Promising technologies of intellectual agriculture

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Abstract: The future workforce of agricultural enterprises will be mainly engaged in warehousing activities. Therefore, it is important to create an environment conducive to the intellectual growth of young people, which is often caused by crime. The article discusses the expected prerequisites for digitalization and the development of a "smart developed economy" and shows practical progress in agrarian relations. However, priority should be given to human resources for economic development. Modern times require a well-developed system of personnel retraining, organizing the labor discipline of residents engaged in small-scale economic activities, and exploring alternative forms of productive participation within the population. Promising smart agriculture technologies are expected to provide effective and environmentally sustainable pest management, support soil and groundwater restoration and conservation, and ensure continuous monitoring of compliance with organic agriculture certification requirements. An emerging agricultural workforce that is properly trained and equipped with the latest information technologies for smart agriculture plays an important role in the development of modern agriculture. Therefore, a key objective of agricultural sector personnel policies should be to carefully select a highly skilled workforce, nurture human potential, and increase production efficiency through digitization and modernization of all individual agricultural enterprises.

1 Introduction

Agriculture primarily focuses on implementing three main areas of activity to address its overall function.

Ensuring food security by ensuring a stable domestic food supply through the production of high quality agricultural products, raw materials and foodstuffs in line with medical recommendations.

Reduce dependence on imported equipment for food production, processing, veterinary and other critical needs within the agro-industrial park. It also reduces the need for seed imports and encourages domestic substitution of crop growing and breeding materials in livestock and poultry raising.

Promote sustainable growth in the export of agricultural and agro-industrial park products to global agricultural markets.

These tasks cannot be effectively carried out by relying on outdated agricultural technologies, machinery, and equipment. Labor productivity, an important indicator of

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economic efficiency in the Russian agro-industrial complex, lags behind developed countries by 4-4.5 times. Other economic indicators such as profits, profitability, and costs also show significant gaps.

Successfully meeting these challenges requires the development of an adequate level of human capital. Human capital consists of human, social, cultural, and organizational capital, which collectively influence management within an organization and have received considerable attention from theorists and practitioners. It is important to note that knowledge is the binding factor for all these forms of capital. Economists consider knowledge to be a valuable resource, making it an important topic of study within human capital theory. The intelligentization of economic activity is the central trajectory of agricultural development, and the practical realization of this concept corresponds to the principles of a highly developed economy. The "Digital Agriculture" project of the Russian Ministry of Agriculture represents a practical manifestation of these changes.

2 Research Methodology

In recent years, there has been a great deal of interest in human and social capital in the economic sciences. This research focuses on exploring other forms of capital that are closely related to these categories, specifically organizational capital. It is important to emphasize that while the interaction between social and human capital has received a great deal of attention in academia, the aspect of organizational capital within modern economic entities has only recently received significant attention.

Organizational capital plays an important role in integrating the resources of the enterprise in the process of creating value for customers and ultimately shaping the competitiveness of the enterprise. The key innovation of the initiative is the "Digital Rural Economy" digital platform, which serves as an extensive information repository for the agro-industrial complex. A significant part of the project budget will be allocated as free support for farms investing in modernization[1].

Known as "My Farm," the system uses neural networks and internet data to autonomously assess the economic viability of production, consumer behavior, public health indicators, and other economic factors. Based on this analysis, the farm determines the optimal animal species and breeds for breeding (taking into account specified qualitative and quantitative parameters).In the current socio-economic, political and institutional environment, of course, activities are relevant, mainly addressed to small and medium-sized farms, and more often only those that were previously identified by the authors of the study. as "peasant farms" and "family farms". At the same time, as can be seen from the results of surveys of farmers and generalizations from the scientific literature, it includes those who continue family agricultural traditions, work in industry and use the already established material base of the family, as well as those who just join the ranks of farmers without special skills and the necessary material support. Particular attention should be focused on creating the necessary conditions for the activity of young farmers. The results of these policies are important and valuable because they benefit both the subjects of the state, politicians (and farmers).

Regarding the field of support, support for the development of important production infrastructure of farms is carried out by compensating the costs of construction of buildings for livestock (the amount of monetary compensation is 50% of the costs incurred by the farm). The decision on allocation of funds is made by the administrative authorities of the region on the basis of documents confirming the full cost of the construction of the facility, the presence of animals and poultry on the farm, as well as agreements stipulating the obligations of the farmer to use the livestock buildings for the purpose for which years. It is done [2].

Absorptive capacity is the ability of an organization to recognize, absorb, change and use external knowledge, research and experience. Absorptive capacity is defined as the rate at which a company can acquire and apply scientific, technological, or other external knowledge. It assesses an organization's ability to learn.

The value of a company's employee skills, professional training, or other sensitive data that can give the organization a competitive advantage is intellectual capital.

And intellectual capital (IC) is considered a commodity. Intellectual capital encompasses all core competencies and capabilities within a company that can be leveraged to increase profitability, attract new customers, innovate new products, or generally improve the company's market position. This includes the collective skills of the workforce, organizational processes, and other intangible characteristics of the company. Intellectual capital is a valuable asset to a company, but its value is difficult to quantify.It is not explicitly recognized as "intellectual capital" in financial statements; instead, it is generally integrated to the greatest extent possible and often appears as a component of intangible resources and goodwill in accounting, making it difficult to value [3].

Organizations allocate significant resources to developing management expertise and training employees for specific roles in order to enhance the "intellectual potential" of the company. Investments in building intellectual capital generate revenue for the company, although these gains are difficult to measure accurately; however, these investments can bring economic benefits over many years. The three most common the components of intellectual capital are structural capital, relational capital and human capital. Human capital includes all the knowledge and experience of the employees of the organization. Social capital, on the other party, is considered to be “the totality of available and specific resources, integrated, accessible and derived from the network of interactions of the individual or society. In this regard, the term "social" is defined as "the glue that holds communities together" [4].

Some discuss the degree of novelty, such as Secundo et al., distinguishing between radical and gradual in another case, Buenechea-Elberdin refers to "creative followers" who generate additional innovations using any radical invention as starting point. Xu Research et al. and Martin de Castro et al. eliminated widely a common misconception about the breadth of innovation (generation or implementation), focusing on the scale of innovation. However, the adoption of innovations is based on the duplication of already existing information. Under these conditions, companies that generate new knowledge may depend on the intellectual capital, while the development of new knowledge is an experimental process, characterized by diversity, exploration, experimentation, unpredictability and discoveries. The generation and implementation of innovations provide enterprises with different steps.

Relational Capital despite the notion that relational capital has emerged to gain a competitive edge in a changing global context, it has received little attention [5]. There is evidence of reference to relational capital from various viewpoints and conceptual frameworks in the literature’s frameworks for monitoring and evaluating intellectual capital. Relational capital is mirrored in the “client viewpoint,” which examines how to generate value for the customer, match their needs, and why the customer is spending. Agostini and Nosella are contemporary authors who allude to relational capital as “customer capital”, emphasizing their focus on consumer loyalty to the firm and trust in connections. In previous publications, the authors broadened the idea of relational capital to include, in addition to connections with consumers, interactions with vendors, competitors, partners, allies, and public bodies and institutions, and these interactions have been enhanced by technological innovation in communication. The latter is the case with Secundo et al, who broaden the study of organizational–customer interactions, alluding to this kind of intellectual capital as consumer and relationship capital, which have both been

boosted by technological innovation. Along these lines, other authors, such as Alvino et al. (2020), examine its ties with its rivals, suppliers, organizations, and the government in its so-called customer capital.

These authors incorporate client and supplier connections, business image in this investment and technological innovation in basing their arguments. The following hypothesis is proposed based on these arguments: Absorption capacity (AC) was introduced in research from the postulations of Cohen and Levinthal, which referred to an organization's capacity to recognize, incorporate and utilize available information within its environment. [6].

The mediating role of absorptive capacity between human capital and technological innovation is seen when the organization provides a good working environment, space, and effective database, which in turn reduce time wastage and promote the prevailing knowledge toward innovation. Absorptive capacity mediates the relationship between intellectual capital and technological innovation though involving its external parties in its enhanced production of superior products and process innovation. The absorptive capacity is considered to mediate the effects of intellectual capital on technological innovation through the adoption of enhanced ICT techniques, which are critical in the development of new products and adjusting the existing ones toward reduction in cost. It also allows firms to adjust their strategies based on the existing business situation. Intellectual capital is identified as a critical factor in driving external knowledge assimilation. Moreover, the capacity for this incorporation is dependent on previous understanding of the industry, which is regarded as more important than the individuals' sum knowledge. According to Mariano and Walter, empirical studies on AC within the domains of intellectual capital and knowledge management should be oriented toward examining and clarifying the advances of intellectual capital factors to the dynamic processes of firms. Lin et al. investigated the correlation between knowledge loss and declining AC, offering empirical evidence on the effects of knowledge loss, as well as declining performance. Based on these assumptions, the following hypothesis is tested.

3 Results and Discussions

The agro-industrial zone is an important component of the Russian economy and serves as the main producer of essential products, especially those vital for human life. The importance of agriculture is emphasized by its share in GDP [7]. The efficiency and effectiveness of agricultural management has a major impact on a country's level of food safety and biosafety [8]. Agro-industrial complexes are faced with various factors that hinder the effective development of the agricultural sector. These factors include economic uncertainty, intense competition, inflationary tendencies, declining demand, price discrepancies, inadequate investment in enterprise fixed assets, and the need for income replacement.

Currently, the innovative development of Russian agriculture is characterized by the following. Negative aspects:

– Inadequate incentive mechanisms

– Low level of technological modernization within agriculture and an associated imbalance

– Broadly speaking, the growth of agricultural entrepreneurship relies on extensive factors, leading to gross output

– The adoption of innovative technologies is primarily focused on modernizing the material and technical infrastructure

– Insufficient marketing efforts

– Low effective demand for innovative products
– Feeble competitiveness of domestic developments in international markets

Over two-thirds of innovative companies depend on external assistance, primarily due to the lack of a scientific and technological base and financial resources. In particular, only 29% of entrepreneurial farming businesses engaged in innovation have established their own research and development departments. By early 2020, scientific research and development was carried out by 150 businesses, employing a total of 1,310 people. The scientific potential of such entrepreneurial agriculture remains limited, resulting in the production of low-quality agricultural innovations. An examination of the information sources available to agricultural organizations revealed that innovations mainly originate from specialized scientific institutions, provincial or regional agricultural departments, and individual farms. In this context, agricultural extension services, which currently lack infrastructure, have the potential to play an important role.

More than two-thirds of innovative enterprises rely on external support, mainly due to a lack of scientific and technological base and financial resources. In particular, only 29% of agricultural enterprises engaged in innovation have their own research and development departments. As of early 2021, 150 business units, totaling 1,310 employees, were conducting scientific research and development. In this context, agricultural extension services, which currently lack infrastructure, can play an important role.

4 Conclusions

Smart agriculture is recognized as a technology that leverages ICT to overcome climate limitations and increase food production efficiency. It is considered a key technology to mitigate food shortages caused by climate change and a shrinking agricultural population. Accordingly, countries around the world are actively developing these technologies; however, they are faced with the challenge of selecting the most promising technologies that are essential for development [9].

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