Foodnet Market: role of rural schools

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Abstract. Existing directions of Foodnet market technologies development were defined. The correlation between the food culture of schoolchildren and Foodnet market development directions is considered. The role of a rural school in training personnel for Foodnet market is defined. The necessity of purposeful work for the formation of a food culture of teaching students Foodnet technologies: traditional food products; group personalized food; alternative sources of raw materials; precision agriculture; food substitutes; individual personalized food; genomics (plants and animals); durable production methods is indicated. A program of teaching students in this area was developed, including familiarity of students with Foodnet technologies, educational actions to ensure the readiness of students to make a conscious choice in favor of nutrition, a system of educational activities with teachers and parents was developed, focuses on the development of a culture of healthy eating in educational organizations. In the survey of rural students priorities in the choice of profession and knowledge of Foodnet technologies were identified.

1. Introduction

The growth of the world's population, globalization processes that gave rise to a series of economic crises and the desire to create a unipolar world dispelled the myth of the need for an interstate division of labor in the food market. Food security of the state becomes an increasingly important criterion of its sovereignty and the health of its citizens. In particular, the problem of food security is significant for Russia, given its territorial and climatic conditions. Our state needs to preserve the centuries-old traditions of the agrarian state, not only to enter the world market of high technologies of the food industry, but also to take a leading position in it. This benchmark puts the national technology initiative (NTI) for Foodnet market [1]. This personalized food market should ensure the adaptation of high-quality food technologies to the diversity of both current and planned consumer needs. Planning implies the orientation of food culture both on the priorities of a healthy lifestyle, national and territorial mentality, and on individual requests of the body, which guarantee active and professional longevity. The prospects of the Foodnet as a market are confirmed by the interest in it from large campaigns and the volume of investments [1]. Considering the volume and variety of consumers and existing competitors, it is possible to perform such a task if, while maintaining the quality of products, the automation and intellectualization of technological processes are provided all the way from the manufacturer to the consumer.

The National Technology Initiative (NTI) is one of the key benchmarks for the development of our state. This is a state program of measures to create competitive products and services, which should
provide Russia with a leading position in the high-tech markets [2]. NTI is a global task on a national scale.

Special attention should be paid to personnel to ensure the Foodnet market. It follows from the above that it is conditionally possible to distinguish four groups of specialists that are necessary for its implementation. The first group is the group associated with product sales in the Foodnet market, the second group - with the food processing industry and creation of competitive production for the Foodnet market, the third group – personnel providing the automation and intellectualization of the technological processes, the fourth group – professionals directly involved in food production. If the first three groups are able to migrate between NTI markets, the fourth group is geographically connected with it and requires not only the formation of a certain set of professional competencies, but also purposeful work on the formation of all personality substructures. Given that the foundation of such formation is laid in childhood, we focus on the role of rural schools in the development of the Foodnet market. Being skeptical about the prospect of mass migration of citizens to the village, we believe that at all stages of the formation of a rural schoolboy personality, there should be an orientation to his future active role in the implementation of the Foodnet market. Undoubtedly, to take such a role, it is necessary to form production competencies, which are successfully implemented through such forms as work on the school site, participation in the practical activities of agro-industrial enterprises, development of specialized general education programs focused on the specifics of agriculture. These competencies are further developed at the level of professional or higher education. In such a traditional scheme of agricultural specialist training, further development requires the formation of a system of values that correspond to the values of the Foodnet, first of all, food culture.

The formation and active development of these production markets requires the education system to intensify work on training specialists with appropriate competencies. Considering NTI as a reference point for predicting the future actualizes the need for training specialists who can create and develop these technology markets. There is no doubt that these should be highly qualified specialists of the "new formation", having "soft skills", ready for "life-long learning education". Given the horizon of NTI implementation, such work today should be focused on the level of general education.

Despite such a long-term perspective, the education system should already respond to these changes, since 20 years is the time during which those who sit at their desks and are in classrooms will determine the future of Russia. Responding to changes involves first of all assessing the risks of changes in the existing education system [2].

The personalized food market, which is based on advanced technologies for the production and marketing of food products, is called the Foodnet. Its difference from the existing one is that it presents the end user with products of better quality and for less money. The Foodnet includes the following segments: organic and precision farming, alternative sources of raw materials, modern breeding and personalized nutrition. World-class companies see its prospects and actively finance scientific developments in this area. Global investment in the agricultural sector has increased 10-fold over the past 4 years, reaching $4.6 billion in 2015. In recent years, thanks to the achievements of science, decryption the "code of life" – human DNA and other studies of the body, it has become clear that nutrition should be personalized – that is, there are no healthy and wholesome products that are suitable absolutely for every person. Personalized nutrition is a new approach to diet planning and regulation of nutrition habits. This market segment is just emerging [3].

The formation of the Foodnet market is impossible without purposeful work on the formation of food culture.

So, V.I. Grigoryev, D.N. Davidenko, V.A. Chistyakov consider food culture as a theoretical and practical understanding of optimization of the cooking and food consuming processes that contribute to the harmonious physical development of a person, taking into account his heredity [2, p. 4]. Other authors (E.A. Bashmakova, A.V. Bakhmetov, O.I. Zhdanova, V.V. Onishina, O.V. Sidorenko, V.M. Shepel) use the concept of "healthy food culture" as a willingness and ability to properly realize their need for nutrition [5,6]. While various experts are similar in their belief that food culture is part of the common culture, people and society and defines the human activity [7].
Food culture is a reference point that the Foodnet should focus on, in turn, the Foodnet should influence the formation of food culture based on the projected goals and resources (Figure 1).

![Diagram of Foodnet and Food culture](image)

**Figure 1.** Correlation between food culture and Foodnet technologies.

Food culture is formed for life, but its foundations are laid in childhood. Studies show that properly organized nutrition provides harmonious physical development and health of adolescents, as well as affects mental abilities, helps perception and acquisition of knowledge. Students who receive hot meals in a general education organization are less tired, more active in the classroom and remain cheerful and efficient throughout the day [8,9].

Activities implemented in schools, as a rule, are departmental in nature of specific manufacturers, for example, "talk about proper nutrition" — Nestle, "school milk" Programs [https://schoolmilk.info/contacts/](https://schoolmilk.info/contacts/) etc. It should be noted that the weak side of this approach is its orientation to the position of the region, which puts children and teachers in unequal opportunities. The NTI strategy provides for equal opportunities for Russian citizens to participate in NTI markets, including Foodnet, which requires the inclusion of a program for the formation of food culture as a mandatory part of the general education system.

In the implementation of Foodnet technologies, a significant role should belong to the residents of the village, since the migration of citizens to the village is problematic. Therefore, it is necessary to include Foodnet-oriented disciplines in the school curriculum. It is necessary to link the training of these technologies with professional (cognitive component), educational aspect and psychological health. This should be a comprehensive program of rural schools for the development of the Foodnet.

Work on training in Foodnet technologies and formation of a healthy food culture in general education organizations should be carried out in the following areas:

- acquaintance of students with Foodnet technologies;
- rational organization of food;
- implementation of educational programs for the formation of a healthy food culture;
- educational work with parents (legal representatives), involvement of parents in the process of forming a culture of healthy nutrition in the family.

This program includes 3 age groups of students: primary school, middle school and high school. The main goal of this program is the formation of healthy food culture and acquaintance with Foodnet technologies.
The implementation of the developed Program aimed at improving the level of knowledge and practical skills of students provides for:
- organization of clubs, sections, electives on selected topics;
- holding thematic health days, intellectual competitions, contests, Olympiads, holidays, etc.;
- creation of a public council on healthy nutrition, which includes parents and specialists who develop and implement the school's food culture program.

The program provides for various forms of classes organization: integration into the curriculum; health days; classes in clubs, sections; holding leisure activities: competitions, Olympiads, holidays.

The creation of healthy food culture in educational organizations must be systematic, to ensure continuity of the process at different stages, levels of education and be based on interaction with authorities, academic institutions, healthcare institutions, further education and other related organizations [4,6,8].

The specificity of teaching students the Foodnet technology.

When teaching students Foodnet technology it is necessary to give the knowledge about closed biological systems. At the same time, the role of a person in this system, in the process of agricultural production, is reduced to the role of a biosystem engineer. Students should be given knowledge about computer modeling of the environment using augmented reality. Analysis of satellite images will help to preserve the Earth's biodiversity. Students should master agri-biotechnologies, analysis of geospatial data and satellite images of the Earth, augmented reality technologies. Students should have a good knowledge of biology, geography and computer science.

2. Materials and methods
To solve this problem, the following research methods were used: theoretical (analysis of psychological and pedagogical, methodological literature and dissertation research on the studied problem, content analysis, comparison, synthesis of essential characteristics of concepts, generalization of practical experience); empirical (pedagogical observation, questioning).

The study was conducted on the Internet.

The subjects were:
1. Students of 9-11 grades of rural secondary schools of the Udmurt Republic. The study involved 82 students.

The above-mentioned respondents were asked to complete a computer questionnaire.

The purpose of the survey of participants in educational relations was to identify their ideas about the goals of NTI.

Survey of students.
This questionnaire included the following questions:
1. Do you know about the Foodnet market of the National Technology Initiative?
2. Did you want to use Foodnet technologies in your life (group personalized food, individual personalized food)?
3. Would you like to work in the future in the areas of the NTI market: precision agriculture, cultivation of traditional food products, development of food substitutes, genomics (plants and animals), sustainable production methods?

The final result of this survey was the generalization of the results obtained and the writing of conclusions.

3. Results and discussion
Results of the students' survey.
The following results were obtained when the test students were interviewed with the above questions.
To the first question about whether you know about the Foodnet market of the National Technology Initiative, the majority of respondents (96%) answered negatively. The remaining subjects (4%) found it difficult to answer.
To the second question about getting to know the markets of the National Technology Initiative, all respondents said that they would like to use group personalized food and individual personalized food.

To the third question, would you like to work in the future in the areas of the NTI market: precision farming, growing traditional food products, developing food substitutes, genomics (plants and animals), and sustainable production methods, the following answers were received. The majority of subjects answered that they are ready to work, developing the market of Foodnet technologies (78 % - yes, 22 % - no). The greatest priority and interest was aroused by the technologies of precision agriculture and the cultivation of traditional food products.

The obtained empirical data were subjected to mathematical processing using the statistical program SPSS.

Based on empirical data on the methods used in the study, a correlation analysis (Pearson's criterion) was conducted based on the results of a survey of participants in educational relations. The Pearson correlation coefficient (r-Pearson) is used to study the correlation between two variables measured in metric scales on the same sampling. It allows to determine how proportional the variability of two variables is. That is, it is a numerical proportion expressed in a numerical value.

The following significant correlation was revealed (Fig. 2).

![Diagram](image)

**Figure 2.** Correlation galaxy, showing the relationship of the level of readiness of students to implement Foodnet technologies and their level of knowledge about the Foodnet technologies.

### 4. Conclusions

Thus, the study revealed the existing degree of readiness of modern schoolchildren to work and develop in new technological conditions. Need to help students more actively acquainted with the NTI technologies, including Foodnet technologies and prospects of their development. What will make it more effective in the future to build the career trajectory of the future graduate. Due to the fact that the labor market in the future will experience constant changes, focusing on short-term goals will allow a more flexible approach to choosing a profession and, if necessary, changing it.

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