Problems of Risk Management for Textile Enterprises in Turkmenistan

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Abstract
The article presents an original approach to the identification, assessment, and risk management of textile enterprises in Turkmenistan. Turkmenistan is a state in Central Asia that has significant oil and gas reserves, and traditionally develops the textile industry, which, along with hydrocarbons, is a source of export revenue for the state budget. The need to attract investment resources for the modernization of the enterprises of the textile industry of Turkmenistan gave a new impetus to the development of the risk management system for the industry. The main aim is to increase the competitiveness of all participants in the production chain engaged in cotton processing. The authors propose the risk passport of textile enterprises of Turkmenistan obtained in the process of identification, which takes into account the systematized most significant factors, the management of which will minimize the industry-specific risks. To group the methods of risk management, the authors suggest using the "risk field" - a graphical interpretation of the described relationship between the level of risk, the risk source factor, and the selected risk management method at the enterprise, considered in detail on the example of textile enterprises. The numerical values obtained in the risk assessment model can be used when working with the Matlab package to visualize the two-factor dependence and impose it on the risk field to choose the optimal method for minimizing a specific risk for a specific enterprise. The article presents an example of self-organizing (SOM) Kohonen maps, which identifies insurance methods as the best ways to manage price risks for raw materials of the textile industry. The use of exchange-traded instruments and the creation of a system of state monitoring of textile industry enterprises are proposed as measures to reduce the risk.

Keywords
Textile industry; risk management; risk passport; full factorial experiment; risk level model.

Introduction

Turkmenistan is located in the southwest of the Central Asia region and has a territory of 488,100 km2, extending 1,100 km from west to east and 650 km from north to south. Turkmenistan borders Uzbekistan, Afghanistan, and Kazakhstan. The western coast of the country is washed by the Caspian Sea. The Turkmen shore along the Caspian Sea is 1,748 kilometers long (Figure 1). The Caspian Sea is entirely landlocked, with no natural access to the ocean, although the Volga–Don Canal allows shipping access to and from the Black Sea. Most of the territory of Turkmenistan is located within the Turan lowland. The terrain is dominated by flat or hilly sandy deserts with dunes, which occupy more than 80% of the territory of Turkmenistan. The Karakum desert stretches from west to east for 880 km, from north to south for 450 km. There are the ruins of the ancient settlements of Nisa and Merv, through which the Great Silk Road once ran (Britannica, 2021).

Figure 1. The geographical position of Turkmenistan
(Britannica, 2021)

Turkmenistan has significant natural resources: oil, gas, and raw materials for the textile industry, one of which is cotton. About 1071.1 thousand tons of cotton fiber are produced in Turkmenistan every year (The Pakistan Business Council, 2017). The fall in energy prices led to a decrease in export revenues to the country's budget. In this regard, one of the promising industries that allows diversifying export revenues is the textile industry, whose raw material potential allows you to expand the product range and successfully compete in the foreign market.

The reason for the instability of the political and socio-economic situation in the country is the vulnerability of its economy. In this regard, the state institutions of power face the task of preventing threats of an economic, social, and political nature by developing and implementing appropriate mechanisms that should contribute to the successful integration and consolidation of the national economy on the world stage (Haytanova, 2019).

The purpose of the article is to identify the most significant problems that arise in risk management at the enterprises of one of the leading sectors of Turkmenistan – the textile industry, since the organization of risk management of textile enterprises based on modern scientific instruments is becoming a reserve for increasing the investment attractiveness of the industry, which is especially relevant at present.

Textile industry in the economy of Turkmenistan

Almost half of the cotton fiber produced in the country is processed. The enterprises produce up to 118 thousand tons of cotton yarn, 178 million square meters of fabrics, 11 thousand tons of knitted fabric, 7.2 thousand tons of terry cloth, and 100 million pieces of sewing and knitwear (State Committee of Statistics of Turkmenistan, 2020). It is worth noting that the production capacity allows selling abroad 70 percent of the products (Dzhumaev, 2012, p.13). 85 enterprises are operating in the textile industry in Turkmenistan (Trapeznikov, 2021).

The development of the textile industry affects the solution of the following tasks in the economy of Turkmenistan:
- providing the light and food industry with raw materials and semi-finished products;
- creating new jobs, reducing unemployment, improving the standard of living of the population;
- increasing tax revenues to the state and local budgets.

Turkmenistan's economy is mainly dependent on oil and natural gas production. However, over the years, other sectors, such as textiles, chemicals, and financial services, have also played an important role in economic growth (State Committee of Statistics of Turkmenistan, 2020) (Table 1).

*Table 1. Main export goods of Turkmenistan for 2011-2018, million US dollars*

Period	Natural Gaz	Petroleum Products	Oil	Electric Power	Cotton fiber	Cotton Fabrics	Carpets and other carpeting
2011	10823,5	2720,1	1975,7	71,7	260,9	44,6	0,5
2012	13358,6	2892,3	2351,9	76,3	302,8	46,5	0,2
2013	12580	2756,6	2140,5	82,4	452,7	59,9	0,1
2014	13592,9	2367,3	2316,1	85,3	560,4	51	0,2
2015	8400,7	1038,3	1466,8	114,6	421	45,9	0,2
2016	4327,8	796,2	1210,8	134,9	335,3	44,3	0,2
2017	4132,5	650,1	1125,6	146,9	310,5	42,1	0,2
2018	4214,1	589,3	989,7	139,6	301,3	43,8	0,19

State Committee of Statistics of Turkmenistan, 2020

The textile industry, one of the cornerstones of the state's manufacturing industry, has a positive impact on the country's economic performance (Haytanova, Luskatova, Eivazov, & Amosova, 2018). The analysis of the economic situation of Turkmenistan

and textile production in the country is accompanied by significant difficulties caused by "the closeness of this state and questions about the quality of statistics," as pointed out by experts of the leading Russian analytical agency "Expert RA" (Tabakh, Prokudin, & Podrugina, 2021).

Among the Central Asian states, competing in the textile market, Turkmenistan traditionally holds the second position in cotton production, after the leader of Uzbekistan, which occupies the seventh position among world producers (Figure 2).
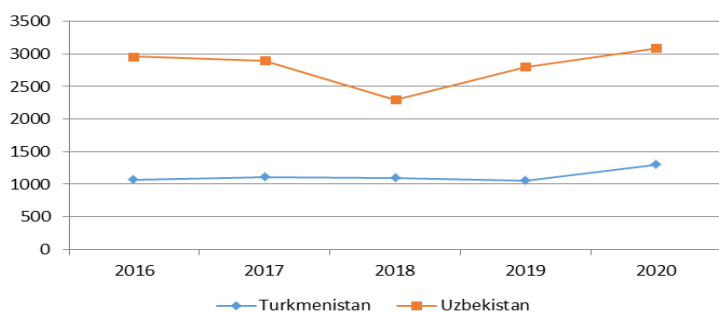
Figure 2. Dynamics of the gross cotton harvest in Turkmenistan and Uzbekistan,
***thousand tons***
(Ministry of Textile Industry of Turkmenistan, 2021; State Committee of the Republic of Uzbekistan by Statistics, 2021)

The volume of raw cotton production in these countries depends on the areas occupied by cotton; the crop yield does not tend to increase in the studied time interval. In Uzbekistan, since 2020, the state order for cotton production has been canceled and a policy of reducing acreage is being implemented. Budget revenues are expected to be maintained due to the depth of processing of raw materials and the export of finished products (State Committee of the Republic of Uzbekistan by Statistics, 2021).

The economy of Turkmenistan is characterized by a raw material orientation. The country's budget depends on world energy prices. Ensuring the economic security of the state is possible with the development of other industries whose products are in demand on the world market. The contribution of the textile industry to Turkmenistan's GDP is at the level of 12% (Trapeznikov, 2021). The structure of Turkmenistan's cotton exports reflects the transitional period of the development of this economic sphere. Slightly less than half of the export earnings are accounted for by cotton fiber, and the rest is made up of finished products and textile goods for the home (Tabakh et al., 2021). The production of textile products in Turkmenistan is carried out under various world-famous brands (for example, Puma, Walmart, IKEA, etc.) (Ministry of Textile Industry of Turkmenistan, 2021).

Indirectly, the textile industry has a positive impact on related sectors of the economy, in particular on agriculture. The rapid development of the textile industry and the deepening of raw materials processing contribute not only to the growth of agriculture but also to increasing employment and changing the share of manufacturing in the structure of the state's GDP (Trapeznikov, 2021). In the production of cotton-fiber, the textile industry focuses on the production of goods of deeper processing, containing a

greater added value. Nowadays the list of textile industry products is quite wide (threads, fabrics, nonwovens, knitted fabrics), which allows increasing the income from exports (Figure 3).
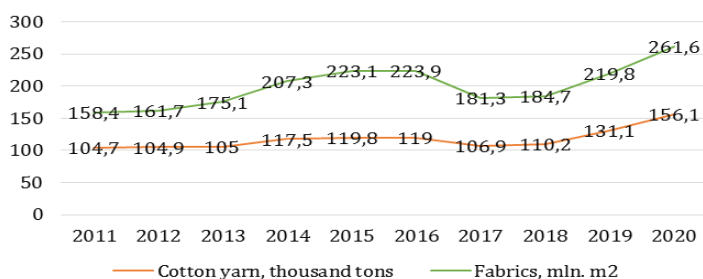
Figure 3. Dynamics of production of the main types of textile industry products
in Turkmenistan in 2011-2020
(Ministry of Textile Industry of Turkmenistan, 2021)

Thus, the textile industry of Turkmenistan occupies a special place in the system of economic security of the country. The production potential, actively attracted investments in this sector, its impact on the development of related industries, and the increasing share in the state's GDP suggest that the textile industry, along with the oil and gas sector, ensures the sustainable development of Turkmenistan (Haytanova et al., 2018, p. 240).

It is revealed that the effect of macroeconomic factors on the situation in the textile industry is unstable; among the main reasons of turbulence, we should call prices in the markets of raw materials, labor, and equipment; changes in the exchange rate; inflation and the improvement of the tax system. The specifics of the internal factors of textile enterprises and the uncertainty of the impact of macroeconomic factors cause an increased risk of investment in the industry (Haytanova, 2019). The need to attract additional investment resources and accelerate the pace of development of the textile industry in Turkmenistan has led to the demand for using risk management in the organization of management processes at textile enterprises.

Textile industry enterprises are faced with many events that can have a negative or positive impact, and possibly both of them. The negative impact events describe risks that can prevent creating the new value or destructing the existing value. The events with a positive impact can compensate for the negative impact or provide other opportunities in which a fact will occur that will positively affect the achievement of goals. Risk is the possibility of losses arising from the specifics of certain natural phenomena and types of human activity.

Companies strive to minimize unpleasant consequences, for this purpose they should study and take timely measures to minimize the risk. Risk minimization procedures should be reviewed periodically to ensure that threats are controlled and that risk is prevented through a well-defined risk management framework.

Risk passport of textile enterprises of Turkmenistan as a result of risk identification

Business risk management (risk management) deals with the risk and opportunities that affect the creation or maintenance of an enterprise's target, so it should be a central part of its strategic management. Generally, risk management is a strategic process that helps and supports management decision-making under the conditions of uncertainty at the strategic and operational levels in a company in any sphere of activity. The better understanding and management of all the risks that may affect the firm will lead to increased productivity and competitive advantage, especially when risks are assessed and controlled, hazards and threats are identified, as well as opportunities and benefits (Kadarova & Durkáčová, 2012).

Enterprises cannot completely protect themselves against risks, thus special attention is paid to the existing risk management methods that they can use to avoid the consequences. Enterprise risk management allows organizations to improve their ability to identify potential risks and establish appropriate responses, reducing surprises and related costs or losses (Committee of Sponsoring Organizations of the Treadway Commission (COSO), 2017). The risk management process at the enterprise is continuous, it includes several steps (Figure 4), mentioned below:

Figure 4. The algorithm of continuous risk management of the enterprise
(Developed by the authors)

This process includes the steps of the development and adoption of a risk management strategy, the identification, assessment, and control of risk, as well as the monitoring phase common to all effective management systems. The choice of a method to minimize the consequences of risk management decisions is considered to be the key in the enterprise risk management system.

Risk identification is an iterative process that is carried out throughout the entire life cycle of a company. Currently, the methods available for risk identification can be divided into traditional and innovative ones. In the practice of risk management, it is difficult to stop using any one method of risk identification. Experts and decision-

makers (DM) comprehensively use traditional methods, and the application of innovative approaches depends on the specific goal of the company.

The result of the risk identification stage is to obtain a risk passport for a particular company, which includes a detailed description of the types of risk inherent in the enterprise in the time interval under study (Haytanova, 2020, p.64). During the analysis of external and internal factors influencing the results of textile enterprises' activity in Turkmenistan, a risk passport based on the international methodology of the COSO and FERMA risk management standards was compiled (Committee of Sponsoring Organizations of the Treadway Commission (COSO), 2017, Federation of European Risk Management Associations, 2003) (Figure 5).
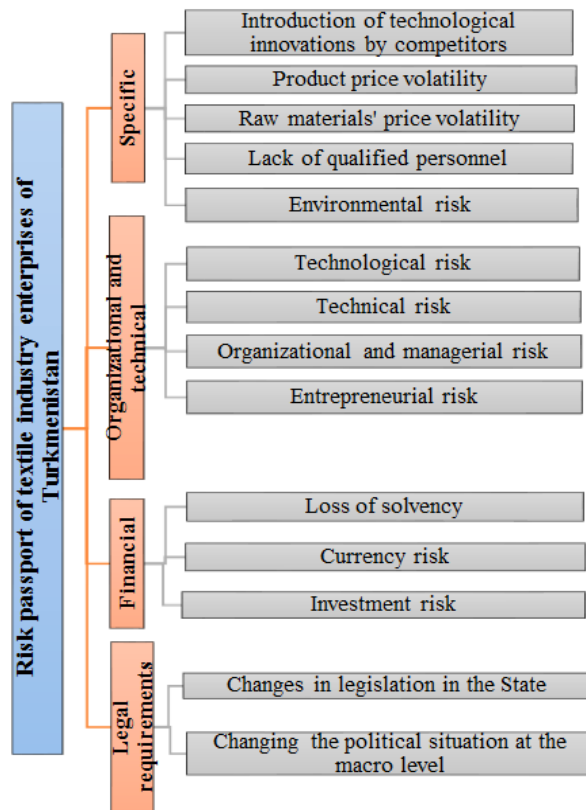

Figure 5. Structure of the risk passport of the textile industry enterprises of Turkmenistan
(Developed by the authors)

The risk passport is "a set of objects or phenomena that form an integral system that determines the need to take into account not individual factors, but a set of risk types specific for the enterprise" (Luskatova, 2014, p. 22). Numerous factors are formed into four groups – specific, organizational and technical, financial, and legal.

Specific risks of the textile industry enterprises are characterized by the most significant factors for Turkmenistan. They include tracking the technological

innovations introduced by competitors, the dependence on the world level of prices for agricultural products used as raw materials, and the dynamics of prices for textile products. The effectiveness of the companies' activities depends on the raw materials obtained, this situation requires taking into account natural and environmental factors. A significant problem of textile industry enterprises is the low level of personnel qualification, especially at the level of middle managers.

Organizational and technical risks include factors that take into account the specifics of the equipment and technology of production processes, the compliance, and the optimality of the organizational structure and the existing communication system.

Among the financial risks specific to textile enterprises, the authors have identified the possibility of a loss of solvency as a result of incorrect management actions, dependence on finding sources of investment during the development or re-profiling of the company, currency fluctuations, as the products of the industry are a source of export revenues to the budget (Haytanova, Luskatova, & Gorshkova, 2021).

The peculiarities of the state policy and the mentality of the population make it necessary to take into account legal risk factors. The first one is the dependence of the activities of enterprises on the stability of the political situation in the country. The second factor is the stability in the field of legislation, which is undergoing significant changes due to the formation of legal norms that correspond to the market conditions of business.

Features of risk assessment of textile enterprises based on a complete factor experiment

One of the important stages of risk management of any enterprise is the assessment of events, the occurrence of which may lead to adverse consequences or cause damage. Among the most commonly used methods for quantifying risk, it should be noted:
- the method of statistical analysis for already occurred adverse events;
- the method of theoretical analysis, in which cause and effect of processes and events are studied;
- the method of expert evaluation.

Statistical data allows to determine the probability of an adverse event, as well as to pre-evaluate its scale and the expected damage. The limitation of their use is that the method gives accurate results only for regularly occurring cases. Risk events are not a priori regular. The limited use of cause-and-effect relationships is because the result of such an analysis does not provide for specifying the cause of the occurrence of a risk event. This method of theoretical analysis establishes a general picture of the factors that influenced the occurrence of adverse consequences. The application of this method can be considered as an appropriate stage in the modeling of risk assessment for the enterprise.

To assess the risk, the authors propose the position of considering "risk as a possibility of losses arising from an unfavorable outcome of the implementation of management decisions made under conditions of uncertainty" (Koshechkin, 2010). At the same time,

both traditional tools of probability theory and methods of possibility theory that take into account the subjectivity of estimates are used to identify and assess risk.

The proposed modeling of the risk level is based on its subjective assessment under conditions of uncertainty. Experts who determine the degree of risk of factors affecting the indicators of a textile enterprise were selected from among the top managers of industry organizations. They made a decision on the level of risk based on their own practical experience. The subjectivity of the assessments was manifested in the individual assessment of the risk level for each expert.

The approach to risk assessment proposed by the authors is based on the theory of experiment planning. The basic postulates of this theory assume that the experiment is divided into successive stages, which are used in the method of active planning. The data obtained in the previous stage becomes the basis for the next level of action. When planning an experiment, you can get a quantitative assessment of all the factors under consideration, change them in the process of studying. The use of this theoretical approach suggests that there is no correlation between the coefficients of the regression equation and the autocorrelation of individual factors (Makarichev & Ivannikov, 2016).

Using the planned experiment to solve the problem of risk measurement involves the following steps:
- analysis of the risk situation in the activities of the textile enterprise and creating a risk passport;
- selection of the risk measurement scale;
- selection of indicators for evaluating factors.

When choosing the risk measurement scale, the need for an assessment that takes into account the comparison of the absolute scale with the probability of the implementation of risk events is revealed. This gradation is formed based on subjective probability. To construct quantitative estimates of the risk level, we proposed to measure possible damage in relative units that take values from the interval [0, 1]. To minimize the consequences of the subjectivity of the work of the expert group in assessing the level of risk, a closed discussion was chosen. Each specialist received a factor table-a matrix of the complete factor experiment (CFE), compiled taking into account the structure of the risk passport of the textile enterprise.

The sequence of risk situations, with the characteristic consequences of the influence of a set of factors, was set in the form of a planning matrix. The number of evaluated states was determined by 4 factors and amounted to $(2^4 + 1) = 17$ deterministic combinations. "*The orthogonality of the planning matrix allows us to obtain independent estimates of the coefficients. This means that the value of any coefficient does not depend on what values the other coefficients have*"(Makarichev et al., 2016). At the preparation stage, the scale of the resulting indicator – the level of risk and each factor separately - was determined individually with each expert.

In the conducted study, based on a survey of experts and analysis of statistical data of the textile industry of Turkmenistan, the gradation of the risk level, previously given in

the works of O. V. Luskatova (Luskatova, 2014; Luskatov & Luskatova, 2014), was confirmed:
- acceptable risk-up to 0.10;
- permissible risk – 0.10 – 0.25;
- critical risk – 0.25 – 0.40;
- catastrophic risk-over 0.40.

Although the most common is the financial assessment of the damage caused by a risk event, among the factors that affect the level of risk, only the financial factor can have a cost estimate. Taking into account the need for uniformity of the values of variables in the CFE model, the expediency of using the relative dimensions of all incoming factors was accepted. Based on the expert assessment of the risk of textile enterprises in Turkmenistan using the CFE methods in the Matlab 14.0 program (Haytanova, Luskatova, & Roberts, 2021, p.14), the authors obtained a polynomial that characterizes the level of risk from the studied factors:

$$Y = 0.3060 + 0.2378*X1 + 0.2512*X2 + 0.2263*X3 + 0.2848*X4 + 0.1954*X1*X2 + 0.1771*X1*X3 + 0.2208*X1*X4 + 0.1856*X2*X3 + 0.2142*X2*X4 + 0.2110*X3*X4 + 0.1454*X1*X2*X3 + 0.1817*X1*X2*X4 + 0.1648*X1*X3*X4 + 0.1733*X2*X3*X4 + 0.1355*X1*X2*X3*X4 \qquad (1)$$

where
X1 – specific factors of the textile enterprise;
X2-organizational and technological factors;
X3-financial factors;
X4-legal factors.

The resulting model (1) required additional analysis, during which the terms of the polynomial with low coefficients for variables were removed since their value for assessing the risk level is small. The initial provisions of the theory of experimental planning, which fixes the orthogonality of the model, allow us to remove insignificant terms of the polynomial without compromising the adequacy.

$$Y = 0.3060 + 0.2378*X1 + 0.2512*X2 + 0.2263*X3 + 0.2848*X4 + 0.2208*X1*X4 \quad (2)$$

This equation (2) indicates that all the factors specified in the risk passport are significant, the coefficients for each of the specified input parameters with a margin greater than the cut-off line adopted at the level of 0.22. The combination of the bipolar interaction of specific and legal factors proved to be among the significant ones.

Choosing the optimal way to manage the risks of a textile enterprise based on information visualization

Traditionally, the following groups of risk management methods are used: methods of compensation, dissipation, localization, and risk avoidance. The choice of a particular method will depend on the type of management at the enterprise. Decision-makers (DM) rank the risks based on the consequences and probability of each. Many business managers believe that the assessment of the consequences and probability of a high,

medium, or low level of risk is adequate to the needs of the firm. They compare the estimates obtained with the company's strategy to identify what risks may affect the immediate goals and assess the degree of riskiness, taking into account the requirements of the legislation, costs, and interests of investors. When developing the risk management strategy, it is necessary to take into account the risk tolerance of the DM. Strategy selection is about making choices and accepting trade-offs. So it makes sense to apply enterprise risk management to strategy as that is the best approach for untangling the art and science of making well-informed choices. (Committee of Sponsoring Organizations of the Treadway Commission (COSO), 2017, p. 4). The process of risk assessment is difficult to clear from the subjectivity associated with the degree of risk acceptance by a particular manager. For example, with an extremely cautious type of management, risk avoidance methods are more preferable.

It is advisable to choose the optimal risk management method based on the visualization of the risk situation of a particular enterprise or industry as a whole in the "risk field". This concept was introduced by O. V. Luskatova for investment projects (Luskatova, 2014). When searching for the most effective method of risk management for a particular company, it is necessary to take into account the subjective characteristics of the DM in terms of the activity of implementing tactics and strategies in relation to management, as well as the subjectively assessed level of risk. The "risk field" model (Figure 6) for textile enterprises was refined by the authors as it has greater detail on the "risk level" axis. This aspect makes it possible to clarify the use of the proposed six risk management tools at the enterprise.

Figure 6. "Risk field" - dependence of the risk management method of a textile enterprise on the level of risk and the activity of implementing the management strategy
(Developed by the authors)

The choice of methods that can be used to avoid risk is carried out by the DM only if the level of risk and the activity of monitoring the reduction of its impact are low. If the degree of risk increases, the responsibility for the consequences of the risk is commonly shifted to other persons. This is usually provided in advance, during the insurance of possible negative consequences of the risk.

Risk insurance refers to the transfer of risk to another party, in which the burden of possible negative or positive consequences is transferred along with the risk. If the risk concerns issues of adverse price fluctuations and the purchase and sale processes are

carried out on an international scale, then it is possible to use exchange-traded instruments, for example, hedging or options contracts.

If managers are passive to the risk, provided that the level of risk increases, it is necessary to use *localization* methods. Such risk management practices contribute to the isolation of the centers of responsibility for it; at the same time, the risk itself is not isolated. Specially formed risk divisions transfer the increased risks to other areas. At the same time, the transferred risks, in this case, are characterized by reduced size and financial losses.

If the developed strategy implemented by the management team is characterized by a high level of risk, methods of *cross-industry diversification* are used, in which the risk is prevented or reduced using the most drastic measures. Such measures may even include a change in the scope of business application (in this case, the diversification of production and investment should be characterized by the highest possible activity).

If managers are actively concerned with risk, provided it is relatively low, methods of *intra-industry re-profiling* are used. This approach is used as a measure to restore the solvency of textile enterprises. Working on the same raw materials, you can expand the range of products. A partial change in equipment makes it possible to increase the depth of processing of raw materials and obtain other products with a greater share of added value (Figure 6).

If there is a reduction of the risk level in the company, the managers who occupy the highest positions use *compensation* methods. The essence of these methods is to control risks at the earliest stages of their occurrence. It is possible to compensate for the uncertainty of the internal and external environment of the enterprise by monitoring financial and economic activities and effectively planning these activities.

The value of the risk field is that it reflects the collective wisdom of the parties involved, objective assessments of the degree of risk, and the subconscious subjective attitude to the risk of the DM. The work of T. Kohonen on the use of self-organizing maps (SOM) (Osovsky, 2019) revealed the possibility of visual processing of information obtained during the construction of functional dependencies. Self-organizing maps are a neural network learning method that does not involve external interference. Due to the use of SOM, data of a larger dimension can be displayed on maps of a smaller dimension, which are based on neural lattices. When using the SOM, it is also noted that the topological data is stored on a map of a smaller dimension, where the corresponding data is moved.

In this study, the connection of clusters of functional connections in the risk field is proposed (Figure 7). The degree of visual clustering is estimated on a scale from 0 to 1. The unit corresponds to the yellow color, which characterizes the highest level of risk and the most optimal proposed method of risk management.
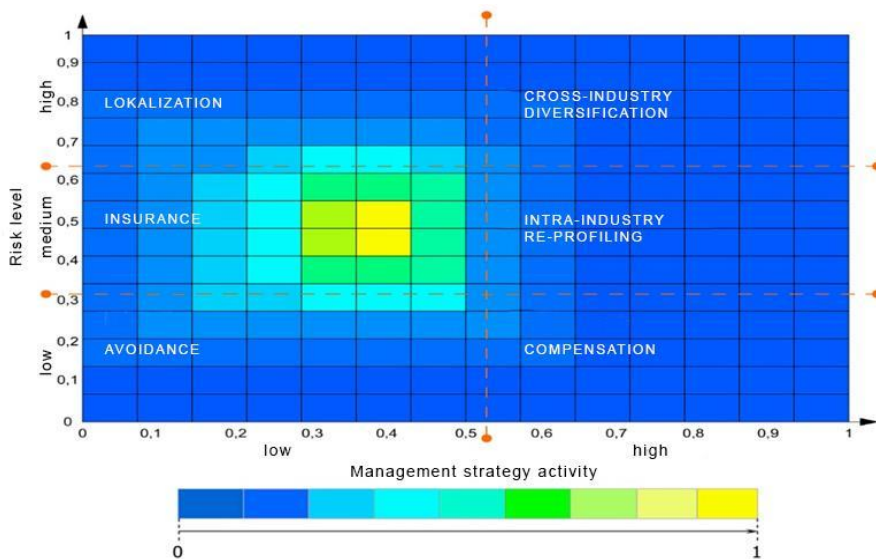
Figure 7. The dependence of the risk level on price factors, considered in the "risk field"
(Developed by the authors)

Figure 7 shows the interaction of the volatility factor of the price of raw materials in the textile industry and the level of risk. Price variability is the main factor that characterizes the specific risks of textile industry enterprises. When the two-factor model is superimposed in the "risk field", a significant maximum in the area of the insurance method is visible. The interpretation of the SOM visualization suggests the need to apply risk minimization methods using exchange-traded instruments: hedging with futures contracts or using options.

Conclusions

Thus, the effective development of the textile industry of Turkmenistan implies the mandatory establishment of a risk management system at the enterprises of the industry. This will increase the investment attractiveness and competitiveness of the industry, which is an important link in ensuring the economic security of the state in the conditions of the volatility of prices for hydrocarbon raw materials.

The analysis of the peculiarities of the functioning of the enterprises of the textile industry of Turkmenistan became the basis for the preparation of the risk passport of textile enterprises, which includes specific, organizational, technical, financial, and legal factors.

Based on the complete factor experiment, a simulation of the risk level of a textile enterprise in Turkmenistan was performed. It showed the special significance of specific and legal risks for the investment of the industry. The resulting model became the basis for assessing changes in the most important risk factors and choosing the optimal ways to minimize their impact. The use of futures and options contracts for

hedging textile production, as well as the creation of a system of state monitoring of the financial condition of textile industry enterprises, are proposed as measures to reduce the risk.

References

Britannica (2021). Turkmenistan. https://www.britannica.com/place/Turkmenistan

Committee of Sponsoring Organizations of the Treadway Commission (COSO) (2017). Enterprise Risk Management—Integrating with Strategy and Performance. Executive Summary. https://www.coso.org/documents/2017-coso-erm-integrating-with-strategy-and-performance-executive-summary.pdf

Dzhumaev, I. (2012). *Turkmenistan's foreign trade: trends, problems and prospects.* VRS Company.

Federation of European Risk Management Associations (2003). A Risk Management Standard. https://www.ferma.eu/app/uploads/2011/11/a-risk-management-standard-english-version.pdf

Haytanova, M. M. (2019). Economic aspects of the formation and development of the textile industry of Turkmenistan. *Bulletin of the Academy, 3,* 111-117.

Haytanova, M. M. (2020). Financial risk management in business: the concept, system and principle of construction. *Economics and Management: Problems, Solutions, 4*(2)*,* 62-67*,* https://doi.org/10.34684/ek.up.p.r.2020.04.02.010

Haytanova, M. M., Luskatova, O. V., Eivazov, R. A., & Amosova, N. A. (2018). Textile industry as a factor of economic security of Turkmenistan. *News of Higher Educational Institutions. Textile Industry Technology, 5,* 239-243.

Haytanova, M. M., Luskatova, O. V., & Gorshkova, E. V. (2021). Risks of textile industry enterprises and ways to minimize them. *News of Higher Educational Institutions. Textile Industry Technology, 2*(392), 28-33.

Haytanova, M. M., Luskatova, O. V., & Roberts, M. V. (2021). Modeling of risk assessment of textile enterprises of Turkmenistan. *Industrial Economy, 2*(2), 10-15. https://www.elibrary.ru/item.asp?id=46173138

Kadarova, J., & Durkáčová, M. (2012). Risk management in industrial companies. *Applied Machine Intelligence and Informatics (SAMI), IEEE 10th International Symposium.* https://www.researchgate.net/publication/261311332_Risk_management_in_industrial_companies

Koshechkin, S. A. (2010). Investment project risk concept. https://www.cfin.ru/finanalysis/koshechkin.shtml

Luskatov, N., & Luskatova, O. (2014). Using of neural networks for risk-management of state investment projects. *Life Science Journal, 11*(7), 434-443. https://www.researchgate.net/publication/293254629

Luskatova, O. V. (2014). Actual problems of business, science and education development in the context of the knowledge economy formation. VIB Publishing House.

Makarichev, Yu. A., & Ivannikov, Yu. N. (2016). Methods of experiment planning and data processing. Samara State University. http://em.samgtu.ru/sites/em.samgtu.ru/files/mpe _posobie_2016.pdf

Ministry of Textile Industry of Turkmenistan. (2021). https://www.textile.gov.tm/

Osovsky, S. (2019). *Neural networks for information processing* (2ⁿᵈ ed.). Hot line – Telecom.

State Committee of Statistics of Turkmenistan. (2020). Statistical Yearbook of Turkmenistan 2019 year. https://www.stat.gov.tm/ginishleyinNeshir/28

State Committee of the Republic of Uzbekistan by Statistics. (2021). Socio-economic situation of the Republic of Uzbekistan. Industry. https://stat.uz/ru/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=328&id=1511&Itemid=1000000000000

The Pakistan Business Council. (2017). 2017 Turkmenistan Country Profile. The Central Asia Country Series. https://www.pbc.org.pk/wp-content/uploads/Report-Turkmenistan.pdf

Tabakh, A., Prokudin, A., & Podrugina, A. (2021). The macroeconomic situation in the countries of Central Asia: how Kazakhstan, Uzbekistan, Kyrgyzstan and Tajikistan are experiencing the consequences of the COVID-19 pandemic. https://www.raexpert.ru/researches/int_fin/central_asia_2021/

Trapeznikov, V. F. (2021). The textile industry plays an important role in the economy of Turkmenistan. https://sng.fm/12759-trapeznikov-tekstilnaja-otrasl-igraet-vazhnuju-rol-v-jekonomike-turkmenistana.html