Public Administration and Innovation Policy in a Networked Society

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Abstract*: *In modern conditions of global transformations and the growth of crisis phenomena in the global economy, the question of finding and developing alternative economic models becomes urgent. As a tool for stimulating economic development and a new source of growth, innovations and the results of scientific and technological activities were chosen. This approach was theoretically developed and described at the beginning of the last century, but it has become in demand only now. The development of the innovative sector of the economy leads to the emergence of qualitatively new technologies and is non-linear. The complexity of management objects, the dynamism of innovative processes, which, in turn, transform the economy, markets, institutions, are growing. Changing management objects require new scientific theories, management technologies and tools. In this article, the author analyzes modern economic and technological trends, identifies the main scientific theories that describe these processes, identifies trends in changes in management sciences. The article discusses the classification of models of innovative development, outlines the main directions of changes in the state management of innovative development and innovative infrastructure. Based on the study, the systematic changes in the role of the state in building an innovative economy are systematized, the emerging formats of managerial structures and the institutions for the development of innovative infrastructure are described.

Keywords* : *Innovations, Innovation Policy, Networked Society, Public Administration.

I. INTRODUCTION

Crisis phenomena in the world economic system in the new century tend to increase their manifestations, increase in duration, and to structural complexity. The issues of overcoming them are considered on the agendas at various international summits, forums and conferences. A general slowdown in economic growth, stagnating indicators of the economies of developed countries, imbalances between different sectors of the economic system are forcing the world community to look for alternative development models. The main direction for breaking negative trends and resuming growth was the development of innovation. This is largely due to the fact that innovation in technology is being capitalized at an accelerated pace, growth in these sectors of the economy is measured in ten-digit numbers, they significantly affect the quality and speed of economic growth in general, and increase labor productivity. Therefore, building an innovative economy has become a priority for many developed and developing countries. But it is impossible to choose the path of innovative development in isolation from the rest of the system, in which external and internal trends can significantly affect the desired scenarios.

Scientific and technological progress, the stages of the creation and dissemination of innovations, as is now universally recognized, develop unevenly in time, they are characterized by a characteristic of cyclicity. The consequence (and/or reason) of this process are cyclical fluctuations in economic activity - the alternation of the stages of growth and growth in periods of decline and crises. Such macro-oscillations of the economic system at the beginning of the last century were discovered and described by N. Kondratiev [1]. According to his economic theory of cycles ("Kondratiev's theory of long waves"), the economic system at this historical stage is at the downward stage of a long wave, which is characterized by low market conditions, a decline in economic activity, prolonged stagnation in traditional sectors of the economy, and failures in financial system in view of the crisis of institutions, forms, organizations and methods of functioning of this system. The way out of such negative trends, in accordance with the innovative theory of economic development of J. Schumpeter [2], which substantially supplemented Kondratyev's theoretical studies, is scientific and technological innovation - the main driving force of economic development, which "demolishes" old technologies, organizational structures, industries, markets and create new ones, as a result of which new dynamics are set for economic growth. The idea of overcoming crises only through innovation is supported by G. Mensch [3,4]. According to scientists [5-7], this period of recession and "depression" of the long economic wave will continue until approximately 2018–2020. At the same time, new technologies will emerge, which will then "accelerate" economic development. The evolution of the innovation process, as mentioned earlier, is also a cyclic process of replacing some technologies with others, but their change is complex and structural - through the emergence of a new "core" of technologies, which are the foundation for further scientific and technological development. This process is described in most detail in the theory of technological

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structures (TS) - complexes and aggregates of technologies, processes and relationships, which includes the entire cycle of reproduction of innovations. Studies within the framework of this scientific school show direct relationships between long economic waves and the process of technology change.From the set of technologies of the new way of life, it becomes clear that the gradual diffusion of these innovations and developments will strongly affect such economic factors and indicators as labor productivity, energy and resource efficiency of production, the structure of employment, GDP growth, etc. The predicted predominance of intellectual work over physical work, the replacement of the biological environment of a person with a technological one (depending on life support technologies, medical technologies, safety, etc.) will lead to the outstripping development of the services sector, including information. Previously, it was by the criterion of the degree of development of this sector of the economy that countries were divided into post-industrial, transition countries and industrial countries. However, crisis phenomena were also observed in post-industrial countries, which showed the insufficiency of certain proportions between sectors of the economy, traditional real production is also necessary, but on different, promising technological principles. The proliferation of technologies for flexible production systems, production automation, 3D printing, the development of electric, automated manned vehicles, the improvement of logistics technologies for cargo transportation management, etc. should lead to the release of a large number of people employed in traditional sectors of the economy and, in theory, to stimulate the change of physical labor on the intellectual. Theoretical descriptions of new world-system realities, formats of society's life activity were synthesized into the concept of post-industrial society. A detailed economic study of new theories has led to the emergence of such approaches as “knowledge economy” [8, 9], “innovative economy” [2, 10], “information economy” [11], “smart economy” [12] etc. In essence, these are attempts to describe economic processes during the phase transition of society to new forms of existence, including, in many respects, due to scientific and technological progress. In the new economy, according to these theories, intangible factors in technology and development, in the value of a business (for example, goodwill (goodwill), become decisive. The value of knowledge and information as a new factor of production is increasing, fundamental research is becoming decisive in the strategy of state innovation policy, they are trying to quantify and capitalize on intellectual capital. With the new employment structure, information services, and the services sector as a whole, will dominate the structure of the economy. Human capital is becoming a central development factor, and quality of life is becoming a fundamental priority. However, new economic formats, which are becoming more widespread over time, and the non-linearity, complexity and acceleration of the pace of technological changes and innovation cycles set new requirements for public administration and control.

II. PUBLIC ADMINISTRATION AND INNOVATION POLICY IN A NETWORKED SOCIETY

A. Differences between business and public sector innovation

The main differences between innovations in business and the public sector are related to incentives and benefits from innovations, with mechanisms for identifying and developing successful innovations, as well as curtailing unsuccessful attempts in this area at minimal cost.

In the business sector, the incentives for innovation and the benefits of their successful implementation are immediately apparent in the form of higher profits. The success of innovation is determined by competition in the market. Innovation is an entrepreneurial activity that is fraught with serious risks and a high probability of failure. The market quickly eliminates unsuccessful innovations before too many resources are spent on their implementation. And the market directs these resources to successful innovations, expressed in the form of higher profits or in the future of their receipt. Thus, the market allows us to transform successful innovations into large projects that serve a large number of consumers and provide employment for many employees.

In the public sector, incentives and benefits tend to be much less prominent. Public goods and services are usually provided free of charge or, in extreme cases, on a cost-recovery basis. Moreover, the reason why some goods and services are best provided by the government rather than the business sector is because the market will not undertake to provide them. As a result, innovations in the public sector do not generate higher returns. Therefore, other mechanisms are needed to encourage and reward innovation in the public sector.

In addition, in the business sector, the risk of failure is generally perceived as an integral part of the innovation process and is an essential element in the process of finding successful innovations. This risk is acceptable because private investors deliberately risk their personal wealth in pursuit of personal gain.

The public sector, by contrast, has a much lesser inclination to take risks and put up with setbacks. Often constitutional, legal and political barriers are set up to limit the risk of failure, which is well-founded: in the public sector, public servants deal with taxpayer money. Thus, ethical and regulatory considerations may inhibit the participation of public servants in innovation, or "state-owned internal business." Therefore, other mechanisms must be used to identify successful innovations.

In addition, while the amount of resources to which a business gains access is determined by profit and the expectation to receive it, in the public sector budgets and, therefore, access to resources are usually more determined by costs or needs. Thus, unlike the business sector, successful innovators in the public sector cannot automatically rely on rewards in the form of large budgets and large amounts of resources. Therefore, other mechanisms are needed in the public sector to channel resources to successful innovations and stimulate their diffusion.

B. The current state and models of state management of the development of innovative infrastructure

The development of management technologies should occur (and is) at the same accelerated pace as economic and technological. This is due to the fact that the complexity of the control object must correspond to the complexity of the control subject, otherwise risks and threats will only increase. If the subject is simpler in structure and functions, then the tendencies of chaotization, unsystematicity, delay, inefficiency of managerial actions are growing. The time lag of decision-making is increasing, the available information is "already" reality, and does not reflect its characteristics, it is impossible to exercise control. This is true for political, and for economic, and for social systems. However, with the transition of science to a new stage of development - post-non-classical rationality [13], the basic paradigms and models of innovative development are replaced (see Table 1), and in accordance with them, managerial models, approaches, and tools also evolve.

Table- I: Basic methodological aspects of innovative development models

Type of scientific rationality	The basic paradigm of innovation development management	Basic management objects	Time periods	Technological structure	Innovation development models
Classic	Subject – Object	Complex systems	1920s – 1960s	4 TU	Linear model Functional model
Non-classical	Subject – Subject	Active systems communications	1970s – 2000s	5TU - 6TU	Non-linear model (including NIS)
Postclassical	Subject - polysubjective environment	Self-developing environments	Present	6TU - 7TU	Self-developing innovative environments

New managerial approaches to innovative development cover not only institutions and objects of innovative activity, communication and communication between them, but also include such elements and areas as education, culture, values and ethics in administrative objects. These factors form the environment for the development of innovations, so there is a need to manage such specific objects (not always material).

Let us outline the main directions of changes in the state management of innovation infrastructure (AI) and innovative development: change of managerial functions and tools, new management institutes and new development institutions.

The basic model of the subjective environment for innovation was the following: "the state (strategic contours of the formed innovation system, the creation of infrastructure and the necessary conditions for the development of scientific and technical progress) - business (expresses the interests of society, works to meet the needs of society, the main investor for research and technological development) - society (functions of control over power)". That is, the state creates the institutional framework and conditions, business "fills" the existing system with money, personnel, production and scientific equipment, the society makes demand and monitors the effectiveness of the system. However, changes in technologies, markets, industries, global and local competition, volatility of the environment, increasing risks and threats - all this leads to a "adhesion" of the functions of the state, society and business.

Innovation policy includes scientific and technical, and industrial, and financial, and educational, and social policies, and issues of resource allocation. Complex hierarchical state structures cannot effectively cope with the solution of all assigned tasks. Therefore, there is a tendency for the emergence of common communication platforms, management institutions for the state, business and society. Separate areas of development are science and education - the increased attention of developed countries to the development of human capital contributed to the transition of these areas of public policy from objects of management to the subjects of management. The growing competition of countries in the field of innovation and the limits of the geographical expansion of markets lead to new geo-economic formats of competition - cultural. The demand and nomenclature of new digital products is limited by the cultural and linguistic framework of consumers, so the cultural sphere is becoming a new field of economic competition. Thus, the basis of innovation policy is not laid down by the consensus of the roles of the state, business and society, but by the environment of interactions and communications of all subjects of innovation infrastructure, and their subordination to certain strategic national goals (Fig. 1).

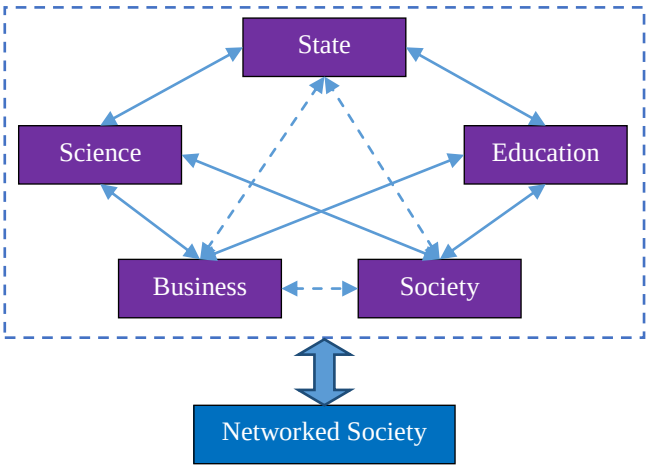

Fig. 1. Scheme of interaction of innovation infrastructure entities

Goal setting (setting goals and setting goals) and strategy, determining technological and scientific priorities have always been the functions of the state to develop a national innovation policy. However, development institutions, innovative infrastructure facilities were created out of system as "centers" for creating innovative activity. Now, under the strategic priorities of state policy, priority scientific directions, specific institutes of innovative infrastructure are built up on a project and purposefully –

technology parks, business

incubators, technology centers, research laboratories, etc. That is, the institutions of innovative infrastructure are used by the state not just as an instrument for the development of a separate economic sector, but as part general national policies, including national security, and the development of economic sectors, and building innovative ionic economy. The functions of financing (grants, subsidies, state orders, benefits, tax instruments, etc.) and creating conditions for the effective functioning of the subjects of innovation policy (legislative support, standardization, staffing, security, technical infrastructure) remain with the state.

Forecasting (scientific, technological, social, macroeconomic, etc.) and planning (expertise, technology ecology, operational statistical service, indicative planning) are added to the above functions as mandatory. Given the specifics of innovations, the state, within the framework of the forecasting function, needs to not only highlight existing trends in scientific and technological progress and determine the priorities of national scientific and technological development, but also anticipate the emergence of new markets for emerging innovations ("technological waves") and create them in the global economic space. An example of such a policy is Finland, which created infrastructure and enterprises under the wave of demand for mobile devices and communications, or Israel, which anticipated the massive demand for UAVs, and was one of the first to create a production and patent environment for these technologies.

Following changes in managerial functions, increasing complexity of management structures, new development institutions and elements of innovative infrastructure appear.

In the new innovation economy, all phases of the innovation cycle from independent functioning pass into a system of constant interactions, communications and synchronizations. The role of basic research is increasing - in connection with the simplification of the establishment of applied development processes, with an increase in requests for qualitatively new technologies, with the ability to capitalize the value of fundamental scientific research and knowledge. The increasing complexity and transdisciplinarity of new technologies, the non-linearity of innovation cycles (Fig. 2) require not separate functional institutions, but integral, synergistic, combining many functions - providing material and technical conditions, financing, expertise, consulting, and assistance in entering commercial markets at various levels, demand assessment, patenting, etc.

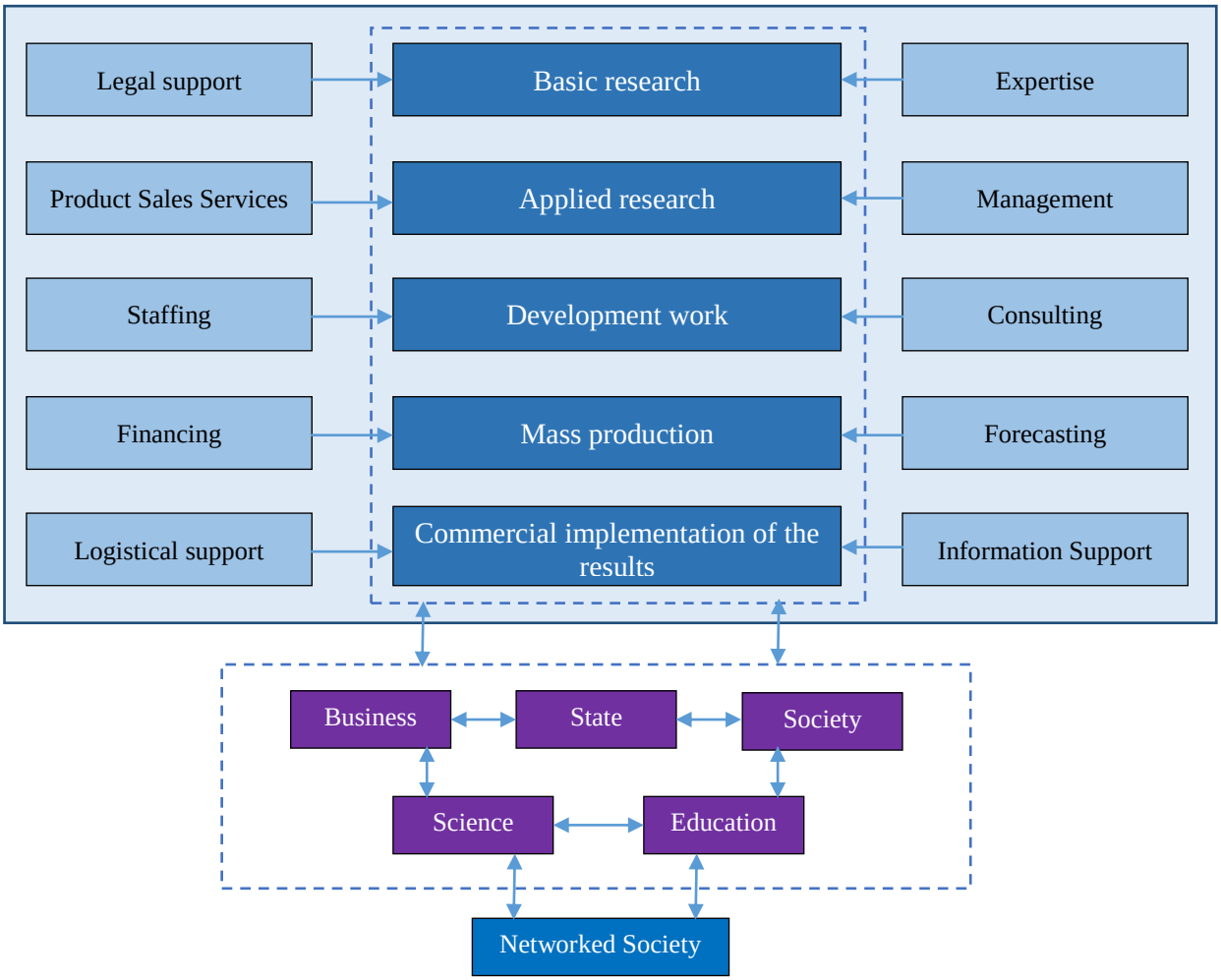

Fig. 2.The environment of functioning of modern innovation cycles

That is, all phases — from development and research to the commercialization and consulting support of finished technologies, firms, markets, are "turnkey".

State and science communication institutes are modern analogues of state scientific centers created to implement breakthrough directions, which are formulated in documents such as Innovation Development Strategies, Socio-Economic

Development, National Security, etc. Cognitive Centers are institutions that monitor trends and discoveries of fundamental science, identify new priority markets for the long term.

Institutions of interaction between the state, business and society for the formation of personnel policy - Centers for innovative education, combining leading departments of universities, research centers and laboratories, institutes of the Academy of Sciences, technology business, specialized departments and ministries. They form a general educational and personnel policy for the priorities of the state innovation policy, for the current and future needs of business and society. They train specialists, both engineering and managerial in the field of innovation.

Institutions of interaction between the state, business and society for planning and organizing promising market formats are global technology clusters. Based on expert forecasting networks, promising technology markets are calculated. According to new waves of demand, large cluster formations are being built - areas for the development of priority technologies with special business conditions, the necessary production elements are built in, the necessary business structures are involved, educational and scientific centers are organized for specific specific innovative tasks. That is, the transition to the market pull innovation development model.

C. Best practices and recommendations public administration and innovation policy in a networked society

Based on this disclaimer, the following best practices and recommendations can be usefully applied to guide policy in this area (Fig. 3).

III. RESULT AND DISCUSSION

The institutes for the interaction of the business of science and universities are research and production consortia [10-13]. These are associations of enterprises of the real sector of the economy with scientific and educational organizations for the implementation of joint production and innovation programs, “the implementation of priority scientific and technological projects and the creation of basic platform technological solutions and supply chains that fulfill operational and tactical tasks of replacing high-tech imports and determine the global competitiveness of the economy in the medium and long term”.

There are a number of other models for organizing innovative infrastructure (for example, “innovative supermarkets”), other AI institutes (engineering centers, high technology centers, etc.), but the variability of this environment, the constant creation of new institutions is difficult to track. However, almost all models for building innovative infrastructures and creating new institutions correspond to the indicated trends in the development of the theory and methodology of innovative economies and modern management tools.

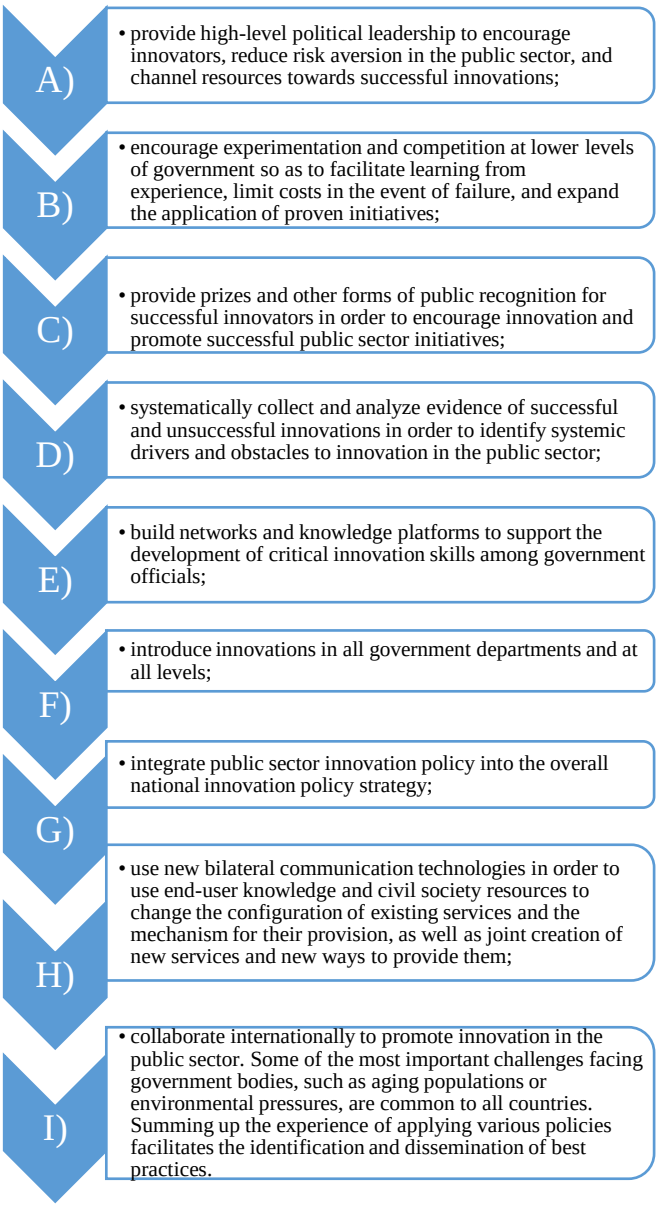

Fig. 3.Best practices and recommendations public administration and innovation policy in a networked society.

IV. CONCLUSION

Innovation in the public sector is still a relatively new area, and the evidence base for policy assessment and policy making remains limited. More work needs to be done to measure the impact of innovation policies in the public sector and to learn how best to promote it and how to overcome existing obstacles. Network society will develop faster and faster every year, the current trend proves this (Fig. 4).

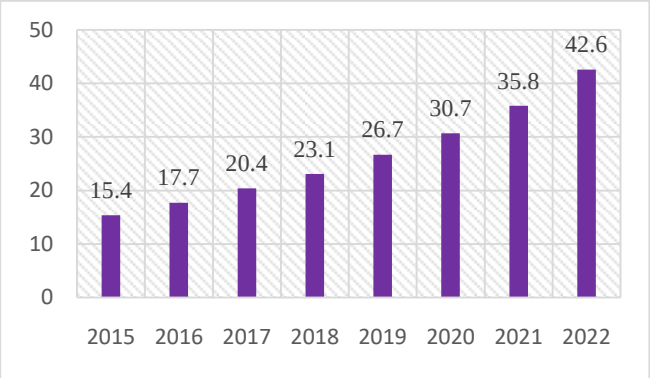

Fig. 4.Development trend networked society (2015 to 2022)

In the foreseeable future, all societies are doomed to use the information society services in one way or another. Reconstructing public relations on the path to creating a network society must be mindful of its challenges and challenges.

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