

*Doctor of Economics, corresponding member in NAAS, manager of programs for scientific researches at the Institute of innovative providing at NAAS*

## MODEL FOR INNOVATIVE DEVELOPMENT OF AGRARIAN SCIENCE ON EXAMPLE OF NAAS SYSTEM

**Problem statement.** Ukraine chooses European way of development, which anticipates the transition of economics to the innovative model. Agrarian sector with reason is considered to be a locomotive of national economics, thus, innovative transformations in agro-industrial business are of crucial importance in exit of Ukraine from the situation of economical crisis.

Agrarian science is the basis for competitiveness of agro-industrial complex. The modern policy, directed to improve the efficiency of agrarian economics, to modernize the infrastructure and to attract investments into basic sectors of agro-industrial complex, anticipates outrunning the development of scientific technical and innovative agrarian sphere.

The search for efficient model for development of agrarian science requires determining the place and role of its academic, educational, market sectors, as well as foreign intellectual centers, which are represented in Ukraine.

**Analysis of recent researches and publications.** The works by the following foreign scientists are devoted to problems on study of peculiarities in innovative processes, theoretical and methodological fundamentals of innovative activity, in particular, I. Ansoff [18], R. Braille [22], E. Deming [19], P. Drucker [20], M. Porter [21], D. Russell [23], A.A. Thompson [24], etc. The issues about transition of economics to innovative model for development were considered by foreign and national scientists, in particular, V.M. Geyets [4], V.Yu. Gryga [5], S.M. Illiashenko [9], A. Levytskyy [11], B.M. Malitskyy [13]. The issue about formation of innovative approaches for development of AIC was described in works by Vytvytska [1], O.I.

Datsiia [6], M.M. Ilchuk [14], L.I. Kurylo [10], Yu.O. Lupenko [12], P.T. Sabluka [16], O.G. Shpykuliaka [17], etc. The researches by the Institute of innovative providing are devoted to scientific methodological and organizational economical principles for innovative development of agrarian science under market conditions [2; 8]. However, the insufficient attention is paid to the problem on reformation of national agrarian science system and establishment of efficient system for scientific provision of innovative development in Ukraine.

**Goal setting.** The goal of research is to seek for the efficient model for innovative development of agrarian science, which would provide with improvement in competitiveness of agrarian economics, modernization of its infrastructure, involvement of investments into basic sectors of AIC.

### **Presentation of the research main material**

#### **Grounding the model base**

*Academic science does not stand the economical competition.* The system of academic agrarian science, being the last one at post-Soviet space, makes the attempts to adapt to certain challenges by old methods, not dividing the scientific and economical part of its activity, not being engaged into consolidation of own economical base. Such approach has resulted in liquidation of economical complexes at academies in all CIS countries, the same situation may happen with experimental production base of Ukrainian agrarian science.

The academic system was built and has still been working due to post-Soviet system for creation of new knowledge, which has very significant importance for development of agro-industrial complex but mainly performs the humanitarian function. Modern science influences on scientific technical process in economics, including agrarian one, through economical component of knowledge, i.e. in the form of intangible assets of scientific technical achievements, which have the commercial value and tangible assets of science intensive production. It is high time to reinforce the system of agrarian science, especially its academic sector at the expense of efficient economical activity of scientific institutions and their experimental production base under competitive market conditions [3]. The main indices shall

become the volume of money receipts from sales of science intensive products at predicted prime cost of scientific research and experimental production process.

*The only way out is the transition to innovative Model for development.* It is necessary to make the cardinal scientific organizational transformations [7] and to transfer to the Model for innovative development of NAAS, which implementation program was developed and prepared for realization at Academy by the Institute of innovative providing at NAAS.

But there are many obstacles along the way of innovative transformations; most of them are the internal factors, the result from imperfection and conservatism of managerial system at academic agrarian science.

*Problems that prevent from development of NAAS.*

- Presidium as a management body of establishments and enterprises that are under jurisdiction of NAAS requires the radical changes that would strengthen the economical base of Academy as a scientific production association of economic entities. Presidium of Academy due to status and practice of many years was not established to manage the scientific production structure due to the type of economical association. Making many efforts to keep the positions in scientific sphere, the preservation of scientific schools, staff, experimental base, NAAS loses in economical relations in real sector of agrarian economics.

- Obsolete system for production mainly of new knowledge at SRE due to capitation scheme for financing of researches does not motivate to create innovations. It was proved that innovative activity, unlike scientific one, is entrepreneurial activity. Thus, the results from scientific activity in the form of new knowledge do not always correspond to requirements for formation of innovative products on their basis, which are needed to the market.

- Insufficient concentration and specialization of branch-specific scientific production base reduces its competitiveness in innovative provision of agro-industrial production. Not always grounded administrative decisions and market challenges have significantly injured the academic system for recent 10-15 years. The dispersion of researches, duplication, indetermination of branch-specific priorities have resulted

in weakening the positions of academic science in competitive agrarian market. As a result – partial loss of influence on development of traditional segments in agro-industrial production, and in some, especially modern high technology ones – full loss in comparison with foreign technologies and their providers.

- The network of regional establishments and enterprises, engaged into transfer of scientific achievements and innovations, has been destroyed; the system of their efficient territorial management is absent. The important bridge in cooperation of science and production was the previously developed system of seed growing, pedigree sector, and other applied scientific production networks, which provided with the state regulation of branch-specific and regional needs in science intensive products. At present moment the academic network of research stations and farms does not cover the production structure, which has been formed during the period after reforms. Lost niches are occupied by competitors, who perform the expansions in agro-technological market under own conditions. The state loses the control over the process that threatens to national food security.

- The network of experimental production base has mainly lost the contact with science; the material technical park has become obsolete, the dependence on entrepreneurial structures-contractors (so-called “investors”) prevails in most enterprises. One of the main factors in destruction of network is the loss of contacts with scientific institutions by some enterprises. Inefficient management, including due to “instructions” by Presidential Administration, has led to worsening in conditions of technological base, some enterprises are under bankruptcy. The centralization of research farms has released the directors of scientific institutions from responsibility for efficiency in use of experimental production base. There appeared the temptation “additionally to trade” the land and property complex of Academy through its transfer to business structures (so-called “investors”) under preferential conditions. The result is known – the indebtedness of research farms as of 01.01.2014 was UAH 1 billion, this “result” during recent 4 years was annually increased by UAH 200-300 millions.

•It is impossible to involve the capital for development of scientific research base without legalization of business structures and regulation of their activity within the network of NAAS. The lost material and technical base of agrarian science cannot be restored: state establishments and enterprises may be developed only at the expense of state funds, which are absent and are not anticipated. The expectation on the state private partnership will succeed only when the system of agrarian science would establish the appropriate own innovative entrepreneurial network, being able to defend the interests of scientific institutions and experimental base in relations with creditors, suppliers, contractors, processing enterprises and other entities in agrarian market.

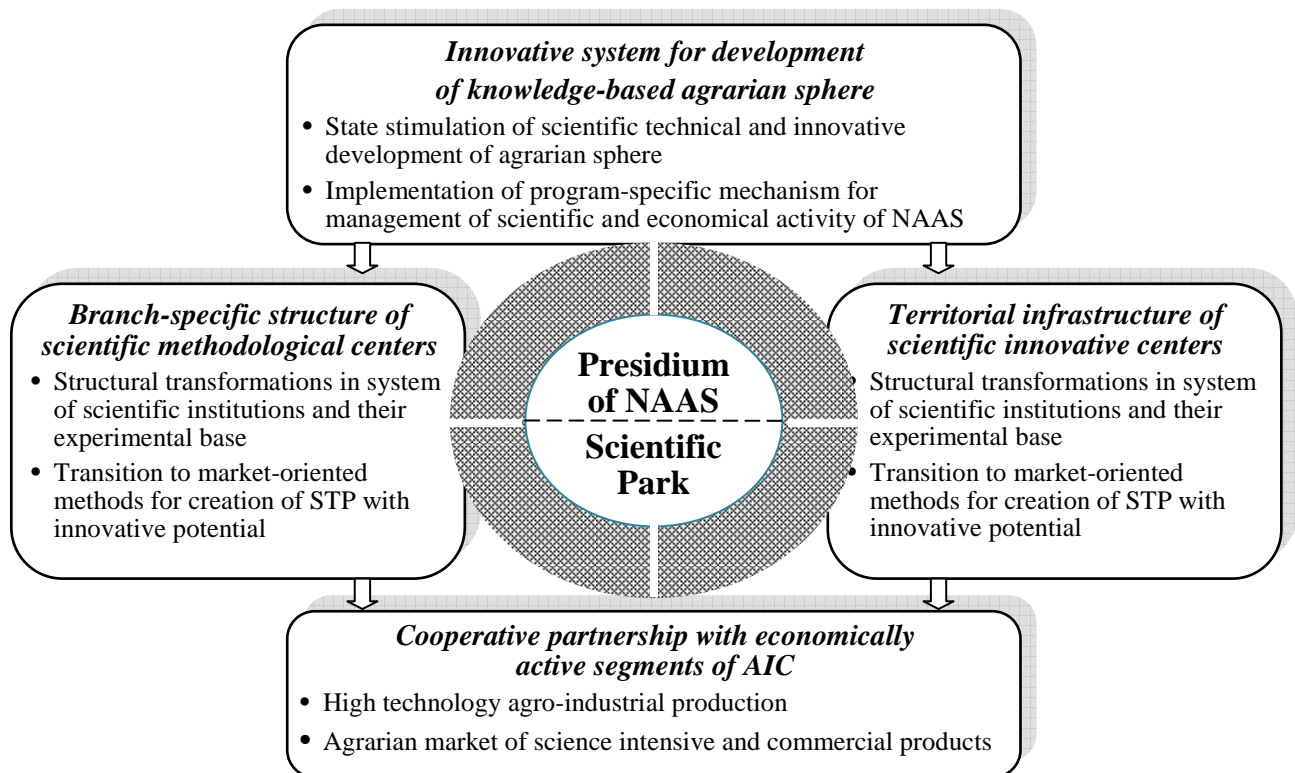
*Ways for development of NAAS.* The Conceptual principles and the Model for scientific organizational and innovative investment development of NAAS was developed and approved in order to improve the efficiency in system of agrarian science [15].

The mechanism for implementation of Model that includes grounding the scenarios for organization of management, technical economical analysis, action plan for transformations, program for economical development of NAAS, assessment of conditions and perspectives for development of scientific production base at NAAS, regulatory provisions for regulation of activity by division on scientific provision of innovative development, its coordination and regional scientific innovative centers, management of scientific, innovative, investment, production projects within the network of centers of territorially branched division and in cooperation with the network of branch-specific divisions was prepared in order to implement the project into the system of Academy.

The Model takes into consideration NAAS peculiarities for combination of functions on coordination of fundamental and applied researches in agrarian sphere with the function on test polygon of scientific technical and innovative achievements that provide with high technology development of agrarian production. The Model anticipates the concentration of scientific potential in powerful branch-specific scientific methodological centers, and it is suggested to set the transfer technological

function on promotion of innovations to agrarian market to scientific innovative centers, united into infrastructure platform of NAAS Scientific Park.

The Model for scientific organizational transformations and innovative investment development of NAAS (Fig. 1) provides with development of agrarian science in new economical conditions through improvement of its management system, creation of market-oriented scientific technical products and improvement of their competitiveness at the expense of innovative investment development of experimental production base.



**Fig. 1. Model for innovative development of agrarian science**

*Source: developed by author.*

As it is known, a model is a simplified copy of original, which reproduces its most significant peculiarities. The suggested Model for innovative development of NAAS is based on the following organizational components:

- Approval of economical platform for efficient management of NAAS system;
- Improvement of scientific research structure at NAAS on the base of branch-specific scientific methodological centers;

- Formation of transfer technological infrastructure at NAAS on the base of territorial scientific innovative centers;

- Creation of Scientific Park to implement cluster projects for innovative investment development in AIC.

The emasculation of any component or ignorance of requirements for its application in the Model levels the effect from implementation of model events, misrepresents the results. One of the most dangerous threats for “failure” of the model is the amateurish or negative prejudiced approach to consideration and implementation of the Model that results in imitation of reforms already for many years but does not change the economical organizational imperfection of system. Hindering the reforms may cause to fatal consequences for NAAS.

### **Approval of economical platform for efficient management of NAAS system**

Table 1 shows the issues, set to strengthen the economical component in functioning and development of academic system.

*Table 1*

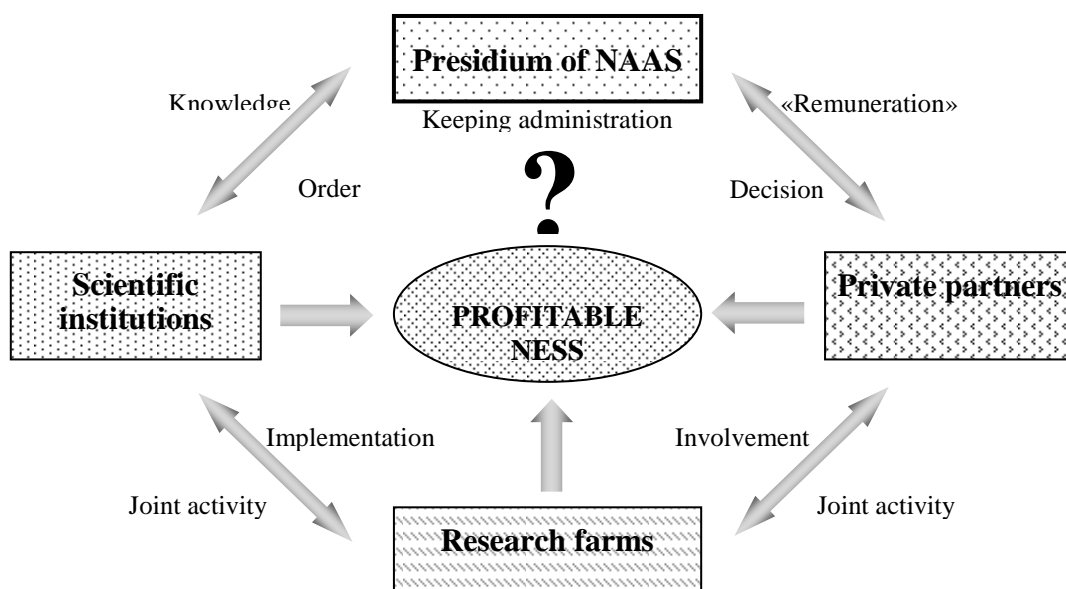
### **Issues, set to strengthen the economical component in functioning and development of academic system**

Goal	Implementation of economical legal principles for function of NAAS system as an economical scientific production association
Task	<p><i>To ground and to suggest the efficient Model</i></p> <ul style="list-style-type: none"> <li>• Economic management of scientific establishments at strategic, branch-specific and territorial levels in relation to creation of competitive scientific technical and innovative achievements</li> <li>• Economic management of research farms on approbation and implementation of innovative achievements by scientific institutions with the output of science intensive products of not less than 25%.</li> <li>• Transfer of science intensive technologies and products due to principles of state private partnership pursuant to entrepreneurial mechanism for commercial concession</li> </ul>
Results	Decrease in load on state budget, increase in financing scientific researches at the expense of efficient system on market licensing and resource and technological transfers of scientific institutions.

*Source: developed by author.*

According to statutory requirements, scientific institutions, state enterprises, research farms, which shall run the economical activity at least without loss but more correct – with profit, report to Presidium of NAAS that provides with self-financing the scientific technical, innovative, production activity. But the models for efficient management in the new conditions of scientific production structures have not been created; the study is not held, the certification and monitoring of economical conditions for indicative indices of development is not performed. Having a powerful team of economists-agrarians, researchers and developers of science intensive business systems, it is necessary to correct this situation and to provide with development and implementation of economical platform for efficient management of NAAS system.

The position for formation of efficient platform may become the scheme (Fig. 2), according to which the main criterion for efficient management is profitability.



**Fig. 2. Economical platform for efficient management of NAAS system**

*Source: developed by author.*

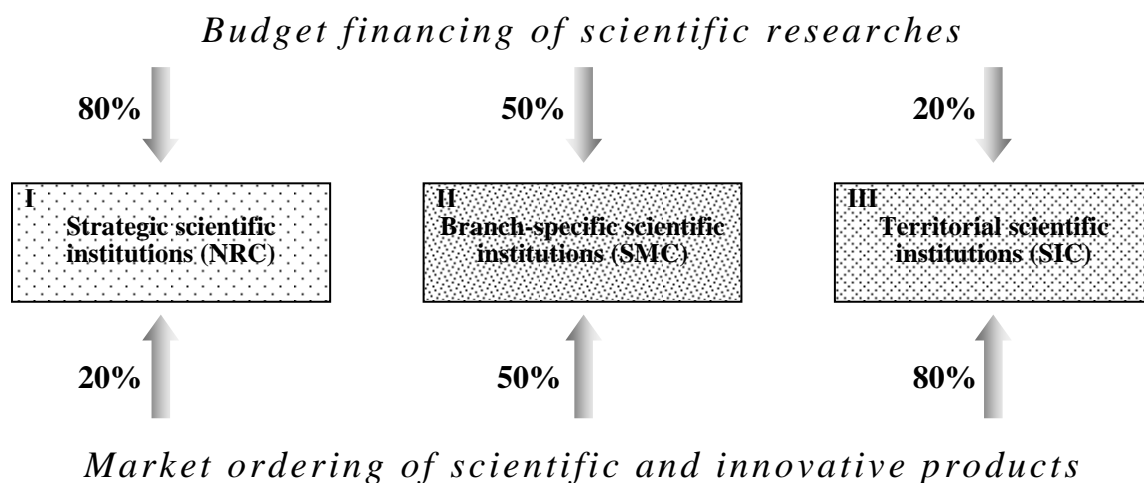
No matter how paradoxical it is, the weak link is the main coordinator of system – Presidium of NAAS. Let the strategists for development of agrarian science have the answer to question: why the authority for assistance to activity of Academy as a society of scientists, has transformed into official authority of administrative command management, on their consciousness. But any developer and practitioner in



branched organizational economical management systems, while getting acquainted with the logistics of academic decision-making mechanism, will confirm the following:

*Presidium, which is economically dependant on the state, cannot efficiently manage the economical activity of subordinated establishments and enterprises, aimed to the profit. This is the base for corruption!*

The important factor for efficient management of scientific system is also the determination of financing sources, their ratio with expenses and capability of scientific institutions profitably to promote own achievements and products of experimental production base in the market. The state shall answer the question (Fig. 3), which scientific institutions have the strategic importance, which ones – branch-specific and territorial (regional) importance.



**Fig. 3. Sources of incomes for scientific institutions**

*Source: developed by author.*

The ratio of budget financing and receipts from performance of self-financing works due to market orders, which is recommended as 80:20% for strategic establishments, branch-specific ones – 50:50%, territorial ones – 20:80% and more depends on the category of establishments. But for this purpose it is necessary to improve the mechanism for market-oriented activity of establishments on creation of scientific technical products with high innovative potential that requires the implementation of results from scientific researches under programs “Innovative

providing” and “Transfer of innovations, which are performed by the Institute of innovative providing in 2011-2015, into NAAS system.

The implementation of economical approaches to development of agrarian science in 2014-2015 will allow re-aiming the part of scientific potential to market needs that will provide with performance of scientific researches by Academy in 2016-2020 due to state market orders for scientific technical and innovative products pursuant to pragmatic program-specific indices. As a result, the reduction in load on state budget is achieved; the financing volume of applied scientific researches and elaborations is increased at the expense of efficient system on transfer of innovations by scientific institutions and their experimental production base.

**Improvement of scientific research structure on the base of branch-specific scientific methodological centers**

The economical platform for operation of agrarian science system allows forming organizational principles for structural transformation in NAAS system in order to strengthen the use of scientific potential and its concentration on top-priority directions in development of agro-industrial complex.

The issues, set in this section, are provided in Table 2.

*Table 2*

**Issues, set to form organizational principles for structural transformations in NAAS network**

Goal	To perform the structural transformations in academic agrarian science, to concentrate the scientific potential in the network of powerful branch-specific scientific methodological centers, to improve their management system
Tasks	<p><i>To ground and to approve</i></p> <ul style="list-style-type: none"> <li>• Strategy on transformation of system of branch-specific science due to top-priority directions, agreed with scientific community, state authorities, associations of agrarian manufacturers and entrepreneurs</li> <li>• Program-specific mechanism for planning, financing and acceptance-delivery of results from scientific researches due to state and market order</li> <li>• System on examination of innovative potential for scientific technical achievements and efficiency in commercial use of experimental production base for agrarian science</li> </ul>
Results	Concentration of scientific potential on top-priority directions in development of AIC, improvement of innovative component for scientific projects and products, which assists to improvement of competitiveness at agro-industrial production.

*Source: developed by author.*

As the experience in formation of proposals by work groups due to directions, established by Presidium together with the Board of Directors at NAAS, showed, it is important correctly to organize the process for consideration and acceptance of proposals by branch-specific scientific institutions and their leading groups of scientists.

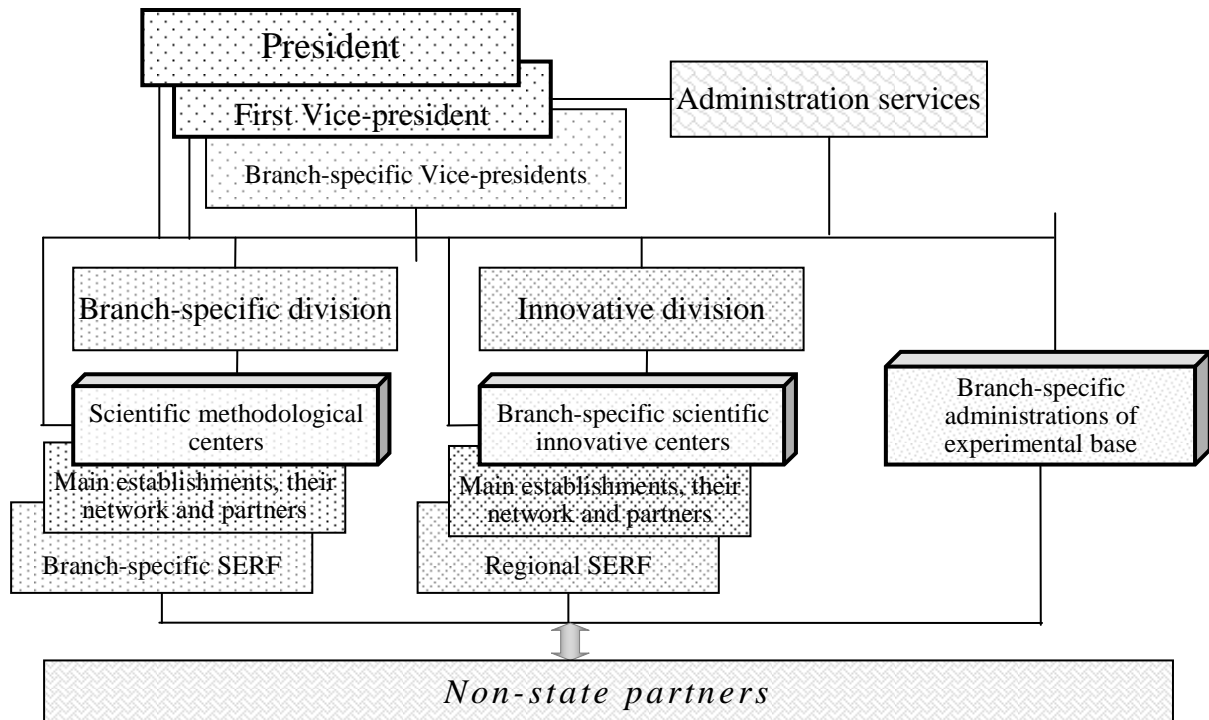
How many there are establishments and specialists, so many there are centers of “special” importance. The administration of Academy shall manage this process together with the Ministry of agrarian policy and branch-specific associations, which represent the leaders and consumers of innovative products. It is necessary to enter to scientific technological complexes, being of top-priority for industry, for which creation the methodological and technological institutes, their stations and farms are united by program-specific method. Vice-president of NAAS or other person, appointed by Presidium, shall be at the head of program-specific complex. The executor of program-specific complex is the scientific methodological center, established on the base of the main establishment with involvement of all participants – executors of program-specific researches, achievements and implementations. The innovative potential for scientific products is defined through market examination by Scientific innovative centers of NAAS, which are united due to territorial principle.

The logistics of management system, existing at NAAS (Fig. 4), shows the concentration of scientific institutions and research farms that report to them pursuant to branch-specific and territorial principle.

The cross scheme from Bureau of Presidium for management of scientific production network of scientific centers, role of administration services, including management of investment innovative development for experimental base at NAAS remains unsolved.

It is interesting what was the basic education and experience of the manager, who suggested for the administrative division of 10-15 persons to manage 170 enterprises, located all over the territory of Ukraine. What tools shall one possess in order to provide with planning, monitoring for fulfillment and regulation of deviations from production and commercial activity in the area of 400 ths. ha. The

result is known – most enterprises are financially and materially incapable, the land and property complex is under control of raiders, and the management for investment innovative development of experimental production base plays the role of statisticians (outsiders) in shady schemes of state private relations.



**Fig. 4. Logistics of management system, existing in NAAS**

*Source: developed by author.*

*The structural changes of scientific institutions shall be carried out due to categories. The following institutions are distinguished according to significance, level of scientific base, influence on development of agro-industrial production and peculiarity for approaches to reformation and innovative development:*

I – strategic scientific institutions (National scientific centers), which define the fundamental directions in development of agrarian science – 12 SREs with the network of up to 40 research stations and farms, the necessary area is up to 50 ths. ha.;

II – branch-specific scientific institutions (Scientific methodological centers) due to some directions in plant growing, cattle breeding, agricultural products processing – 14 SREs, up to 50 research stations and farms, the necessary area is up to 100 ths. ha.;

III – territorial scientific institutions (Scientific innovative centers), which provide with mastering and transfers of technologies in regions of Ukraine – 7 SREs, 134 research stations and farms, the total area is approximately 300 ths. ha.

The competent commission due to defined criteria shall perform the distribution of SREs according to the categories. But the reference of research stations and farms to the institutes of corresponding centers requires grounding the events for economical improvement and development of these structures depending on their current conditions. Most SERFs shall be transferred to the network of Zonal scientific research centers, which must have the experimental production base in each region. It is planned to implement the innovative investments projects for reinforcement and development of material technical base of research stations and farms within the network of scientific innovative centers. Thus, the technological network of testing and distribution of scientific technical products by establishments of Academy is renewed.

The variant to group scientific centers due to categories is shown in Table 3. According to decision by Presidium of NAAS the network of territorial scientific innovative centers has been formed, the preparation for provision with their efficient operation and development is performed.

**Table 3**

**Grouping scientific centers of NAAS due to categories**

National scientific centers	Branch-specific scientific centers	Territorial scientific centers
<ul style="list-style-type: none"> <li>• Farming and mechanization</li> <li>• Soil science, agro-chemistry and agro-ecology, microbiology</li> <li>• Grain and technical crops</li> <li>• Forage production</li> <li>• Agricultural biotechnologies</li> <li>• Viniculture and wine making</li> <li>• Zootechny</li> <li>• Veterinary medicine</li> <li>• Agrarian economics and food provision</li> </ul>	<ul style="list-style-type: none"> <li>• Sugar beetroots</li> <li>• Bioenergy crops</li> <li>• Fruit growing</li> <li>• Potato growing, vegetable growing</li> <li>• Rice growing</li> <li>• Hop growing</li> <li>• Essential oil, medical and bast crops</li> <li>• Oils and fats</li> <li>• Swine breeding</li> <li>• Fish culture</li> <li>• Poultry raising</li> <li>• Beekeeping</li> </ul>	<ul style="list-style-type: none"> <li>• Coordinating (Kyiv)</li> <li>• Central (Kirovohrad)</li> <li>• Pivnichnyy (Sumy)</li> <li>• Pryazovskyy (Donetsk)</li> <li>• Prychornomorskyy (Odessa)</li> <li>• Poliskyy (Rivne)</li> <li>• Karpatskyy (Ivano-Frankivsk)</li> <li>• Krymskyy (Simferopol)</li> </ul>

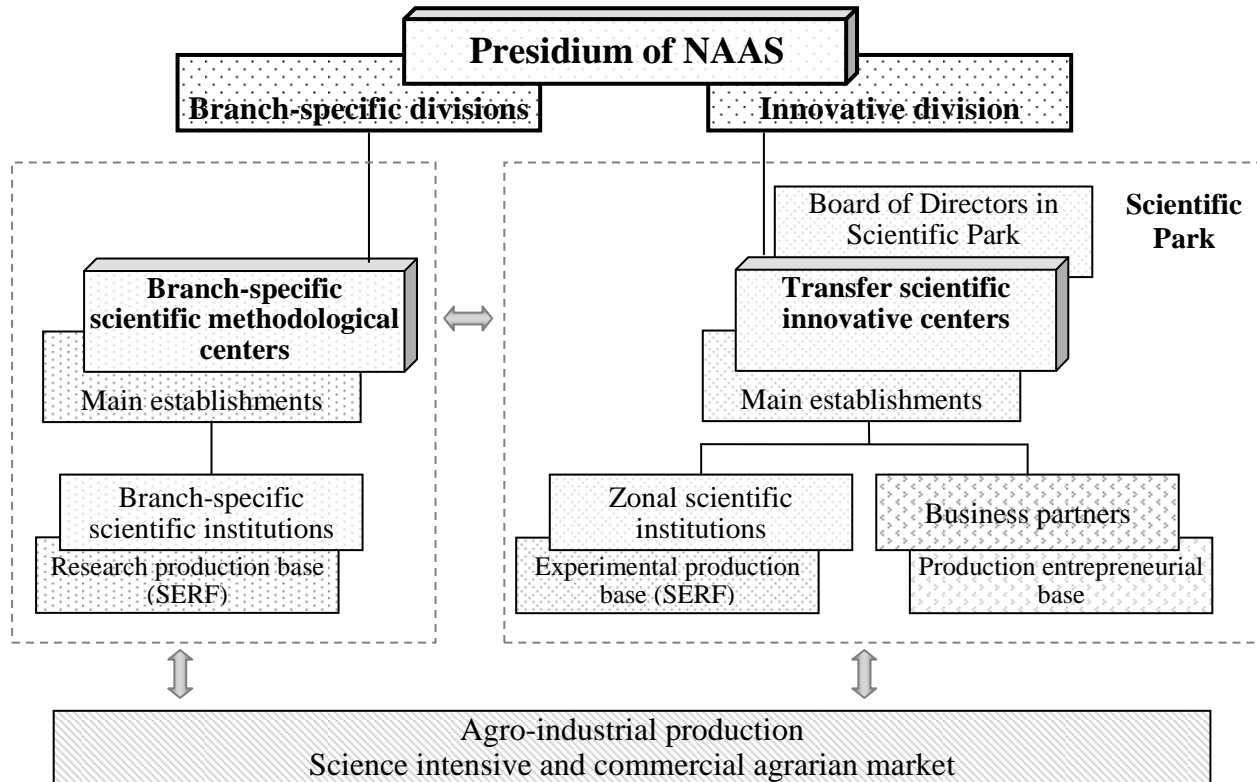
*Source: developed by author.*

The Academy shall define the amount, directions, structure of organization and operation of strategic and methodological branch-specific scientific centers.

The functional scheme for interaction of scientific centers in renewed system of NAAS (Fig. 5) divides and unites the scientific production network of Academy into two sections:

- those ones that create and accompany the implementation of scientific technical products on the base of branch-specific scientific methodological centers;
- those ones that provide with approbation and transfer of innovative products to the market on the base of territorial scientific innovative centers.

The possibilities for successful operation of transfer technologies in the market are reinforced by involvement of business structures due to principles of regulated relations of state private partnership. The Scientific Park is established on the base of network of scientific innovative centers in order to provide with coordination for fulfillment of projects for innovative investment development by state and non-state structures.



**Fig. 5. Functional scheme for interaction of scientific centers**

*Source: developed by author.*

## **Formation of transfer technological infrastructure on the base of scientific innovative centers**

The split-off of establishments and enterprises due to territorial features requires the efficient system for organization and management of their state part (Table 4).

*Table 4*

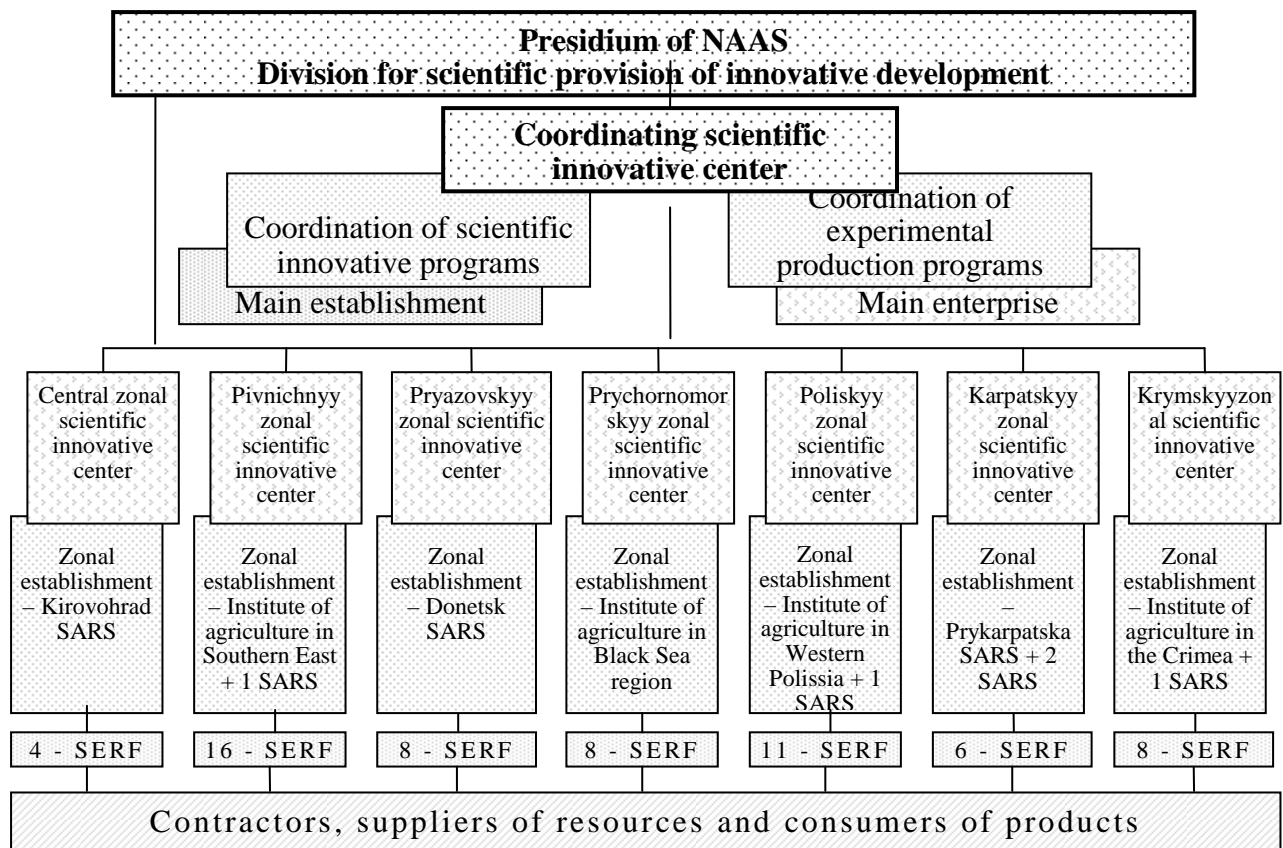
### **Issues, set in relation to efficient system for organization and management of state part in scientific innovative centers**

Goal	To unite territorially branched establishments, research stations and farms into uniform transfer technological network with centralized management system on the basis of coordinating and zonal scientific innovative centers of NAAS
Tasks	<p><i>To develop and to implement</i></p> <ul style="list-style-type: none"> <li>• System for organization and management of scientific production structures at division of Academy through scientific innovative centers</li> <li>• Mechanism for operation of SIC system on financial, methodological and staff base of programs for scientific researches No 42 “Innovative providing” and No 41 “Transfer of innovations”.</li> <li>• Management of processes for commercialization of scientific technical projects and efficient operation of experimental production base through transfer project contractual mechanism</li> </ul>
Results	Prevention from crisis and restoration of capacity to function at experimental production base of agrarian science, creation of competitive system on mastering, approbation and implementation of science intensive technologies and products in agro-industrial production

*Source: developed by author.*

It is obvious that the network, being branched along the regions of Ukraine, requires the centralized, on the one hand, and the diversified management system, on the other hand. It is also important to use the funds, which were allocated to scientific researches under programs No 42 “Innovative providing” and No 41 “Transfer of innovations” in order to provide with creation, mastering and operating the transfer technological mechanisms.

The structure of scientific innovative centers is shown in Fig. 6.



**Fig. 6. Structure of scientific innovative centers**

*Source: developed by author.*

The division for scientific provision of innovative development has 7 employees, engaged on full time basis. It is sufficient to perform the statistical functions, to execute the scientific plan-reports and to fulfill some instructions by management. Such staff cannot manage the network of 76 entities, which are located in 20 regions of Ukraine.

The additional scientific organizational resource provides the coordinating scientific innovative center, which may involve 10 scientists-specialists in innovative technologies and business at the expenses of funds, allocated by Academy in 2014.

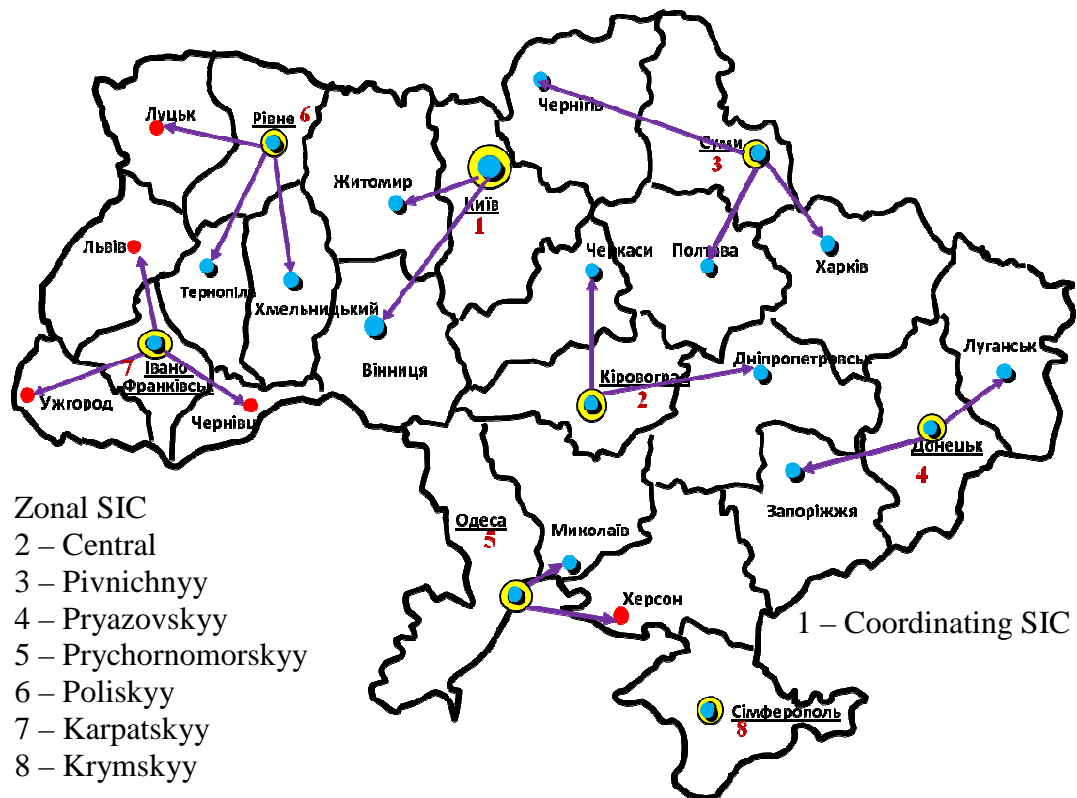
The scientists from zonal centers and their main establishments, which are financed as co-executors of PSR No 41 “Transfer of innovations”, are involved into the system of scientific innovative activity at scientific coordinating accompaniment of the main establishment – Institute of innovative providing. The conditions to involve the additional resource in the amount of 50 persons, prepared for marketing



information researches of market, examination of innovative potential for scientific technical projects (products), project contractual accompaniment for their market transfer are established. Coordinating scientific innovative center forms the scientific methodological base, performs the study of representatives from zonal center, and coordinates the scientific practical work of transfer technological network.

The weak link is the position for management of investment innovative development of experimental base. To leave it in the composition of Presidium means to preserve the corruptive scheme for management of SERF, which will result in full loss of networks of farms. The situation requires transferring to the management system of state experimental base with redistribution of rights and duties between the center and regions. It would be reasonable to keep the division of analysis and prediction of work for experimental production base within the composition of Presidium (for example, in division for scientific provision of innovative development) and to transfer the expert administrative group to the composition of state enterprise, which shall be defined as the main one in issues about coordination of experimental production programs by SERF at NAAS. This enterprise shall be financed at the expense of deductions from successful production activity of research farms. The managerial potential may consist of 12-15 persons.

Thus, it is possible to concentrate about 100 organizational managerial entities on provision with operation and development of transfer technological scientific production system of NAAS without great structural transformations using available staff and financial resource of establishments and programs of Academy. The next step is to delegate organizational managerial and expert analytical functions to zonal scientific innovative centers (Fig. 7) and their directors. It will decrease the shoulder of managerial relations, will allow

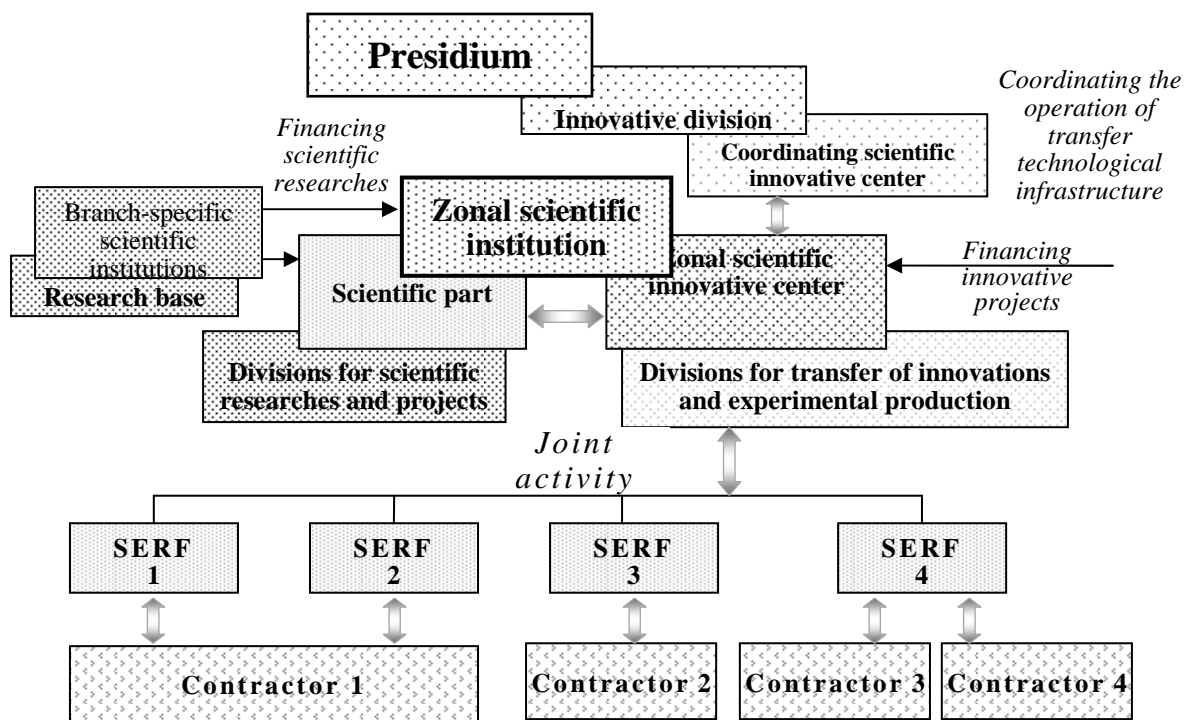


**Fig. 7. Location of scientific innovative centers**

*Source: drawn up by author pursuant to decisions by Presidium of NAAS.*

controlling the work of SERF by management of zonal main establishments using the tools of zonal centers, running financial, legal, technological audit and project contractual accompaniment for activity of farms. The harmonization of central and regional functions is provided through coordinating scientific innovative center. The protection against corruptive activities is reinforced: the network of scientific innovative centers carries out the expert analytical and project contractual provision, and the management of Presidium and scientific institutions of NAAS takes and controls administrative decisions.

Possible scheme for operation of scientific innovative centers is shown in Fig. 8.



**Fig. 8. Scheme for operation of scientific innovative centers**

*Source: developed by author.*

Zonal scientific innovative center performs the role of “trust” on management of transfer operations by scientific institutions, coordination for work of SERF and their cooperation with entrepreneurial structures-contractors.

The transfer technological scientific production structures, coordinated due to three levels (center, zone, region) and presented almost in all regions of Ukraine, is the platform for further development of NAAS system and improvement of role for agrarian science in innovative development of agro-industrial complex.

#### **Establishment of Scientific Park on the base of scientific innovative centers**

The Scientific Park of Academy is established pursuant corporate statutory contractual principles of state private partnership in order to integrate the system of agrarian science into market environment (Table 5) and to provide with implementation of cluster projects for innovative investment development.

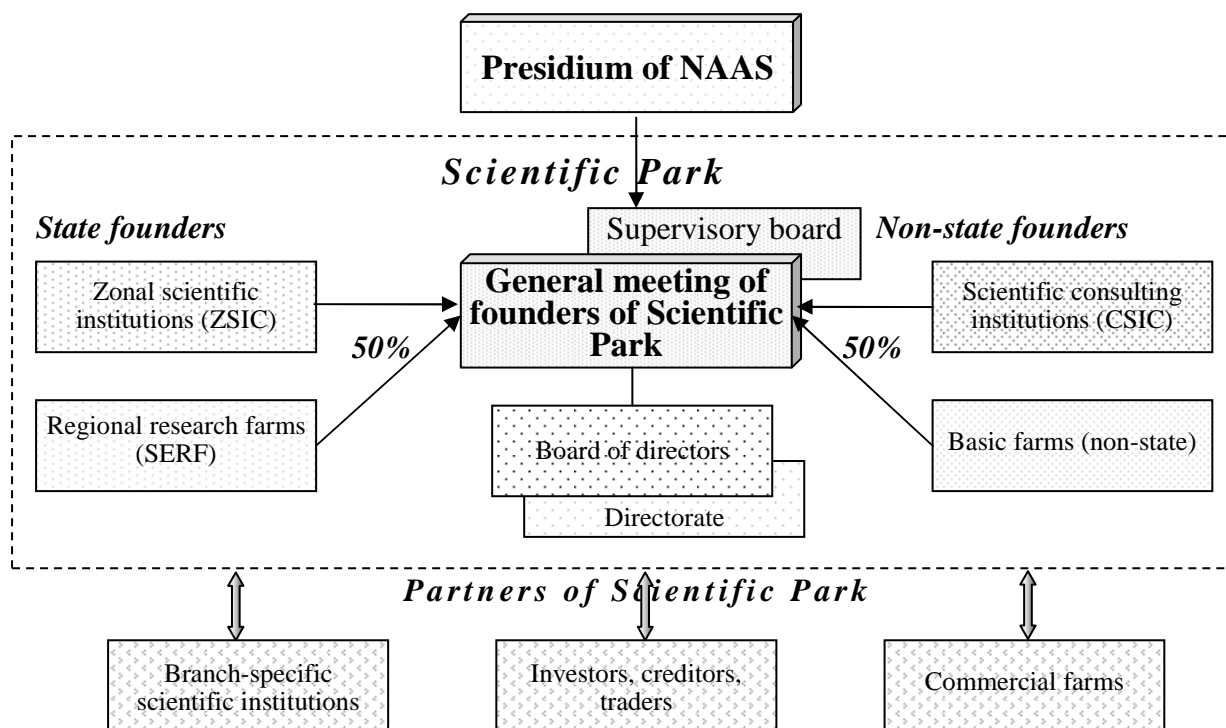
**Table 5****Issues, set for establishment of Scientific Park on the base of scientific innovative centers**

Goal	Integration of transfer technological infrastructure at NAAS into economically active segments of science intensive agrarian market through implementation of innovative investment projects for development of agro-industrial production.
Tasks	<i>Preparation and implementation of</i> <ul style="list-style-type: none"><li>• Infrastructure project for establishment of Scientific Park pursuant to principles of state private partnership with transformation of scientific innovative centers at NAAS into authorities of territorial management for Scientific Park</li><li>• System on examination, evaluation of custodian accounting and circulation of facilities for innovative transfer of science intensive technologies and products in agrarian market</li><li>• System of innovative investment business incubator for preparation and implementation of cluster projects for science intensive agrarian business</li></ul>
Results	Combination of advantages in state structure of agrarian science with entrepreneurial market infrastructure in order to provide with promotion of competitive science intensive products to the market, to prevent from technological expansions and regulation of science intensive agrarian market on issues of national food security.

*Source: developed by author.*

The Scientific Park is established in NAAS system and for development of its scientific production base. But the projects of Scientific Park are directed to development of innovative investment infrastructure for science intensive agrarian market and high technology agro-industrial production. Thus, the integrated infrastructure of founders and partners of Scientific Park is formed on a parity basis from a number of state and non-state participants in cluster project complexes of transfer technological infrastructure.

The constituent scheme for Scientific Park is shown in Fig. 9.



**Fig. 9. Constituent scheme of Scientific Park**

*Source: developed by author.*

While establishing the Scientific Park it is important to avoid duplicating the functions and technological capabilities of scientific institutions, as well as providing with representation of state research farms and non-state basic farms in all regions of Ukraine.

The partners of Scientific Park on contractual conditions are branch-specific scientific institutions of NAAS, other scientific institutions, commercial farms, processing enterprises and consumers of agricultural products and food. Investors of projects, creditors, traders, service structures are involved into participation in the work of innovative investment business projects incubator on a constant or one-time contractual basis.

The suggested state entrepreneurial complex may occupy its niche in agrarian market, which has been formed as a result from loss of positions for state system of approbation and implementation of science intensive products, as well as origin of need in middle commodity and small commodity agricultural production.

*Issues, which are solved by establishment of Scientific Park:*

- Management for interrelations of state private partnership through typical project contractual regulatory methodological base, approved by NAAS and agreed by market entities.

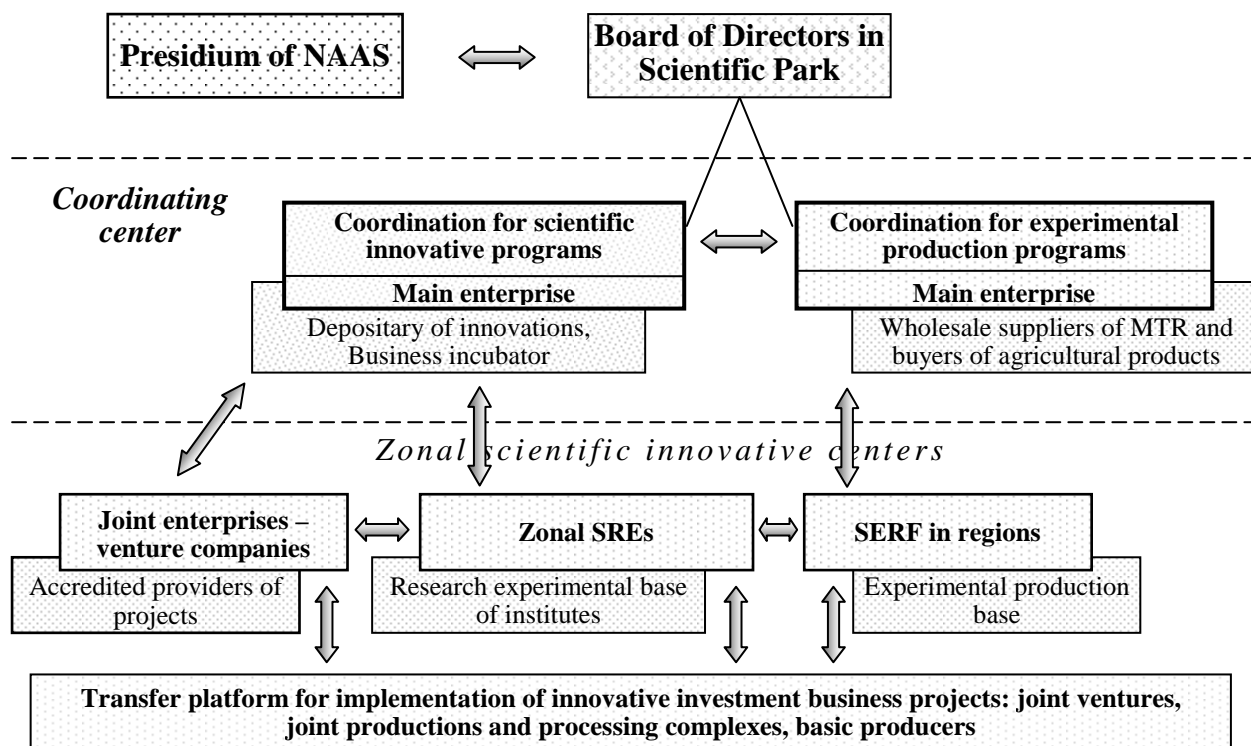
- Introduction of independent market examination of conditions for capitalization and commercialization of scientific technical and innovative objects of rights by scientific institutions, their fair evaluation, custodian accounting and accompaniment of entrepreneurial circulation under conditions of regulated science intensive agrarian market.

- Provision with efficient use of land and property complex of experimental production base through project analysis and observance of project indices for contracts of joint activity by state enterprises with private partners.

- Legalization of entrepreneurial structures – partners of scientific institutions and research farms through their accreditation and registration of licensing contracts, contracts for joint production, supply of material technical resources and sales of agricultural products.

The organization of Scientific Park requires redistributing the functions between Presidium of NAAS and Board of Directors in Scientific Park as to coordination for activity of reporting structures (Fig. 10).

The level of authorities and responsibilities is defined by Charter of NAAS and Charter of Scientific Park, which cannot contradict to Charter of NAAS. Thus, the issues about activity of scientific institutions in relation to fulfillment of scientific programs, qualification of staff, use of state property and property rights and other issues about observance of statutory requirements from state establishments and enterprises are coordinated by Presidium of NAAS. The issues on coordination in relation to participation in projects for innovative, investment, integral development, production and sales of science intensive products are solved by Board of Directors in Scientific Park.



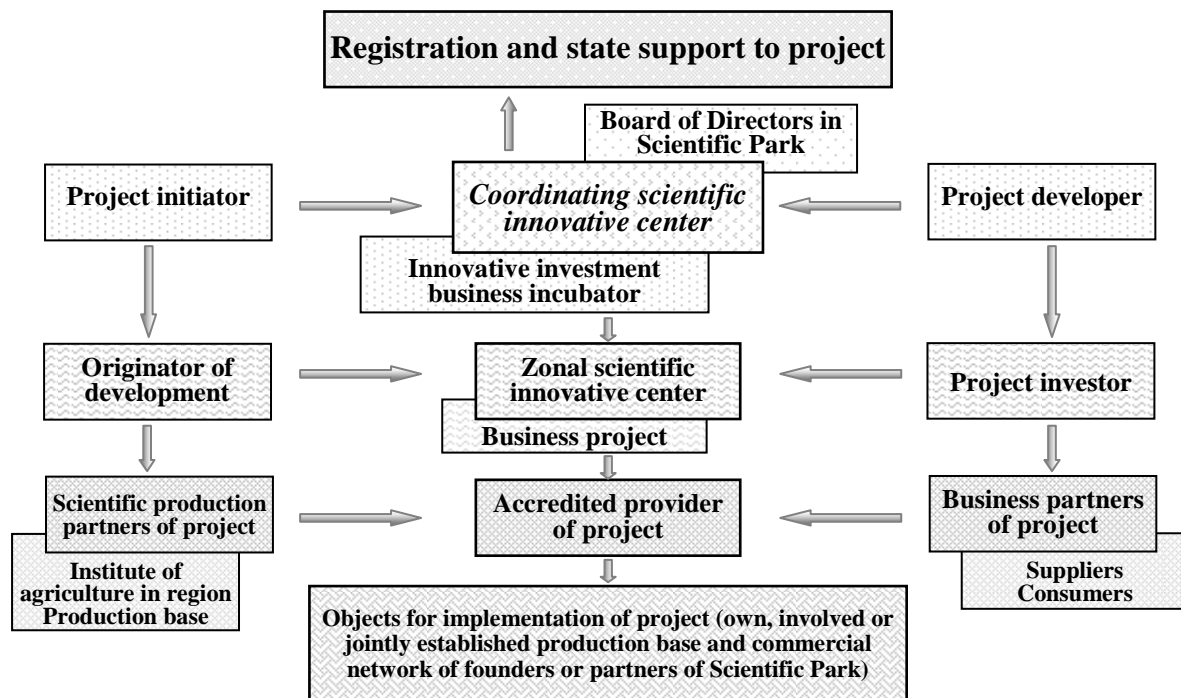
**Fig. 10. Structure for organization of Scientific Park**

*Source: developed by author.*

The participation of state scientific institutions and enterprises, which are under jurisdiction of NAAS, in statutory and contractual obligations of Scientific Park, is agreed with Presidium of NAAS. Presidium of NAAS delegates its representatives to the composition of Supervisory Board in Scientific Park in order to control the activity of Scientific Park in relation to observance of requirements from Academy by state participants.

While approving the constituent documents of Scientific Park, Presidium of NAAS establishes the compulsory conditions for operation and development of Scientific Park, which are approved by Presidium of NAAS, namely: use of NAAS trademark, participation of state organizations and farms in establishment of joint ventures, transfer of commercial concession right to accredited providers of projects, etc.

The procedure for approval of projects by Scientific Park (Fig. 11) is approved and controlled by Presidium of NAAS.



**Fig. 11. Procedure for approval of projects at Scientific Park**

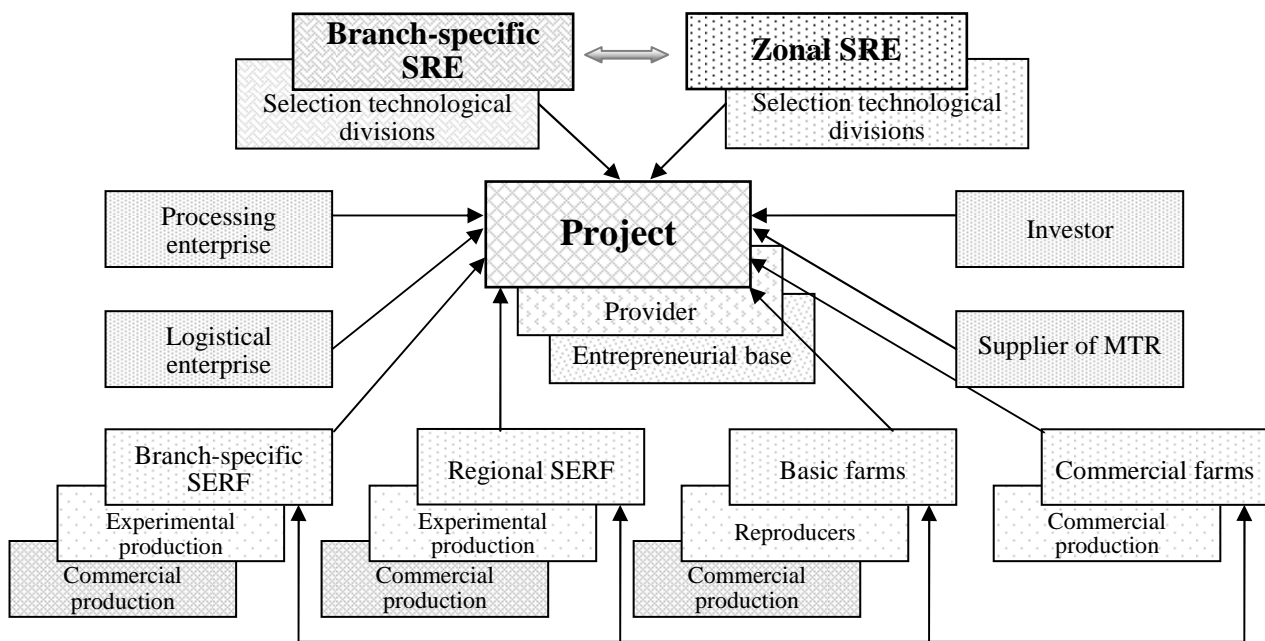
*Source: developed by author.*

The operations of Scientific Park in relation to implementation of projects are carried out using typical project contractual packages, approved by NAAS.

The mutually profitable conditions for participation of state and non-state participants in implementation of projects are agreed pursuant to cluster mechanism (Fig. 12), according to which a project provider is defined due to competitive principles, and the complex of contractual accompaniment for implementation of project is approved for all participants due to the place of location and registration.

The project mechanism creates the conditions to prevent from ungrounded obligations, which result in losses for state participants, provides with participation of scientific institutions in market capitalization and commercialization of their intellectual achievements. All facilities of research stations i.e. land and property resources shall be covered by projects, which innovative component is provided by scientific institution on a contractual basis. The efficiency factor is the volume of receipts to special account of scientific institution from participation in each project.





**Fig. 12. Project cluster on production of science intensive and commercial products**

*Source: developed by author.*

The cluster mechanism assists to market integration of agrarian science and high technology agro-industrial production (Fig. 13), allows creating the competitive contractual association on production and sales of science intensive and commercial products using the advantages of state and private form of management.

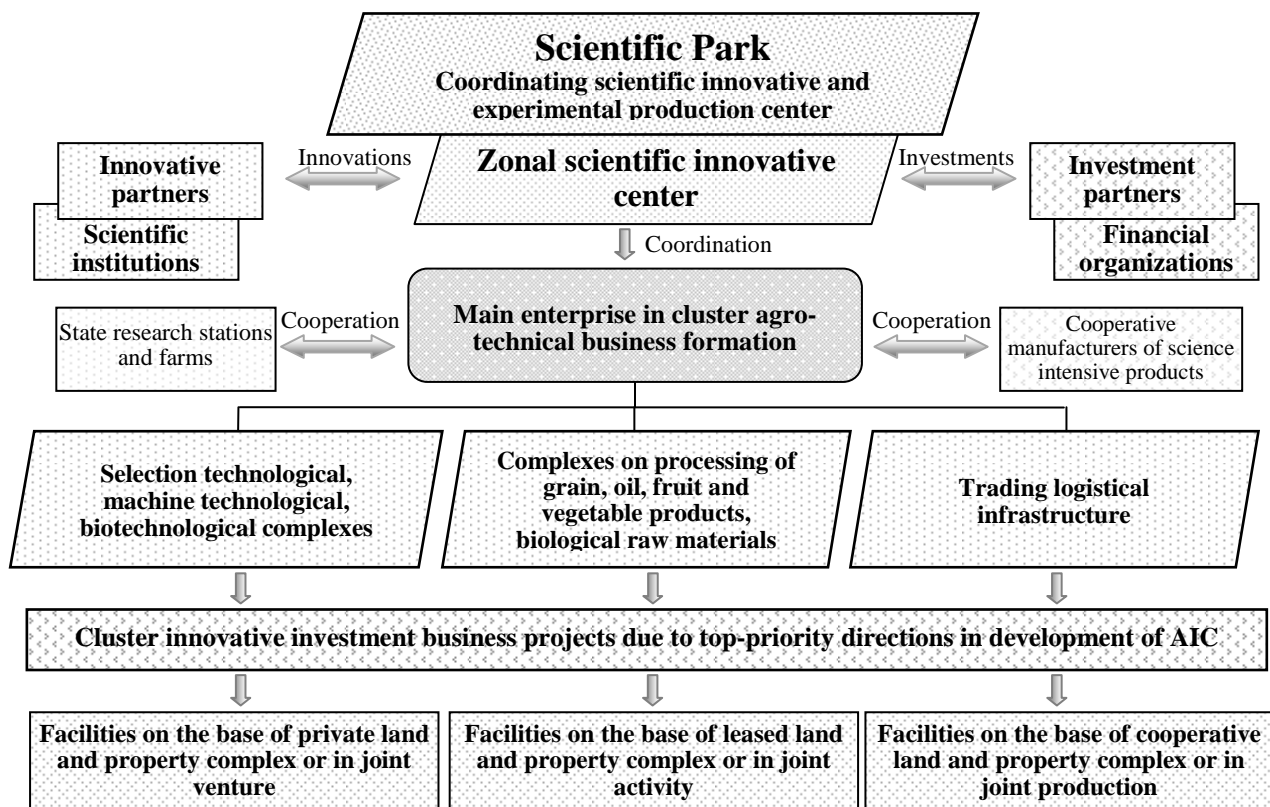
#### **Analysis on variants for implementation of the Model**

The researches on variants for organization of NAAS management were held according to methodology of scenario analysis, the following conclusions were made:

- *Pessimistic scenario* (the Model is not implemented).

*Consequences – The Academy loses the economical base and independence.*

The existing system leads to loss of experimental production base of Academy and significant reduction in influence of agrarian science on development of AIC. As a result, there is a very real threat for Academy to lose its economical capability and, as a consequence, self-management.



**Fig. 13. Cluster mechanism for market integration of high technology agro-industrial production**

*Source: developed by author.*

- *Realistic scenario* (the Model is implemented in the part of state organizations and enterprises).

*Consequences – the Academy will stabilize the base and improves the economical capability.*

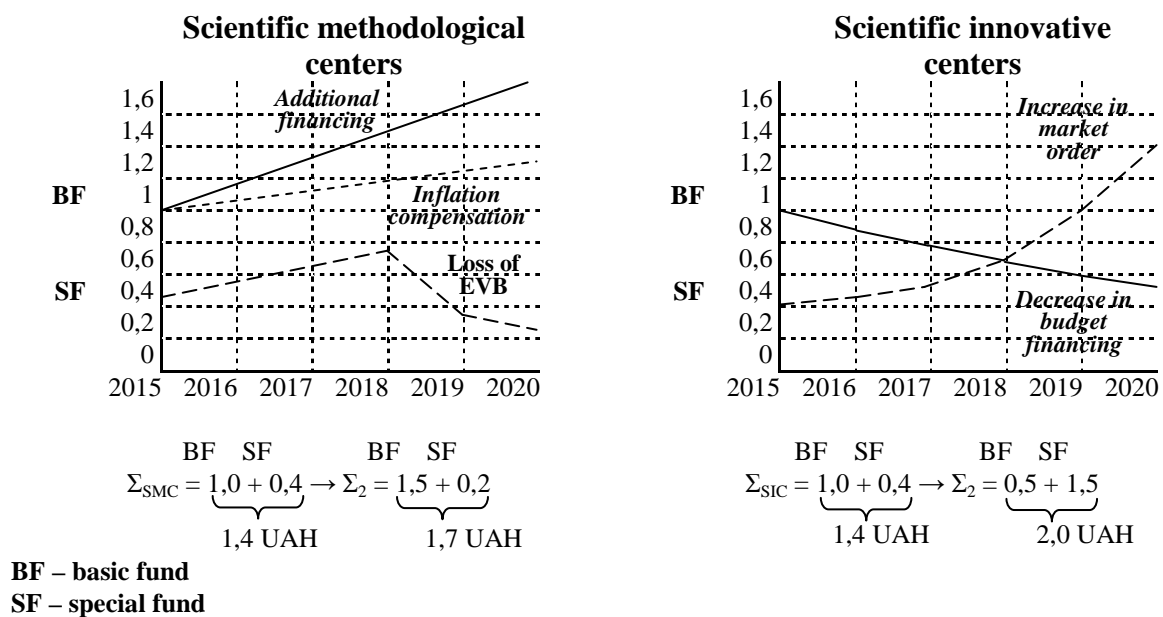
The management vertical is improved taking into consideration the peculiarities for scientific and economical activity of NAAS and its economical position is stabilized. But the material technological base, lost before, has no resources for restoration, as a result there is the dependence on commercial structures and, as a consequence, a threat to privatization of experimental production base at local level.

- *Optimistic scenario* (the Model is implemented in full).

*Consequences – the Academy is developed at the expense of innovative infrastructure.*

The system of agrarian science is reinforced on economical legal foundation of state private partnership. The Academy becomes the main player in establishment and development of entrepreneurial structures of innovative investment type. Scientific Park, integrated into market relations due to entrepreneurial principles, is difficult “to sink”, in particular, to liquidate, and, mostly important, there is no sense as such corporate scientific entrepreneurial complex will be an efficient conductor of innovations into high technology agro-industrial production.

The financing volumes of academic science for recent 10 years, economical indices for business activity of scientific institutions and their experimental production base were analyzed. The economical analysis testifies that the modern position of institutions and especially enterprises is critical. The system of science management requires the cardinal changes. The following variants to finance the science in 2016-2020 are perspective (Fig. 14).



**Fig. 14. Variants to finance the science in 2016-2020**

Source: developed by author.

Branch specific scientific methodological centers shall receive larger budget financing for scientific researches at the expense of saved money for state support to scientific institutions of transfer technological direction. This compensates the

reduction in share of receipts from work of experimental production base, which cannot be kept without implementation of investment projects for development. Scientific institutions shall not encumber themselves with production commercial problems of experimental management; this work should be transferred to the system of scientific innovative centers.

Scientific innovative center in 2014-2015 shall be prepared for work under self-financing market conditions. Since 2016 it will enable annually reducing their budget financing at outrunning increase in receipts from fulfillment of market order. Further development of these institutions may be carried out through their corporatisation, commercialization with participation of scientific collectives, providers and investors, leading scientific technological centers in the world.

### **Conclusions and further researches.**

#### **Results, expected from implementation of Model**

*The performance of full complex on implementation of Model for innovative development of NAAS will provide with:*

- Mobilization of innovative potential for scientific institutions of NAAS at breakthrough directions in development of agro-industrial complex;
- Creation of competitive corporate system for transfer of innovations with investment security on the basis of integration relations of science and business;
- Development of state private partnership in NAAS system through implementation of repaying business projects for innovative investment development in top-priority directions of AIC with participation interest of state, private capital and object of right for scientific technical products of SRE;
- Involvement of flexible incentive system into high technology production and service cooperation of scientific research institutions with production and commercial private partners for guaranteed distribution of own scientific technical and innovative products pursuant to long term forward contracts;
- Involvement of modern technologies and capital into participation in investment development of innovative infrastructure at NAAS, improvement in competitiveness of scientific institutions at science intensive agrarian market.

*The state support is necessary:*

- To approve the implementation program of Model for innovative development of NAAS within the Strategy for economical development of AIC;
- Granting the status of National project for establishment of Scientific Park in relation to development of infrastructure for science intensive agrarian market with participation of NAAS institutions and enterprises, commodity producers and entrepreneurs of agro-industrial complex;
- To approve the system of economical legal examination and regulation of transfer of technologies, established at the expense and due to the order of the state, as well as to prevent from technological expansions in AIC with doubtful quality and efficiency;
- To initiate the state support to cluster innovative investment projects for establishment and development of high technology agro-industrial production in Ukraine and its commercial infrastructure.

*Place of agrarian science in provision with innovative development in AIC.* Modern pro-European strategies for innovative development of economics are characterized by technological platforms. The mission of technological platform (Fig. 15) is directed to reinforce the potential of agro-industrial complex through innovations and is based on sectors of scientific, market and production provision.

The place of reformed academic agrarian science is defined by market-oriented system for creation of scientific technical products with high innovative potential, which provides with scientific technical progress in AIC.



**Fig. 15. Technological platform for development of AIC on innovative basis**

*Source: developed by author.*

It is the place, which shall be occupied by National academy of agrarian sciences of Ukraine, being reformed due to Model for innovative development.

#### References

1. Vytvytska, O.D. (2011), "Formation of the strategy of agricultural enterprises' innovative development", *Economika APK*, no. 10, pp. 132-138.
2. Volodin S.A. (2006), *Innovatsiyni rozvytok ahrarnoi nauky* [Innovative development of agrarian science], IAPM, Kyiv, Ukraine, 400 p.
3. Volodin S.A. (2007), *Teoretyko-metodolohichni ta orhanizatsiini zasady innovatsiinoho provaidynhu na naukoiemnomu ahrarnomu rynku* [Theoretical methodological and organizational principles for innovative providing in science-intensive agrarian market], CJSC "Nichlava", Kyiv, Ukraine, 384 p.
4. Heiets, V.M. and Semynozhenko, V.P. (2006), *Innovatsiini perspektyvy Ukrainy* [Innovative perspectives of Ukraine], Konstanta, Kharkiv, Ukraine, 272 p.
5. Hryha, V.Yu. (2010), *Teoretychni ta praktychni aspekty vykorystannia naukovykh rezultativ NAN v ekonomitsi Ukrayiny* [Theoretical and practical aspects of the use of research NAS in the Ukrainian economy], STEPSCenter NASU, Kyiv, Ukraine, 113 p.
6. Datsii, O.I. (2010), "Institutional change as a basis for elimination of contradictions of innovative development", *Investytsii: praktyka ta dosvid*, no. 9, pp. 32-34.
7. Zubets M.M. and Volodin S.A. (2009), "Scientific and organizational framework for innovation development of agricultural science", *Gerald of agrarian science*, no 6, pp. 5-12.
8. Zubets M.M. and Volodin S.A. (2010), "Approval of innovative model in the system of agrarian science", *Gerald of agrarian science*, no 7, pp. 5-11.
9. Illiashenko, S.M. (2010), "Strategic innovation management company based marketing innovation", *Actual Problems of Economics*, no. 12, pp. 111-119.
10. Kurylo, L.I. (2011), "Statutory regulation of innovative activity in agricultural sector", *Visnyk Sumskoho natsionalnoho ahrarnoho universytetu. Seriya "Finansy i kredyt"*, Iss. 2 (31), pp. 298-302.
11. Levitskaia, A. and Perchinskaia, N. (2013), "Innovation Model for Interactions of Science, Government and Business in the Republic of Moldova", *Attitude of Society and State to Science*

under Contemporary Economic Crises: Tendencies, Models, Ways to Deepen Mutual Understanding and Interaction: Proceedings of the International Symposium (Kiev, June 2-5, 2013), Nash format, Kiev, Ukraine, pp. 96-104.

12. Lupenko, Yu.O. and Mesel-Veseliak V.Ya. (2012), *Stratehichni napriamy rozvytku silskoho hospodarstva Ukrainy na period do 2020 roku* [Strategik directions of the development of agriculture in Ukraine for the period till 2020], NNTS IAE, Kyiv, Ukraine, 182 p.

13. Malitskyi, B.A. (2011), "The strategy of innovative development of Ukraine: from design to actual practice", *Nauka ta naukoznavctvo*, no. 2, pp. 6-20.

14. Ilchuk, M.M. and Ishchenko, T.D. (2006), *Pidpryiemnytska diialnist ta ahrobiznes* [Commercial and agricultural business], textbook, Vyshcha osvita, Kyiv, Ukraine, 543 p. Conceptual framework of innovative and investment development of the National Academy of Agricultural Sciences of Ukraine"

15. Prysiazhniuk, M.V., Petrychenko, V.F. and Volodin S.A. (2013), "Conceptual foundations of innovative and investment the development National Academy of Agrarian Sciences of Ukraine", *Economika APK*, no. 4, pp. 3-22.

16. Sabluk, P.T. (2012), "Sustainable development for agricultural reforms", *Economika APK*, no. 6, pp. 3-6.

17. Shpykuliak, O.H., Kurylo, L.I. and Suprun, O.M. (2011), "Institutional regulation as a determinant for the formation of innovative model of agricultural sphere development", *Oblik i finansy APK*, no. 2, pp. 106-112.

18. Ansoff, Igor H. (2007), *Strategic Management: Classic Edition*, Hampshire, UK: Palgrave Macmillan, 272 p.

19. Deming W.E. (2000), *The New Economics: For Industry, Government, Education*, Cambridge, Massachusetts : MIT Press, 247 p.

20. Drucker, P. (1985), *Innovation and Entrepreneurship : Practice and Principles*, New York: Harper and Row, 277 p.

21. Porter, M.E. (1998) *Competitive Strategy : Techniques for Analyzing Industries and Competitors*, New York : Free Press, 432 p.

22. Richard A. Brealey, Stewart C. Myers and Franklin Allen (2011), *Principles of corporate finance*, NY : McGraw-Hill/Irwin, 1071 p.

23. Russell, D. (2003), *Archibald Managing High-Technology Programs and Projects*, 3rd Edition, New York : John Wiley & Sons, 396 p.

24. Thompson, A.A. and Strickland III A.J. (2003), *Strategic management : concepts and cases*, 13 th. ed., Boston : McGraw-Hill/Irwin, 1049 p.

## **Володін С.А. МОДЕЛЬ ІННОВАЦІЙНОГО РОЗВИТКУ АГРАРНОЇ НАУКИ НА ПРИКЛАДІ СИСТЕМИ НААН УКРАЇНИ**

**Мета** дослідження – пошук ефективної моделі інноваційного розвитку аграрної науки, яка б забезпечувала підвищення конкурентоспроможності аграрної економіки, модернізації інфраструктури, залучення інвестицій в базові сектори АПК.

**Методика дослідження.** Дослідження здійснювалися на науково-методичній базі Інституту інноваційного провайдінгу в наукоємній аграрній сфері. У роботі використані загальнонаукові та спеціальні методи дослідження, зокрема: монографічний метод – для вивчення теоретичних засад і наукових підходів до створення та розвитку в мережі наукових установ підприємницьких структур для сприяння адаптації аграрної науки в ринковому середовищі; метод моделювання для обґрунтування та прогнозування напрямів та шляхів ефективного господарювання системи НААН; системного аналізу і синтезу – для встановлення причинно-наслідкових зв'язків і формування висновків та пропозицій; у процесі обґрунтування теоретичних аспектів роботи використані методи абстрагування для оцінки критеріїв прийняття рішень, фундаментальних та прикладних аспектів сучасної теорії економіки знань.

**Результати.** Дослідження спрямовано на вирішення проблем інноваційно-інвестиційного розвитку аграрної науки на прикладі Національної академії аграрних наук України. Обґрунтовано шляхи подолання проблем розвитку аграрної науки з урахуванням вимог стратегії інноваційного розвитку агропромислового комплексу; задіяння гнучкої системи заохочень до високотехнологічної виробничої і обслуговуючої кооперації науково-дослідних установ з виробничими та комерційними приватними партнерами для гарантованого збуту власної науково-технічної та інноваційної продукції за довгостроковими форвардними контрактами. Розроблено конкурентоспроможну корпоративну систему трансферу інновацій з інвестиційним забезпеченням на основі інтеграційних відносин науки та бізнесу; механізм залучення сучасних технологій та капіталу до участі в інвестиційному розвитку

інноваційної інфраструктури НААН, підвищення конкурентоспроможності наукових установ на наукоємному аграрному ринку. Сформовано організаційні засади структурних перетворень мережі НААН з метою посилення використання наукового потенціалу і концентрації його на пріоритетних напрямках розвитку агропромислового комплексу.

**Наукова новизна** полягає в подальшому розвитку теоретичних та прикладних аспектів новостворених та нововведених на підприємницьких засадах, обґрунтування ролі, місця і умов розвитку системи аграрної науки як високотехнологічної бази конкурентоспроможної аграрної економіки.

**Практична значущість.** Реалізація Моделі інноваційного розвитку НААН забезпечить мобілізацію інноваційного потенціалу наукових установ НААН на проривних напрямках розвитку агропромислового комплексу; розвиток державно-приватного партнерства в системі НААН шляхом реалізації самоокупних бізнес-проектів інноваційно-інвестиційного розвитку на пріоритетних напрямках АПК з дольовою участю держави, приватного капіталу та об'єктів прав на науково-технічну продукцію НДУ.

**Ключові слова:** інновація, інноваційний потенціал, інноваційні перетворення, інноваційний розвиток агропромислового комплексу, наукове забезпечення агропромислового виробництва, наукоємна аграрна сфера, реформування аграрної науки, державно-приватне партнерство, венчурні інвестиції, інноваційно-інвестиційний розвиток, інноваційна підприємницька інфраструктура, експериментально-виробнича база, ринкова інтеграція, науковий парк

### **Володин С.А. МОДЕЛЬ ИННОВАЦИОННОГО РАЗВИТИЯ АГРАРНОЙ НАУКИ НА ПРИМЕРЕ СИСТЕМЫ НААН УКРАИНЫ**

**Цель** исследования – поиск эффективной модели инновационного развития аграрной науки, которая обеспечивала бы повышение конкурентоспособности аграрной экономики, модернизации инфраструктуры, привлечения инвестиций в базовые сектора АПК.

**Методика исследования.** Исследования осуществлялись на научно-методической базе Института инновационного провайдера в наукоёмкой аграрной сфере. В работе использованы общенаучные и специальные методы исследования, в частности: монографический метод – для изучения теоретических принципов и научных подходов к созданию и развитию в сети научных учреждений предпринимательских структур для содействия адаптации аграрной науки в рыночной среде; метод моделирования для обоснования и прогнозирования направлений и путей эффективного ведения хозяйства системы НААН; системного анализа и синтеза – для установления причинно-следственных связей и формирования выводов и предложений; в процессе обоснования теоретических аспектов работы использованы методы абстрагирования для оценки критериев принятия решений, фундаментальных и прикладных аспектов современной теории экономики знаний.

**Результаты.** Исследование направлено на решение проблем инновационно-инвестиционного развития аграрной науки на примере Национальной академии аграрных наук Украины. Обоснованы пути преодоления проблем развития аграрной науки с учетом требований стратегии инновационного развития агропромышленного комплекса; задействование гибкой системы поощрений к высокотехнологичной производственной и обслуживающей кооперации научно-исследовательских учреждений с производственными и коммерческими частными партнерами для гарантированного сбыта собственной научно-технической и инновационной продукции по долгосрочным форвардным контрактам. Разработана конкурентоспособная корпоративная система трансфера инноваций с инвестиционным обеспечением на основе интеграционных отношений науки и бизнеса; механизм привлечения современных технологий и капитала к участию в инвестиционном развитии инновационной инфраструктуры НААН, повышения конкурентоспособности научных учреждений на наукоёмком аграрном рынке. Сформированы организационные основы структурных преобразований сети НААН с целью усиления использования научного потенциала и концентрации его на пріоритетных направлениях развития агропромышленного комплекса.

**Научная новизна** заключается в дальнейшем развитии теоретических и прикладных аспектов новосозданий и нововведений на предпринимательских основах, обоснования роли, места и условий развития системы аграрной науки как высокотехнологичной базы конкурентоспособной аграрной экономики.

**Практическая значимость.** Реализация Модели инновационного развития НААН обеспечит мобилизацию инновационного потенциала научных учреждений НААН на прорывных направлениях развития агропромышленного комплекса; развитие государственно-частного партнерства в системе НААН путем реализации самоокупающихся бизнес-проектов инновационно-инвестиционного развития на пріоритетных направлениях АПК с долевым участием государства, частного капитала и объектов прав на научно-техническую продукцію НИУ.

**Ключевые слова:** инновация, инновационный потенциал, инновационные превращения, инновационное развитие агропромышленного комплекса, научное обеспечение агропромышленного производства, наукоёмкая аграрная сфера, реформирование аграрной науки, государственно-частное партнерство, венчурные инвестиции, инновационно-инвестиционное развитие, инновационная



предпринимательская инфраструктура, экспериментально-производственная база, рыночная интеграция, научный парк

## **Volodin S.A. THE MODEL FOR INNOVATIVE DEVELOPMENT OF AGRARIAN SCIENCE ON THE EXAMPLE OF NAAS SYSTEM OF UKRAINE**

**Purpose.** The goal of research is to seek for the efficient model for innovative development of agrarian science, which would provide with improvement in competitiveness of agrarian economics, modernization of its infrastructure, involvement of investments into basic sectors of AIC.

**Methodology of research.** The research was performed on the scientific methodological base in the Institute of innovative providing in science intensive agrarian sphere. The paper used the general scientific and special methods of research, in particular: monographic method – to study the theoretical principles and scientific approaches to creation and development of entrepreneurial structures within the network of scientific institutions to assist to adaptation of agrarian science in market environment; modeling method to ground and to predict the directions and ways for efficient management of NAAS system; systematic analysis and synthesis – to determine the relationships of cause and effect and to form conclusions and proposals; the abstraction methods were used while grounding the theoretical aspects of works in order to assess the criteria for decision taking, fundamental and applied aspects in modern theory of economics of knowledge.

**Findings.** The research is aimed to solve the problems in innovative investment development of agrarian science on example of National academy of agrarian sciences of Ukraine. The ways to overcome with the problems in development of agrarian science taking into consideration the requirements to strategy for innovative development of agro-industrial complex; to involve the flexible incentive system into high technology production and service cooperation\_of scientific research institutions with production and commercial private partners for guaranteed distribution of own scientific technical and innovative products pursuant to long term forward contracts were grounded. The competitive corporate system for transfer of innovations with investment security on the basis of integration relations of science and business; the mechanism to involve modern technologies and capital into participation in investment development of NAAS innovative infrastructure, improvement in competitiveness of scientific institutions at science intensive agrarian market was developed. The organizational principles for structural transformations of NAAS network were formed in order to reinforce the use of scientific potential and its concentration on top-priority directions in development of agro-industrial complex.

**Originality** is further development of theoretical and applied aspects for new formations and innovations due to entrepreneurial principles, grounding the role, place and conditions for development of agrarian science system as a high technology base for competitive agrarian economics.

**Practical value.** The implementation of Model for innovative development of NAAS will provide with mobilization of innovative potential for scientific institutions of NAAS at breakthrough directions in development of agro-industrial complex; development of state private partnership in NAAS system through implementation of repaying business projects for innovative investment development in top-priority directions of AIC with participation interest of state, private capital and object of right for scientific technical products of SRE.

**Key words:** innovation, innovative potential, innovative transformations, innovative development of agro-industrial complex, scientific provision of agro-industrial production, science intensive agrarian sphere, reformation of agrarian science, state private partnership, venture investments, innovative investment development, innovative entrepreneurial infrastructure, experimental production base, market integration, scientific park.