IDENTIFICATION OF LITHUANIAN INTERNATIONAL TRADE RISK IN BEVERAGES

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Abstract

Research purpose. The article aims to identify the risk groups arising in foreign trade in the four main groups of processed beverages at a national level.

Design / Methodology / Approach. Processed agricultural drinks do not fall into the category of essential food. The article examines four main drink groups: waters (including mineral waters and aerated waters, with additive), beer, wine, and other alcoholic (e.g., spirits, liqueurs, whiskies, rums, gins, vodkas, etc.) beverages. The case of Lithuania is presented. Analysis and assumption of scientific literature and TOPSIS method are used. The study does not aim to assess all risk factors but to identify the groups of risk factors and to rank them according to their importance for each processed beverage sectors supply chains.

Findings. Based on the scientific literature analysis, the eight risk groups were identified and were evaluated according to their importance for the beverages supply chain. Experts ranked risk groups taking into account their importance for international processed beverages trade for each product group. The results show that the most important is the Demand risks group for all processed beverages, and the least important is Political risk. The significance of other risk groups for a particular beverage supply chains differs. Supply risks were second in the 'water with add' group, while in the 'other alcohol' group, it is in fourth place. For the 'other alcohol' group, supply risks are less significant. Production risks are one of the most important in the wine trade. Financial risks are one of the most important in the 'other alcohol' group. Management and operational risks play an essential role in the beer supply chains. The least significant is three risk groups: Logistical and infrastructural risks, Policy and regulatory risks, Political risks.

Originality / Value / Practical implications. The identified risks groups in the four main groups of processed beverages can help shape the country's trade policy, mitigate trade risks, and effectively manage the agricultural trade beverage subsector. Research results can be practically used both for government or business decisions and for the public sector (trade associations).

Keywords: International trade; Beverages trade; Foreign trade risk; Risk identification; TOPSIS.

JEL codes: F1, F13, L66, N5, D81.

Introduction

International trade is one of the most common research subjects in various fields of study (economics, strategic management, logistics, etc.) and assessed at both micro and macro-economic levels. In addition, the analysis at the country level (meso-level) is the subject of research on the international trade activities of many countries. However, risk analysis is rare among all topics related to foreign trade, and even less frequent is the risk assessment. Risks have become relevant only in recent decades, as globalisation, technological development and changes in resource deployment have led to increased supply chains and their importance. As a result, food supply chains become longer, more complex and more vulnerable (Gervais, 2018). Most risk-related research is conducted to ensure the country's food

security. The agri-food sector provides goods of first necessity, and it affects the quality of life. Most attention is given to international trade-related risks in the essential foodstuffs: grain, rice, corn trade. Cereals, milk, and meat sub-sectors are analysed most often (Khanal & Mishra, 2017; Hoque & Alam, 2018). In recent years, risk studies have focused on raw and perishable foods (fruit, fish) (Prakash et al., 2017; El Hariri et al., 2018). Due to climate-related factors (climate change fluctuations (drought, rainfall), climate change trends) and scarce resources (growing place, yields, etc.), risks are mainly analysed for primary food products. In comparison, the agricultural sector is analysed as a risky and sensitive sector (Novickyte, 2019). However, there is also a risk in trade in all other food products, including processed foods. Processed food has a longer life cycle, but it also has a higher risk of dissatisfaction with consumers' habits and expectations among different countries. Food is often treated as a commodity of necessity, as a source of pleasure, and lifestyle. Despite this, one should note that all business is risky, and international trade has more risks that are specific. International trade is more dangerous than domestic trade (Meral, 2018). Also, noticeable that the European food and drink industry is one of the world's leading manufacturing sectors but with a downward trend (Lodorfos et al., 2018). Although trade in beverages takes an important role in Lithuania and the turnovers are growing (compared to 2016, turnover increased by 269,8 million EUR (7.9 %) in 2020), the negative balance increased by 28,2 million (4,7 %), including the products with long traditions and favourable conditions for production in the country (beer, water with additives, other alcoholic beverages. There is an upward trend in imports (increased by 7.4 % in the period under consideration) (Statistics Lithuania, 2021).

Stable commodity flows reflect a stable position in those markets and, at the same time, regular income. That allows planning the profitable development of activities, business performance both at the company and at the national levels. International trade in beverages is a risky business for all food supply chains. Suppose the trade of water without additives and milk can be treated as first necessity products. The water with additives, beer, wine, and other alcoholic beverages are not related to the first necessity products. Many countries restrict their consumption through excise duties and appropriate education policies (healthy lifestyles programmes). It is noticeable that obesity and unhealthy food consumption in the current period is more significant than hunger risks in economically developed countries (Otero et al., 2018). Nevertheless, the consumption of these products is typical to many people, favoured and moderately consumed to increase life satisfaction. Due to the imprudent choice of restrictive measures, states lose part of their revenue to the black market. Balanced management of this sector would allow increasing the country's GDP by increasing exports, reducing imports, and considering benefits and risks. The trend of international trade in these beverage groups is growing (WB, 2018). Supply chain risks are analysed by many authors (Khanal et al., 2018; Nyamah et al., 2017; Ho et al., 2015; Bakumenko, 2019 etc.), but risks vary across supply chains and countries (Mital et al., 2018). Moreover, there is a lack of research on risks in the processed beverage supply chain. However, when it comes to agricultural trade, the processed beverage sector has its specific characteristics. Supply chains distinguish between fresh and processed food products (Chen and Voigt, 2020; Assefa et al., 2017; Naudé and Badenhorst-Weiss, 2020; Khan et al., 2019). Complex studies are needed to evaluate and analyse the distinctions between the different supply chain context and scope (Bak, 2018). Risk management decisions can be attributed to the strategic decision (Rathore et al., 2017) on which the competitiveness of companies and the country's trade success depends.

This work aims to identify the risk groups of foreign trade in four processed beverage groups: waters with additives (including mineral waters and aerated waters, with additives), beer, wine, and other alcoholic beverages (e.g., spirits, liqueurs, whiskies, rums, vodkas, and others) at a national level. Scientific literature analysis and systematisation, groups of risk factors were identified and ranked. TOPSIS method was used to evaluate the experts' opinions. The research limitations: (1) employed only risk groups, not the risk factors, (2) employed only the qualitative risk identification tool.

Literature Review

While international trade is widely explored worldwide, it does not address the risks (Gervais, 2018). The Global Risks Report'2019 (WEF, 2019) provides a detailed description of the risks that have and will have a significant impact on global development. This report grouped risks into economic, environmental, geopolitical, social and technological categories. All of them impact international trade,

given that the first three risks are linked to climate change, which is of great importance to agricultural production risks. The risk of production is identified as one of the highest in the farming sector (Hardaker, 2015). International trade of risky products is already dangerous in term of its origin. Production risks are essential for both the export and import of agricultural products. In addition, it is not the only source of risk in international trade. The food and beverage industry directly impacts the daily lives of the entire society and plays a vital role in both regional and global economies (Zhu et al., 2018). Supply chain risks are analysed by most scientists (Xu et al., 2020; Khanal, 2018; Cimprich et al., 2017; Kolotzek et al., 2018; 2018; Hyuha et al., 2017; Bakumenko, 2019; Baryannis et al., 2019). The structure of agri-food supply chains is becoming increasingly complex, making them more sensitive to different societal levels and risks. Therefore, there is a need to manage supply chain risks effectively and efficiently to improve performance.

Risk and uncertainty are the most common terms in supply chains analysis. They include studies on vulnerability and disturbance, disruption describing a supply chain affected by risk. In addition, some researchers analyse threats, crisis, and robustness effects. Risk in supply chain risk management (SCRM) literature have also been classified in different ways, depending on the scope and goals of the research. However, as a rule, three primary levels are considered (Baryannis et al., 2019): risks that are not related to the network (environmental risks); risks that are internal to the network but external to the local firm (network or industrial risks); risks within the undertaking referred to as organisational risk.

The food and drink industry faces strict rules, customer behaviour and service changes, increasing competition and low-profit margins. The Manufacturing Execution System (MES) is analysed as a manufacturing process to identify significant benefits, barriers, possible solutions, and future research areas of the MES implementation (Chen and Voigt, 2020). Two main components must be ensured: Safety and Traceability. For this purpose, integration of all actors and activities of the food supply chain from primary production, food processing, distribution, retailing, and consumer consumption is needed (ECSIP, 2016). One should note that different risk groups are affected by various risk factors. For example, digital technologies & data analytics and sustainable risk management in SFSC influence risk management (Zhu et al., 2018). Researches have shown that the created added value differs from one supply chain to another. The main reasons are the choice of plant variety, pesticide levels, product promotion and products adaptation to the retail sector, risk management strategies are diverse and interlinked with other business innovations. The prices of top-quality products are more stable than standard quality products (Assefa et al., 2017). It is noted that different drink groups use different supply chain network approaches. E.g. examining the parts of alcoholic beverage, the authors provide examples of leading companies in the sector: Heineken Baccardi-Martini, Diageo and Moët Hennessy. These companies have developed different models for supply chain risk management with various partners and affected supplier choices. Production seasonality, creativity, innovation and complexity of the item, customer order decoupling points and the internal organisation agreements between a company and an external party with reliability and open communications under a win-win climate were the main success factors for the trade (Dollet et al., 2011). Some authors seek to identify critical factors and barriers to success. While most studies are limited to major market players (Dollet et al., 2011), some research relates to SME of the food and beverages industry, like small and medium-sized enterprises (SME's) (Kowalska, 2020; Long et al., 2018). The most critical factors for success and sustainability are the following: collaboration, continual innovation, a straightforward narrative and vision, a sustainable foundation, profitability, and serendipitous external events emerge. Barriers (risks) include external events, principle-agent problems and a lack of support from wider actors and systems (Long et al., 2018). In addition, managers' risk perceptions vary among companies and between managing divisions (Sato et al., 2020).

Some researchers analyse unique supply chains. Halal food supply chain (HFSC) encounters different risks, but the most significant risk in these chains are "supply-related risks". Raw material integrity is a vital element in the Halal food supply chain (Khan et al., 2019). Research in SCRM applies different methodologies. Examining food supply chain risks management (FCRM), scientists distinguish various risk factors. The risk factors are numerous and diverse. They are grouped according to the sources that cause the risk. Ho et al. (2015) grouped all risk factors into three main groups: Macro-risk, micro-risk (demand, production and supply risks) and infrastructural risk flows (information, transportation,

financial risks). The categories or risk groups in the food supply chain differ. Supply risks refer to the shortage of food grains and unavailability of procurement centre, insufficient packaging and preservation, communication failure between different supply chain stages, risks related to natural disasters. Storage and transport risk is inadequate storage at warehouses, poor handling, preservation of the food grains, in-transit loss, unavailability of the vehicles, etc. Risk management decisions can be attributed to strategic decision. It is noted that the investigation has limitations: the risk framework is adapted to the Indian market but has not been tested for other markets (Rathore et al., 2017). All risk factors in any supply chain can be grouped according to their nature. However, one should note that specific risk factors may characterise different supply chains. Nyamah et al. (2017) grouped all risk factors into nine risk types: demand-related risk, supply-related risk, biological and environmental-related risk, weather-related risks, managerial and operation-related risks, logistics and infrastructure risks, public policies and related institutional risk, political-related risk, and financial-related risk. Zhao et al. (2020) identified 16 new AFSC risk factors. Rathore et al. (2017) applied another risk factor grouping. According to their nature, all risk factors may be divided into risk groups in different ways depending on the sub-sector under investigation. Our research covers the processed beverage sector. To summarise, a framework of eight supply chain risk groups was developed: supply risks, demand risks, production risks, management and operational risks, logistical and infrastructural risks, financial risks, policy and regulatory risks and political risks (see Fig. 1).

Fig. 1. Supply chain risk factor groups (adapted from Zhao et al., 2020; Nyamah et al., 2017; Ho et al., 2015)

All risk factors from the supplier's side, e.g. bankruptcy of a supplier, price fluctuations on upstream markets, capacity fluctuations/deficiencies in supply markets, availability of alternatives, insufficient exchange of information between supply partners, supplier's quality problems etc. are assigned to the supply risk group (Zhu et al., 2018, Behzadi et al. 2018; Rathore et al., 2017; Nyamah et al., 2017). The demand risk group is the potential for a loss due to a gap between forecast and actual demand, and the demand risks factors can also differ in every supply chain. The most frequently mentioned factors are the following: variability in demand, fluctuations in market prices or market price volatility, the uncertainty of the production of local suppliers (e.g. related to weather conditions), insufficient information from customers on demand for products, imbalances between supply and demand; dependence on production flows etc. (Zhu et al., 2020, Behzadi et al. 2018; Nyamah et al., 2017). Production risk group factors are linked to the production processes, the vulnerability of production (perishability), pollution (additives, diseases), availability of substitutes, technological backwardness, weather-related risks (periodic deficit/excess rainfall; extreme drought/ flooding/ wind/ cold etc. (Zhu et al., 2020, Behzadi et al. 2018; Nyamah et al., 2017). The logistical and infrastructure-related risk group includes poor infrastructure and services, unreliable transport, changes in transportation, the poor performance of logistics service providers, lack of good system integration, volatility in fuel price etc. (Zhu et al., 2020, Shen et al., 2020; Behzadi et al. 2018; Nyamah et al., 2017). Policy and regulatory risk group describes the risk factors related to domestic governance: stricter food quality and safety standards, weak institutional capacity to implement regulatory mandates, animal welfare legislation

negatively affecting the competitiveness, potential local restrictions on waste disposal etc. (Zhu et al., 2020, Behzadi et al. 2018). Financial risk group factors are uncertain trade/ market/ land/ tax policies, inadequate financial support, delays in payment and even possible non-payment, changes in the exchange rate, insufficient credits etc. (Bachev, 2017). Management and operational risk group incorporate soft management features. The following are distinguished: forecast and planning errors, poor management decisions on asset allocation, poor quality control management, poor collaboration, poor decision making in use of inputs, farm and firm equipment breakdowns, inability to adapt to changes in cash and labour flows, forecast and planning errors etc. (Zhu et al., 2020, Long et al., 2018; Shen et al., 2020; Behzadi et al. 2018).

Lavastre et al. (2012) highlighted three main aspects of the risk analysis: the number of losses, the size of the losses and the loss probability. Furthermore, the likelihood of failure is analysed from two different perspectives: supplier and consumer perspectives. Risks are mainly analysed at the macro or micro level. At the meso/country level, the most frequently addressed are food safety risks. The Covid-19 pandemic triggered more risk studies related to food supply chains (Laborde et al., 2020; Sharma et al., 2020; Aday & Aday, 2020; Jablonski et al., 2021). This pandemic demonstrated that different companies from different industries are closely connected worldwide (Aday & Aday, 2020). Advanced strategies and technologies are proposed for risk management, such as machine learning and big data (Ivanov et al., 2020; Baryannis et al., 2019). Burinskas (2020) analysed research papers in disruption cases. They provided three main drivers of risks sources at the micro-level: delays (unreliable supplier, operational performance, unreliable transport system, etc.), inaccurate forecast (lack of visibility in the supply chain, under-estimated demand due to shortage cases), and inventory problems (product obsolescence, damages, mismatch of physical and system stock, quality problems etc.).

Research Methodology

Scientific literature presents different qualitative and quantitative models. Qualitative methods are used more frequently for risk factor evaluation (Zhao et al., 2020; Nyamah et al., 2017; Angelo et al., 2017; Kara et al., 2018; Irani et al., 2018; Challinor et al., 2018). Some authors carried out detailed quantitative assessment models (Ho et al., 2015; Burinskas, 2020). Probability analysis presents processes under consideration that have the probability of being disturbed for different periods (Geng et al., 2021; Roccato et al., 2017). Various methodologies are used to evaluate the system's vulnerability, e.g. a less risky alternative (Ho et al., 2015; Sharma et al., 2020; Zhao and Zhu, 2018).

The risk of the country's international trade in processed beverages is analysed in two stages. In the first stage, a qualitative study, is carried out based on literature analysis to rank the main risk groups of the supply chain according to their importance. The second stage compares the results between different groups of beverages.

Lithuania has been selected for the research because of its size, geographical location and trade conditions. Lithuania is a small country (EU member since 2004); its trade takes place under all existing inter-lateral agreements and faces all risks inherent in a small open economy. The Lithuanian beverage industry is not the predominant industry in the country. A four-digit international Combined Nomenclature (CN) is applied. Four processed beverage groups at a national level are analysed:

- 2202 – water, including mineral waters and aerated waters, with additives (e.g., containing added sugar or other sweetening matter or flavoured). The abbreviation used below in this research is 2202 – ‘water with adds’;
- 2203 – beer;
- 2204 – wine;
- 2208 – other alcoholic beverages with undenatured ethyl alcohol of alcoholic strength by volume of less than 80 % vol. (e.g., spirits, liqueurs, whiskies, rums, gins, vodkas and other spirituous beverages). The abbreviation used below is 2208 – ‘other alcohol’.

A qualitative method is carried out based on scientific literature. The aim is to adjust the chosen types of risks groups according to their importance. In addition, an evaluation of the experts' opinions was carried out. According to Libby and Blashfield (1978), an optimal number of seven experts participated

in each product group. All the experts represent the government, private or public sectors and have more than 5 years of experience. Information about the experts is presented in Table 1.

Table 1. Qualitative information about experts (Source: created by authors)

Expert No.	Experience in international trade in beverages group	Workplace sector (government/private/public leader position)
E ₁ , E ₂ , E ₃ , E ₄ , E ₅	all beverages	government sector
E ₆ , E ₇ , E ₈ , E ₉	beer	private sector
E ₁₀ , E ₁₁ , E ₁₂	wine	private sector
E ₁₃ , E ₁₄	alcoholic beverages	private sector
E ₁₅ , E ₁₆	all beverages	private sector
E ₁₇ , E ₁₈	waters with additives	private sector
E ₁₉	all beverages	public sector (scientific institute)
E ₂₀	all beverages	public sector (association)

Experts were asked to complete a questionnaire for each beverage group and each risk group. The Lickert scale of three risk options was used (low risk, moderate risk and high risk). The survey results were processed using the TOPSIS Multicriteria decision support method. The main principle of this method is that the optimal dote should have the farthest point in the distance from the negative ideal solution point and the shortest line from the positive ideal solution (Dandage, 2018). The application of the TOPSIS method involves these steps: normalisation procedure, calculation of best and worst alternatives, calculation of the distance to the ideal solution and worst solution, prioritisation of risk groups according to the calculated values. The method TOPSIS uses vector normalisation (Podvezko & Podvezko, 2014):

$$\tilde{r}_{ij} = \frac{r_{ij}}{\sqrt{\sum_{j=1}^n r_{ij}^2}} \quad (1)$$

where:

- r_{ij} : r - value of the i^{th} index for the j^{th} object;
- $\tilde{r}_{ij}$: r - normalised value of the i^{th} index for the j^{th} object;
- n : the number of criteria.

After the normalisation procedure, the best alternative V^+ and the worst alternative V^- need to be chosen. Then the distance Dj^+ of every considered alternative to the ideal solution and its distance Dj^- to the worst solution of the method need to be calculated by (Podvezko & Podvezko, 2014):

$$D_j^+ = \sqrt{\sum_{i=1}^m (\omega_i \tilde{r}_{ij} - V_i^+)^2} \quad (2)$$

$$D_j^- = \sqrt{\sum_{i=1}^m (\omega_i \tilde{r}_{ij} - V_i^-)^2} \quad (3)$$

where:

- $\tilde{r}_{ij}$: r normalised value of the i^{th} index for the j^{th} object;
- m : the number of alternatives.

The main cumulative criterion C_j^* is calculated (Podvezko & Podvezko, 2014):

$$C_j^* = \frac{D_j^-}{D_j^+ + D_j^-}; \quad (j=1,2,\dots, n), \quad 0 \leq C_j^* \leq 1 \quad (4)$$

Risk groups are arranged according to C_j 's calculations. The closer the value of C_j is to 1, the more important the risk group is. After ranking each beverage group, a comparison between them was made.

Research Results

A qualitative study carried out to identify the riskiness of the trading in the beverage supply chain. Based on the scientific literature analysis, the eight risk groups were evaluated. In addition, all four processed beverage groups were evaluated. For the **2202 – ‘water with adds’**, the results were calculated as follows: the best alternative V^+ and worst alternative V^- according to the TOPSIS method are presented in Table 2, and the results of the rank assessment are presented in Table 3.

Table 2. The best alternative V^+ and the worst alternative V^- results for ‘water with adds’

Alternatives	E1	E2	E3	E4	E5	E6	E7
Best alternative V^+	0,500	0,442	0,603	0,447	0,447	0,548	0,539
Worst alternative V^-	0,167	0,147	0,302	0,224	0,224	0,183	0,180

According to our research, the significance of the risk groups according to their importance for "water with add" supply chains was as follows: Demand risks, Supply risks, Production risks, Management and operational risks, Financial risks, Policy and regulatory risks, Logistical and infrastructural risks, Political risks. Therefore, international trade in "water with add" should focus on controlling and mitigating demand risk groups.

Table 3. Results on the TOPSIS method valuation of risk groups for ‘water with adds’

	D^+ values	D^- values	C_i value	Rang
Supply risks	0,416	0,643	0,607	2
Demand risks	0,167	0,754	0,819	1
Production risks	0,396	0,603	0,604	3
Management and operational risks	0,550	0,428	0,437	4
Logistical and infrastructural risks	0,700	0,232	0,249	7
Political risks	0,807	0,000	0,000	8
Policy and regulatory risks	0,686	0,245	0,263	6
Financial risks	0,578	0,444	0,434	5

For the **2203 – beer** group of beverages, the results according to the TOPSIS method: the best alternative V^+ and worst alternative V^- are presented in Table 4, and the results of the rank assessment are presented in Table 5.

Table 4. The best alternative V^+ and the worst alternative V^- results for beer

Alternatives	E1	E2	E3	E4	E5	E6	E7
Best alternative V^+	0,535	0,485	0,603	0,447	0,485	0,567	0,539
Worst alternative V^-	0,267	0,243	0,302	0,224	0,243	0,189	0,180

According to the research, the significance of the risk groups according to their importance for beer supply chains was as follows: Demand risks, Supply risks, Management and operational risks, Supply risks, Financial risks, Production risks, Logistical and infrastructural risks, Policy and regulatory risks, Political risks.

Table 5. Results on the TOPSIS method valuation of risk groups for beer

	D+j values	D-j values	Ci value	Rang
Supply risks	0,529	0,431	0,449	3
Demand risks	0,000	0,776	1,000	1
Production risks	0,668	0,302	0,311	5
Management and operational risks	0,561	0,465	0,453	2
Logistical and infrastructural risks	0,675	0,287	0,298	6
Political risks	0,776	0,000	0,000	8
Policy and regulatory risks	0,631	0,261	0,292	7
Financial risks	0,590	0,343	0,368	4

For the **2204 – wine** group of beverages, the results according to the TOPSIS method are presented in Table 6 and Table 7

Table 6. The best alternative V^+ and the worst alternative V^- results for wine

Alternatives	E1	E2	E3	E4	E5	E6	E7
Best alternative V^+	0,485	0,577	0,500	0,447	0,600	0,514	0,522
Worst alternative V^-	0,243	0,192	0,167	0,224	0,200	0,171	0,174

According to our research, the significance of the risk groups according to their importance in wine supply chains were: Demand risks, Production risks, Supply risks, Financial risks, Management and operational risks, Logistical and infrastructural risks, Policy and regulatory risks, Political risks.

Table 7. Results on the TOPSIS method valuation of risk groups for wine

	D+j values	D-j values	Ci value	Rang
Supply risks	0,496	0,498	0,501	3
Demand risks	0,000	0,876	1,000	1
Production risks	0,357	0,620	0,635	2
Management and operational risks	0,652	0,384	0,370	5
Logistical and infrastructural risks	0,710	0,296	0,294	6
Political risks	0,876	0,000	0,000	8
Policy and regulatory risks	0,824	0,171	0,172	7
Financial risks	0,604	0,536	0,470	4

For the **2208 – ‘other alcohol’** group of beverages, the results according to the TOPSIS method are presented in Table 8 and Table 9. For the ‘other alcohol’ beverages, the importance of risk groups from our research was as follows: Demand risks, Financial risks, Production risks, Supply risks, Management and operational risks, Logistical and infrastructural risks, Policy and regulatory risks, Political risks.

Table 8. The best alternative V^+ and the worst alternative V^- results for ‘other alcohol’.

Alternatives	E1	E2	E3	E4	E5	E6	E7
Best alternative V^+	0,485	0,469	0,548	0,417	0,485	0,539	0,522
Worst alternative V^-	0,243	0,156	0,183	0,209	0,243	0,180	0,174

Table 9. Results on the TOPSIS method valuation of risk groups for 'other alcohol'.

	D+j values	D-j values	Ci value	Rang
Supply risks	0,538	0,471	0,467	4
Demand risks	0,000	0,801	1,000	1
Production risks	0,393	0,544	0,580	3
Management and operational risks	0,655	0,316	0,326	5
Logistical and infrastructural risks	0,659	0,313	0,322	6
Political risks	0,801	0,000	0,000	8
Policy and regulatory risks	0,674	0,250	0,271	7
Financial risks	0,238	0,687	0,743	2

Summarised results of all analysed results are presented in Table 10. According to our research, the significance of the risk according to their importance among different processed beverages groups was uneven. However, according to all evaluations, the most crucial risk group is Demand risks, which should be at the centre of the management of supply chains. It could be linked to the fact that processed beverages have an extended life circle, require relatively simple storage, transport and production volumes depending mainly on consumer demand, i.e. how demand is created/shaped and managed across all supply chains.

Table 10. Results on the ranks according to TOPSIS method valuation of risk groups for different processed beverages

	'water with adds'	beer	wine	'other alcohol'
Supply risks	2	3	3	4
Demand risks	1	1	1	1
Production risks	3	5	2	3
Management and operational risks	4	2	5	5
Logistical and infrastructural risks	7	6	6	6
Political risks	8	8	8	8
Policy and regulatory risks	6	7	7	7
Financial risks	5	4	4	2

In addition, the lowest risk group for processed beverages is the Political risks. It could be explained by the fact that supply chains are mostly located in low political risks areas. Usually, the main trading partners of the analysed country are the EU and neighbouring countries, with which no political sanctions have been imposed in the trade-in processed beverages. Risk groups such as Production, Supply and Financial risks were recognised as necessary but had different importance in different beverage groups. Supply risks were second in the 'water with add' group according to the matter, while in the 'other alcohol' group, it is in fourth place. It may be due to factors related to consumption habits, and if the 'water with add' supply is impaired, consumers easily switch to other beverages (substitutability). For the 'other alcohol' group, supply risks are less significant because consumers are more often looking for their favourite drinks and have their safe stocks because they have a more extended validity period. It takes longer than they replace them with other beverages.

According to our research, Production risks are one of the most important in the wine trade. It could be explained by the fact that this group of beverages is most dependent on natural resources. Their production is hard to manage, whereas the output of the other analysed beverages is not so closely linked to natural resources conditions (place of raw plants production, climatic conditions). Financial risks are one of the most important in the 'other alcohol' group. It may lead to the fact that it is one of the most expensive drinks traded in large quantities, and trading partners are not always reliable. Management and operational risks play an essential role in the beer supply chains. It contributes to Chen and Voigt

(2020) research, showing that trades of these beverages are highly competitive, and management errors cause great damage. Our study identified that the least significant are three risk groups: Logistical and infrastructural risks, Policy and regulatory risks, Political risks. During the Covid-19 pandemic period, many supply chains collapsed/suffered due to logistics. However, it has little impact on the processed beverage sectors supply chains. Experts underestimated these risk groups as sufficiently risky. It could be caused by the products not being the first necessity, and they had not been subject to the new specific trade restrictions. In addition, the processed beverages have a long shelf life/ life period, which prevented the build-up of sufficient stocks, which allowed logistic delays to be contained. Summarising the results, the risk factors groups according to their importance for international processed beverages trade is Demand risks (highest risk). Therefore, the management of these risks must be at the forefront. The least significant for all processed products is the Political risk group. Other risk groups have different significance for different beverage supply chains.

Conclusions

Literature analysis helps identify the eight risk groups for processed beverages. Experts evaluated them in Lithuania according to their importance for every analysed beverage group, and the TOPSIS multi-criteria decision support method (MCDM) was employed to process the data. The most critical risk group in all processed beverage supply chains was the Demand risks group. Although risk factors are similar in all supply chains, their importance varies from beverage group to beverage group. For example, the investigation shows that trade in processed beverages differs from basic FSCRM. E.g. if, in the wine supply chains of Africa, the most critical risk factors are wine-making activities and financial risks (Naude et al., 2020), while in other countries, it can differ.

The ideas for further research stem from the limitations of this research. Only the qualitative tool has been employed, not all the risk factors have been identified, but only risk groups have been investigated. The study could be extended to a more detailed risk assessment of trade with selected countries. In addition, risk factors for each beverage group could be identified and included into risk groups in all processed beverages that are important for managing the country's trade in processed drinks. At the same time, risk assessment can employ several quantitative methods. In addition, a combination of qualitative and quantitative methods could help assess risks in the beverage sector.

The risks of foreign trade in processed beverages identified in this article can help shape the country's trade policy, mitigate trade risks, and effectively manage the agricultural trade beverage subsector.

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