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CONCEPTUAL APPROACHES TO ECONOMIC RISK MANAGEMENT AT THE ENTERPRISES OF AGRO-INDUSTRIAL COMPLEX IN BELGOROD REGION

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ABSTRACT

The article describes the conceptual approach to economic risks management at agroindustrial complex enterprises. This research presents the definite algorithm of risk management conception at agrarian sector enterprises. It involves the analysis of special aspects and particular characteristics of economic risks at agroindustrial complex enterprises; identifying the whole range of risks, which the enterprises under research face; allocating the place for risk management in the enterprise management system; the task of setting up a risk management system; securing the principles of economic risk management; drawing up an agroindustrial enterprise risk analysis pattern; interpreting the subsystem of coordination and control over risk management processes; interpreting the subsystem of monitoring the enterprise and its business environment; interpreting the subsystem of identifying risk factors and revealing the risk; interpreting the subsystem of risk analysis and risk assessment; interpreting the subsystem of developing measures for risk management; identifying measures of economic risk management efficiency; a general conclusion and formulation of proposals. The research resulted in drawing up an algorithm flowchart with feedback loops showing risk analysis at an agroindustrial enterprise. The chart illustrates the interaction between risk management subsystems. The article also presents an economic risk register which identifies the risks agricultural enterprises may face within the enterprise, region and country. In the table, risks are grouped into three types: macrolevel, mesolevel, and microlevel. The article also describes the concept of "risk profile", a document containing information about risk areas, risk criteria as well as guidelines on measures to prevent or minimize risks.

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1. INTRODUCTION

The results of economic activity always depend on random factors. Thus, the given sphere constantly functions under risk and uncertainty. Out of all the sectors of national economy, only the agricultural sector is exposed to such a number of specific economic risks. The risk impact on the results of an activity is not to be disregarded in the development of the effective performance of enterprises. Therefore, the study of theoretical materials and practical recommendations gives us an opportunity to build the conceptual algorithm of risk management and offer it to the enterprises of the Belgorod region agroindustrial complex. Such an algorithm is under review in the given article.

2. THEORY

The investigation of the economic essence of the risk category showed that in the agricultural sector external and internal conditions give reason to the specific common features attributed to risk. Both such typical features as controversy, optionality, uncertainty and the specific ones typical of an agricultural complex performance should be considered. They both play a significant role in the formation of the risk management system.

The development of a methodological basis for applying risk management in the operation of enterprises, corporations and other businesses is becoming one of the high-priority agricultural economy directions in modern Russia. It is not just imbedding the practices of foreign agricultural companies into local environment but a creative search for new solutions [Fomichev, 2016].

The objective of the risk essence study is not to exclude the uncertainty in a business situation, but to learn how to vary it in order to eliminate possible negative consequences or obtain prospective positive results in the performance of an industrial structure. The study suggests that risk essence may be described as an entrepreneurial risk which is a specific result of a business activity obtained in the system of a market-oriented economy that also determines a risk as a possibility of sustaining a loss as a result of a planned act or solution while conducting business or profit-making. These are two sides of one and the same roadmap under the realization of managerial solutions or acts functioning in the same direction – the higher the profit the higher the risk [Golubjatnikova, 2017; Dogil, 2005; Herbert and Link, 1982].

Conceptually, the risk management process in business bears little or no difference from the classical management process of any enterprise. Thus, economic risks are naturally correlated to all management functions, such as: planning, organization, operations management, deployment of staff and control. To some extent, each of these functions is risk-related and requires the creation of a specific-risk-situation adjusted system of management.

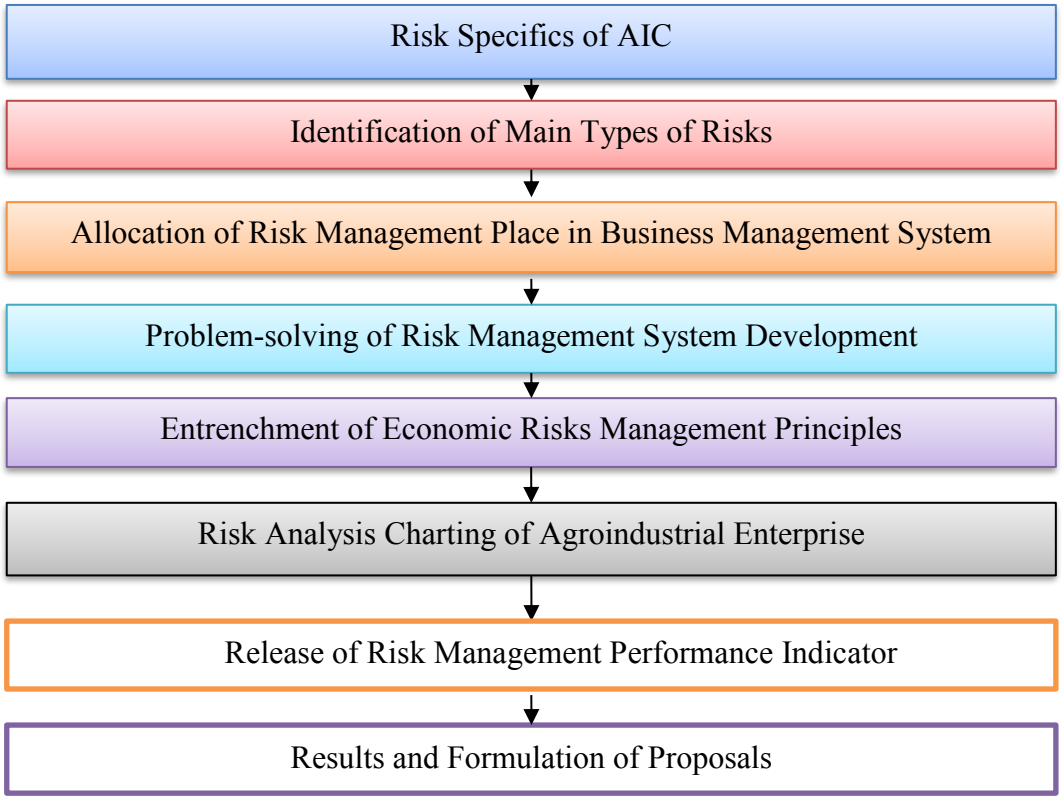
3. METHODS OF INVESTIGATION

In our understanding, when deciding on economic risk management in agriculture, entrepreneurs ought to follow a certain algorithm of risk-management within the framework of an agroindustrial complex that implies [Golubjatnikova, 2012; Ermasova, 2013; Baldin, 2006.]: the scrutiny of peculiarities and the specifics of economic risks at agroindustrial enterprises; singling out major economic risks from the totality of risks for enterprises under research; the role of risk management

within the framework of enterprise management; problem solving while developing a risk-management system; the securing of economic risk-management principles; charting the risk-analysis of an agroindustrial enterprise; deciphering the subsystems of economic risk management; summarizing the results and the formulation of proposals (Picture 1).

The striking feature of a risk-related situation in agriculture is the fact that the manufacturing process in this sphere is inextricably connected with the natural development processes of living organisms – plants and animals, the functioning of which, to a large extent, depends on natural hazards. These are the reasons for negative, at times, even catastrophic for agriculture consequences of extreme weather conditions (severe frost, hail, drought, flooding and etc.) due to the vagaries of the place and time of their attacks [Minakov, 2003].

The weather factor of risk in agriculture is related to other kinds of risks, which eventually may cause a major problem. In the long run, it could possibly lead to grave consequences [Organization for agricultural production, 2003].



Picture 1: Algorithm of Risk Management Concept at Enterprises of Agroindustrial Complex.

In our research we have identified the following economic risk groups for enterprises of the agrarian sector: macrolevel (political and ecological risks), mesolevel (agrarian branch risk), microlevel (economic structure risk), (Table 1).

The economic structure risk may be divided into:

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3.1 PRODUCTION

3.1.1 PLANT GROWING

a risk involving disproportion and cuts in equipping the means of production, a risk involving lack of conformity concerning the composition of cultivated crops and the conditions for their growth (risks of disrupting crop rotation, breaching the seed-farming system, disproportionate application of fertilisers, lack of sufficient means against pests and diseases, erroneous tillage, tending of plants and land reclamation), risks involving the appropriate usage of arable land and labour management;

3.1.2 LIVESTOCK BREEDING

- risks in inadequate and inefficient equipment, herd reproduction, feeding, animal upkeep, lack of sufficient supplies for medical treatment, lack of conformity concerning the branch structure and production trend

- commercial (risks involving low sales, inefficient functioning of sales network, competition, price changes on agricultural products and their depreciation while in circulation);

- financial (risks involving insolvency, loss of liquidity and financial sources, asset turnover and company profitability);

- risks in company management (loss of qualified personnel, loss of working hours) [Eckhoudt, l., Goliier, Ch., 1995, Malashihina, N. N., Belokrylova, O. S., 2004].

Table 1: Economic Risk Register within the Framework of an Enterprise, Region and Country

Risk №	Risk Name	Risk Description	Risk Factor	Risk Scope	Risk Code
All-Russian					
1.1.	Political Risk	Risk occurrence possibility or profit margin reduction caused in the result of state policy	Possible change of administrative policies, changes in priority areas of its function	Macro-level	001-1
1.2.	Ecological Risk	Environment affecting uncertainties	Environmental pollution	Macro-level	001-2
Regional					
2.1.	Economic and Structural Risk	Discrepancy in the scope of open market economic processes	Regions incapable of business competitiveness	Meso-level	002-1
Corporate					
3.1.	Manufacturing Risk	Manufacturing process changeability	Impact level of climatic and natural conditions Equipment capability level of an enterprise Supply of materials and machinery level	Micro-level	003-1
3.2.	Financial Risk	Probability of event occurrence connected with a loss of capital as a result of entrepreneurship or investment activities	Debt position for shipped product	Micro-level	003-2
3.3.	Commercial Risk	Inefficient output distribution management	Level of price change for agricultural products	Micro-level	003-3
3.4.	Enterprise Management Risk	Shortage of qualified personnel and lack of efficiency	Personnel qualification level Equipping level Index of working hours loss	Micro-level	003-4

The submitted risk register is an approximate register for an agricultural company. Apart from the content, the register should illustrate the risk update specifying the risk area as well as the changes concerning the risk minimization measures and the comments on them. The risk may be updated by its reissuing (giving it a new registration number) or making some alterations (the risk registration number remains unchanged) depending on the nature and amount of required change in the risk profile.

The purpose of risk management is to reduce the possibility of making the wrong decision and lessen the negative consequences.

On the whole, the risk management system is a process of preparing and implementing measures to succeed [Risk management: educational-methodical complex (Bachelors). 2012].

In order to succeed in risk management, it is essential to set up the guidelines for the risk management system: drawing up the methodological, regulatory and reference documentation on managing economic risks, creating a model for managing economic risks, training risk managers the methodology of risk management.

The basic principles of economic risk management at company level are the assumed risk concept, the unique character of decision-making, adaptability to change, taking chances, coordination with company management, overall encompassing of economic risks [Michael D. Rogers., 2001, Merbeck, A., Stegemann U., Frommeyer J., 2004].

Economic risk management is an integral and important part of general company management. In the algorithmic chart of an agricultural company risk analysis the feed-back chain is depicted (Picture 3). The coordinating function of economic risk management completes the feed-back. The chart also clearly shows the interaction with other subsystems. This is how economic risk management works. Information on the state of affairs in the company and its environment for the current period or certain periods of time is collected in the Company Monitoring and Functioning section. This information is processed, enlarged and transferred to the Risk Identification Factors section, where a list of risk factors, endangering the operation of the agricultural company, is singled out labelling them as more important or less important [Star, M., 2006.]. Possible risks are identified through the influence of positive or negative factors.

The Risk Analysis and Assessment section receives the results. This information, together with analogical previous information and regulatory and reference data, is processed by applying the economic risk assessment analysis and methodology. The results of this analytical study on assessing the risk level is compared with the previous data on processed risks, which are stored in the archive of Regulatory, Reference and Other Information, and the preset level of assumed risk.

If it turns out that the currently received economic risks do not significantly differ from the previous ones and do not exceed the preset level, which has been established by the automated program or the company management, the controlling function is completed by transferring the processed risks to the archive along with a recommendation for the time of the next controlling cycle.

Let us take a closer look at how it works at a processing plant - the Belgorod Experimental Plant of Fish Mixed Feed and its Risk Analysis and Assessment section.

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Risk assessment is probably the most complicated stage in company risk management. We shall measure these economic situations by applying the known economic and mathematical methods for economic risk assessment or, to be more precise, the investment risk. At present, due to the current economic situation in the country and the growing competition on the mixed feed market, Belgorod Fish Mixed Feed Plant is facing the problem of increasing the competitiveness of its product. In our opinion, it is possible to solve this problem by improving the product's quality. Therefore, the company must purchase and install an automated volume expansion line (Table 2).

Table 2: Programme of expanded mixed feed production

Name of Mixed Feed	Production Level (in thou tons)		
	2017	2018	2019
Fish mixed feed for feeding fish hatchlings	3	6	9
Mixed feed or feeding commercial fish	5	9	12
Mixed feed for poultry	10	12	16
Mixed feed for pigs	7	10	14
Mixed feed for cattle	5	8	9
Total production level	30	45	60

The installation of such a line will help the company to improve the quality of mixed feed by increasing its nutritional and metabolic properties, achieving a significant decrease in granule friability, prolonging their shelf life, as well as eliminating the pernicious effect of undesirable microorganisms, bacteria and fungi, which cause various diseases among animals and fish.

By analyzing the situation on the mixed feed market, the trends of growth and development of livestock breeding, chicken and fish farms, as well as analyzing the supply and demand for various kinds of mixed feed, we managed to draw up a program for producing and selling expanded mixed feed (Table 2).

In order to be able to implement this project it will be required to purchase a volume expansion line, hire and train the personnel. It will also be necessary to buy a fork-lift truck for transporting the raw material and finished product on the expansion line. A bank loan for the project for 3 years with a 16% interest rate is likely to be required. Most of the loan shall be repaid by the end of the term, while the interest shall be paid out at the end of each year (Table 3).

Table 3: Flow of loan cash and payments (RUB'000)

Line Item	2017	2018	2019
Loan Entry	54634	-	-
Loan Repayment	-	-	54634
Closing Balance	54634	54634	-
Interest on Loan	16	16	16
Credit Disbursement Totality	8741	8741	8741
Total Payment	8741	8741	63375

A cash-flow discounting model shall be designed based on the production program, financial prognosis and cash availability (Table 4).

Table 4: Cash Flow Discounting Model (RUB'000)

Line Item	2017	2018	2019
1. Net Profit	24600.1	59656.8	122698.1
2. Net Cash Flow (2.1. +2.2. + (-) 2.3. - (+) 2.4. - 2.5. + (-)2.6-2.7.- 2.8.)	29757.4	59933.3	68340.6
2. 1. Net Profit	24600.1	59656.8	122698.1
2.2. Depreciation	9017.5	9017.5	9017.5
2.3. Debt Growth/ Debt Service Payment	-	-	-54634
2.4. Receivables Growth/ Payment	-	-	-
2. 5. Interest Payment	8741	8741	8741
2. 6. Proceeds from Asset Sales	-	-	-
2. 7. Capital Investment	24634	-	-
2. 8. Increment of Floating Capital Growth	30000	-	-
3. Accrued Cash Liquidity eop	-29757.4	59933.3	68340.6
4. Present (Discounting) Value Factor	0.87	0.77	0.67
5. Present (Discounting) Value of Cashflow (p.2*p.4)	-21425.3	31764.6	25969.4
6. Net Present (Discounting) Value	-21425.3	10339.3	36308.7

Table 4 shows that the project is a profitable one as the NPV, despite the negative value of the 1 year of its implementation, the 2 and 3 years show signs of positive development. Now we shall assess the risks of this investment project by applying a range of methods: the sensitivity analysis of efficiency criteria; the scenario method; the breakdown of potential payments and the decision tree. We shall now take a closer look at each method.

3.2 METHODS

3.2.1 THE SENSITIVITY ANALYSIS OF EFFICIENCY CRITERIA

Table 5 reveals that the NPV of the given investment project is at its most sensitive towards such an index as price. With a 10% decrease of this index the NPV becomes a negative figure, i.e. a 10% change in the price leads to a 58,1% change in the NPV index. It proves that a slight change of this index may significantly affect the implementation of the investment project. Therefore, the investor must keep an eye on this index.

Table 5.Analysis of Sensitivity of Efficiency Test

Volume Turnover Change		Price Change		Change of Fixed Outlay		Discount Rate Change	
Turnover, tonnage-wise	NPV, RUB'000	Price, RUB	NPV, RUB'000	Fixed Outlay, RUB'000	NPV, RUB'000	Discount Rate	NPV, RUB'000
40000	11565.9	3840	-10512.9	78064	95630.5	0.124	72348.2
45000	38257.4	4320	27218.01	87822	80289.7	0.144	68156.9
50000	64948.9	4800	64948.9	97580	64948.9	0.16	64948.9
55000	91640.4	5280	102679.9	107338	49608.2	0.176	61881.6
60000	118331.9	5760	140410.8	117096	34267.4	0.192	58946.5

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3.2.2 SCENARIO METHOD

The scenario method is used for risk analysis of the investment project which is being implemented at the Belgorod Experimental Plant of Fish Mixed Feed.

We shall draw up three scenarios for implementing the project (pessimistic, most likely and optimistic) (Table 6).

Table 6: Implementation of Investment Project Scenario

Key Figures	Pessimistic Scenario	Probable Scenario	Optimistic Scenario
Sales Revenues, RUB'000	525000	9450000	11255000
Cumulative Costs, RUB'000	364 0000	4820000	6980000
Amortization, RUB'000	9017.5	9017.5	9017.5
Discount Rate, %	20	16	11
Start-up Investment, RUB'000	54634	54634	54634
Occurrence Probability	0.15	0.7	0.15
NPV, RUB'000	-28361.8	28537.93	33460.27

The calculation has revealed that the average expected NPV value has turned out to be positive. The standard deviation figure does not exceed average NPV value. By applying the 3 sigma rule there is a 68% possibility that the NPV of our project will be within:

4136,65≤ NPV≤ 37346,02.

It is highly likely (68%) that the investment project under consideration will have an NPV exceeding 0. The variation ratio of the project came to 80%. On the one hand, it exceeds 25% which points at the fact that the project has a high degree of variability. On the other hand, the variation ratio came to less than 1, which means that the risk of this project, on the whole, is lower than the company's investment portfolio risk.

3.2.3 IMITATION MODELLING OF INVESTMENT PROJECT RISKS (THE MONTE-CARLO METHOD)

Some imitation modelling of investment project risks shall be done using the data on the production and sales of mixed feed for pigs.

The modelling shall be done in PPP EXEL, which means that two approaches shall be used: built-in functions and the random number generator (Table 7).

Table 7: Most Probable Initial Index Data and their Change Scope

Key Figures	Datum	Change Scope
1 . Production output, tn	50000	40000 - 60000
2. Unit Price, RUB	4800	3840-5760
3. Variable Costs, RUB	1404,4	1404,4
4. Constant Costs, RUB'000	97580	78064-117096
5. Amortization, RUB'000	9017.5	9017.5
6. Profit Tax	0.3	0.3
7. Discount Rate	0.16	0.124-0.192
8. Start-up Investment, RUB'000	54634	54634

Using the built-in functions approach makes sense only in the case when the probabilities of the mean are the same. Therefore, we shall apply the random number generator tool. This tool is used for the automatic generation of a data set (general totality) of the given volume, the elements of which are characterized by a certain probability distribution. A normal distribution type was chosen for research with 150 experiments.

The initial terms for imitation modelling in ППП EXEL are given in Table 8.

The initial data for imitation modelling are located in the left part of the table. In order to preset a normal distribution of the general totality of the data in the above-mentioned table, such indices, as average values and their standard deviation were calculated.

Table 8: Experiment Initial Conditions

	Minimum	Probable	Maximum	Average	Deviation
Constant costs	78064	97580	117096	97580	2394093
Quantity	40000	50000	60000	50000	2873
Price	3.84	4.8	5.76	4.8	301.5
Discount Rate	0.124	0.16	0.192	0.16	0.02
Probability	0.15	0.7	0.15	0.7	
Experiments =	150			Line Number =	163

In accordance with the imitation analysis data, the NPV upon implementing the project will amount to 32615,68 RUB'000 with a standard deviation of 21627,4 RUB'000 and a variation ratio of 66,3%. Therefore, we can assume that the degree of risk of the investment project on offer is not high. The chance of receiving a negative NPV value during the implementation of the project is estimated at only 6,6%. The total number of negative NPV values stands at 8 out of 150. At the same time, the probability that the NPV figure will turn out to be more than P(M(E)+d, equals 15,5%, while the probability of the NPV value being placed in the space [P(M(E)- d; M(NPV)], equals 34,1%.

3.2.4 THE DECISION TREE METHOD FOR RISKS ANALYSIS

The decision tree method for risks analysis is applied to of the investment project, which is being implemented at the Belgorod Experimental Plant of Fish Mixed Feed.

The Chief Engineer must decide whether to install a new volume expansion line or not. If the new line operates smoothly, the company will make a profit of 122 mln roubles. If it breaks down, the company might lose 60 mln roubles.

The Chief Engineer's opinion is that there is a 60% possibility that the new expansion line will fail. It is possible to design an experimental installation and decide whether to assemble the production line or not. The experiment will cost 8 mln roubles. The Chief Engineer thinks there is a 50% chance that the experimental installation will work.

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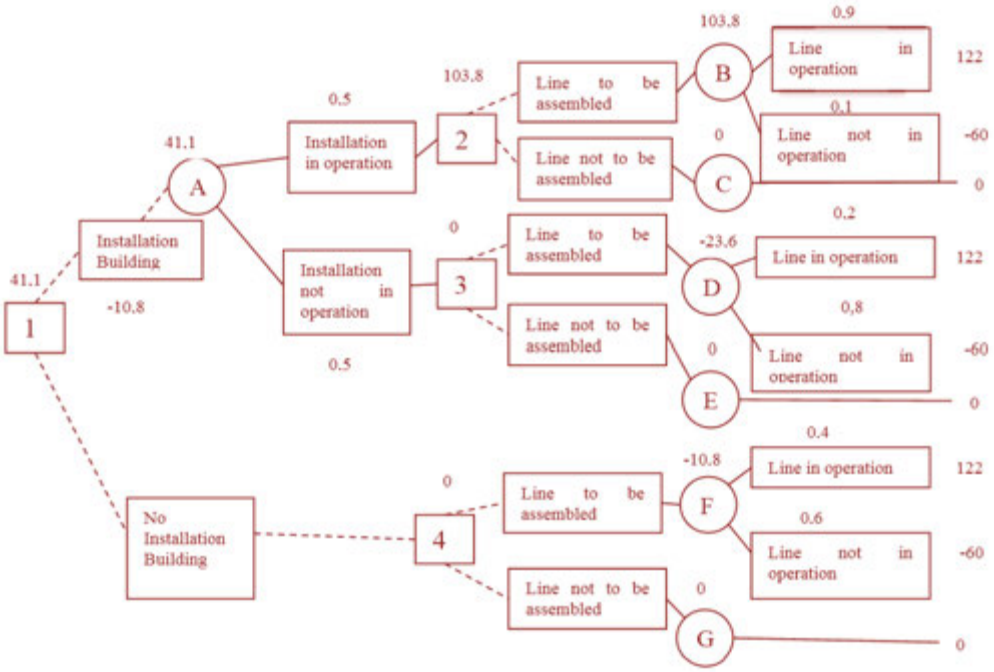


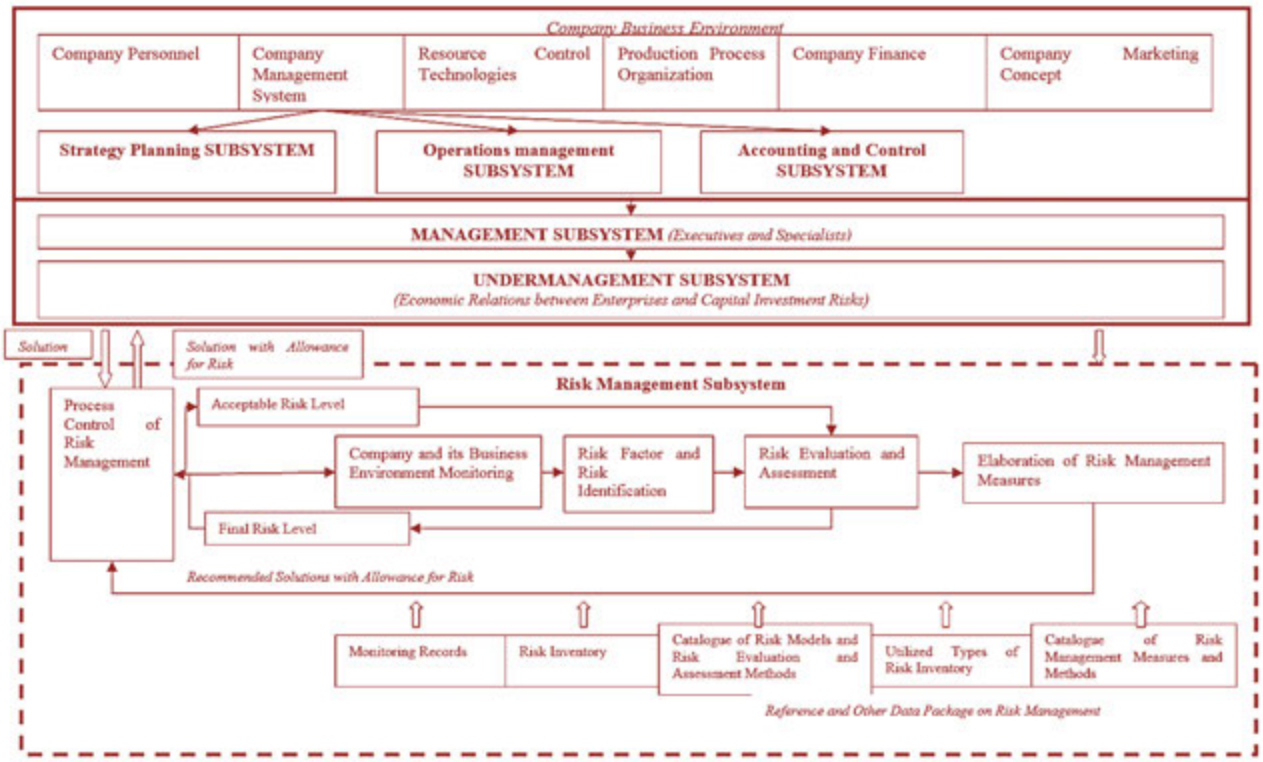
Picture 2: Chart of the Decision Tree method used for investment project risk analysis at the Belgorod Experimental Plant of Fish Mixed Feed.

The given investment project economic risk assessment of this chosen company suggests a selection of risk assessment methods to be used individually at a company. The composition and order of assessment risk procedures may vary depending on the purpose, state of affairs at the company and the timing for conducting the analytical work.

The measures for risk management comprise the order for every single type of economic risk, which suggests its own specific way for minimizing them.

The algorithm for risk management is based on preparing a strategic solution and is represented by the following actions: the solution is directed from the Strategic Planning subsystem via the Coordination Processes of Risk Management section to the Risk Analysis and Assessment section. That said, extensive information is used in this section for analyzing the solution – risk profile registers, previous and current company monitoring results and its operating environment (Picture 3).

Drawing on the information received from the Risk Identification sector, which identifies the internal and external risk factors possibly caused by the strategic solution, the Risk Analysis and Assessment section analyses and assesses the probability of their manifestation, rates their significance for the given period of time and economic situation [Makarevich, L.M., 2006] and draws up a risk profile complete with a certain mathematical model or expert system. At this point, the models and indexes, the values of which have been defined in the Risk Analysis and Assessment section, help to select the measures for minimizing or managing the risks in the Measures for Risk Management section, which makes a list of measures and methods for preventing an undesirable turn of events or making up for their negative consequences [Ryhtikova, N.A., 2012; Abchuk, V.A., 2006].



Picture 3: Algorithmic Chart of an Agrarian Enterprise Risk-analysis

The result of selecting the measures for risk minimization is arranged as a risk profile, containing complete data on spheres of risk, criteria of risks as well as recommendations for preventing or minimizing risks, in other words, the complete attendant information revealed during the whole period of analysis. The risk profile is placed in a catalog and handed over to the company management. While the risk profile is being compiled, it is important to be able to foresee the discovery of a risk when going through the accounting reports: the balance sheet, the profit and loss account. Therefore, each risk profile should be given a code of its own in an app (Table 1) [Balabanov, I.T., 1996.; Vasin, S., 2010. ;Vishnyakov N. N., 2008. ;Altman, Edward, 1968.].

The completed risk profiles are handed to the company management and stored in the archive, as well, and, by all means, are taken into account during future analytical procedures, revision of adopted decisions and other cases of risk reassessment. Outdated risk profiles are not shredded as they contain information for comparing and assessing the dynamics of risk level change.

Understanding the result seems to be the most challenging thing in managing risk assessment. Resources and time are easily assessed and measured, but the result is the most difficult [Musshoff, O., Hirschauer, N., 2010].

There are final results, where management is mediate, and the immediate result, typical for any kind of human activity, is mentioned.

The immediate management result may be characterized by a set of criteria and efficiency indexes (number of implemented risks, undeclared risks, leading to an unexpected revision of the business scenario and the opposite [Hufnagel, J., 2004].

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While assessing the efficiency of economic risk management it is necessary to apply the whole range of general and particular indexes [Charykova, O.G., Golubjatnikova, Yu. Yu., 2011].

The final section in the algorithm of the risk management concept for agribusinesses is summarizing and drawing up proposals.

4. RESULTS

At present, the majority of Russian companies traditionally regard risk management as a specialized activity, which stands apart from the regular company management functions. For instance, risk management is considered to be the same as managing various types of economic risks (financial, production, management, etc.) [Kudryavtsev, A .A., 2010, 168-173 P.]. The new approach to risk management, which has just started to take shape in recent years among Russian agricultural businesses, is aimed at the integration of the functional subsystems of the business to be able to manage risks at all levels.

Under integrated risk management, the company analyses every type of risk systematically to achieve maximum efficiency at each stage and, eventually, the business as a whole [Kudryavtsev, A .A., 2010]. In other words, for our research, we need to introduce an integrated risk management system (study the existing economic risk management practices, draw up the appropriate regulatory and reference documentation for economic risk management, design the organizational models for economic risk management, allocate responsibilities in managing the risks among all participants.

The structurized concept of risk management for agricultural companies, presented in the article, which is based on the practices of a functioning company, makes it possible to plan further activities, calculate the expenses as well as formulate a need for methodological guidance papers, which will provide for a new and relatively specific, but essential, part of the business.

5. CONCLUSION

The presented concept of risk management studies risks comprehensively. That said, risk management must not focus on one type of risk alone, but look at all possible risks.

The most significant advantage of this approach is in its systemic way of studying a company's economic risks. It offers a chance, first of all, to actually see the economic risks, which the company has to deal with. Secondly, the aggregate of economic risks makes it possible to make the right decisions in strategic, financial and personnel management.

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