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Keywords: risk, logistics, corporate risk, logistics company, risk management.
Abstract: Relevance of the problem. Complexity in the global supply chain increase the risks that enterprises are exposed to, including logistics. Purpose of the article. The article analyzes the corporate management risks of logistics enterprises. Methods. The article used the method of statistical groupings and statistical tables, the game theory method, the matrix game method. Main results. The study substantiates an algorithm for the analysis of corporate management risks of using blockchain technologies in the activities of logistics companies when concluding smart contracts, certifying new types of transportation, and integrating cryptocurrency for delivery payments. Examples of choosing an economic strategy for managing the risks of a logistics company using the criteria of maximax, Laplace, Wald, Savage, Bayesian, Hurwicz were elaborated. Referring to the relevant calculations, it was determined that the most often recommended strategy was "the certification of new types of logistics services". It was determined that this strategy will contribute to minimizing the logistics company's risks associated with the implementation of blockchain technology through ensuring the competitive position through innovation. Practical relevance. The findings can be useful for managers of logistics companies in practical implementation and use of blockchain technologies as well as in risk management. It is expedient to focus the further research prospects onto the integration of blockchain technology with modern logistics companies' ERP systems in the further developing the Logistics 4.0 concept.

1 Introduction

1.1 Problem statement

Logistics is an important tool in business management, optimizing material and related flows in the sphere of commodity and money circulation [1]. In the processes of goods movement in the market space the logistics system includes various elements, the functioning of which is influenced by certain risk factors [2]. Ensuring stability and reliability at all levels of the logistics system requires careful analysis of relevant risks to anticipate and minimize them.

The transition to digital manufacturing and e-commerce requires a rethinking of the role of logistics as a value chain management tool. Digital transformation raises the need for the changes in logistics in order to adapt it to modern requirements and obtain numerous advantages due to the use of the latest technologies. Digital transformation can accelerate the execution of business processes in supply chains, providing more reliable and transparent information for informed decision-making. This will lead to cost savings by preventing potential risks and eliminating operations that are of no value to customers. The continuum of digital technologies that make up the core functionality of digital logistics includes big data processing and analytics, the Internet of Things, blockchain technology, cloud services, e-logistics, 3D printing, and others. According to global practice, the use of blockchain technology is one of the most promising areas in the information support of logistics services.

Blockchain technology is widely used in various fields due to its unique features. One of these fields is logistics, which often involves multiple stages and numerous geographical locations. This complexity makes it difficult to track events, monitor the transportation of goods, and respond to unforeseen circumstances. Additionally, the lack of transparency makes it challenging to investigate illegal activities along the route. However, blockchain technology can address these issues by providing a transparent public ledger that allows clients and auditors to

track the entire route easily. It is crucial that all members of the supply chain have access to the network to fully utilize blockchain's benefits. By eliminating unnecessary intermediaries, reducing workflow, and ensuring strong security, blockchain technology can prevent errors, illegal labeling of goods, and other fraudulent activities. An additional advantage of using innovative blockchain technology is cost savings for the industry.

The logistics sector is gradually implementing projects that utilize blockchain technology. One such project is being carried out by Maersk, the Danish transport giant, which is exploring ways to automate document flow and manage freight transport more efficiently and transparently. In collaboration with IBM, Maersk is developing its own blockchain technology based on Hyperledger Fabric, which enables the monitoring of millions of container shipments per year and better integration with customs services. Another example is Walmart, the popular US retailer, which is using Hyperledger Fabric in its distributed ledger technology pilot project to track pork leakage in China and its transport and storage in the US. Thus, there are different ways and strategies of implementing blockchain technology in the activities of logistics companies. This makes it necessary to carefully assess the risks of such implementation and define a strategy that will ensure their minimization.

1.2 Research focus

Thus, given that blockchain technology is a way of storing data or a digital register of transactions, agreements, contracts, its main advantage is that this register is not stored in any one place. It is distributed among several hundred or even thousands of computers around the world. Any user of this network can have free access to the current version of the registry, which makes it transparent to absolutely all participants. Logistics is one of the areas where the use of blockchain can increase the efficiency of enterprises, namely, to ensure the transparency of supply chains, reduce costs and risks during logistics operations.

The purpose of the study is to determine the managerial corporate risks of using blockchain technology in a logistics company.

2 Literature review

A considerable number of scientific works are devoted to the study of the risks of the activities of logistics companies. A number of scientists determine the essence and factors of risk formation in logistics activities.

What should be stressed here is that according to researchers the main motive behind risk identification is to identify all significant risks that the supply chain may face. Once relevant risks are identified, the evaluation is carried out to enhance the understanding of each risk and their significance, [3].

In this context authors research is worth highlighting, in which the consider organizations providing logistics services, dynamic changes in the external environment affect the risk of performing processes and compromise effective integration of resources, coordinated operations management and, therefore, negatively affect on customer satisfaction and loyalty, [4,5]. From this perspective such processes require improved management of logistics services and an integrated management concept that combines the integration of processes for analyzing satisfaction and risks that may adversely affect the provision of satisfactory logistics services.

Pokrovskaya et al. [6] state that the results of a logistics audit often reveal the following problems in the logistics system for the delivery of goods: a process control system was not created; there is no complete supply chain control system; there are considerable gaps in the cross-functional interaction of the structural divisions of the company. In fact, the above circumstance is a serious logistical risk, which reduces the reliability and manageability of the supply chain in the logistics system for the delivery of goods and does not allow automating the operation of the enterprise's logistics system. Consequently, there are risks of making untimely or incorrect management decisions in supply chain management, [6].

It is also worth highlighting the studies that systematize the specific risks of logistics companies. For instance, researchers note that the risks associated with the supply chain management process indeed raise many concerns and require the company to be flexible in response. In this regard, various sources of risk including political risk, socio-cultural risk, as well as business risk can lead to weaknesses and inefficiencies in supply chain integration, [7,8].

Authors point out that delays in delivery are usually caused by personal and operating conditions. In this regard, one of the personal conditions causing delivery delays are drivers and technicians who are less agile in carrying out their duties. Moreover, unexpected damage can occur in the operating conditions such as trucks and generators, [9].

Still other scientific papers are devoted to the practical aspects of risk management in logistics companies. In particular, authors argue that one of the most important prerequisites for a successful business is the integration of risk management into business management. The scholars view it as an integral part of company's competitiveness. Increasing costs and complexity in organizations lead to increased uncertainties and risks. This entails an increasingly widespread implementation of the risk management process to reduce risk and thereby avoid deviation from the goal, [10,11].

Wang et al. [12] hold that it is also important to consider the risk on the part of the client, which is primarily associated with the client, for example, request and offer, order receipt, order processing and possible order modification. Customer risk, a type of internal supply chain risk that mainly comes from the customer, can cause controversy and/or affect normal logistics operations at logistics service providers. Correspondingly, researchers focus on the risks associated with customers of logistics companies.

In the same vein, as noted by researchers, supply chains are currently striving to develop recovery and reintegration strategies for end-of-life products. Nevertheless, in these reverse logistics operations certain events can entail financial losses for the company and adverse consequences that damage the environment and society], [1,13].

For another thing, the scholarly works also elaborate on the opinion regarding the risks of using blockchain in the management decisions of logistics companies. For example, Kodym et al. [14] point out that risks arise from both sides, both cybernetic and physical, and companies become more vulnerable in consequence. When utilizing risk models, risk evaluation should beyond question provide risk awareness.

Likewise, authors reasonably note that risks can negatively affect not only internal processes within the company and business results, but also management decisions. Hence, the identification of specific risks would be an indispensable prerequisite for making informed decisions, [15,16].

With all the mentioned aspects, it cannot be denied that current research has practical relevance from the perspective of digitalization economy as one of the groundbreaking means of conducting logistics activities is blockchain technology. Blockchain can be defined as a distributed database solution endorsed by users participating in the network and a regularly growing set of data records or a data record technology that captures and distributes transactions, deals, sales, and contracts, [17].

That having been said, the consideration of risks in logistics activities is an important area of scientific research in various sectors of economy. The scientific enquiry is focused on determining the nature of risks in logistics, directions for managing them, determining the advantages and disadvantages of risk evaluation methods. Probing deeper into the findings of the above scientific studies, it is still relevant to clarify the risks in the corporate segment of logistics companies management.

3 Methodology

The research procedure comprises the following stages:

1. At the first stage of the study, a set of research methods and tools was formed.
2. At the second stage, a sample of the study was formed (three Azerbaijani logistics companies)
3. At the third stage, the corresponding calculations were made using the matrix game methodology, game theory, and the method of statistical groupings and tables.

3.1 Methods

The study used the method of statistical groupings and statistical tables, the game theory method, the matrix game method, which were utilized when choosing a risk management strategy. In particular, the use of statistical groupings and tables made it possible to quantify the degree of homogeneity of the selected data groups in relation to the calculation of the matching criteria, and to select essential grouping features. Grouping of a statistical population begins with the selection of grouping characteristics. The method of statistical groupings establishes only the existence of a relationship between phenomena, without determining its comparative quantitative parameters. For this reason, along with the method of groupings, the method of game theory is further applied. Game theory should be considered as a tool for improving the efficiency of planning and management decisions. With the help of this section of mathematical economics, we investigate the resolution of conflicts between players (logistics companies) and the optimality of their strategies. Conflict in this sense is referred to the distribution of profits. The matrix game method is a finite two-player zero-sum game in which player 1's payoff is represented as a matrix. The row of the matrix corresponds to the number of player 1's strategy, the column corresponds to the number of player 2's strategy; the intersection of the row and column of the matrix is the payoff of player 1 corresponding to the strategies used. The use of a matrix game has provided scientifically sound strategies for coordinating the actions of logistics companies in terms of risk management.

3.2 Sample

The study examined the practice of the Azerbaijani logistics companies Trade Logistic MMC, CLS and Global Logistics Services LLC (selected according to the rating of the CARGO-CARDS portal, based on their first positions in the rating in terms of traffic volume and the rating of trust in the company, [18]). For risk analysis and calculation of game theory criteria, a choice of alternatives in the activities of the companies under study is proposed. These alternatives are as follows: alternative A_1 - the use of blockchain for concluding smart contracts, alternative A_2 - certification of new types of transportation, alternative A_3 - integration of cryptocurrency for payments for deliveries (A_3).

3.3 Tools

To elaborate an economic risk management strategy, the current study used the criteria of maximax, Bayes, Laplace, Wald, Savage, and Hurwicz. The maximax criterion guides statistics towards favorable conditions in the logistics market, in other words this criterion communicates an optimistic evaluation of the situation.

According to the Bayes criterion, the (pure) Ai strategy is taken as optimal, which maximizes the average payoff a or minimizes the average risk r.

With the Laplace criterion, provided that probabilities of state of energy market are plausible, they are evaluated using the Laplace principle of insufficient basis, according to which all states of nature are considered equally probable, i.e. (1), (2).

$$q_1 = q_2 = \ldots = q_n = 1/n. \quad (1)$$

$$q_i = 1/3. \quad (2)$$

According to the Wald criterion, the pure strategy is taken as optimal, which guarantees the maximum payoff under the worst conditions, i.e. (3)

$$a = \max(\min a_{ij}) \quad (3)$$

The Wald criterion focuses statistics on the unfavorable conditions of the logistics market: i. e., this criterion communicates a pessimistic evaluation of the situation.

The Hurwicz criterion is a pessimism – optimism criterion. The optimal strategy is considered to be the one for which the relation is fulfilled as follows (4):

$$\max(s_i) \quad (4)$$

where si = y min(aij) + (1-y)max(aij)

At y=1 we get the Wald criterion, at y=0 we get the optimistic criterion (maximax).

In this regard, the Hurwicz criterion takes into account the possibility of both the worst and the best market behavior for the company. As such, the worse the consequences of erroneous decisions, the greater the desire to insure against mistakes, the closer to 1.

3.4 Data analysis

To determine the economic strategy for managing the risks of using blockchain technology and elaborating the payment matrix, the data on the cost of implementing blockchain technology (mln dollars) and profit from each of the identified alternatives (mln dollars) were used.

4 Results

To analyze the corporate risks of logistics enterprises, we will choose the risk of using blockchain technology in the management of logistics enterprises. In particular, we adddress the following key areas for the application of blockchain technology in logistics enterprises management (Figure 1).

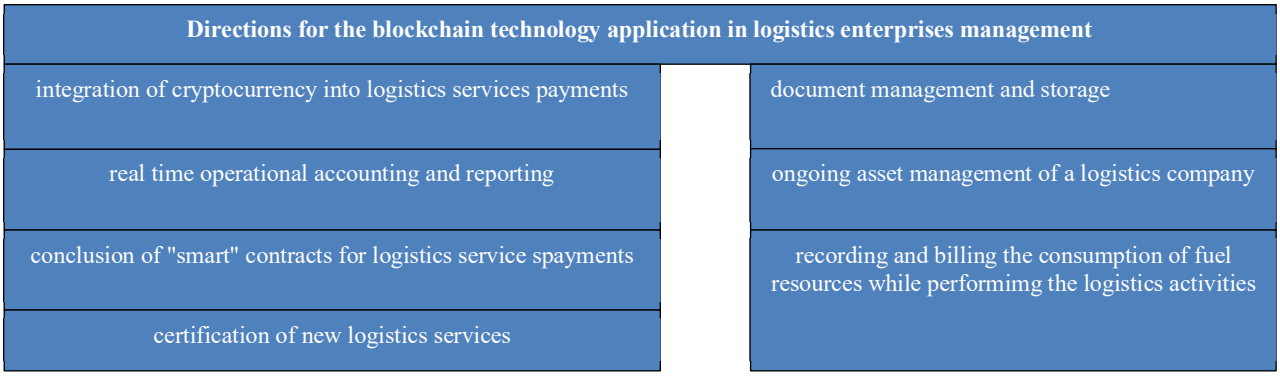

Figure 1 Directions for the blockchain technology application in the corporate logistics enterprises management
Source: compiled by the author based on [12,17,19].

Given that blockchains have a number of advantages, they are not without some downsides. With special reference to the application of blockchains in enterprise logistics management, we systematize the main risks thereof.

1. High energy intensity of the system (the energy consumption of using the blockchain is quite high and requires significant costs).
2. Lack of familiarization and standardization.
3. Cyber security and other technical issues.
4. Accounting difficulties (for example, accountants' lack of knowledge of blockchain technology).
5. Problems of audit practice (lack of sufficient evidence of the transaction nature, guarantees for the classification of transactions in the financial statements of the fuel and energy company, the estimated transactions cost, etc.).
6. Technological barriers (considerable computing power for the transactions to be verified, a huge amount of memory for the transactions history to be stored).

More to the point, it is possible to reduce the risks impact of using blockchain in logistics activities by analyzing the risks thereof in logistics enterprises, which should be carried out in a certain sequence (Figure 2).

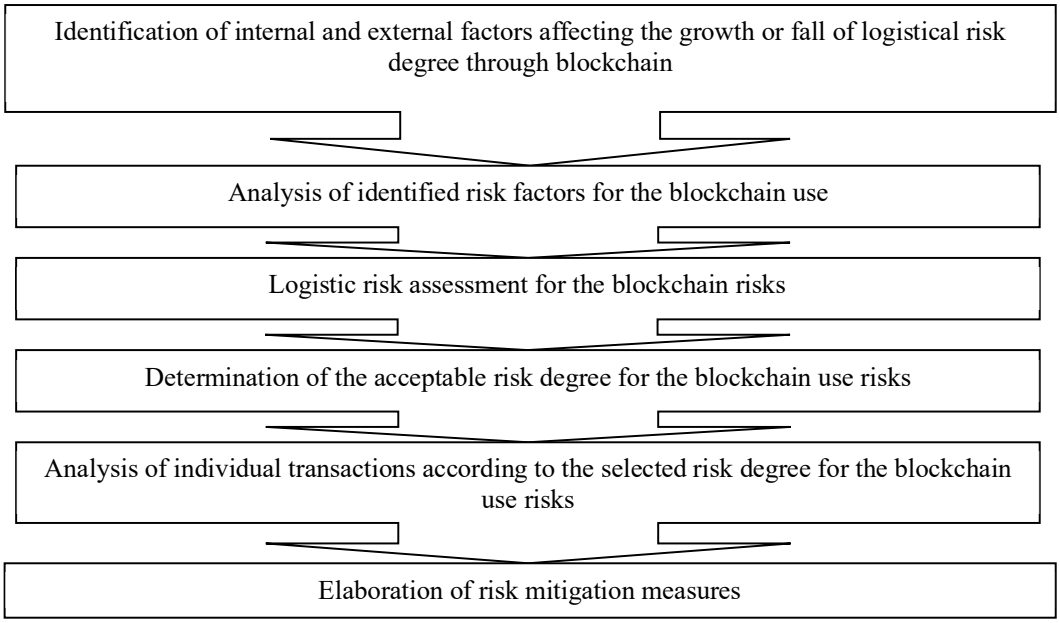

Figure 2 The risk analysis algorithm for the blockchain use risks in a logistics company
Source: author's calculations.

It should be pointed out that while carrying out the research we examined the examples of risk management. The application of the matrix game yielded the following data. The Azerbaijani logistics company Logistic MMC can apply the blockchain for concluding smart contracts (A_1), certifying new types of services (A_2) and integrating cryptocurrency for supply settlements (A_3), while receiving a profit (million dollars), which can be in one of three options (P_1, P_2, P_3) depending on the decision made, namely A_1, A_2 or A_3 (the data taken from the company's activities). The elements of the payoff matrix characterize the profit received in the course of the i-th activity of the companyin the j-th state of demand. The enterprise's game against demand is provided by the payoff matrix. The results of applying the above method are structured in the form of a table below.

As a result of applying the game theory method and the method of statistical groupings and tables, the following data were obtained (Table 1).

Table 1 Criteria for the economic strategy of MMC company risk management

	Logistic MMC company				
Initial data	A_i	P_1	P_2	P_3	
	A_1	10	9	11	
	A_2	15	17	12	
	A_3	10	11	14	
Maximax criterion	A_i	P_1	P_2	P_3	$\max(a_{ij})$
	A_1	10	9	11	11
	A_2	15	17	12	17
	A_3	10	11	14	14
	max=17 (Strategy N=2)				
Bayesian criterion	A_i	P_1	P_2	P_3	$\sum(a_{ij}p_j)$
	A_1	3.3	2.97	3.63	9.9
	A_2	4.95	5.61	3.96	14.52
	A_3	3.3	3.63	4.62	11.55
	p_j	0.33	0.33	0.33	
	max=14.52 (Strategy N=2)				

Analysis of corporate management risks in the work of logistics enterprises
Vaqif Maharram Quliyev, Sevinj Agamamed Abbasova, Mehriban Shaban Aliyeva, Elnara Robert Samedova, Manzar Aziz Mammadova

Laplace criterion

A_i	P_1	P_2	P_3	$\sum(a_{ij})$
A_1	3.333	3	3.667	10
A_2	5	5.667	4	14.667
A_3	3.333	3.667	4.667	11.667
p_j	0.333	0.333	0.333	

max=14.67 (Strategy N=2)

Wald criterion

A_i	P_1	P_2	P_3	Min (a_{ij})
A_1	10	9	11	9
A_2	15	17	12	12
A_3	10	11	14	10

max=12 (Strategy N=2)

Savage criterion

A_i	P_1	P_2	P_3	Max(a_{ij})
A_1	5	8	3	8
A_2	0	0	2	2
A_3	5	6	0	6

min=2 (Strategy N=2)

Hurwicz criterion

A_i	P_1	P_2	P_3	Min (a_{ij})	Max (a_{ij})	y min(a_{ij}) + (1-y)max(a_{ij})
A_1	10	9	11	9	11	10
A_2	15	17	12	12	17	14.5
A_3	10	11	14	10	14	12

Max=14.5 (Strategy N=2)

Source: author's calculations.

Further, we will perform these calculations for the CLS company (Table 2).

Table 2 Criteria for the economic strategy of CLS company risk management

CLS company

Initial data

A_i	P_1	P_2	P_3
A_1	12	10	13
A_2	14	15	14
A_3	11	12	15

Maximax criterion

A_i	P_1	P_1	P_3	max(a_{ij})
A_1	12	10	13	13
A_2	14	15	14	15
A_3	11	12	15	15

max=15 (Strategy N=2)

Bayesian criterion

A_i	P_1	P_2	P_3	$\sum(a_{ij}p_j)$
A_1	3.96	3.3	4.29	11.55
A_2	4.62	4.95	4.62	14.19
A_3	3.63	3.96	4.95	12.54
p_j	0.33	0.33	0.33	

max=14.19 (Strategy N=2)

Laplace criterion

A_i	P_1	P_2	P_3	$\sum(a_{ij})$
A_1	4	3.333	4.333	11.667
A_2	4.667	5	4.667	14.333
A_3	3.667	4	5	12.667
p_j	0.333	0.333	0.333	

max=14.33 (Strategy N=2)

Wald criterion

A_i	P_1	P_2	P_3	Min (a_{ij})
A_1	12	10	13	10
A_2	14	15	14	14
A_3	11	12	15	11

max=14 (Strategy N=2)

Savage criterion

A_i	P_1	P_2	P_3	Max (a_{ij})
A_1	2	5	2	5
A_2	0	0	1	1
A_3	3	3	0	3

min=1 (Strategy N=2)

Hurwicz criterion

A_i	P_1	P_2	P_3	Min (a_{ij})	Max (a_{ij})	y min(a_{ij}) + (1-y)max(a_{ij})
A_1	12	10	13	10	13	11.5
A_2	14	15	14	14	15	14.5
A_3	11	12	15	11	15	13

max=14.5 (Strategy N=2)

Source: author's calculations.

Further, we perform the evaluation of these criteria for the company Global Logistics Services LLC (Table 3).

Table 3 The economic strategy criteria for Global Logistics Services LLC company risk management

CLS company

Initial data

A_i	P_1	P_2	P_3
A_1	11	13	17
A_2	10	15	18
A_3	12	14	19

Minimax criterion

A_i	P_1	P_2	P_3	max(a_{ij})
A_1	11	13	17	17
A_2	10	15	18	18
A_3	12	14	19	19

max=19 (Strategy N=3)

Bayesian criterion

A_i	P_1	P_2	P_3	$\sum(a_{ij}p_j)$
A_1	3.63	4.29	5.61	13.53
A_2	3.3	4.95	5.94	14.19
A_3	3.96	4.62	6.27	14.85
p_j	0.33	0.33	0.33	

max=14.85 (Strategy N=3)

Laplace criterion

A_i	P_1	P_2	P_3	$\sum(a_{ij})$
A_1	3.667	4.333	5.667	13.667
A_2	3.333	5	6	14.333
A_3	4	4.667	6.333	15
p_j	0.333	0.333	0.333	

max=15 (Strategy N=3)

Wald criterion

A_i	P_1	P_2	P_3	Min (a_{ij})
A_1	11	13	17	11
A_2	10	15	18	10
A_3	12	14	19	12

max=12 (Strategy N=3)

Savage criterion

A_i	P_1	P_2	P_3	Max (a_{ij})
A_1	1	2	2	2
A_2	2	0	1	2
A_3	0	1	0	1

min=1 (Strategy N=3)

Hurwicz criterion

A_i	P_1	P_2	P_3	Min (a_{ij})	Max (a_{ij})	y min(a_{ij}) + (1-y)max(a_{ij})
A_1	11	13	17	11	17	14
A_2	10	15	18	10	18	14
A_3	12	14	19	12	19	15.5

max=15.5 (Strategy N=3)

Source: author's calculations.

Thus, because of solving the statistical game according to various criteria, the A_2 strategy proved to be the most often recommended one, in particular the certification of new types of logistics services. Such a strategy in the context of digitalization will ensure the competitive position through innovation and will minimize risks by automating the logistics services processes.

5 Discussion

The current risk analysis algorithm for the use of blockchain technology by logistics enterprises (Figure 1) has common stages with the opinion of researchers. Supply chain research tends to break down risk management into three processes: risk identification, risk evaluation, and risk mitigation. The initial stage of the process starts with risk identification, which is basically considered imperative for risk management, [20,21].

What should be stressed here is that yet other researchers, assigning the risks of the logistics system to a specific category allows one to determine the processes that need to be given special attention when developing the company's logistics strategy, identify weaknesses in logistics, additional costs associated with risk prevention policies, etc., [22,23].

However, Bartosova et al. [24] indicate that the larger the company size, the higher its costs for anti-crisis management. The number of employees involved in the risk management process is also consistent with this conclusion. What is more, the size of the company does not affect the number of external employees involved in the risk management process.

In view of the above, it is advisable for logistics companies to keep a register of corporate risks. Reserchers reasonably note that organizations that develop an adequate risk register will be able to identify immediate supply chain threats associated with their business operations and quickly develop strategies to mitigate such risks before they lead to catastrophic losses over time. Suffice it to say that organizations that develop their risk register will be able to identify the immediate supply chain risks associated with their business operations and thus be able to mitigate such risks before they lead to catastrophic losses, [25,26].

Above all, significant risks lie in particular in globalization and outsourcing. We agree with Urciuoli [27] that outsourcing and globalization can increase the vulnerability of supply chains to unexpected risks or disruptions. Companies may know very little about the local culture or political conditions of the countries they outsource from. The research findings by Zhai and McDermott [28] also indicate the existence of a risk and manifestation of logistical outsourcing in conditions of asymmetric information, as well as the risk and manifestation of logistical outsourcing caused by the social system imperfection. Finally, in accordance with the principles of game theory, it is noted that the signing of an effective contract is necessary to prevent and control the risk of logistics outsourcing; using the institutional arrangement of intermediary organizations to prevent and control the risk of logistics outsourcing caused by information asymmetries, [28]. A similar opinion regarding the risks of outsourcing logistics companies is emphasized authors at work [29]. Let us supose for the sake of argument that businesses escalate questions that are not related to their core area of expertise to companies that are experts in that area. As a result, efforts are being made to improve efficiency and reduce costs. However, if the outsourcing organization does not operate at the proper level of security and coordination, this creates many risks and problems. As a result, this situation has a negative impact on the business and can lead to a wide range of losses in terms of efficiency, productivity, competitiveness and cost advantage.

Researchers likewise hold that logistics enterprises cannot be perceived only as logistics systems, rather we must take into consideration a whole range of external influences. In this regard, they effect the internal environment of the logistics enterprise and the decision-making processes, thus creating interactive links between their own logistics system and the external environment, [30,31].

It is also expedient to pay attention to the specific risks stemimg from the main risks. For example, in present-day logistics the use of Logistics 4.0 concept by logistics enterprises is relevant. However, Kodym et al. [14] point out that automation, digitization and network technologies

require large infrastructure, implementation and maintenance costs. Investing in new technologies occurs with high financial risk as we do not know which processes will be economically viable in the long run and which will not.

Furthermore, logistics enterprise management is associated with international risks. Similarly, Yan et al. [2] share such a perspective on the problem. Understanding international logistics risks is essential for the smooth operation of international trade, systematically studying the causes, responsible parties and possible consequences of international logistics risks. Drawing on the above, the international logistical risk is classified in terms of the consequences caused by the logistical risk, in combination with the influencing factors and types of risk, a scorecard and a model for international logistical risk evaluation are distinguished.

Likewise, risk management strategy is addressed by authors [3]. The scholars hold that is is imperative to develop a strategy, the task of which would be to optimize the use of resources and costs. A risk management strategy is only successful when it is based on the intersection of logistics goals with the corresponding motivation of enterprise's employees to an innovative development.

That being said, one should also take into account the opinion of researchers [7] as regards the difference between traditional logistics risk management and risk management strategy. In fact that the goal of the latter is not only to deliver the right product at the right time at the right time at the lowest cost with the highest level of quality (this is especially true transaction costs, the magnitude of which is difficult to determine in advance), but also the continuous improvement of logistics processes, the allocation of a separate service and paying more attention to all flow processes.

We share the opinion of Bonsón and Bednárová [17] that the identified threat and risks can be mitigated to a reasonable extent. It comes down to how a company should respond to a declared hazard. The first step will be to develop procedures to anticipate changes in the blockchain and accounting standards.

However, according to authors [19], smart contracts can be impressive, although there emerges a certain complexity in their programming. Smart contracts can function as controls, and if poorly designed, they will give way to imperfect business operations. The legitimacy and completeness of transactions may be in question if the company is engaged in off-chain transactions. Off-chain transactions are not involved in the blockchain and it would not present any additional challenge to verify and reconcile such transactions.

We also agree with the findings of researchers that blockchain does an excellent job of eliminating traditional risks that were more focused on subjects; although further use of blockchain will need to consider new types of risks. Risk will be more focused on IT and companies are moving to blockchain as new users will have to adapt their risk management processes. Moreover, the companies that are just getting started with blockchain can become susceptible to new scams, [32,33].

6 Conclusion

The relevance of this study is manifested in the fact that in order to ensure the effective operation of a logistics company in present-day changing global environment, it is imperative to take into account and minimize the risks that may arise within the company. One of the promising technologies that can be useful in the process of minimizing a number of risks, such as the presence of unnecessary intermediaries, disruptions in workflow, security problems, can be blockchain technology, which is capable of preventing errors, illegal labeling of goods, and other fraudulent activities.

During the implementation of blockchain technology in the company's activities, there are a number of possible directions and alternatives for its use, which, in turn, also requires an assessment of the risks of such implementation. The analysis of these risks involves the analysis of possible development alternatives and the choice of the optimal opportunity to evaluate the probability of the selected options' implementation taking into account the presence of uncertainty. Realization of probable risks and effects from the implementation of blockchain technology may be random, therefore quantitative estimates can be obtained using the probability theory framework.

The process of this research included the assessment and comparison of three possible alternatives. As a result of solving the statistical game according to criteria of maximax, Laplace, Wald, Savage, Bayesian, Hurwicz, the A_2 strategy ("the certification of new types of logistics services") was most frequently recommended. This means that the use of blockchain technology to certify new activities will be applied with relatively less economic risk for the studied logistics companies.

It is expedient for further research to integrate blockchain technology with state-of-the-art ERP systems of logistics companies in the further context of elaborating the concept of Logistics 4.0.

6.1 Limitations

The limitation of the study was that the timeframe is based on information as of 2022. The number of respondents was three companies, with geographical restrictions determined by the fact that the companies surveyed belonged to the country of Azerbaijan.

6.2 Originality

The study solved a number of scientific tasks. In particular, an algorithm for analysing corporate governance risks when using blockchain technologies in the activities of logistics companies when concluding smart contracts, certifying new types of transportation, and integrating cryptocurrency for delivery payments is developed. Proposals for improving the corporate risk management of logistics companies have been supplemented.

References

[1] KABUS, J., MICIUŁA, I., PIERSIALA, L.: Risk in supply chain management, *European Research Studies Journal*, Vol. 23, No. 4, pp. 467-480, 2020. https://doi.org/10.35808/ersj/1694

[2] YAN, B.-R., DONG, Q.-L., LI, Q., LI, M.A.: A study on risk measurement of logistics in international trade: A case study of the RCEP countries, *Sustainability*, Vol. 14, No. 5, pp. 1-13, 2022. https://doi.org/10.3390/su14052640

[3] EL BAZ, J., RUEL, S.: Can supply chain risk management practices mitigate the disruption impacts on supply chains' resilience and robustness? Evidence from an empirical survey in a COVID-19 outbreak era, *International Journal of Production Economics*, Vol. 233, No. March, pp. 1-12, 2021. https://doi.org/10.1016/j.ijpe.2020.107972

[4] STEFANOVA, M.: Integrating quality and risk management in logistics, IntechOpen, 2022. https://doi.org/10.5772/intechopen.103050

[5] BORISENKO, I., PANASENKO, N., GANZHUR, M., SHATAMIROV, I., PROKOPAYLO, A.: Risk analysis managerial structures, *AIP Conference Proceedings*, Vol. 2188, No. 1, pp. 1-8, 2019. https://doi.org/10.1063/1.5138451

[6] POKROVSKAYA, O., RESHETKO, N., KIRPICHEVA, M., LIPATOV, A., MUSTAFIN, D.: The study of logistics risks in optimizing the company's transportation process, *IOP Conference Series: Materials Science and Engineering*, Vol. 698, No. 6, pp. 1-8, 2019. http://dx.doi.org/10.1088/1757-899X/698/6/066060

[7] DUONG, N.H., HA, Q.A., TAN, A.: The links between supply chain risk management practices, supply chain integration and supply chain performance in Southern Vietnam: A moderation effect of supply chain social sustainability, *Cogent Business & Management*, Vol. 8, No. 1, pp. 1-27, 2021. https://doi.org/10.1080/23311975.2021.1999556

[8] SYNYTSIA, S., VAKUN, O., DANYLYSHYN, V.: Risk management in the logistics of the enterprise, International Humanitarian University Herald, *Economics and Management*, Vol. 2020, pp. 78-83, 2020. https://doi.org/10.32841/2413-2675/2020-42-14 (Original in Russian)

[9] PRADITA, S.P., ONGKUNARUK, P., LEINGPIBUL, T.: The use of supply chain risk management process (SCRMP) in third-party logistics industry: A case study in Indonesia, *Industria: Jurnal Teknologi dan Manajemen Agroindustri*, Vol. 9, No. 1, pp. 1-10, 2020. https://doi.org/10.21776/ub.industria.2020.009.01.1

[10] BELANTOVÁ, T., TARABA, P.: Risk management in the logistics projects, *MATEC Web of Conferences*, Vol. 292, p. 01049, pp. 1-3, 2019. https://doi.org/10.1051/matecconf/201929201049

[11] DESHPANDE, S., JAKHAR, S., RATHOD, U., HUDNURKAR, M.: Supply chain risk classification schemes: A literature review, *Operations and Supply Chain Management: An International Journal*, Vol. 10, No. 4, pp. 182-199, 2017. http://doi.org/10.31387/oscm0290190

[12] WANG, M., ASIAN, S., WOOD, L., WANG, B.: Logistics innovation capability and its impacts on the supply chain risks in the Industry 4.0 era, *Modern Supply Chain Research and Applications*, Vol. 2, No. 2, pp. 83-98, 2020. https://doi.org/10.1108/MSCRA-07-2019-0015

[13] PAREDES-RODRÍGUEZ, A.-M., GRISALES-AGUIRRE, A.-F., SÁNCHEZ-ZAMBRANO, D.-A.: Operational risk management in the reverse logistics process of used vehicle oil, *Revista Facultad de Ingeniería*, Vol. 31, No. 61, pp. 1-19, 2022. http://doi.org/10.19053/01211129.v31.n61.2022.13869

[14] KODYM, O., KUBÁČ, L., KAVKA, L.: Risks associated with Logistics 4.0 and their minimization using Blockchain, *Open Engineering*, Vol. 10, No. 1, pp. 74-85, 2020. https://doi.org/10.1515/eng-2020-0017

[15] VIRGLEROVA, Z., PANIC, M., VOZA, D., VELICKOVIC, M.: Model of business risks and their impact on operational performance of SMEs, *Economic Research-Ekonomska Istraživanja*, Vol. 35, No. 1, pp. 4047-4064, 2022. https://doi.org/10.1080/1331677X.2021.2010111

[16] KOSTIN, K., KOZHUKHINA, K.: Problems of the improvement of risk management in business, *Economics and Environmental Management*, Vol. 12, No. 1, pp. 171-180, 2019. http://dx.doi.org/10.17586/2310-1172-2019-12-1-171-180

[17] BONSÓN, E., BEDNÁROVÁ, M.: Blockchain and its implications for accounting and auditing. *Meditari Accountancy Research*, Vol. 27, No. 5, pp. 725-740, 2019. https://doi.org/10.1108/MEDAR-11-2018-0406

[18] CARGO-CARDS, Top Freight Companies, [Online], Available: https://cargo-cards.com/en [17 Mar 2023], 2023.

[19] UPADHYAY, A., MUKHUTY, S., KUMAR, V., KAZANCOGLU, Y.: Blockchain technology and the circular economy: Implications for sustainability and social responsibility, *Journal of Cleaner Production*, Vol. 293, 2021. https://doi.org/10.1016/j.jclepro.2021.126130

[20] FOLI, S.: Total interpretive structural modelling (TISM) and MICMAC approach in analysing knowledge risks in ICT-supported collaborative project, *Vine Journal of Information and Knowledge Management Systems*, Vol. 52, No. 3, pp. 394-410, 2022. https://doi.org/10.1108/VJIKMS-09-2021-0205

[21] MOSHESH, R., NIEMANN, W., KOTZÉ, T.: Enterprise risk management implementation challenges: A case study in a petrochemical supply chain, *South African Journal of Industrial*

Engineering, Vol. 29, No. 4, pp. 230-244, 2018. http://sajie.journals.ac.za/pub/article/view/1782

[22] BARMUTAA, K., RUSAKOVAB, N., MALKHASYANA, A.: Improving the method of analyzing risks of the company's logistics processes, *Transportation Research Procedia*, Vol. 63, pp. 737-745, 2022. https://doi.org/10.1016/j.trpro.2022.06.069

[23] WANG, M.: Impacts of supply chain uncertainty and risk on the logistics performance, *Asia Pacific Journal of Marketing and Logistics*, Vol. 30, No. 3, pp. 689-704, 2018. https://doi.org/10.1108/APJML-04-2017-0065

[24] BARTOSOVA, T., TARABA, P., PETEREK, K.: Approach to the risk management process in logistics companies, *Chemical Engineering Transactions*, Vol. 86, pp. 403-408, 2021. https://doi.org/10.3303/CET2186068

[25] GANIYU, S., YU, D., XU, C., PROVIDENCE, A.: The impact of supply chain risks and supply chain risk management strategies on enterprise performance in Ghana, *Open Journal of Business and Management*, Vol. 8, No. 4, pp. 1491-1507, 2020. https://doi.org/10.4236/ojbm.2020.84095

[26] MESJASZ-LECH, A.: Logistics performance and management of logistics system safety, *System Safety: Human – Technical Facility – Environment*, Vol. 1, pp. 730-737, 2019. https://doi.org/10.2478/czoto-2019-0093

[27] URCIUOLI, L.: Risk management in supply chains, Mecalux News, [Online], Available: https://www.mecalux.com/logistics-articles/luca-urciuoli-risk-management-supply-chain [17 Mar 2023], 2022.

[28] ZHAI, N., MCDERMOTT, E.: The game and risk control of three parties in logistics finance, In: *Proceedings of the 2020 2nd International Conference on Economic Management and Cultural Industry (ICEMCI 2020)*, Atlantis Press, pp. 1-5, 2020. https://doi.org/10.2991/aebmr.k.201128.001

[29] KORUCUK, S., AYTEKIN, A., KARAMAŞA, C.: An analysis for outsourcing-based risks and problems in logistics enterprises, *Journal of Process Management and New Technologies*, Vol. 10, No. 3-4, pp. 106-120, 2022. https://doi.org/10.5937/jouproman10-35566

[30] STRELCOVÁ, S., ŠIMÁK, L., RISTVEJ, J.: Risk management in a logistic enterprise, *Logistics and Transport*, Vol. 37, No. 1, pp. 33-40, 2018. http://dx.doi.org/10.2478/jlt-2018-0004

[31] KUBASOVA, T., TKACH, V., TSVIGUN, I.: Priorities of the logistics risks management in the resource support of construction projects, *MATEC Web of Conferences*, Vol. 212, pp. 1-8, 2018. https://doi.org/10.1051/matecconf/201821208010

[32] WANG, Q., ZHU, X., NI, Y., GU, L., ZHU, H.: Blockchain for the IoT and industrial IoT: A review, *Internet of Things*, Vol. 10, No. June, 2020. https://doi.org/10.1016/j.iot.2019.100081

[33] PASHAEVA, I., ALIYEVA, M., ATAKISHIYEVA, N., BABASHIRINOVA, E., MUSAYEVA, N.: Digital models of income and expenditure management and accounting, *TEM Journal*, Vol. 9, No. 2, pp. 590-600, 2020. https://doi.org/10.18421/TEM92-22

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