Development of a Methodological Approach for Risk Assessment and Management in the Development of a Project Roadmap: Using the Example of a Roadmap for the Development of Wholesale Food Markets

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Abstract - The author's algorithm for risk assessment in the development of roadmaps for state transformation projects, tested on the case of the development of wholesale food markets, is presented. The author's algorithm includes a formalized description of the 8 main stages of the study and uses both classical risk assessment methods and adapted FMEA analysis tools, mathematical statistics methods used to specify the algorithm, taking into account the need to involve experts in the assessment process. The results of the approbation of the methodology, based on the opinions of 120 experts, are attached. The main risks and ways of their mitigation, developed by the expert group during the analysis of the plan for the state transformation of wholesale food markets in terms of consumer cooperation, are revealed.

Keywords - Quality of public administration, risk management in public administration, wholesale food markets, sustainable development, FMEA analysis.

1. Introduction

The crisis phenomena accompanying external and internal shocks at the present stage of economic development, as well as the uncertainty inherent in various markets, lead to the need to make additional decisions on effective project management, which involve risk assessment [1]. This is especially true within the framework of the current concept of sustainable development, implemented in the state practice of many countries. According to the OECD guidelines, effective risk management does not consist in eliminating risks, but in deciding how to respond to possible future events and scenarios for their development [2]. Within the framework of such a concept, management turns into forward–looking management, the purpose of which is to identify risks that may arise as a result of changes in strategy or the environment in order not only to minimize potential losses, but also to use new opportunities arising from the principles of sustainable economic development [3], [4]. The application of risk management principles in the public sector is expected to facilitate management in complex risky situations and support perceived public value. Risk management can not only contribute to the success of achieving the set goals, but also effectively mitigate the negative perception of the population of managing transformational impacts [5].

However, many researchers recognize that risk management in the public sector is much more difficult than in the private sector. Firstly, this is due to the wide range of stakeholder groups involved, which in most cases conflict with each other, as well as the possibility of political influence, etc. [6], [4]. Secondly, the practical management of government risks is complicated by a large number of operating factors [7].

The increasing attention of scientists and practitioners to this problem leads to the fact that risk management in the public administration system begins to evolve and develop. Government programs in many countries have been redesigned to take into account risk management practices [8]. The experience of countries such as New Zealand, Australia, the United Kingdom (UK), and Canada demonstrates that a risk management system can improve the effectiveness of government programs and turn threats into opportunities [9], [10].

Despite this, there is a lack of systematization of the accumulated body of knowledge on this issue and there is a shortage of comprehensive research that can become methodological developments in this area and used practices in public administration [3].

This work was aimed at creating a practice-oriented risk management methodology in the public sector in the process of forming roadmaps and was tested on a specific case: A draft roadmap for the development of wholesale food markets in the Russian Federation.

The problem of transformation of the state concept of management of wholesale food markets (hereinafter -WFM) has undergone widespread rethinking and rebirth not only in Russia, but in many other countries, starting with European ones such as Spain, France and Germany, and ending with representatives of the Pacific region, including Australia, New Zealand, Japan, India, Indonesia. World practice has shown that the system of wholesale food markets is able not only to solve problems related to optimizing the distribution function of the national food system, but also to bring significant public benefits, helping to improve the well-being of the community, providing wider access to local healthy food. That is why the authors believe that the presented results of the risk study are of particular practical interest [11].

The problem of developing market channels for food sales has been in the Russian Federation since the abolition of the centralized distribution system. In this segment, tasks such as organizing wide sales of perishable goods, reducing losses of manufactured products, ensuring effective quality control of products, and providing necessary services to wholesalers and buyers require solutions. These components have become the basis of state policy in the field of the creation and functioning of WFM in the Russian Federation.

As a rule, the stages of the ongoing state transformation and the action plan for their implementation, which specifies specific performers, deadlines, types of documents and expected results of implementation, are contained in the roadmaps.

Draft roadmap for the implementation of the Action Plan for the Implementation of the Concept for the Development of Wholesale Food Markets in the Russian Federation until 2026 (as far as consumer cooperation is concerned) (hereinafter referred to as the draft roadmap) it was developed taking into account the Concept and Action Plan for the development of the food markets of the Russian Federation [12], [13]. State road maps as a strategic management tool represent a separate practice of road mapping. The priority purpose of drawing up such maps is to approve the regulatory obligations of the controlled structures for the implementation of top–level federal initiatives [14], however, the analysis of risks or development scenarios regarding the mapping object has not been established as a mandatory element of the state roadmap [15], [16], [17], [18], [19].

At the same time, risk assessment should be an important and integral part of the formation of a roadmap, which is due to several reasons.

First, it helps to identify potential threats and difficulties that may arise when implementing the tasks and initiatives outlined in the roadmap.

Secondly, understanding the risks allows users to set priorities correctly, allocating resources to the most risky and important aspects of the project implementation of the action plan.

Thirdly, risk assessment helps to identify exactly where additional resources or specialized skills may be needed, as well as to determine where they can be saved, which makes the implementation of the action plan more effective.

Fourth, having a clear understanding of the possible risks, participants in the action plan can develop a response system or risk management strategies to minimize the negative impact. In addition, transparency in the identification and analysis of risks and willingness to manage them strengthen the confidence of stakeholders (including investors, partners and customers) in a project or initiative can contribute to more efficient use of investments and improve their return.

The risk assessment provides additional information that can be used in decision-making at different stages of the roadmap implementation. Finally, in many industries and fields of activity, there are risk management standards, compliance with which is mandatory. Therefore, risk assessment and subsequent risk management are key to the successful implementation of any roadmap.

The purpose and objectives of the study – the authors set the task of formalizing the risk management algorithm in the process of evaluating and developing a roadmap for a state project using the example of a roadmap for the development of wholesale food markets in the Russian Federation.

In this case, risk is understood as an uncertain event that, if it occurs, has a negative impact on at least one of the characteristics or results of planned activities (for example, timing, cost, content or quality) [20].

2. Research Methodology

The proposed author's framework is described using 11 blocks shown in Figure 1.

It includes the classic stages of risk assessment (risk identification, risk analysis and assessment, risk response, which involves the choice of appropriate methods or ways to prevent them [21], [22]) and it is specified taking into account the need to involve experts in the assessment process. The combination of research approaches used within the framework of the chosen research design made it possible to identify new characteristics of the phenomenon under study based on the use of existing basic theories [23].
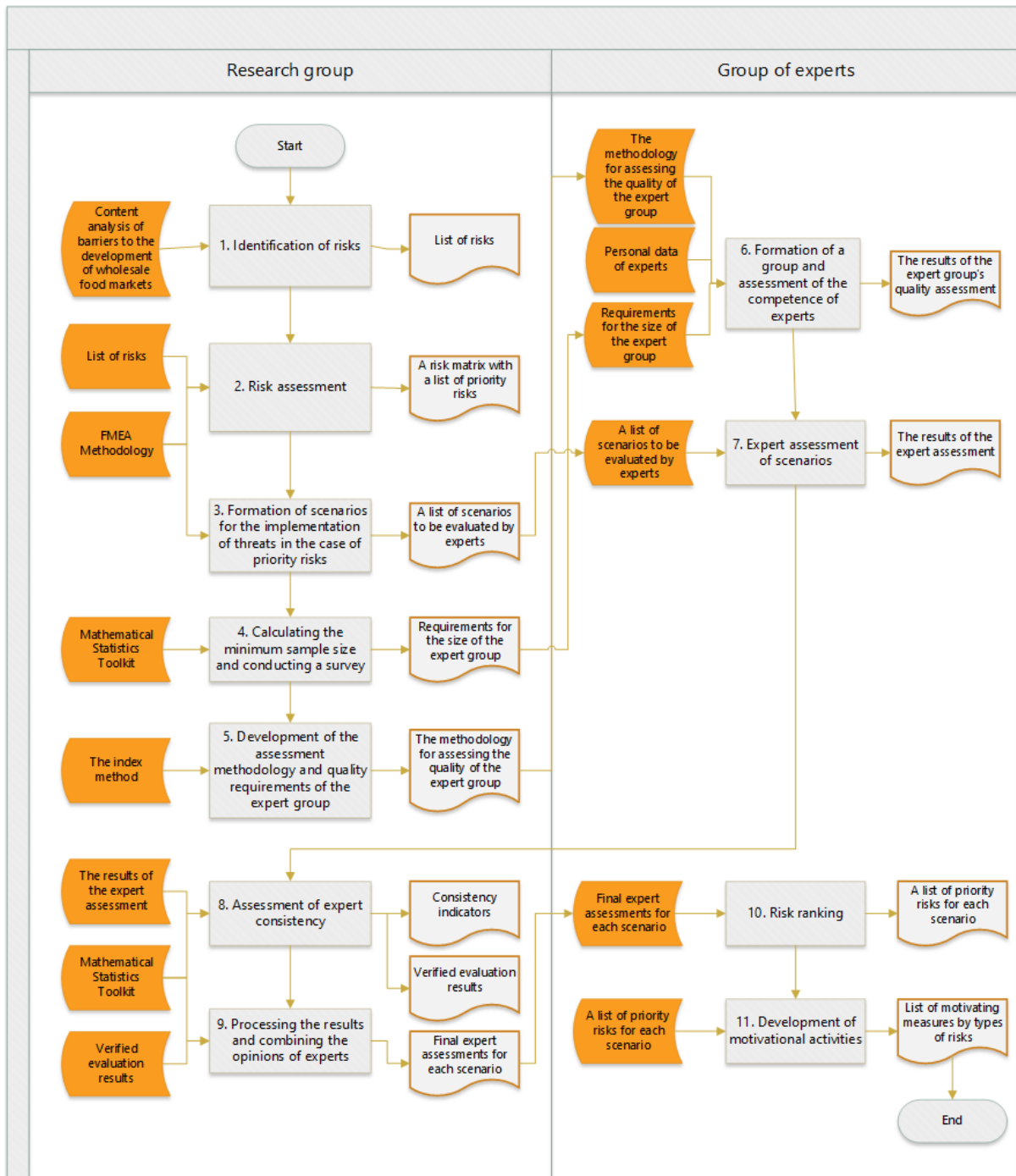

Figure 1. Algorithm for implementing an approach to risk assessment and management in the development of a draft roadma.p

Stage 1. Risks identification

The identification of risks in public administration means the recognition of sources of public risk and the definition of its main subcategories [24]. At this stage, it is important to consider the risk "as is", since later on, at the stages of assessment and communication, it is transformed based on value judgments into a "perceived risk". In this regard, at the stage of forming the risk register for the implementation of the draft roadmap, the identified barriers to the participation of representatives of consumer cooperation in the framework of the creation and development of wholesale food markets were used. This approach is justified because barriers and risks are closely related: if barriers are obstacles or barriers that prevent you from achieving a certain goal or completing a task, then risks are potential events or conditions that, if they occur, may have a negative impact on achieving goals. Thus, barriers can serve as sources of risks. Understanding the relationship between barriers and risks allows users to predict potential problems and adapt development strategies to better cope with unforeseen circumstances.

At this stage, the authors identified 26 types of risks, grouped into the following categories: infrastructural, technological, market, financial, information, economic, administrative, legal, institutional, risks associated with the main stakeholders.

Stage 2. Risks assessment

To solve the problem of identifying the most critical risks of the roadmap project implementation, the FMEA analysis methodology was adapted. Unlike other reliability management tools, FMEA is a proactive method of preventing system failures, rather than a reactive analysis method. That is, its main task is to identify, prioritize and respond to known or potential types of system failures before they occur [25], [26]. Based on the results of expert sessions, the "risk priority number (RPN)" indicator was determined for each of the identified types of risks as a generalized quantitative characteristic of the risk associated with the implementation of the roadmap (formula 1) event

$$RPN = \boldsymbol{S} \times \boldsymbol{O} \times \boldsymbol{I} \qquad (1)$$

S - the degree of destructive influence on the possibility of implementing the event (possible assessment. The rating scale ranges from 1 (low, risk that does not affect the project) to 10 (the most severe, risk, the implementation of which will not allow the project to be realized).

I - the ability to monitor the progress of the event. Assessment scale: from 10 (for risks beyond the control of the actors) to 1 (timely and accurate monitoring of the event allows minimizing the manifestation of risk).

O - the probability of occurrence of a draft roadmap during the implementation of the event. Assessment scale: from 1 (for risks that are unlikely to occur) to 10 (for risks that are highly likely to occur).

Based on the values of the probability of occurrence of risk and the level of exposure to risk and its rank, a risk map for the implementation of the roadmap project was built (Figure 2).

FMEA guidelines [27] require that corrective actions should first be developed in accordance with high values of the degree of destructive influence on the possibility of implementing the event, and then according to the probability of occurrence, therefore, those risks that fell into the red and yellow zones were identified as priority risks that are critical and require immediate corrective action: financial, infrastructural, legal risks, as well as risks associated with key stakeholders; in yellow - information, administrative, market and institutional risks [28]. It is these risks that should be considered first of all when building negative scenarios. The green zone includes economic and technological risks. These risks are not the subject of in-depth analysis and management, since they are either unlikely or the degree of their impact is uncritical.

Stage 3. Formation of scenarios for the implementation of threats in the case of priority risks

As a result of working out the FMEA matrix for each block of measures of the draft roadmap, possible negative scenarios of the development of events were formulated, leading to the formation of risks previously identified as priority (Table 1.)

Table 1. Negative scenarios for the development of the WFM project presented for expert evaluation

Negative scenarios for the development of events for the project on the formation of WFM in the region according to the Action Blocks of the Roadmap
BLOCK I. Improving the regulatory framework for the functioning of wholesale food markets (WFM)
1. Document/initiative to amend the Methodological Recommendations on the organization of wholesale food markets in the Russian Federation, in terms of consumer cooperation, is blocked at one of the stages of approval
BLOCK II. Activities aimed at the development of WFM in the Russian Federation
2. There is no consulting and methodological support for the activities of representatives of state authorities of the subjects of the Russian Federation and representatives of consumer cooperatives on the creation (organization, modernization) and development of WFM or provided at a low level.
3. Developed methodological recommendations on the creation (organization, modernization) of regional WFM and standard models of the organization/schemes of participation of representatives of consumer cooperation in their functioning are not applicable in the applied aspect.
4. The developed list of services and regulations for the provision of consulting and methodological support for the activities of representatives of state authorities of the subjects of the Russian Federation on the creation (organization, modernization) and development of WFM is not relevant / optimal for the region.
5. The public discussion of the necessary measures to support the participation of representatives of consumer cooperatives in the WFM revealed a conflict of interest and blocked the implementation of further measures in the region.
6. Representatives of consumer cooperatives did not participate in the development of a program to support projects for the creation (organization, modernization) WFM in the subjects of the Russian Federation.
BLOCK III. Measures to assess the state of regional wholesale food markets and the degree of participation of subjects
7. When developing the draft (program) methodology of the WFM monitoring system, the specifics of the activities of consumer cooperation entities were not taken into account.
8. Public discussion of the draft methodology of the monitoring system for wholesale food markets, taking into account the specifics of the activities of consumer cooperation entities on WFM, based on a generalization of best practices, revealed a conflict of interest and blocked the implementation of further measures in the region.
9. The WFM monitoring program, taking into account the specifics of the activities of consumer cooperation entities based on a generalization of best practices, has not been approved.
10. Monitoring of WFM, taking into account the specifics of the activities of consumer cooperation entities in WFM, has not been carried out or has not been carried out qualitatively.
11. Information support (public promotion) of the results of monitoring wholesale food markets has not been carried out (or carried out with low efficiency), taking into account the specifics of the activities of consumer cooperation entities in the WFM.
12. The prepared proposals on response measures are not relevant to the results of monitoring of wholesale food markets, taking into account the specifics of the activities of the subjects of consumer cooperation of WFM.
BLOCK IV Measures to enhance the participation of key stakeholders in wholesale food markets
13. There was no monitoring of the assessment of the readiness of executive authorities to participate in WFM, or it was carried out incorrectly
14. Weak information support for the process of promoting WFM as a platform for the sale of consumer cooperation products in the region does not form the institution of stable expectations of WFM participants
15. The mechanism of vertical and horizontal integration of cooperatives with producers and intermediaries with the possibility of forming a production and trade consortium in the future has not been formed or is working inefficiently
BLOCK V Creation of the Institute of professional participants in wholesale food markets
16. There are no specialized federal and regional support programs for participants in the Register of Consumer Cooperation Entities that are participants in wholesale food markets.
17. There is no promotion of regional WFM projects among representatives of consumer cooperation
BLOCK VI Initiation of the creation of a digital ecosystem of participants in wholesale food markets
18. The creation of the concept of an automated system for conducting electronic auctions based on best practices is missing or has not been elaborated in detail.
19. Recommendations have not been made on the creation of a system for consolidating minority sellers' offers for the release and sale of products on wholesale food markets
20. When designing the concept of the digital infrastructure of the ecosystem of WFM participants, including the creation of a conceptual set of functionality (sales and inventory management, price monitoring, food safety tracking system, logistics, insurance and financial services), a number of functions important for this region were not taken into account.
21. There is a low demand for digital trading platforms and platforms with online trade support.
22. There is a decrease in confidence in agricultural products of producers during the transition from the classic interaction between seller and buyer to the digital WFM platform.
23. Proposals have been adopted to create a "Single Window" function for participants in the wholesale food market system, within the framework of a digital ecosystem with excessive functionality, as a result of which the potential of the digital ecosystem is not fully used.

Source: developed by the authors based on the assessments of the expert community and representatives of consumer cooperation

The task of the experts was to evaluate each scenario according to the 4 components presented below. The assessment was made on a three-point scale.

1. The impact of risk on the deadline: low – deadlines are not violated (1 point), medium – delay within the reporting period (year) (2 points); high – delay of more than a year (3 points).

2. The impact of risk on the budget: low – budget excess of no more than 5% (1 point); average – budget excess of 5% to 20% (2 points); high – more than 20% (3 points).

3. The impact of risk on the effectiveness of project implementation: low – the minimum deviation of the ERP functionality from the project initiative (1 point), medium – the ERP is not fully implemented, but with basic functionality (2 points), high – the implementation of the ERP only "on paper" (3 points).

The total effect is defined as the arithmetic mean of the three selected components.

4. The probability of risk occurrence: low – up to 20%; average – from 20-50%; high – over 50%.

Calculating the minimum sample size and conducting a survey

The correct determination of the sample size is an important element of any risk management methodology that uses expert analysis in a scenario approach. The size of the systematic error depends on the sample size, which occurs when the researcher ignores the sample size and uses only superficial similarity measures.

The sample size depends on the design of the study and the type of features that will be studied in the study [29]. Since in our case the volume of the general population is unknown, and the studied feature is qualitative, the sample size will be determined by the formula. 2

$$n = \frac{t^2 \times P \times Q}{\Delta^2} \qquad (2)$$

In economic research, the reliability (significance) level of 0.05 is used as a critical one. At this level of significance, the critical value of the Student's criterion is $t^2 - 1,96$.

The level of acceptable error Δ (confidence interval) is assumed to be equal to 10%. This indicator reflects the interval calculated from the sample data, which with a given probability (confidence) covers the unknown true value of the estimated distribution parameter. For exploratory (primary) research, when the research hypothesis itself is being tested, this value is acceptable. When conducting studies with increased accuracy, the acceptable error level is set at a lower level (1-5%), but this requires a significant increase in the sample size.

Since the expected proportion of the attribute for which the error is calculated is unknown (P), we will set it at 50%, which is the level that corresponds to the maximum error. Accordingly, the indicator Q – the proportion of cases in which the studied trait does not occur will also be equal to 50% (100-P).

Thus, the minimum number of experts who need to be interviewed so that the results can be considered representative, at a given level of reliability, will be 97.

Assessment of the expert's competence

When using the expert approach, it is necessary to take into account its limitations, the most relevant of which is the dependence of the reliability and value of the results obtained on the competence of the interviewees. This necessitates the formulation of requirements for the selection of experts and taking into account the level of their professional competence and experience in the field of research in the final assessment [30]. To do this, in the general methodology of expert assessment of risks and possible measures within the framework of the draft roadmap, the opinion of each expert was considered taking into account his level of competence, because an insufficient level of expert competence can lead to distortion of the results, which in turn reduce the quality of the examination. [31], [32].

Subjective indicators are used to assess the level of argumentation of experts' answers. They are determined as a result of the expert's self-assessment based on judgments about his awareness of the problem being solved and the indication of typical sources of argumentation of his opinion [33], [34]. In the general methodology of expert risk assessment and possible measures within the framework of the draft roadmap, it is very difficult to assess the level of expert awareness, therefore, it was decided to use only objective (provable) indicators.

Thus, the assessment of the expert's competence was carried out on the basis of the following indicators:

The level of the position held. Traditionally, a five-point assessment scale is used here, but in our case, the division into specialists and junior specialists is not advisable, since junior specialists may not be competent enough in the issue under study, therefore, it was decided not to involve this group of specialists in an expert assessment. As a result, the following scale was used for the indicator (Table 2):

Table 2. Scale of assessment of the level of the expert's position

The level of the position held	The assigned score
senior management (for universities - dean and above)	10
heads of departments (for universities - head of department or similar department)	7,5
leading specialist (for teachers - professor)	5
specialist (for teachers - associate professor, senior lecturer)	*2,5*

Source: developed by the authors.

1. *Work experience.* Work experience will be assessed on an interval scale presented in Table 3.

Table 3. The scale of evaluation of the expert's work experience

Work experience	The assigned score
1-5 years	1
5-10 years	5
Over 10 years	10

Source: developed by the authors.

2. *Duration of work experience in the field under study.* Taking into account the fact that both practical experts and experts from the scientific community were involved in the assessment, both scientific and practical experience were evaluated equally in the methodology of expert assessment of risks and possible measures within the framework of the draft roadmap. If the expert has both practical and scientific experience, then it has been summarized and determined according to any of the scales presented below. The scale used to assess the duration of work experience in the field under study is presented in Table 4.

Table 4. Scale of assessment of the duration of the expert's work experience in the field under study

Duration of work experience in the field under study	The assigned score
- practical experience in the field of consumer cooperation	
1-5 years	1
5-10 years	5
Over 10 years	10
- scientific experience in the field of consumer cooperation	
1-5 years	1
5-10 years	5
Over 10 years	10

Source: developed by the authors.

The final coefficient reflecting the expert's level of competence ($К_{к.экс.}$), is determined by the form. 3:

$$К_{к.экс.} = w_1 \times К_д + w_2 \times К_с + w_1 \times К_{оп}, \quad (3)$$

where $К_д$ – the assigned points, according to the scale corresponding to the level of the expert's position;

$К_с$ – the assigned points, according to the scale corresponding to the assessment of the expert's work experience;

$К_{оп}$ – the assigned points, according to a scale corresponding to the assessment of the duration of the expert's work experience in the field under study;

w_1, w_2, w_3 – Accordingly, the weight of the indicators is the level of the position held, the length of work, the duration of the expert's work experience in the field under study in the overall assessment of the expert's competence. In the methodology of expert assessment of risks and possible measures within the framework of the draft roadmap, these weights were taken as $w_1 = 0,3; w_2 = 0,3, w_3 = 0,4$.

Assessment of the consistency of expert opinions.

A prerequisite that guarantees the quality of an expert forecast is a high consistency of expert opinions. As studies of game theory in the social sphere show, participants receive significantly greater payoffs if they choose the same or corresponding strategies than if they choose different strategies [35]. If, at the stage of analyzing the results, heterogeneity of expert opinions is revealed, then it is necessary:

First, to assess the consistency of expert opinions on each of the analyzed features and compare it with the level of consistency across the whole set.

Secondly, it is necessary to analyze the responses of experts with similar opinions and identify the reasons for the discrepancy. If such reasons are objective, it is necessary to identify separate subgroups of such experts and further analysis should be carried out taking into account the reason that caused a significant differentiation of opinions.

Thirdly, if the cause could not be identified, it is necessary to remove the "outliers" that distort the average estimates of experts.

Thus, in our case, the assessment of the consistency of expert opinions should be carried out in 2 directions:

1. *General assessment of the consistency of expert opinions in the group.*

Since it is necessary to calculate the degree of consistency for experts in a group containing more than two people for the ordinal scale (it is used in risk assessment), the Kendall concordance coefficient of variance (W) was chosen to solve this problem, which is determined by the formula. 4 and 5 [36], [37]:

$$W = \frac{12 \times \sum_{j=1}^{n} D^2}{m^2 \times (n^3 - n)}, \qquad (4)$$

where W – the coefficient of rank concordance;
D – the sum of the squares of the ranks;
m – the number of ordinal variables to be analyzed;
n – the number of objects of the ranked attribute or the number of experts.

The sum of the squares of the ranks is calculated according to the formula. 5.

$$D = \sum_{i=1}^{n} r^2{}_{ij} - \frac{[\sum_{i=1}^{n} r^2{}_{ij}]}{n}, \qquad (5)$$

where – the rank of the i-th factor according to the j-th expert.

The values of W are in the range [0; 1]. At the same time, it is usually assumed that W values from the range [0;0.3] indicate low consistency of expert opinions, and from the range [0.7;1] – high.
The significance of the concordance coefficient (statistical significance) was checked using χ^2 distributions, when the null hypothesis H_0 about the inconsistency of expert opinions is tested.

2.   *The consistency of expert opinions on the j-th factor* can be determined using the coefficient of variation of estimate*(V_j)* (see formula 6):

$$V_j = \frac{\sigma_j}{s_j} \qquad (6)$$

where σ_j – the standard deviation of the values;
s_j – the arithmetic mean of the estimates of a certain factor.

The coefficient of variation of estimates characterizes the degree of dispersion of expert opinions in relation to the average value of the overall assessment. The greater the degree of consistency of experts, the lower the value of the indicator V_j. The degree of consistency of expert opinions is considered satisfactory if the coefficient of variation does not exceed 0.33, and good when the coefficient of variation is not more than 0.2 [37].

Combining the opinions of experts

The aggregation of expert judgments is the production of a consensus distribution f(θ) as a function of individual distributions {f1(θ),....., fn(θ)}. There are several ways to aggregate expert judgments [31].
1.   Linear consensus distribution f(θ).
In this case f(θ) is defined as the weighted average of individual distributions with weighting coefficients, the sum of the values of which is equal to 1 (see formula 7).

$$f(\theta) = \sum_{i=1}^{n} w_i \times f_i(\theta) \qquad (7)$$

The simple average (equally weighted) is $w_i = 1/n$ (for n experts); otherwise, weights are selected depending on the level of expertise of the experts.
2.   Logarithmic consensus distribution f(θ).
In this case f(θ) it is defined as the weighted average geometric number of individual distributions (see formula 8)

$$f(\theta) = k \times \prod_{i=1}^{n} f_i(\theta)^{w_i} \qquad (8)$$

where k — a normalizing constant that ensures that *f(θ)* integrates into 1.

The choice of the method depends on the possible level of bias in the estimates, and this may be determined by several factors. Firstly, it can be laid down by the very scheme of forming an expert group. In the case of the formation of a so–called symmetric group, when the pool of experts consists of several specialists on the same problem, the bias in estimates is usually lower than when forming an asymmetric group, when experts on different aspects of the problem are included in the pool. Secondly, it may be related to the level of competence of the expert group. If the pool of competence experts is heterogeneous and the coefficient reflecting the consistency of expert opinions is low, then it is recommended to use a logarithmic consensus distribution.

It should be noted that the linear consensus distribution f(θ) opinions are more widely used in practice, while the logarithmic pool of opinions is largely ignored.

The methodology of expert assessment of risks and possible measures within the framework of the draft roadmap provides for the formation of a symmetrical group of experts, as well as the establishment of weights depending on the level of competence and the definition of an indicator reflecting the consistency of experts. In this regard, the definition of a specific way to combine expert opinions will depend on the values of these indicators obtained at the stage of analyzing the results of the expert survey.

Risk ranking

Ranking is the process of determining ranks, relative quantitative estimates of degrees of difference based on qualitative characteristics [38]. Experts need to rank the risks of the presented threat scenarios according to the degree of significance and probability of their implementation. To determine the final rank of the threat implementation scenario, a simple ranking method will be used, when experts place ranking objects in descending order of their importance. Ranks are indicated by numbers from 1 to m, where m is the number of ranks. The sum of the ranks S_m in this case, it will be equal to the sum of the numbers of the natural series (formula 9):

$$S_m = \frac{m \times (m+1)}{2} \qquad (9)$$

When analyzing this section of the expert questionnaire, it should be remembered that the ranking of objects contains only information about which of them is more preferable, but does not make it clear how much or how many times one object is preferable to another.

3.   Research Results

In fact, more than 120 experts from 12 subjects of the Russian Federation, representing both the scientific community and practitioners, participated in the study, therefore, the level of acceptable error Δ (confidence interval) was 8.95% due to an increase in the number of observations.

According to the grouping of experts on the actual level of competence presented in Table 5, a high expert rating was assigned to 60% of the experts who participated in the survey. Only 10.8% of experts have a low level of competence (0-2.5).

Table 5. Grouping of experts by competence level

Expert's rank	Number of experts, person	Share in the total number, %
0-2,5	13	10,8
2,5-5	21	17,5
5-7,5	14	11,7
7,5-10	72	60,0
The overall result	120	100,0

Source: calculated by the authors based on the survey conducted

The final coefficient of concordance of experts was 0.43, which indicates sufficient consistency of opinions. Checking the significance of the concordance coefficient confirmed this conclusion.

The following conclusions were obtained for the main analyzed risk groups:

<u>The risk of running out of time or the risk of falling behind the project schedule</u> is one of the most common components of the manifestation of risks, which is more or less characteristic of almost all projects planned for implementation. It is most often and most strongly manifested in dynamic projects with many interrelated subtasks. The draft of the roadmap under consideration is precisely one of such projects. In the future, the risk of falling behind schedule may affect other aspects, such as budget, deadlines, and overall project effectiveness.

From the point of view of experts, scenarios have significantly different effects on the probability of falling behind the project schedule: experts' estimates of the presented negative scenarios in this risk profile range from 1.43 to 2.34 on a three-point scale (Fig. 2).
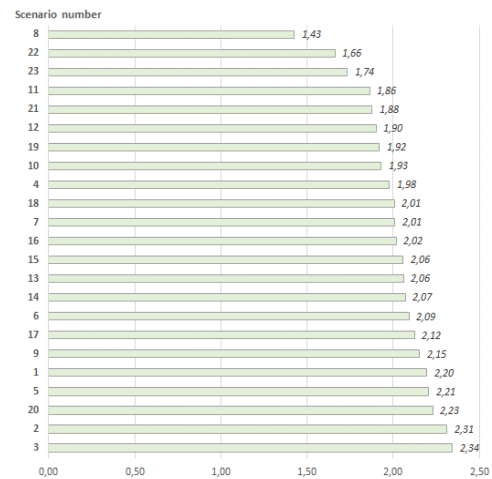

Figure 2. The results of experts' assessment of the impact of negative scenarios on the duration of the project (average impact score)
Source: calculated by the authors based on the survey conducted

Experts consider scenario 8 to have the lowest impact on the timing of the project: "Public discussion of the draft methodology for monitoring wholesale food markets, taking into account the specifics of the activities of consumer cooperation entities on WFM, based on a generalization of best practices, revealed a conflict of interest and blocked the implementation of further measures in the region." For this scenario, the impact on the timing was estimated at an average of 1.43, that is, experts believe that even if it is implemented, the project deadlines will practically not be violated. At the same time, there is a high consistency of opinions: 66.7% of experts assessed the manifestation of such a risk at level 1, that is, as insignificant (Fig. 3).
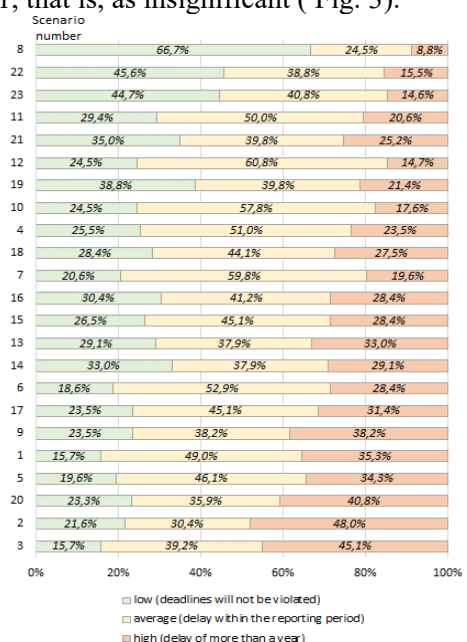

Figure 3. The results of the distribution of estimates of the impact on the duration of the project by experts for each negative scenario
Source: calculated by the authors based on the survey conducted

Negative scenarios associated with the initiation of the creation of a digital ecosystem of participants in wholesale food markets also have a minor impact on the timing. All these scenarios received an average expert assessment of this risk characteristic below 2.

– 19 (no recommendations were made on creating a system for consolidating minority sellers' offers to enter and sell products on wholesale food markets, – 1.91 points);

– 21 (low demand for digital trading platforms and platforms with online trading support, – 1.88 points);

– 22 decrease in confidence in agricultural products of producers during the transition from the classic interaction between seller and buyer to the digital ERP platform, – 1.66 points;

– 23 the "Single Window" function for participants of the wholesale food market system within the digital ecosystem is implemented with excessive functionality, as a result of which the potential of the digital ecosystem is not fully used, – 1.74 points.

The exception to this block is scenario 20 (2.23 points), which assumes that when designing the concept of the digital infrastructure of the ecosystem, WFM participants did not take into account a number of important functions for this region. This scenario received one of the highest ratings for the impact on the timing of the project, – 2.23 points. However, it should be noted that the level of expert consistency in this case is not unambiguously high: more than half (41.2%) of respondents believe that if this scenario is implemented, the delay will be more than a year, 36.3% of experts noted that the delay of the project will be within the reporting period, and 23.5% – that there will be no delay at all.

The scenarios, the implementation of which, according to experts, is most capable of influencing the timing of the draft roadmap, belong to the block of measures aimed at the development of WFM in the Russian Federation. Scenario 3 has the highest impact on the timing of the project: its impact is estimated at 2.34 points. Experts believe that poorly developed and not applicable in the applied aspect methodological recommendations on the creation (organization, modernization) of regional WFM and an irrelevant list of services and regulations for the provision of consulting and methodological support for the development of WFM can significantly shift the timing of the project. A delay of more than a year in the case of scenarios 3 and 4 is predicted by 45.1% and 48.0% of experts, respectively.

One possible way to mitigate the risk of falling behind the project schedule is to increase the time available for various tasks that are bottlenecks of the project.

At the same time, it should be understood that an increase in time only provides additional opportunity for maneuver and adaptation in the event of a negative scenario, but the risk will not be completely leveled.

The second important characteristic of risk is the impact on the project budget. This is a risk associated with excessive additional costs that arise in the event of overspending of funds originally budgeted for the project. The results of the assessment of this risk characteristic are presented in Fig. 4.
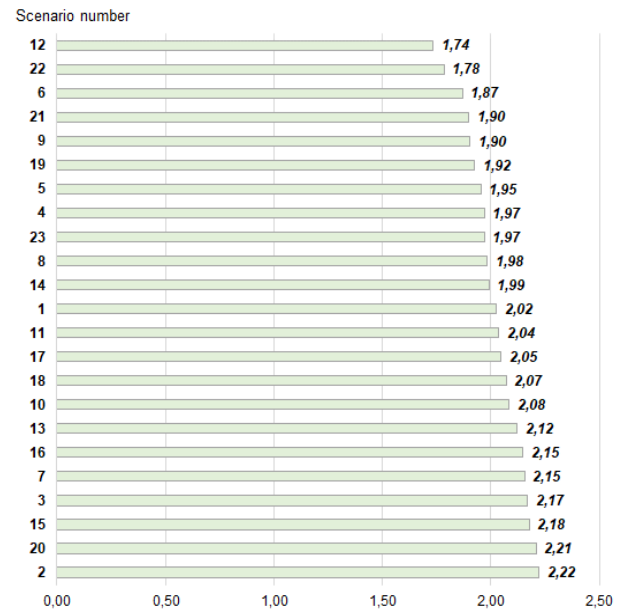

Figure 4. The results of experts' assessment of the impact of negative scenarios on the project budget (average impact score)
Source: calculated by the authors based on the survey conducted

According to experts, the implementation of 2 scenarios (2.22 points) may cause the most increase in the cost of the project, assuming that consulting and methodological support on the creation (organization, modernization) and development of WFM will either not be developed or will be provided at a low level. Experts see the main reasons for the implementation of this scenario in the absence of relevant specialists in the regions and the lack of their qualifications and experience in this matter. As a migration measure, the organization of centralized training of specialists engaged in this consulting is proposed.

In second place in terms of the impact on the project budget is scenario number 20 (2.21 points), in which the risk is realized that when designing the concept of the digital infrastructure of the ecosystem of WFM participants, a number of important functions for a particular region were not taken into account.

Here, experts point out the possible lack of feedback from the regions when designing the system and the likelihood of creating a single system that does not take into account the specifics and level of access to modern technologies necessary for the creation and development of digital WFM infrastructure in each region.

The implementation of both of these scenarios may occur due to a lack of understanding of user requests and requirements, as a result of which potential market participants may either refuse to participate in the project, or their activities will not reach the level and volumes envisaged by the project. It should be noted that scenarios 2 and 20 are also among the top 3 most risky and most likely to delay the project deadlines.

In third place in terms of the impact on the budget, experts put scenario 15 (2.18 points), suggesting that it will not be possible to effectively form a mechanism for vertical and horizontal integration of consumer cooperatives with producers and intermediaries. This, according to experts, may be due to two main reasons. Firstly, there may be a lack of an appropriate legal framework, which may complicate the process of formal integration. Secondly, there is a potential conflict of interest between cooperatives and producers, who may not want to cooperate with cooperatives if they have direct access to wholesale markets.

However, in general, the assessment of the impact of the implemented negative scenarios on the project budget is quite low: there is approximately the same distribution of opinions on all possible estimates (Fig. 5.).
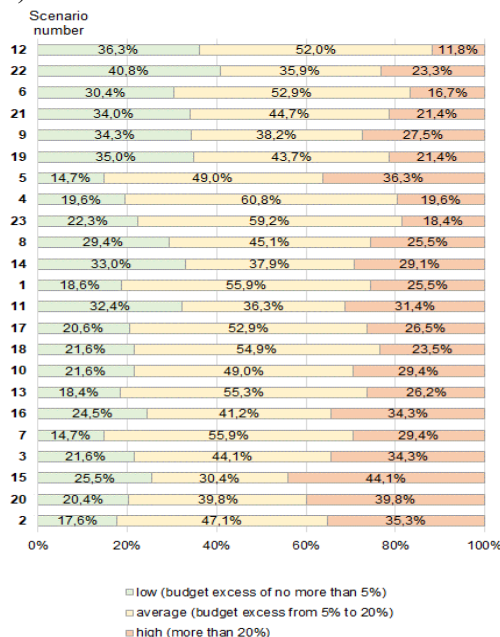

Figure 5. The results of the distribution of estimates of the impact on the project budget of experts for each negative scenario
Source: calculated by the authors based on the survey conducted

The greatest difficulty for experts was the assessment of the impact on the budget. This is partly due to the fact that the information about the project budget is not final, and experts answered this question in conditions of insufficient data. At the same time, it is with regard to the implementation of the most risky scenarios in terms of the impact on the project budget that the highest consistency of experts is observed. 44.1% and 40.2% of respondents believe that the implementation of the 15th and 20th scenarios will lead to an increase in costs by more than 20%. According to scenario 2, the consistency of experts is somewhat lower: only 35.3% believe that it can cause an increase in costs by more than 20%, and 17.6% of experts believe that the excess costs in the case of this scenario will not exceed 5%.

The third characteristic of risk is the impact on efficiency – the ability to achieve the set results. The results of the experts' assessment of this risk component are presented in Fig. 6.
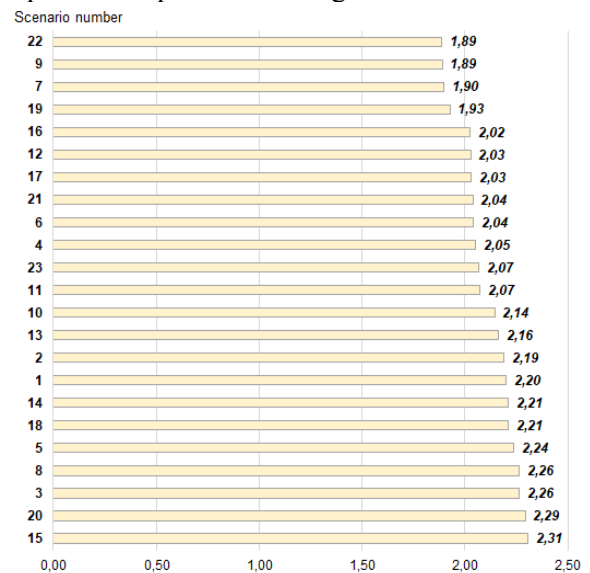

Figure 6. The results of the expert assessment of the impact of negative scenarios on the effectiveness of the Project
Source: calculated by the authors based on the survey conducted

Experts also attributed scenarios 15 and 20 (2.31 and 2.29 points, respectively) to the most strongly influencing efficiency. Thus, these scenarios have some of the highest ratings for all 3 risk components. However, with a slight gap, they are followed by scenarios 3, 5 and 8 (2.26; 2.24 and 2.26 points, respectively). They provide for the possibility of a conflict of interest between WFM participants at various levels and blocking the implementation of further activities in the region. Experts cite possible competition for a limited sales market or supply volume as the main reasons for the conflict of such interests. Moreover, the first reason, in their opinion, is the most likely.

The highest level of expert consistency in terms of the impact on project effectiveness is typical for 15 and 8 scenarios (Figure 7).

The lack of an effective mechanism for vertical and horizontal integration of cooperatives with producers and intermediaries will lead to a formal level of project implementation, according to 48% of experts.

The absence of a monitoring system for wholesale food markets, taking into account the specifics of the activities of consumer cooperation entities, will lead to the same result (49% of experts).

Regarding the impact of scenario 3, concerning the applicability of methodological recommendations on the creation (organization, modernization) of regional WFM, expert opinions differ. The majority of respondents (48%) believe that the low level of their practical development will lead to the introduction of an WFM system with only basic functionality, 13.7% of experts believe that this fact will have virtually no impact on the effectiveness of the project, and 38.2% assess the impact of this scenario as strongly negative, it can lead to the implementation of an WFM development project in the regions, only "on paper".
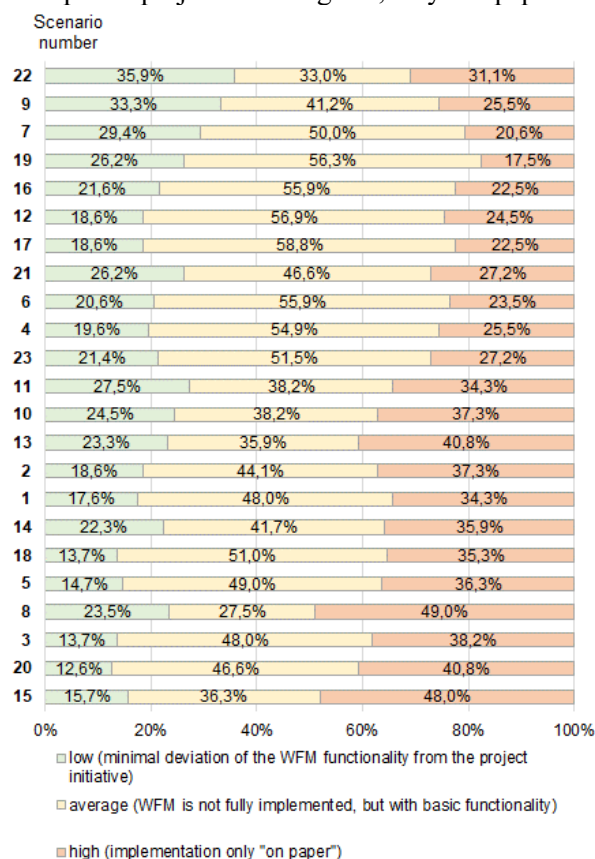

Figure 7. The results of the distribution of estimates of the impact on the effectiveness of the project by experts for each negative scenario
Source: calculated by the authors based on the survey conducted

As a result, the risk value for each scenario was determined as the product of the probability of risk occurrence by the corresponding consequences for all three characteristics presented above. The results are shown in Table 6.

Table 6. Results of the expert assessment of the risk register of the draft roadmap for the implementation of the action plan for the implementation of the concept of development of wholesale food markets in the Russian Federation (in terms of consumer cooperation)

Scenarios	Impact on duration	Impact on budget	Impact on effectiveness	The total impact of the risk	The probability of occurrence	The size of risk
1	2,20	2,02	2,20	2,14	1,68	3,61
2	2,31	2,22	2,19	2,24	1,90	4,25
3	2,34	2,17	2,26	2,26	1,78	4,00
4	1,98	1,97	2,05	2,00	1,71	3,43
5	2,21	1,95	2,24	2,13	1,93	4,11
6	2,09	1,87	2,04	2,00	1,97	3,94
7	2,01	2,15	1,90	2,02	2,05	4,15
8	1,43	1,98	2,26	1,89	2,11	4,00
9	2,15	1,90	1,89	1,98	1,88	3,72
10	1,93	2,08	2,14	2,05	1,83	3,75
11	1,86	2,04	2,07	1,99	1,94	3,86
12	1,90	1,74	2,03	1,89	1,93	3,64
13	2,06	2,12	2,16	2,11	1,81	3,83
14	2,07	1,99	2,21	2,09	1,64	3,43
15	2,06	2,18	2,31	2,18	1,78	3,87
16	2,02	2,15	2,02	2,06	1,78	3,68
17	2,12	2,05	2,03	2,07	1,85	3,82
18	2,01	2,07	2,21	2,10	1,71	3,59
19	1,92	1,92	1,93	1,92	1,58	3,04
20	2,23	2,21	2,29	2,24	1,87	4,19
21	1,88	1,90	2,04	1,94	1,91	3,70
22	*1,66*	*1,78*	*1,89*	*1,78*	*1,63*	*2,89*
23	1,74	1,97	2,07	1,92	1,84	3,54

Source: calculated by the authors based on the survey conducted

The analysis of the data obtained made it possible to classify scenarios into 3 groups:

– <u>low-risk</u> (the risk value is less than 3).

Only one scenario fell into this group – 22, which assumes a decrease in confidence in agricultural products of producers during the transition from classical interaction between seller and buyer to a digital WFM platform. Despite the fact that experts assessed the impact of this scenario at an average level, the probability of this scenario occurring was estimated as the lowest of all possible. More than 35% of experts rated it below 20%.

Experts referred to scenarios with a <u>high level of risk</u> (the risk value is greater than or equal to 4) (in the order of decreasing risk value): 2 (4,25), 7 (4,15), 20 (4,19), 5 (4,11), and 8 (4,00).

2, 3 5 scenarios represent negative events, which may affect the block of measures aimed at the development of WFM in the Russian Federation.

Scenarios 2 and 3 concern consulting and methodological support for the activities of representatives of state authorities of the subjects of the Russian Federation and representatives of consumer cooperatives on the creation (organization, modernization) and development of WFM. Experts believe that the poor quality and isolation from the practical application of consulting and methodological support can lead to serious consequences related to both the delay in the implementation period and the effectiveness of the project as a whole.

However, experts differed on the likelihood of these scenarios being implemented. About 23.5% of the surveyed experts estimated the probability of a low quality of the development of consulting and methodological support above 50%. The majority (40.2%) believes that this probability is slightly lower and is in the range of 20-50%. The overwhelming majority of specialists (63.7%) estimated the probability of inapplicability of these recommendations in the applied aspect at the level of 20-50%.

As a migration measure, the experts suggested that an examination of such materials be carried out by interested parties.

Scenarios 5 and 8 consider the possibility of a conflict of interest between stakeholders in the process of developing measures to support the participation of representatives of consumer cooperatives and approving the methodology of the monitoring system for wholesale food markets. Moreover, the probability of such a development is predicted as high (more than 50%) for scenario 8 (conflict at the level of methodology development) – 28.6% of experts, and for scenario 5 (conflict at the level of development of measures to support the participation of representatives of consumer cooperation) – 20.6% of experts.

Scenario 7 assumes that when developing a draft (program) methodology for the WFM monitoring system, the specifics of the activities of consumer cooperation entities will not be taken into account. At the same time, 23.5% of respondents believe that this is a highly probable event, and 55.9% – an average probability.

As measures to reduce the likelihood of such events, experts suggest:
- inclusion in the working group of representatives of all stakeholders, including representatives of consumer cooperatives and wholesale food markets;

- to ensure the independence of experts who will develop a methodology for monitoring wholesale food markets;
- regularly inform stakeholders about the progress of the project and provide them with the opportunity to express their opinions and suggestions.

Scenario 20 implements the risks of designing the concept of the digital infrastructure of the ecosystem of WFM participants, which assumes that in the process of creating a conceptual set of functionality (sales and inventory management, price monitoring, food safety tracking system, logistics, insurance and financial services), a number of functions important for this region will not be taken into account.

The probability of this event at the level of more than 50% is estimated by 24.3% of experts, and at the level of 20-50% – 39.8%.

As mitigation measures, experts suggest:
- studying the experience of implementing similar projects in other countries;
- creating a prototype of the product and testing its functionality in real conditions;
- using agile methodologies in development to quickly respond to changes in requirements and make adjustments to the product.

Thus, experts believe that the greatest risks of the project are associated with the supporting infrastructure aimed at methodological support and implementation of the conceptual functionality of the ecosystem of WFM participants and their specification for the needs of a particular region, as well as with possible hidden conflicts that may arise between stakeholders in the process of implementing the draft roadmap for the implementation of the action plan for the implementation concepts for the development of wholesale food markets in the Russian Federation (in terms of consumer cooperation).

4. Conclusion

The purpose of this work is to create a certain scientific contribution to the dissemination of a culture of improving the quality of public administration through the introduction of scientifically based risk assessment tools into practice. The proposed method of expert assessment of risks and possible measures, tested on the example of the draft roadmap for the implementation of the action plan for the implementation of the concept of development of wholesale food markets in the Russian Federation (in terms of consumer cooperation), allows us to obtain a fairly reliable assessment of the impact of risk factors, since it takes into account the opinion and experience of different specialists, the level of consistency of their points of view.

In our opinion, the results of the study themselves are very valuable, since, as analytical experience shows, the problems arising in the development of the wholesale food market system are not unique.

In addition, the problem of food security and sustainable development makes this experience very relevant. That is why the logic and opinion of the presented expert group, as well as their reaction to risk, which involves the choice of appropriate methods or ways to prevent risks in the field of state transformation of wholesale food markets in the country, is a very valuable result and the basis for a possible discussion.

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