

# THE STATE OF INNOVATION INTRODUCTION INTO PLANT-GROWING BY INTEGRATED STRUCTURES

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## Abstract

The paper studies and analyses some modern trends of agricultural production. The peculiarities of introducing new technologies into plant-growing are considered on the pattern of integrated enterprises. The main trends of research institution activities have been investigated. It has been established that integrated enterprises, while overcoming the crisis situation, introduce on a large scale scientific and technological achievements, directed towards the economic process modernization, into agricultural production. The author lays open that the basic directions of innovation attraction are the utilization of energy-saving production technologies, introduction of new process charts of crop growing, introduction of biotechnologies, application of new technique and technologies of soil cultivation, produce cleaning and storage. It has been proved that the application of innovations affords the opportunity to increase crop yielding capacity, raise labor productivity, minimize losses and ensure the increase in economic efficiency. Some proposals concerning the organization of agricultural production on an innovation basis are suggested.

## Introduction

Ukraine is projected to become the third largest coarse grain exporter and eighth largest wheat exporter globally in 2012/13 MY. The country, boasting some of the world's most fertile soil, has enjoyed record corn harvests in the past two years and has significant potential to strengthen its position in the global grain trade by improving yields. Meanwhile, global coarse grain demand is being fueled by big importers such as China, Saudi Arabia and Japan, with changing diets towards higher meat consumption increasing demand for feed [1].

The development of the agrarian sector of Ukraine's economy, stepping up of competition at the domestic and world markets of agricultural products, deepening of integration and globalization processes and Ukraine's entry into the WTO stipulate the intensification of production and necessity to search for the new factors of raising the competitive capacity of agrarian enterprises which is impossible without the mastering of advanced technologies and introduction of innovations into economic activities. In farming the technology change has a deeper effect than the appearance of new products. The inability of managers to promptly realize the necessity of innovation introduction into the economic process can result in the loss of the position on the market or force commodity producers to suspend activities in earlier profitable for them business spheres. The technological re-equipment is, in its turn, the basic and powerful instrument with the aid of which an agricultural enterprise can possess a competitive advantage and consolidate its position in the market (Syrtseva, 2008, pp. 115–116).

The introduction of innovations into agricultural production under market-oriented economy conditions is complicated not only financially but also psychologically, since it essentially changes the pattern of actions of the staff and executives [3]. The urgency of the research into the innovative activities of agricultural enterprises is conditioned by the strengthening of competitive struggle on the market of foodstuffs and by Ukraine's integration into the international economic space which brings about the necessity for building the innovative model of agricultural development, especially of export-oriented industries. The research of various aspects of innovation processes in the agrarian sector of the economy is conducted by such leading scholars as V. Andriychuk, N. Vasylyeva, S. Volodin, M. Ilchuk, M. Kodenska, M. Koretsky, O. Kushnirenko, G. Pidlisetsky, M. Sadykov, N. Sirenko, O. Skydan, S. Tyvonchuk, I. Fedulova and others. The researchers have carried out the analysis of the development of innovation process in the agrarian sector, its influence on the produce competitiveness and efficiency of economic activity. Many problems, however, still remain unsettled and require further study.

## Methods

The research employs the following methods of scientific cognition: abstract-and- logical method, especially methods of analogy and correlation, inductive and deductive ones and the method of scientific abstraction for theoretical generalization, specification of the conceptual apparatus and formulation of

conclusions; economic-and-statistical methods, namely those of comparison for the assessment of trends in agricultural enterprise development; monographic one when studying the advanced experience of agricultural commodity producer activities.

## Results

Innovations are an integral element of the market mechanism operation, a means of competitive struggle and a factor of forming the consumer demand and product or service cost [6]. Under the existing conditions of economic management the key problems of innovation implementation are outdated facilities of scientific institutions, the absence of the effective mechanism of innovation transfer and insufficient investigation of the state of the innovative activities of agricultural enterprises, which does not permit to comprehensively assess its efficiency. In its turn, this brings about the reduction in the competitive capacity of domestic products (Chaban, 2006, pp. 68–72).

Most agricultural producers are now characterized by the low development level and non-competitiveness of farm products on the external market, this being conditioned by the low engineering and technological level, deficiency of investment opportunities, imperfection of the credit and financial system, insufficient development of government support for agricultural commodity producers. The one-sided orientation to the country's rich farm resources, land in particular, natural-and-climatic conditions and manpower is not reasonable with the undeveloped technological, organizational and managerial potentials. Under market economy the principal way to secure the competitiveness of produce is the modernization of production on an innovation basis.

The characteristic feature is now the wide application of innovations in plant production by integrated structures which is connected with forming the supply of exported products and investing in more workable kinds of activity [2]. The leading directions of innovation attraction are the application of energy-saving production technologies, introduction of new crop-growing flow sheets, introduction of biotechnologies, use of new technique and technologies of soil cultivation, product cleaning and storing, application of ecological innovations which correspondingly make it possible to increase yield level and productive efficiency, minimize losses and ensure environmental security (table 1).

Table 1

### **The guidelines for innovation introduction into plant-growing**

Support lines	Basic steps
Biological	new crop varieties and hybrids, resistant to diseases, pests and unfavorable environmental factors
Chemical	combined fertilizers and plant protection systems
Technological	wide-coverage machinery and equipment; minimum soil cultivation technology; resource-saving technologies of product manufacture and storage; ecological crop-farming
Information	specific crop farming elements
Marketing	entrance to new market segments; product quality improvement; expansion of the product range and distribution chain

Source: personal research

The integrated enterprises, while overcoming the crisis situation, widely introduce achievements of science and engineering into farm industry which is manifested in new means of production and innovation technologies as the constituents of the zonal systems of farm management. Properly, this is a complex of measures which makes it possible to accumulate objective information, analyze it and take prompt and effective decisions (Chaban, 2009, pp. 58–63).

It should be noted that today the equipment with the elements of accurate farming technology is already in operation on the fields of domestic commodity producers. Starting from the simplest one operated manually, at the cost of 15,000 hryvnias, to complex autopilots possessing real accuracy which is quite sufficient for growing tilled crops. At the integrated enterprises of Zhytomyr region such as the A.T.K. limited liability company, the Svitanok agribusiness firm, the Raiz-Maksymko private joint-stock company and the Nibulon limited liability company the utilization of computer modules, designed for exercising control over the losses of fuel, seeds and fertilizer rate, with agriculture machinery have gained wide application. Current technologies make it possible to keep records of all the technique of an enterprise, to reflect its arrangement and working condition [7].

The use of the system of navigation monitoring of transportation facilities, when every truck, tractor or harvester is equipped by GPS-navigators, is effective at integrated enterprises. The technology of soil fertility monitoring with the use of electronic charts of electrical soil conductivity, digital relief models and agrochemical analysis data makes it possible to form exact soil property cartograms. The dispatching service is able to exercise round-the-clock control of the machinery operation in electronic mode, and the head of a department can in a few minutes analyze the machinery operation for a week, evaluate its performance quality and plan work for the next day [5]. The scientific approach and the introduction of geoinformation systems into production helps quickly and accurately assess the soil cover state, decrease the volume of field operations and laboratory work, apply scientifically-based mineral fertilizer rate. This technology promotes the reduction in financial expenses, saves time and boosts the productivity of crops grown.

The introduction of innovations, when storing crop products, can be clearly seen in the activities of the A.T.K. limited company in Lubar district which includes Pechanivka plant of grain products, one of the most modern plants of the type in Ukraine. In 2007 the plant was supplemented with the metal storages, manufactured by the US GSI International company, with the total capacity of 55,000 tons and GSI-4000 grain drier of the tower type with the capacity of 125 planned tons per hour. The technological process is controlled by personal computers placed in the controller's offices. The A.T.K. company have introduced the technology of pressurized grain storage in big plastic bags ('big bags') which can contain up to 200,000 tons of grain. The technology of 'big bags' storage has a number of advantages in comparison with the traditional storage technique.

The No-Till technology of direct grain sowing which conserves the content of organic material in the soil has been practiced on the lands of the A.T.K. company for the fourth year running. Due to it, plant remains on the surface of the soil protect it against all kinds of erosion and raise its fertility. As a result, in 2012 the grain crop yielding capacity increased by 10 %, with the sown area being the same. The above cultivation technology is based on the soil protection: grain is sown into stubble remains with the minimum soil structure breakdown and mechanical influence on the soil. The stubble remains form the mulch which retains the soil water and protects the field from the sun water and wind erosion as well as dust storms [9].

Many integrated enterprises are producers of original elite and reproductive seeds. For example, the Ukraina private agricultural enterprise and the Yerchyky private agricultural firm in Popilnya district of Zhytomyr region are attested seed farms in grain crop seed production. The enterprises in question have lines for cleaning, calibrating, sortins and treating grain seeds with special preparations against pests and diseases as well as for packing finished seed farming products in bags. The line is able to accept and process the seeds of such crops as corn, wheat, barley, soya and rape. It is completely automated and computer-controlled. The above enterprises have introduced and adjusted software which tracks the movement of seeds from one machine to another, productivity and state of processing.

It should be noted that innovations can be attracted by economically powerful enterprises with available financial resources. For the large-scale application of domestic and foreign innovations by all commodity producers the adequate state backing is vital. The suggested lines for the innovative activities of agricultural enterprises are shown in table 2.

Table 2

**Lines of support for the innovative activities  
of agricultural enterprises in plant growing**

Support line	Basic measures
Economic	<ul style="list-style-type: none"> <li>• preferential crediting of innovation projects in the agrarian sector;</li> <li>• application of accelerated depreciation rates to the innovative equipment</li> </ul>
Legislative	<ul style="list-style-type: none"> <li>• working-out of the sectoral and regional programs of innovation development of the agrarian sector;</li> <li>• enactment of the Law of Ukraine 'On the venturing in the innovation sphere'</li> </ul>
Organizational	<ul style="list-style-type: none"> <li>• innovation infrastructure development;</li> <li>• financial security</li> </ul>
Information	<ul style="list-style-type: none"> <li>• advisory activity development;</li> <li>• professional training of the agrarian sector workers</li> </ul>

Source: personal research

The actual feature of the issue is partial compensation for the credit rate to the banks that grant credit facilities for acquisition of innovations. We take the view that the introduction of accelerated depreciation rates for nonliquid innovation assets which will allow to reduce the period of innovation investment payback is the special line of promoting the modernization of agrarian enterprise production facilities. The formation of the market infrastructure is of importance when introducing innovation processes in the agrarian sector of the economy. First of all, it must be the development of the organizational forms of science and farming integration, the establishment of technoparks in particular. The measures suggested will contribute to the build-up of production output and increase in the level of competitiveness of domestic enterprise farm products.

## Conclusions

On the basis of the innovation complex in the production sphere, the system of forming stable competitive advantages and raising competitive ability has been established at the integrated enterprises. This approach makes it possible to combine the effectiveness of innovative economic activities of agricultural enterprises and encourage their workers to acquire new knowledge and competence, and thus it is of service for achieving the strategic objectives of an enterprise. The innovations in plant growing are most widely introduced by integrated structures which is connected with the heavy export of grain and oilseed crops. The main lines of innovation attraction are the introduction of new technologies of agricultural raw materials production, plant varieties and hybrids as well as biotechnologies, use of new technique and technologies of soil cultivation, raw materials cleaning and storage, utilization of energy-saving technologies and application of ecological innovations. With the purpose of the wide attraction of innovations by agricultural enterprises, the state backing concerning the compensation of credits, development of the agrarian market infrastructure, collaboration with leading domestic and foreign scientific institutions for innovation transfer to the economic activities of commodity producers are needed.

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