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Management of Innovative Costs of Public Administration Institutions

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Abstract*: The growth of costs for innovation, as well as the growing role of public administration institutions, makes us take a fresh look at the cost management system. The article discusses the key point of the innovation cost management system at different levels of administration. Public administration institutions contribute to the implementation of innovation in the framework of both its own economic strategy and taking into account the strategy of higher governing bodies. The interaction and cooperation of various management structures within the framework of the implementation of a single innovative project can create an excessive expenditure of financial resources, which is why the issue of competent management of innovative costs becomes so significant. On a specific innovation project, possible problems in the interaction of various public administration institutions are considered, when planning and implementing a joint innovation project.

***Keywords*: Innovative Costs, Innovation Project, Financial Resources, Public Administration Institutions**

I. INTRODUCTION

The issue of costs of innovation has always been one of the main and complex issues in a number of economic studies. It is indisputable that innovations are necessary almost always and everywhere, in any field of activity, in order to maintain and improve competitive advantages, it is necessary to constantly search and find ways both for introducing new technologies and for optimizing existing ones.

The development of digital technology has spurred the emergence of new high-tech products, innovative services and even activities[1-3]. Scientific and technological progress accelerated, and the life cycle of goods began to shrink, something that was new just yesterday, tomorrow may become obsolete technology.

At the same time, the costs of research activities are constantly growing, new technologies require huge investments for their development and implementation, which is why the issue of cost management is extremely acute.

Traditionally, the role of public administration institutions has been to create a favorable innovative climate, thanks to which scientific progress has been stimulated. In addition, the state authorities were entrusted with the task of forming a legal framework for the implementation of innovative activities [4-5].

Since the institutions of public authority exist at different levels of the hierarchy, the tasks of regulating the innovation sphere are being solved at different levels [6].

The task of state authorities is to solve global issues, such as: choosing a strategy for the development of innovative activity, determining methods of stimulating innovative activity on a state scale, sources of filling the fund for financing research, legislation on innovation, etc. At the same time, local governments often solve more practical problems, for example, the regional administration can deal with the introduction of innovative technologies in the administrative system of the administration, solve the problems of introducing energy-saving technologies, determine the policy of supporting innovative enterprises and venture funds [7].

The distribution of tasks, the delegation of authority, and the involvement of various structures, necessitates the development of a clear mechanism for monitoring and managing costs. It is no secret that the costs of innovation can make up a significant part of the total costs of production, and given the fact that at the state level it is strategically important to create basic innovations, the economic return on implementation, which may not come soon, it is impossible to do without a reliable cost control mechanism.

II. METHODOLOGY DESCRIPTION

First of all, it is necessary to determine where the public authorities will receive funds to support or implement innovative activities. Fig 1. shows what is attributed to the sources of financing innovation.

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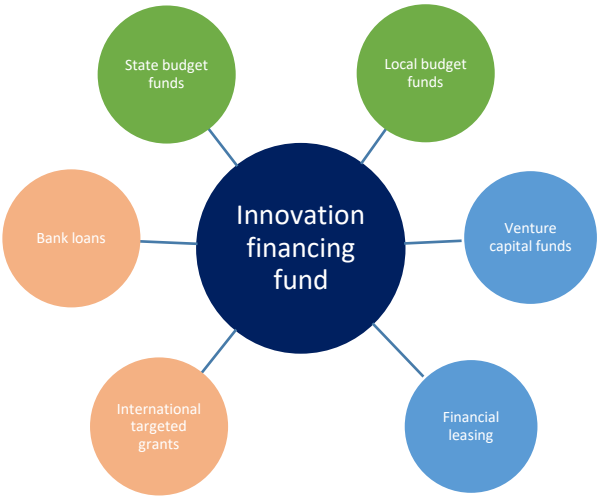

Fig. 1.Source of financing innovation [8].

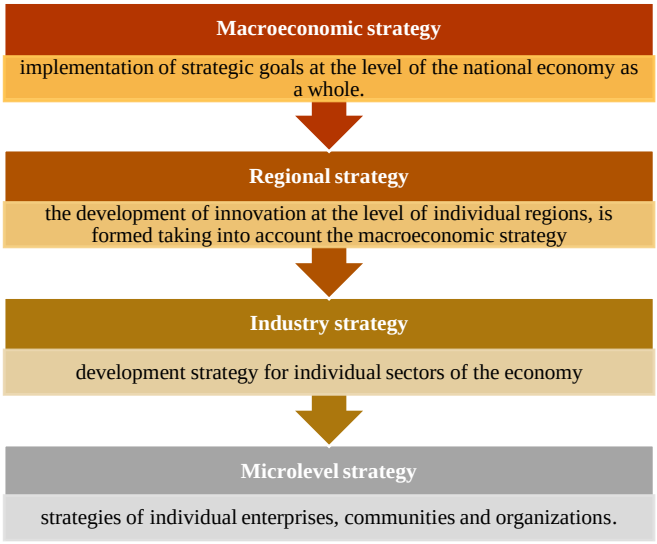

Fig. 2.Hierarchy of innovative strategies [10-11].

It would be a mistake to consider that within the framework of the task of creating conditions for innovation, the main task of the state is to interest enterprises in creating innovations. In a market economy, competition, enterprises are well aware of the need for innovative developments [9]. Therefore, the task of the state is precisely to create a favorable climate in which innovation will not put an unbearable burden on the budget of enterprises.

One of the key points to keep in mind is that innovation does not exist by itself, it is always part of the socio-economic development strategy of a state, region or an individual enterprise. It is within the framework of an economic strategy that defines the main parameters of innovation, and, accordingly, the costs of it.

Given the hierarchy of institutions of public administration, innovation development strategies can be divided into four levels: macro level, regional level, industry level and micro level.

Macroeconomic strategy is associated with the implementation of strategic goals at the level of the national economy as a whole. Tasks solved at the macro level: the creation of legal standards for conducting innovative activities, the definition and implementation of state scientific and technical priorities, the creation of conditions for innovative entrepreneurial activity.

Regional strategy implies the creation of a vector for the development of innovative activity at the level of individual regions, while strategies of this level are formed taking into account the macroeconomic strategy of the state, but taking into account local characteristics and priorities.

Industry strategy determines the conduct of innovation and development priorities for individual sectors of the economy; these strategies are formed both at the level of ministries and enterprise associations.

Micro-level strategy, this type includes strategies of individual enterprises, communities and organizations.

Management of innovation costs implies a planning stage in which the costs of developing innovations and the costs of introducing them should be divided. Depending on the nature of innovation, the share of these costs can vary greatly, when adapting existing innovative technologies to the needs of a particular organization, the bulk of the costs will be at the implementation stage, while basic research will be at the development stage.

When planning costs, various methods of calculating them are used, among which one can distinguish: normative, parametric, direct calculation, and the analogue method. Naturally, the choice of a particular calculation method is purely individual for each specific innovation process.

The normative method, as the name implies, is based on the use of various norms and standards that can be set per unit of the volume of work, products, per unit of time or any resource. The method itself provides for a breakdown of the innovation project into more specific stages and processes.

The parametric method is based on determining the amount of costs based on the set values of the parameters of the innovative object and cost standards per unit parameter. This method can be used to calculate the costs of designing and manufacturing facilities or the full range of innovative works.

The direct counting method means that a cost calculation is made for each element of the innovation object, for each operation for each cost component.

The essence of the method of analogues is to use data on costs for previously completed projects, similar to the planned one. To the costs of the analogue, correction factors can be applied, which increase the cost (cheaper) of new works.

The cost management system in the innovation process should provide the ability to objectively assess the optimal level of costs, while the size of the costs depends on certain factors (Fig. 3).

The degree of radicalization of innovation	• creation of basic (radical) innovations involves a higher level of costs • improving and modifying innovations are several orders of magnitude less costly.
The scale of the tasks	• the innovation process can affect both one enterprise, a city, and an entire branch of the economy. • the task of innovation can be both the modernization of an existing product, and the creation of a fundamentally new technology
Time factor	• time becomes a key factor in the creation and implementation of most innovative projects, the timing can vary from weeks, months, or several years; • as the duration increases, risks associated with changes in the political or economic situation both in the country and in the world exert their influence
Degree of innovation activity	• the costs are affected by the degree of use of available resources, intellectual experience and experience.
Tariff and price changes	• costs change with fluctuations in the value of resources, both material and non-material, used in the process of creating innovations; • the value of costs also has an increase in inflation
Cost Management System Efficiency	• inefficient system of control over the expenditure of resources makes the process of creating innovations more expensive; • the ability to predict, plan and control costs, one of the key factors in reducing the cost of innovation

Fig. 3.Factors affecting the size of costs in the innovation proces.

Knowledge of the structural features of regional innovation potential is necessary to determine the degree of readiness and the availability of specific resources for the implementation of innovative activities of public administration institutions.

To assess the innovative potential of the basic formula can serve as the formula:

$$P = \frac{P_r}{P_{max}} \quad (1)$$

where P – is the calculated indicator;

P_r – indicator value in the evaluated region;

P_{max} – the maximum value among all regions.

In order to analyze the structure of regional innovative potential, a system of subindexes is introduced:

$$P_i = \frac{(P_{pr}+P_{fe}+P_{ia}+P_{inf})}{4} \quad (2)$$

$$P_i = \left[\frac{\Sigma_i^{n=1}(\frac{P_{pr}}{P_{PR}})}{n} + \frac{\Sigma_i^{n=1}(\frac{P_{fe}}{P_{FE}})}{n} + \frac{\Sigma_i^{n=1}(\frac{P_{ia}}{P_{IA}})}{n} + \frac{\Sigma_i^{n=1}(\frac{P_{inf}}{P_{INF}})}{n}\right]/4 \quad (3)$$

where P_I – is the innovative potential of the region;

P_{pr} – the personnel potential of the region;

P_{PR} – indicators characterizing personnel potential;

P_{fe} – the financial and economic potential of the region;

P_{FE}– indicators characterizing the financial and economic potential;

P_{ia} – level of innovation activity in the region;

P_{IA}– indicators characterizing the level of innovation activity;

R_{inf}– the development of innovative infrastructure in the region;

R_{INF}– indicators characterizing the development of innovative infrastructure;

n – is the number of indicators characterizing a particular potential of the region.

In each region, one or another group of indicators predominates in the total innovative potential. Therefore, depending on the dominant group of available resources, all regions can be classified as:

An effective and high-quality management of innovation costs requires an algorithm of actions that will allow you to plan and control the expenditure of resources, including financial and labor, in the implementation of innovative activities.

The innovation cost management algorithm is graphically presented in Fig. 4.

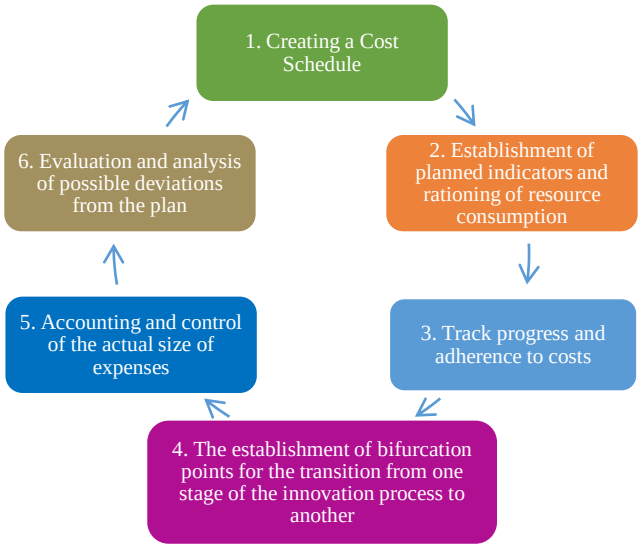

Fig. 4.The innovation cost management algorithm.

III. EXPERIMENT

An example of introducing innovative technologies at the level of the city administration as an institution of public administration will be used as the basis for the experiment.

The prerequisites for the implementation of the innovation project are the modernization of the city's energy system in order to reduce its dependence on fossil fuels.

The object of the experiment is an innovative project for the creation of a solar power plant and high-capacity storage batteries "Green Sun".

The state of the energy system prior to the implementation of the project is the city's power supply is provided by the Severnaya TPP thermal power station, with an average capacity of 25 MW and a thermal capacity of 25 Gcal / h, the main energy source is coal, and the auxiliary energy is peat briquettes. This power plant was launched in 1951, and has undergone modernization twice since its launch: the first time in 1970, in order to realize the possibility of using peat as an auxiliary energy source (with a drop in heat capacity to 23 Gcal / h), the second time in 1982, in order to modernize equipment. At the same time, the city consumes 45 MW and the missing part of the electricity is purchased from the regional IES "ElectroGas-7", a 350 MW natural gas condensing power plant.

The purchase price ranges from 0.13 to 0.18 $ per 1 kW.

The essence of the project is the creation of the “Green Sun” solar power station.

The issue of modernizing the energy network in this project has long been ripe, although the total capacity of Severnaya TPP and IES ElectroGaz-7 was enough to meet urban needs, however, it was considered more expedient to redirect part of the involved capacities to other cities in the region where the energy deficit was expressed brighter.

In the initial version, the city administration, together with the leadership of the Severnaya CHPP, considered a third modernization project by creating an additional power unit with the latest boilers, which would make it possible to increase electricity generation to 45 MW and thermal energy to 35 Gcal / h. This version of the project was called "Northern Modern". At the same time, the costs of modernization amounted to $ 20 million, it was planned that some of these funds would be covered from the local budget (20%), part from the state budget (10%), and trust funds for financing the energy sector (5%) would also be involved. Nevertheless, this option suggested that the enterprise itself would take the bulk of the costs (65%), and would provide it through loans from commercial banks. This option turned out to be incapable, because, firstly, the unprofitable CHPP existing at the expense of state subsidies could not count on such significant credit funds, and in addition, the energy used was coal, which belonged to the category of activities for which banks did not issue loans.

The revision of the Northern Modern project, and further negotiations allowed the reallocation of costs as follows (Table I).

Table- I: Innovative costs

Amount	Source	Share
1 600 000	trust funds	8%
3 600 000	state budget	18%
4 400 000	commercial bank loan	22%
5 400 000	local budget	27%
5 000 000	oblast budget	25%
20 000 000		

At the stage of expert assessment, it was recognized that this option the project will lead to cost overruns in both the city and the region. In addition, an increase in the capacity of thermal power plants led to an increase in coal consumption from 10.5 tons per day to 18.5 tons. Also, public project hearings showed that the population is extremely negative about the alleged increase in emissions and environmental degradation.

Attempts to reduce emissions by installing additional filter units increased maintenance costs by $ 210,000 per year:

CHP "Severnaya"		
electric power	25	MW
thermal power	25	Gcal / hour
coal per day at 1 MW	10,3	tons
just a year	93 988	tons
the cost of 1 ton of coal	80	$
just a year	7 519 000	$
number of staff	40	ppl
average monthly salary	4 000	$
total salary per year	1 920 000	$
profitability per year	6 500 000	$
expenses per year	10 439 000	$

CHP "Severnaya Modern"		
electric power	45	MW
thermal power	35	Gcal / hour
coal per day at 1 MW	18,5	tons
just a year	168 813	tons
cost of 1t. coal	80	$
just a year	13 505 000	$
number of staff	55	ppl
average monthly salary	4 000	$
total salary per year	2 640 000	$
modernization costs	20 000 000	$
profitability per year	7 900 000	$
expenses per year	17 165 000	$

That is why the development of a new project was initiated with the assistance of a number of international and private funds contributing to the increase in the use of renewable energy sources.

When developing a new project, a number of factors were taken into account:

• the project was based on environmentally friendly technologies for generating electric power, which means access to soft bank loans and funds from specialized international funds has appeared;

• a number of technologies for the implementation of the new project were transferred by international organizations in the field of promoting the development of green electricity;

• the scale of the project made it possible to use a number of production capacities of the region that were not in demand in the previous version due to the non-core nature of the work;

• the new project was aimed at creating a new innovative facility, rather than upgrading the existing one, which increased the interest of industry energy associations;

• a significant reduction in dependence on fossil fuels.

Of course, in addition to positive factors, the new project also had negative aspects:

• a significantly increased volume of investments for its implementation, from $ 20 million to $ 45-53 million;

• in spite of the innovative nature of the project, the capacities of state scientific and technical organizations were not involved in its implementation;

• The main suppliers of most of the equipment were not local companies, but foreign firms and funds.

• the inability of solar energy to provide a continuous and uniform supply of electricity, in connection with this the need to use additional third-party capacities during peak hours

The project itself was developed in two versions, the first envisaged the construction of the Green Sun solar power plant using photovoltaic and a planned capacity of 50 MW.

The second option provided the opportunity to level out one of the drawbacks of the project - a decrease in power in the evening, when the load on the power grid reaches its peak. In this option, it was planned to install additional batteries to save SES to save electricity and the ability to use them during peak hours, the capacity of additional batteries was 20 MW, and increased the cost of the project to $ 53 million:

SES "Green Sun"		
number of modules	190 000	pieces
footprint	90	hectare
electric power	50	MW
number of staff	15	people
average monthly salary	4 000	$
total salary per year	720 000	$
creation costs	45 000 000	$
profitability per year	8 500 000	$
expenses per year	1 020 000	$
payback for	4,73	years
SES "Green SunPlus"		
number of drives	200	pieces
additional area	2	hectare
drive power	20	MW
additional creation costs	7 000 000	$
payback for	5,57	years

Despite the obvious advantages of the second option, the key factor was still the cost of the project, so the first option was chosen, without storage and with the preservation of purchases on the regional electricity market (but in much smaller amounts):

Amount	Source	Share
12 600 000	international funds	28%
4 500 000	the state budget	10%
2 250 000	trust funds	5%
8 100 000	local budget	18%
5 400 000	oblast budget	12%
12 150 000	EBRD loan	27%
	45 000 000	

IV. RESULTS ANALYSIS

Although it seems that the load on the local budget has grown significantly from $ 5.4 million to $ 8.1 million, in fact, it should be borne in mind that now the budget has no costs for the purchase of coal, which amounted to more than $ 7.5 million in year.

The implementation of this project will be the first step in modernizing the energy network of the whole region. The load on the regional IES "ElectroGas-7", which means the released capacity will be redistributed to other consumers. In addition, the gained experience and technologies will allow implementing similar projects in other cities, which will significantly reduce energy shortages and dependence on fossil fuels. After the completion of projects, the regional IES will act as an energy hub, the task of which will be to cover peak loads, thus eliminating the need for additional costs for the creation of storage batteries.

A competent approach to managing the costs of all involved public authorities has allowed to save a significant amount of financial resources in this project, as well as to avoid misuse of funds for an unprofitable project.

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