not a regulatory or, moreover, directorial instrument. The examples of China, India, South Korea but also Russia and, on the flip side, a specified group euphemistically termed as oil and gas countries – highlight this fact.

Such conclusions are backed by data devoted to the situation not only in the developing countries but also to the "upper-middle" and "lower-middle income" countries.

Over extended periods during the 1990s China was among the "low-income" countries. According to the classification of WB China entered the "lower-middle income" group in 1999 and stayed there till 2010 when it changed the group for "upper-middle income" group where it is listed now as well as Russia.

The example of China shows that the strategy of R&D accelerated development in conditions of high economic growth rates within 10–15 years may start even in the group of "lower-middle income" counties and implementation of this R&D strategy can provide a real breakthrough and lead to achievement of such indicators which are typical not for developing countries but for economically developed countries, for example, comparable with average indicators for Euro-zone states.

The other issue that was discussed at the technological section was middle level technologies' impact on economic development of Asian economies. The technology under examination was railroads.

*N. Zakharova and V. Khmelevskiy* (Plekhanov Russian University of Economics) in the report ***Potential Of Using High-Speed Railways Between Russia And China For Transportation Of Cargo*** insist that medium technologies as a concept are likely to exist for a long while, but types of these medium technologies have changed and will change under the influence of scientific progress. The definition of technology type (low, medium, high) is associated with the level of increment of new knowledge over a certain period of time. Therefore, technologies can be

transferred from one category to another and back during scientific progress as R&D activities progress and their results are implemented both within and outside transport industry. For example, creation of the high-speed cargo and passenger route between Moscow and Beijing can become the point of transition for this industry from the technological category of medium to high level. At the same time, curtailing programs of supersonic airliners and current minor innovations in the fields of energy efficiency and safety can shift passenger aircraft industry from the high-tech field to the medium one. In addition, nowadays medium technologies rarely change dramatically, but, rather, gradually evolve, primarily through the introduction of information and communication technologies.

High-speed railways can be compared with space programs, innovative private transportation projects (Hyperloop, unmanned vehicles). There is a reputation component in all such projects. In many ways, it depends on the level of competition between countries and companies. The prestige of such projects allows overcoming the rivals and offers ability to achieve certain political and economic goals, both internal and external. On the other hand, high-speed railways require billions of dollars in investments and they are created with a horizon of operation lasting for decades. At the same time, reputational advantages are more short-term, and their potential economic value is much lower than such huge costs. Also, at the current level of human development, the ideological and reputational components go into the background, and pragmatism is brought into the focus of most large-scale projects with the need for greater economic efficiency and necessity of a shorter payback period. In addition, the high-speed railways are not something completely new and unique. There have already been precedents, so the advantage of the "pioneer," which is one of the fundamental factors of prestige and reputation, has been lost.

*A. Sudyin* (Institute of Oriental Studies, RAS) in his report ***The Issue of Technical Progress Efficiency (Case Study of the North-South Transport Corridor)*** states that reciprocal influence between the technology and economy is a complex thing. It is rarely the case that development of technology should produce a direct economic effect, a comprehensive and systemic spirit of technological development is being crucial to ensure such an effect.

For instance, railway development fosters the economy only if such railways are efficiently used. To that end the entire railway system, not just some of its elements, would need a comprehensive development. The North-South Transport Corridor projected to stretch from Saint-Petersburg to Mumbai is a good example of such a case.

The agreement purporting to establish such a corridor was executed back in 2000. However, a gap existing between the railway networks of Russia and Azerbaijan, on the one side, and Iran, on the other side, significantly hampered the transit of goods due to a necessity to transship them through the Caspian ports. Large scale and effective transit of goods from Saint Petersburg to Bandar Abbas and by sea to Mumbai will become possible only after direct railway communication is established between Russia and Iran (via Azerbaijan).

The next issue of the session was energy and especially a competition between carbon and non-carbon energy in Arab countries and long-term fluctuation of energy prices.

*M. Borisov* (Institute of Orient Studies, Russian Academy of Sciences) in his report ***Orient in World Energy Progress*** said that the world energy is likely to emain carbon-based in the near future. But the difference in long-term energy prospects will persist between developed and developing countries. The energy of the former will have qualitative changes (especially renewable energy) rather than quantitative growth (that would be no longer needed). Energy intensive heavy industries in these countries are gone or are leaving the stage and per capita energy consumption is decreasing due to smaller energy use in transport and utilities. The population without growing numerically is improving its living standards and can afford to focus on the ecological component of progress. The developing countries are now living through industrialization period characterized by fast growth of energy consumption. Energy there will be used as a means to boost production. The cheapest and most effective of these means, carbon-based energy, can ensure large volumes of production.

There is no lack in fuel resources in the world which are vital for energy progress in industrializing countries. The current prices of carbon energy sources are unlikely to rise since a heavy restriction has appeared recently. It is the price of profitability of shale oil projects. An adequate rise in supplies from producers of unconventional energy carriers (with the capture of the corresponding market share) compensation in the form of the coordinated restriction of supply from the side of producers of conventional energy. This may be designed to raise the world prices. Such compensation will guarantee price stability essential for long-term development of carbon-based industry.

*L. Bocharova* (IAAS, MSU) in her report ***Arab World Without Oil: Potential And Perspectives Of Renewable Energy Development*** argues that the main drivers for RES development in the Middle Eastern and Northern African countries are: concentration of 45 per cent of global renewable energy potential in the region, the threat of global climate change because of CO2 emissions, limited availability of traditional hydro carbonates even in countries that possess considerable deposits of them. At the same time there are certain limiting factors for renewable energy development:

1. Relatively high generation costs. As of today, generation costs for RES-based energetic systems are higher, than for traditional ones. Yet, researchers argue than in the coming 10 years the world will enter the era of energy distribution parity: the costs of 1 Kw/h of "green" energy for end users will roughly be the same as that of traditionally generated energy. Investment in the RES-energy can be attracted by means of tax subsidies for generating companies and equipment producers; grants for capacity costs reduction of power plants construction and feed-in tariffs introduction. Such policies are already in effect in several Arab countries.

2. Absence of cheap technology for energy storage. The main problem is cyclical nature of generation (energy is generated only when an energy source is

present). Solutions to this problem are actively sought today. One possible way is reserving traditional generation capacities in distribution network storages (pump-storage HPPs already exist in a number of Arab countries), and in the middle-term prospective – new technologies for industrial storage (ultra-high capacity accumulators and superconductors). It should also be noted that costs of RES technologies drops at rather a quick pace. Several Arab countries could make use of them in a middle-tern (until 2030) or long-term (until 2050) perspective.

Today Arab countries have set ambitious "green" energy infrastructure introduction and localization goals. Morocco plans to generate 42 per cent of energy from alternative sources by 2020. Oil-exporting countries plan to "accelerate" by 2030. Algeria plans to generate 40 per cent of energy from alternative sources, leaving behind Saudi Arabia (30 per cent) and Qatar (30 per cent). Several stimulation tools are being developed to make those ambitious goals a reality: governmental subsidies, grants, special term loans, provision or resources for R&D. National funds and private companies with governmental support are being set up.

*L. Rudenko* (Institute of Orient Studies, Russian Academy of Sciences) in her report ***The issues facing the power sector in the Arab countries*** considers that one of the key challenges that face governments in the Middle East and North Africa is meeting the growing power requirements. Demand for electricity is increasing at a rapid rate as the Arab countries throughout the region experience significant population and industrial growth over last three decades.

The power experts estimate that an increase of about 50 per cent on the current installed capacity will be required by 2020 to meet the demand. To achieve this ambitious target the Arab countries are going to build new thermal power plants and will expand existing ones using natural gas and oil as their fuel.

However, at the heart of many of the regional power-capacity-building programs is renewable energy as the Arab governments are looking to diversify their power generation feedstock to reduce reliance on hydrocarbons and boost energy security. In addition, the falling price of renewable technology has made this resource more cost-competitive with conventional hydrocarbon-burning facilities.

With export oil revenues declining over the last two years the Arab governments are forced to scale back investment allocations in power sector, that's why they have decided to give a serious push to independent power projects as a priority for the coming years.

Meanwhile, in spite of the heavy promotion of solar and wind power and the launch of some nuclear power schemes in the region, hydrocarbon-burning plants will still account for the majority (about 75–80 per cent) of electricity generation for some time to come.

*E. Rastyannikova* (Institute of Oriental Studies RAS) in her report ***Supercycle in the commodity market*** presents a theory of cycles in the stock market – specifically the waves of the world market prices of commodities. Today, interest in Elliott wave arose because of the high volatility of world oil prices. Ralph Elliott

created this theory in the 30s of the twentieth century. He reviewed the 80-year period of changes in oil prices and found the existence of eight waves: five of them belong to bullish trend (growth) and three to bearish trend (decline). Eight waves together constitute the full market cycle.

Elliott's waves are well studied in a retrospective analysis, but they are conditionally showing cyclic fluctuations of the stock market in the future. Therefore, the predictions using this theory are rather difficult. However, in periods of terrible fluctuations in commodity markets, economists are still trying to apply the theory of Elliot to predictions. Jeffrey Kennedy, a contemporary analyst of financial market offers on the basis of Elliott's wave to build a thirty-year commodity super-cycle. In his interpretation, the super-cycle has a phase of rising prices, which lasts about ten years, and the phase of decline, which lasts for twenty years. It is assumed that the last commodity super-cycle began in the world economy in the early 2000-ies about due to rapid development of China and some other developing countries such as BRICS. Many analysts were talking about the end of the elevation phase of this super-cycle retrospectively analyzing the dynamics of prices for oil and metals in 2013. If you refine the oil, it may be noted that after a decade of growth (1998–2008) began a price fall, which, in accordance with the theory, should now last until 2025–2028. But, as was mentioned above, to accurately predict the movement of these cycles is impossible.

The last issue discussed at the technological session was devoted to technology in agriculture and food security.

*I. Deryugina*, (Institute of Oriental studies RAS) in her report ***Twenty-first century. Innovative approaches to the development of agriculture in the Asian countries*** insists that in the second decade of the 21st century international agricultural organizations, including FAO, have understood that approaches to innovative development of agriculture in the countries of the East are fundamentally different from scientific developments in the West.

Further development of «green revolution» technologies will cause the destruction of agricultural ecological system in Asian countries. The influence of contamination of soil, water and air on people's lives is manifested at present. We discussed what effects fertilizers, pesticides exert on the status of drinking water and as a consequence on human health. Conference on water resources of India in 2014 stated that increased use of mineral fertilizers, pesticides in India and other countries would continue anyway.

The green revolution made the great contribution to providing the food security in developing countries and to the reduction of the undernourished population. However, the reduction in the proportion of undernourished people amounted to 33 per cent, and the absolute number of undernourished decreased by only 13 per cent from 1990 to 2014 according to FAO estimates. The demand for grain will increase in the minimum estimate by 45 per cent from 2014 to 2050.

FAO proposed a model of sustainable development for agriculture «Save and Grow». «Save and Grow» farming systems are based on five complementary components and their related practices:

- *Conservation agriculture*, through minimal soil disturbance, the use of surface mulches and crop rotation, and the integrated production of crops, trees and animals;
- *Healthy soil*, through integrated soil nutrition management, which enhances crop growth, bolsters stress tolerance and promotes higher input-use efficiency;
- *Improved crops and varieties* adapted to smallholder farming systems, with high yield potential, resistance to biotic and abiotic stresses and higher nutritional quality;
- *Efficient water management* that obtains 'more crop per drop', improves labor and energy-use efficiency, and helps reduce agricultural water pollution; and
- *Integrated pest management* based on good farming practices, more resistant varieties, natural enemies, and judicious use of relatively safer pesticides when necessary.

All changes must be adapted to the smallest farm and based on new generation technologies. In particular, agroecological technologies, green employment, small-scale mechanization, new crops and varieties, innovative fertilizers.

*G. Smirnova* (Institute of Oriental Studies, Russian Academy of Science) in her report ***The Republic of Sudan is trying to solve the problem of food security within the framework of the Comprehensive Africa Agricultural Development Program (CAADP)*** says that after the separation of the South and the loss of the bulk of the proceeds from oil export the Government of the Republic of Sudan proclaimed that the main objective of the economic policy is development of agriculture. However, for this, first of all, it is necessary to change the social basis of the agrarian system, the system of traditional forms of land ownership and land use, to modernize the technical base of agriculture. The Emergency Rescue Plan for the Economy for 2012–2014was developed, as well as under the guidance of the IMF – the Strategic Development Plan for 2012–2017. Within the framework of these programs, the Government of the Republic of Sudan has identified a number of priority areas for intensifying agricultural production. In the first place, this is the provision of all-round support to investors by the state, including giving them the rights to manage economic assets on the land and creating favorable conditions for this. Special attention was paid to achieving food security trough the inclusion of newly cultivated land in circulation, the expansion of areas under wheat, sorghum, as well as by introducing new technologies and increasing the yield of food crops. The state intends to render all-round support to small peasant farms on their own and leased land, which will keep them dominant in agriculture and this would require creating conditions for introducing new crops into the market circulation.

For this it is necessary to provide farmers with new technologies, mineral fertilizers, selective seeds, plant protection products, cheap loans, etc. It is necessary to increase the investments in agriculture to fulfil the set goals. However, in the conditions of a tense financial and economic situation, Sudan is not able to do this. Therefore, the Government of the Republic of Sudan seeks to attract investments in the agricultural sector from other countries – China and the BRICS countries.

Sudanese agriculture remains traditional in the selection of crops, but a number of them have high-value characteristics, and with proper care their output could be increased substantially, supporting the serious demand in the world market. The small-scale Arabian monarchies strive to expand their food fund by supplying agrarian products from the neighboring country and are able to dramatically increase investments and to raise the technological and managerial level of local production. Without this it is absolutely impossible to raise the level of the competiveness of Sudan's agricultural production, which practically only survives, except for the cotton and gum Arab products.

*Z. Solovieva* (Institute of Oriental Studies, Russian Academy of Science) in her report ***Technological progress and environmental degradation in North Africa*** argues that technological progress and economic growth may have positive and negative effects on the environment. The degradation of environment is caused by combination of natural and anthropogenic factors. Actually anthropogenic factors are prevailing.

Urbanization, population growth, rising living standards, growing industries put greater pressure on natural resources, especially on land and water.

Arid and semi-arid areas prevailing in the Arab region are highly vulnerable to climate warming caused by the growing emissions of CO2. In North Africa average surface temperatures have increased by 1–2 degrees since 1970-s. The increase of temperature is coupled with decreases in precipitation and higher evaporation. These changes lead to more variability and extreme weather occurrences (droughts and floods).

Fragile agro-ecosystems prone to degradation are typical to North Africa. Land resources are under high anthropogenic pressure, they face aridity (related to shortage in water) and desertification. Desertification is primarily the result of mismanagement of land system; it relates to salinization, soil erosion, loss of soil structure and organic content. Excessive and incorrect use of fertilizers and pesticides may lead to soil and surface and groundwater pollution.

Irrigation in the dry Arab region is crucial for the development of agriculture. But the efficiency of irrigation is low because of substantial water losses through evaporation. The volume of existing storage reservoirs is declining due to sedimentation.

Already scarce water resources are overexploited. Deep groundwater extraction has increased because of great improvements in drilling methods; it results in rapid deterioration of aquifer's water reserves and decline in groundwater levels.

So, technological progress in some cases may create increased pressure on the environment and cause pollution and environmental degradation.

The summary annual costs of environment degradation are about 3 per cent of GDP in Tunisia, 4 per cent of GDP in Algeria and Morocco.

On the other hand, technological progress is the only way to resist environmental degradation. The adaptation of agriculture to weather-related risks, the reduction of drought's effects requires shifting to conservation or no-tillage agriculture, which contributes to conservation of soil structure, its higher organic content and better quality of groundwater. It consists in the set of farming practices (usage of special technologies and equipment, certified seeds of productive varieties tolerant to drought, crop rotation). Improving the efficiency of irrigation means reducing water losses by use of sprinkler and drip irrigation.

New technologies of non-conventional water resources treatment such as desalination, treatment of wastewater and irrigation drainage water may become a partial solution to water deficit.

It must be noticed that all these measures are highly expensive and require voluminous financial investments coupled with the development of new skills and technologies.