Risk Analysis in Vegetable Farms - Aggressivity Evaluation

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Abstract: - Vegetable production can be considered one of the most vital activities of agriculture. This study focuses on open-field vegetable production farms in Albania. The study's objective is to identify risks according to five main categories: the production process, finding sources of financing, marketing products, compliance with laws, and human resources management. This study aims to use qualitative analysis of the risks that threaten vegetable farms. The risk factor for each event is measured as a combination of probability and impact. For this study, is used the risk matrix method. Based on the matrix analysis, we concluded that the highest risk factors are flood, diseases, and pests, sometimes also illness or death of farmers. In general risk factors are unlikely to occur, but if the event occurs, the damage is catastrophic (they have the aggressiveness of a shark). Meanwhile, out of 19 risk factors analyzed, 52% have the aggressiveness of the rabbit, which means great fear, but the damage is relatively small, and 26% have the aggressiveness of the mouse, which means they have little likelihood and have no impact on the farmer's objectives.

Key-Words: - risk, production, matrix, perception, analysis, evaluation, aggressivity, Albania.

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1 Introduction

Vegetable production is an important activity in the agricultural economy, in developing underdeveloped countries. The activity of vegetable production is exposed to many risks, especially when it comes to production in the field (on open surfaces). In addition to the risks that threaten all agricultural products, vegetables are products with a very short trading cycle, compared to fruit, grain, and livestock products. Seen in this context, the study of risks in vegetable farms should be a priority, not only for researchers and farmers but also for policy-making institutions at local and central levels.

This study focuses on the Guri i Zi administrative unit in the Shkodra region in northern Albania. We have chosen this unit because it has climatic advantages and very good soil quality for vegetable growing. The farmers of this area are the main producers of vegetables in the Shkodra region. Their products meet 42% of the needs of the regional market, [1], [2].

Among other things, it is worth noting that, agriculture in Albania is one of the most important sectors of the local economy. Statistics show that this sector currently accounts for 19.6% of the gross

domestic product, [1], [2], [3]. The stable development of the Albanian economy is related to the progress of the growth of the agricultural sector, [4]. But we must emphasize that Albanian agriculture is under the pressure of imported products, this is due to the advanced technology of developed countries and on the other hand, due to the impossibility of the Albanian government to support farmers with subsidies. We should mention that compared to other countries in the Balkan like North Macedonia, Kosovo, and Serbia Albanian have farmers lower government support. Meanwhile. small-sized farms. low profit. agricultural emigration and migration, abandonment of agriculture by young people, high informality, and gender inequality are also risks that agricultural entrepreneurship is facing, [1], [5], [6].

The objective of the study is to identify the most important risks in vegetable farms and the goal is the usage of matrix analysis to identify higher risks and to measure their aggressiveness. We evaluate the scientific aspect of the study as urgent, due to the marked lack of studies in agriculture specifically in vegetable farms, as one of the most delicate sectors of the agricultural economy.

The study's results are beneficial not only for the farmers in the area but also for students, agricultural risk researchers, and public institutions that initiate policies for the development of agriculture in Albania. Although the study focuses on northern Albania, the findings can be used not only by the farmers in the study area but also by farmers in Kosovo and North Macedonia. This is because Albania, Kosovo, and North Macedonia share similar climatic conditions and have almost the same economic development, and they are not yet part of the European Union. These facts underscore the importance of the study beyond Albania, serving as an example of a post-communist country.

2 Literature Review

This study is based on a contemporary background of recent studies, with the main focus on Albania [7], [8] and the countries of the region, such as Kosovo [9], [10], [11], [12], [13], [14] and North Macedonia [15]. The research is designed in three main dimensions: farm risk classification system, risk management process, and risk framework only in the field of vegetable farms, [16]. The farm risk classification system identifies five main risks that are well known and accepted by all researchers, [1], [2], [9], [10], [11], [12], [17]. The risk management process in the study goes through six stages: objectives, risk identification, risk analysis, risk treatment, counseling and control, [16], [18].

The division of risks in agriculture into five main risks was first applied in the United States of America, [19], [20], [21] then in the United

The results of this study are based on matrix analysis, while in this administrative unit, there have been previous studies that base their results on multi-factorial regression analysis, [1], [2]. The development of the matrix analysis will be compared with these studies to see if the farmers' perception is similar to our findings. The study of production risk Studies in 2023, show that from the multi-factorial regression analysis of drought, flood, high and low temperatures, quality of production factors, and pest diseases, only drought and floods are considered important by farmers, [2]. Later on were developed two studies in 2024, where financial risk and market risk were analyzed, excessive debts and high interest (for financial risk) and high competition (for market risk) were identified as important, [1], [2].

Based on the above, we have created the following research questions:

Q1: Which of the risks in premium farms are low-risk factors?

Kingdom and Australia, [16], [17], [22]. Today, this classification system is used in all countries of the European Union and OECD, [23], [24], [25] (Figure 1).

The risk management framework is limited to the vegetable risk management architecture, development strategy, and risk protocol, [16]. The conceptual framework of this work is based on previous studies which analyze the nearly same issues, [9], [10], [11], [12], [13].



Fig. 1: Five major farm risks *Source:* [1], [2]

The risk management framework is limited to the vegetable risk management architecture, development strategy, and risk protocol, [16]. The conceptual framework of the study is adapted from previous studies that have focused on the study of the five main risks on the farm, [9], [10], [11], [12], [13] (Figure 2, Appendix)

- Q2: Which of the risks in premium farms is an average risk factor?
- Q3: Which of the risks in premium farms are high-risk factors?
- Q4: Which of the risks in premium farms are very high-risk factors?
 - Q5: What is the aggressiveness of risk events?
- Q6: Does qualitative risk analysis follow the trend of previous quantitative analyses?

Analysis and comparison of risk factors are classified as the aggressiveness of the mouse (which means the risk factor is very low and low), with the aggressiveness of the rabbit (which means that there is a great fear of the risk factor, but the impact is small), with shark aggressiveness (meaning the probability is small, but if the event occurs, the impact is very large), and with lion aggressiveness (meaning the probability and impact are very high). This kind of classification is also applied in previous studies, [9], [10], [11], [12], [13].

3 Materials and Methods

To analyze the risk and to evaluate the aggressiveness of the risk in vegetable farms, 260 farmers were surveyed. Interviews are conducted with each of them based on a random selection. The selection of the sample was based on Shkodra region, [1], [2]. The formulas and calculations are presented below, [26], [27], [28]: $n_0 = \frac{Z^2 pq}{e^2}$

$$n_0 = \frac{Z^2 pq}{e^2} \tag{1}$$

where Z = 1.96; p = 0.5; q = 0.5 and e = 0.05, n_0 is calculated:

$$n_0 = \frac{1.96^2 * 0.5 * 0.5}{0.05^2} = 385 \, farmers \tag{2}$$

In our case, the population consists of 3,500 farmers and we can slightly reduce it, [26], [28].

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}} \tag{3}$$

where n represents the sample size and N is the population size equal to 3,500.

The sample size of the study is:

$$n = \frac{385}{1 + \frac{(385 - 1)}{3500}} = 260 \, farmers \tag{4}$$

As we can notice from the calculations in order for the findings to be reliable we can use a sample of 260 farmers as part of our statistical analysis.

3.1 Qualitative Analysis

Oualitative risk analysis passes through three main identification. assessment phases: communication. Risk assessment aims to provide knowledge about the sources and levels of risk and their possible impacts. Risk communication aims to inform farmers and other interest groups about the aggressiveness or level of risk. Other goals of the risk assessment are the weighting of the risk levels and the identification of issues that require decisionmaking by the farm owner to reduce the risk. Based on these rankings and issues, specific priorities for farm owner decision-making can be determined, [9], [10], [11], [12], [13], [23].

3.1.1 Development of **Qualitative** Risk Matrix

Matrix analysis is a very popular tool and very easy to understand by various interest groups in private enterprises, [9], [10], [11], [12], [13], [18]. Figure 3 (Appendix), displays on the horizontal axis the probabilities of risk events occurring and on the vertical axis the consequences or, in other words, the resulting damages caused by these events.

The qualitative risk matrix provides a pictorial view of the levels of risk in the business, [29], [30]. There are two types of the qualitative risk matrix. One presents risks on five levels from very low (or 1) to very high (or 5), [31]. The other presents aggressiveness of risk by comparing them with the mouse, the rabbit, the shark and the lion, [9], [10], [11], [12], [13], [14]. Figure 3 (Appendix) represents the matrix view there you can find a combined qualitative matrix. Colors and numbers show the levels of the risk factors, while the images of the mouse, rabbit, shark, and lion show the aggressiveness of the risk factors. A comparison of risk aggressiveness based on the imagery of living creatures in Figure 3 (Appendix) is used to explain the levels or significance of risk events for entrepreneurs and other stakeholder groups (suppliers, clients, consumers), [9], [10], [11], [12], [13], [14], [16].

Table 1. Evaluation of risk factors

1 0010 11 2 1010001011 01 11011 1000015								
Level	Risk factor	Explanation						
1	Up to 2	Low-level risk factor						
2	From 2,1 to 3	Middle-level risk factor						
3	3,1 to 4	High-level risk factor						
4	More than 4	Very high-level risk factor						

Source: Adapted for our study from previous studies, [9], [10], [11], [12], [13], [14], [16], [29]

The risk factor is calculated as a combination of the consequence and the probability, [16], [18].

4 Problem Solution

The study and analysis of the five main farm risks is a current trend in agricultural research, [2], [3], [18]. Based on the literature, data collected from a survey of 260 farmers, and the study's methodology, we have measured 19 risk factors considered in the study of open-field vegetable production farms. The assessment of risk factors was calculated by multiplying the consequence and the probability of each risk event according to the evaluations presented in Table 1.

Table 2 (Appendix) reflected the risk factors for the events considered for the purpose of the study.

Based on the data in Table 2 (Appendix), we find that production risk is perceived as the highest risk that farmers can face (FR=3.4), followed by financial risk (FR=3.2), while legal (FR=3), human

resources (FR= 3) and market risk (FR=2.6) are perceived as average risks.

For production risk events, farmers have a perception of the risk factor above 2. Floods (FR=4.8), diseases and pests (FR=4.2), followed by temperatures (FR=3.9), and finally non-quality factors of production and drought (FR=2.3).

For market risk events, farmers have an average perception, but the lowest compared to the five main risks. Concern for farmers is low profits (FR=4.5) and the lowest perception is about debts (FR=2.7) and interests (FR=2.3).

In Appendix Table 4, Table 5, Table 6, Table 7 and Table 8 reflect the risk parameters from very high to low, while Table 9 (Appendix) shows the risk factors according to the aggressiveness of the Risks.

Table 3 (Appendix) shows the risk factors with a very high level of impact, which are events that have a significant effect on the farm. This table includes the probability of occurrence, impact, and risk factors for each occurring event. These data indicate that risk factors with a very high impact, even if they have a low probability of occurrence, can have severe consequences when they do occur. These risks require special attention and strong risk management measures to minimize their potential impactTable 4 (Appendix) describes the high-level risk factors, which have a considerable impact on the farm. This table includes the probability of occurrence, impact, and total risk factors for each event. The high-level risk factors described in this table are events with a moderate to high probability of occurrence, but their impact ranges from low to medium. However, the combination of these elements makes these events high-risk, requiring monitoring and management to continuous minimize their impact on the farm.

Table 5 (Appendix) describes the medium-level factors which have a moderate impact on the farm. This table includes the probability of occurrence, impact, and risk factors for each event. The medium-level risk factors in this table represent events with a moderate to low probability and a low to medium impact. Although these are not the most impactful risks, they still require continuous monitoring and careful management to minimize their potential impact on the farm. Table 6 (Appendix) describes the low-level risk factors, including the probability of occurrence, impact, and risk factors for each event. These are events that, although they may occur, have a minimal impact on the farm.

The low-level risk factors in this table represent events with a moderate probability of occurring but with minimal impact on the farm. These factors are important to monitor but do not require immediate or significant management measures.

The results of the risk factors presented and interpreted in Table 3, Table 4, Table 5 and Table 6 are displayed in Figure 4 (Appendix).

Table 7 (Appendix) presents the risk factors with shark-like aggressiveness, indicating rare risk events that have severe consequences when they occur, [16]. The interpretation of the data in Table 7 (Appendix) shows that all the events listed have a very low probability of occurrence (rated as 1 on the Likert scale or with a probability of up to 20%), but when they do occur, their impact is extremely high, resulting in very high-risk factors. These events are classified with shark-like aggressiveness, meaning they are risks that insurance companies accept due to their low probability but can be highly damaging to farmers. The study's findings are supported by previous research on flooding, diseases, and pests but not on farmer mortality or illness, [9], [10], [11], [12], [13], [14].

Table 8 (Appendix) presents the risk factors characterized by rabbit-like aggressiveness, which are events that occur more frequently than those with shark-like aggressiveness but have a moderate impact, [16]. Table 8 (Appendix) includes the probability of occurrence, potential impact, and risk factors for each event. Risk factors with rabbit-like aggressiveness represent events with a higher probability of occurrence but a moderate impact. Some events, such as lower-than-expected profits and food security issues, are classified as very high risks due to their significant impact. Others, such as high competition and price fluctuations, are considered high risks because of their high probability, despite their lower impact. Further risks, such as excessive debt and rising credit interest rates, are classified as medium risks due to their moderate probability and lower impact. The study's findings are supported by previous research, [9], [10], [11], [12], [13], [14].

Table 9 (Appendix) describes risk factors with mouse-like aggressiveness, which are events that occur more frequently but have relatively minor impacts, [16]. Table 9 (Appendix) includes the probability of occurrence, potential impact, and overall risk factor for each event. Risk factors with mouse-like aggressiveness represent events with a moderate probability of occurring but with minimal impact. As a result, these events are primarily classified as low or medium risks. Although these risks are more common, they do not pose a significant threat to farm operations and are easier to

manage, [16]. The study's findings align with previous research, [9], [10], [11], [12], [13], [14].

5 Conclusions and Recommendations

The term "risk" is very complex and has different meanings, [16], [18], [23], [32], [33]. In our study, the term "risk" is used as a combination of consequence and probability (risk factor) with negative impacts on farm entrepreneurship, [16], [32]. Previous studies prove that the number of risks that threaten the farm is relatively large, [16].

Our study focuses on the most significant risk events in vegetable farms. This study is unique to open-field vegetable production farms in Albania. Such studies are not present in Albania or other countries in the Western Balkans, thus providing a valuable contribution to agricultural risk management. Additionally, we emphasize that the study's contribution comes from a country like Albania, one of the post-communist nations in Europe and still not integrated into the European Union. The study offers valuable recommendations primarily for farmers and local and central governance in Albania, but also for farmers and governments in Kosovo and North Macedonia, as comparable countries to Albania in terms of climatic conditions and levels of economic development.

Albania is part of the Western Balkans together with Kosovo, North Macedonia, Montenegro and Serbia, [34], [35], [36], [37], [38], [39], [40], [41]. Compared to other countries of the Western Balkans, new enterprises in Albania face bureaucratic procedures, [34]. The study focuses on agricultural entrepreneurship. This undertaking is very difficult, [23], especially in vegetable farms, [1], [2].

Previous studies have shown that farmers' perceptions do not follow the trend of real damage. This is explained by the fact that they have great fear of their activity, [9], [10], [11], [12], [13], [14]. The same thing is found in this study as well. In previous studies in this unit, drought, excessive debts, and high interest rates have been identified as important risk factors. While according to perception, their aggressiveness is at the average level (or they have the aggressiveness of rabbits), [1], [2]. According to previous studies, the aggressiveness of the rabbit means frequent risk events and the damages are at low levels. For these events, researchers recommend prevention or reduction. Due to the high probability of occurrence, these events are not preferred by insurance companies, [16].

These inconsistencies are due to changing circumstances in this complex enterprise. The risk factors with very high impact in this study are flood, diseases and pests, and illness or death of the farmer (Figure 4 and Table 7 in Appendix). According to previous studies, shark aggressiveness means risk events that happen very rarely, but if they do, the damage is very great. For these events, researchers recommend transferring to insurance companies. Due to the low probability of occurrence, these events are preferred by insurance companies, [16]. These events have the aggressiveness of a shark, meaning the chance of them happening is small, but if they do, the impact is catastrophic for the farm.

Meanwhile, 52% of the variables taken into consideration for the study (10/19) have rabbit aggressiveness, which once again confirms the fear of farmers, meaning that the possibility of occurrence is medium, but if it occurs, the impact is small. However, the large number of variables with this level of aggressiveness remains a problem. Based on the analysis of the 19 variables in this study, 10 have rabbit aggressiveness (Figure 4 and Table 8 in Appendix).

And 26% of the variables analyzed in the study (5/19) have the aggressiveness of the mouse, which means the possibility and impact are small. These risk factors are easily borne by farmers and cannot affect their objectives (Figure 4 and Table 9 in Appendix). According to previous studies, the aggressiveness of the mouse means that the risk is rare and the damages are at low levels. For these events, researchers recommend self-financing. Due to the low probability and low damage, these risk events do not affect the business objectives, [16].

A very important conclusion is the fact that the risk events included in the study do not have the aggressiveness of the lion. According to previous studies, lion aggressiveness means events that occur frequently and have great consequences (damages). These events are beyond the capabilities of the farm owner and researchers recommend avoiding them, [16].

Another very important conclusion is the fact of suitable conditions for the development of agriculture in Albania, with priority given to vegetables, nuts, and fruit crops. This conclusion is confirmed by previous studies, [1], [2], [42], [43], [44], [45]. Forecasting is also a very important risk management tool in business. The Tortoise diagram is recommended as a means of forecasting the production risk in the farm enterprise. The Tortoise diagram is also used in the business auditing process, [46].

Also, the results of our study are in sync with previous studies done in the field of risk in vegetable farms in Albania, [1], [2], [42], [43], our study is characterized by several disadvantages. First, the data was collected from the farmers' perceptions. Previous studies have proven that these data are inaccurate or distorted, [47]. In one of the previous studies, it was proven that farmers' errors in data inaccuracy range from 10 to 15%, [48]. Other studies have shown that the farmers' perception of risk does not follow the trend of actual damages experienced, [9], [10], [11], [12], [13], [14].

Finally, this work is a novelty not only for the economy in the field of vegetable production but also for the risk of entrepreneurship in agriculture in Albania and countries comparable to Albania, such as Kosovo and North Macedonia. Previous studies confirm the importance of studies in Albania, as a post-communist country and still not integrated into the "big family" of the European Union, [49], [50]. The urgency of the integration of the six countries of the Western Balkans into the European Union has been confirmed by previous studies, [34], [35], [36], [37], [38], [39], [40].

However, this study is subject to several limitations. First, the data were collected based on farmers' perceptions. Previous research has shown that information obtained from respondents is often biased and inaccurate [51]. Findings may be affected by self-reporting errors among farmers, with deviations in research results ranging from 10% to 15%, [48], [52]. Second, the study focuses exclusively on Albania, and due to differing contextual conditions, the generalizability of its findings to other countries is limited, [25], [53], [54].

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this paper, the authors used ChatGPT to facilitate a clear and comprehensible presentation of the paper in English. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

References:

[1] Kurtaj, D., Çerpja, T., Arif Murrja, A. (2024). Financial Risk Analysis - Case study Guri I Zi in the Municipality of Shkodër in Albania. WSEAS Transactions on Environment and

- *Development*, vol.20, pp.66-75. https://doi.org/10.37394/232015.2024.20.8.
- [2] Çerpja, T., Murrja, A. (2024). Market Risk Analysis Microeconomic Aspect of Vegetable Farms in Guri i Zi Administrative Unit, Shkodër in Albania. WSEAS Transactions on Business and Economics. 2024, vol.21, pp.885-895. https://doi.org/10.37394/23207.2024.21.74.
- [3] Tomorri, I., Domi, S., Çera, G., Remzi Keco, R., Kapaj, I. (2024). Examination of the Importance and Level of Application of Digitisation in the Rural Sector, the Case of Albania, WSEAS Transactions on Business and Economics, vol. 21, pp. 528-543, https://doi.org/10.37394/23207.2024.21.44.
- Lowenberg-DeBoer, J. (2022). Economics of [4] adoption for digital automated technologies in agriculture. Background paper for The State of Food and Agriculture 2022. FAO Development **Economics** Agricultural Rome, Working Paper 22-10. FAO. https://doi.org/10.4060/cc2624en.
- [5] Domi, S., Keco, R., Musabelliu B., Kapaj, I. (2018). A review of factors affecting SMEs' performance: An Albanian rural tourism perspective. Albanian J. Agric. sci. 2018; (Special edition *Proceedings of ICOALS*, 2018). Agricultural University of Tirana, Tirana, Albania, [Online]. https://ajas.site/wp-content/uploads/2018/11/06 AJAS Full-Paper Shpresim-Domi ICOALS-2018.pdf (Accessed Date: October 10, 2024).
- [6] Degila, J., Sodedji, F.A.K.; Avakoudjo, H.G.G., Tahi, S.P.G., Houetohossou, S.C.A., Honfoga, A.-C., Tognisse, I.S.; Assogbadjo, A.E. Digital Agriculture Policies and Strategies for Innovations in the Agri-Food Systems—Cases of Five West African Countries. *Sustainability* 2023, 15, 9192. https://doi.org/10.3390/su15129192.
- [7] Osmani. M., Keco, R., Kambo, A., and Tomorri, I. (2020). Factors Influencing Consumers' Perceptions of Safety Risk of Fresh Domestic Tomato in Albania Multinomial Econometric Approach. *Int. J. Food System Dynamics*, 11 (4), 2020, 387-401 http://dx.doi.org/10.18461/ijfsd.v11i4.62.
- [8] Keco, R. & Gjika, I. (2021). Value chain coordination and standards: the case of greenhouse vegetables in Albania. *Bulg. J. Agric. Sci.*, 27 (3), 469–478. https://www.agrojournal.org/27/03-04.pdf.
- [9] Fletcher, W. R. J. (2015). Review and refinement of an existing qualitative risk

- assessment method for application within an ecosystem-based management framework. *ICES Journal of Marine Science*, 72(3), 1043-1056. https://doi.org/10.1093/icesjms/fsu142.
- [10] Ndregjoni, A., Murrja, A., Prendi, L. (2023). Analysis of Legal Risk in Farms of Intensive Chicken Production The Case of Kosovo. WSEAS Transactions on Environment and Development, vol. 19, pp. 655-667. https://doi.org/10.37394/232015.2023.19.64.
- [11] Murrja, A., Ndreca, P., Maloku, S., Meço, M. (2023). Analysis of Production Risk in Intensive Chicken Farms the Case of Kosovo. *Folia Oeconomica Stetinensia*, 23(2), 300–316. https://doi.org/10.2478/foli-2023-0032.
- [12] Murrja, A., Ndregjoni, N., Maloku, S., & Prendi, Ll. (2022). Aggressiveness of market risk events and their management in intensive chicken breeding farms in Kosovo. *Specialusis Ugdymas*, 2(43):386-402.
- [13] Murrja, A. (2023). Risk analysis of human resources in the farms of intensive rearing of chickens in Kosovo. *Conference: IBANESS Congress Series on Economics, Business and Management*, At: Plovdiv, Bulgaria. Volume: Proceedings of XIX. Page 38-49. ISBN: 978-619-203-339-2.
- [14] Murrja, A., Vuniqi, D., Maloku, S. (2023). Risk Management in the Intensive Poultry Industry in Kosovo. Conference: 2nd International Scientific Conference "BRIDGE 2023", "The Future of Science: Challenges and Opportunities" At Prizren, Kosovo.
- [15] Martinovska Stojcheska, A., Agic, R. and Janeska Stamenkovska, I. (2021). Vegetable production in North Macedonia competitiveness, trends and challenges. *Acta Hortic*. 1320, 79-86 https://doi.org/10.17660/ActaHortic.2021.132 0.10.
- [16] Ivanov, R., & Atanasov, D. (2023). Risk management in agriculture. *Agricultural Sciences*, 15(37), Article 005. https://doi.org/10.22620/agrisci.2023.37.005.
- [17] Komarek, A. M., De Pinto, A., Smith, V. H. (2020). A review of types of risks in agriculture: What we know and what we need to know. *Agricultural Systems*, 178, 102738. https://doi.org/10.1016/j.agsy.2019.102738.
- [18] Aven, T. (2016). Risk assessment and risk management: Review of recent advances on their foundation. *European Journal of Operational Research*, 253(1), 1-13. https://doi.org/10.1016/j.ejor.2015.12.023.

- [19] Harwood, J., Heifer, R., Coble, K., Perri, J., Somwaru, A. (1999). Management Risk in Farm. http://dx.doi.org/10.22004/ag.econ.34081.
- [20] USDA-ERS, [Online]. https://www.ers.usda.gov/ (Accessed Date: February 21, 2025)
- [21] Anmol, G., Mita, M. (2023). "Enhancing Agricultural Resilience: Exploring The Role Of Insurance And Risk Mitigation Strategies In Sustainable Farming", *Futuristic Trends in Social Sciences*, Vol. 3 Book 12, IIP Series, Vol. 3, May, 2024, pp.116-133. https://www.doi.org/10.58532/V3BISOP2CH 2.
- [22] Hardaker, J. Brian (2006). Farm risk management: past, present and prospects. *Journal of Farm Management*, Vol 12 No.10 pp. 593-612.
- [23] Jankelova. N., Masar, D., Moricova, S. (2017). Risk factors in the agriculture sector. *Agric. Econ. Czech*, 63, 2017 (6): 247–258. doi: 10.17221/212/2016-AGRICECON.
- [24] OECD. (2009). Managing risk in agriculture: A holistic approach. Paris: OECD Publishing. https://doi.org/10.1787/9789264075313-en.
- [25] Murrja, A., & Cera, G. (2025). Exploring the Role of Five Key Risks for Apple Farmers: An Explanatory and Inferential Analysis. *The South East European Journal of Economics and Business*, 20(1), 53-67, doi: 10.2478/jeb-2025-0005.
- [26] Okoye, P. U., Okolie, K. C., & Odesola, I. A. (2022). Risks of Implementing Sustainable Construction Practices in the Nigerian Building Industry. *Construction Economics and Building*, 22(1). https://doi.org/10.5130/AJCEB.v22i1.7420.
- [27] Israel, Glenn D. (1992). Determining Sample Size. Fact Sheet PEOD-6. Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, [Online]. https://www.psycholosphere.com/Determining%20sample%20size%20by%20Glen%20Israel.pdf (Accessed Date: May 24, 2024).
- [28] Cochran, W.G., (1977). Sampling techniques. 3rd Ed. New York: John Wiley & Sons Inc, ISBN: 978-0-471-16240-7.
- [29] Fletcher J. W. (2005). The application of qualitative risk assessment methodology to prioritise issues for fisheries management. *ICE S Journal of Marine Science*, 62: 1576-

- 1587: pp. 1576-1587. https://doi.org/10.1016/j.icesjms.2005.06.005.
- [30] Astles, K.L., Holloway, M.G., Steffe, A., Green, M., Ganassin, C., Gibbs P.J. (2006). An ecological method for qualitative risk assessment and its use in the management of fisheries in New South Wales, Australia. *Fisheries Research*, Vol. 82, Issues 1-3, pp. 290-303. https://doi.org/10.1016/j.fishres.2006.05.013.
- [31] Shah, J.; Alharthi, M. The Association between Farmers' Psychological Factors and Their Choice to Adopt Risk Management Strategies: The Case of Pakistan. *Agriculture*, 2022, 12, 412. https://doi.org/10.3390/agriculture12030412.
- [32] Murrja A., Braha K. (2021). Farm risk, resources and management tools a literature review (Risku i fermës, burimet dhe mjetet e menaxhimit-Një rishikim literetaure). *Social Studies*, 3 (15): 5-13: pp. 93-106.
- [33] Murrja, A., Troka, P., Ndregjoni, A., & Shehu, E. (2019). Explanatory and argumentative essay on the risk of entrepreneurship definition of business risk. Business and Economics, Nuremberg. International Conference II. ISBN: 978-3-9819288-3-2, pp.89-98.
- [34] Abdullah, M. H. S. B., Azmi, A., Yaakob, R., Redzuan, H. (2024). Risk Management Literacy Level Among Oil Palm Smallholders in Malaysia. *Jurnal Manajemen Hutan Tropika*, Vol. 300, No.1. https://doi.org/10.7226/jtfm.30.1.129.
- [35] Bartlett, W., Bonomi, M., Uvalic, M. (2022). The Economic and Investment Plan for the Western Balkans: assessing the possible economic, social and environmental impact of the proposed Flagship projects. PE 702.561. [Online]. https://www.europarl.europa.eu/RegData/etud
 - es/STUD/2022/702561/EXPO_STU(2022)70 2561_EN.pdf (Accessed Date: June 21, 2024).
- [36] Berthomieu, C., Massimo Cingolani, M., Ri, A. (2016). *Investment for Growth and Development in the Western Balkans*. STAREBEI Research Project EIB Institute University of Nice Sophia Antipolis (France). [Online]. https://institute.eib.org/wp-content/uploads/2019/02/STAREBEI-Sophiaall.pdf (Accessed Date: June 21, 2024).
- [37] Daskalov, R., & Mishkova, D. (Eds.). (2014). Entangled histories of the Balkans. Volume two: Transfers of political ideologies and

- *institutions*. Leiden: Brill. https://doi.org/10.1163/9789004261914.
- [38] Estrin, S., and M. Uvalic. 2016. Foreign direct investment in the Western Balkans: What role has it played during transition? *Comparative Economic Studies*, 58 (3):455–483. https://doi.org/10.1057/ces.2016.10.
- [39] Holzner, M., and R. Grieveson (2018). Investment in the Western Balkans: New directions and financial constraints in infrastructure investment. Policy notes and reports 27, The Vienna Institute for International Economic Studies. [Online]. https://wiiw.ac.at/investment-in-the-western-balkans-dlp-4705.pdf (Accessed Date: February 19, 2024).
- [40] Jusufi, G., and F. Gashi-Sadiku. 2020. Impact of fiscal policies in Western Balkans SMEs' growth: Evidence from Kosovo. *Central European Public Administration Review*, 18 (2):135–64. https://doi.org/10.17573/cepar.2020.2.07.
- [41] Batrancea, L. M., Murrja, A., Masca, E. S., Ndreca, P., Tulai, H., & Poleshi, B. (2024). Does Taxation Foster Entrepreneurship across Western Balkans Countries? Empirical Evidence across 30 Years. *Journal of Business-to-Business Marketing*, 31(2), 225–241. https://doi.org/10.1080/1051712X.2024.23490 94.
- [42] Murrja, A., Sosoli, I., Tabaku, I., Orkida Totojani, O., & Keco, R. (2025), Perception of Risk in Farm Activities: A Comparison of Matrix Analysis with Results from Multifactorial Linear Regression, WSEAS Transactions on Environment and Development, vol. 21, pp. 109-126, 2025, https://doi.org/10.37394/232015.2025.21.10.
- [43] Ndregjoni, A. (2024). Identification and analysis of human resources risk on farms, encouragement for sustainable development. London, United Kingdom, Conferencii, Vol. (9) 1, p. 4-10. http://doi.org/10.51586/Conferencii 9 1 202 4.
- [44] Zhllima, E., Imami, D., Nam, J., Shoshi, P., & Gjika, I. (2019). Awareness of climate change impact and adaptation in agriculture The case of Albania. *European Countryside*, Vol. 14, no. 4, p. 604-622. https://doi.org/10.2478/euco-2022-0030.
- [45] Osmani M., Kambo, A. (2019). Efficiency of apple small-scale farming in Albania. A Stochastic Frontier Approach. NEW MEDIT

N. 2/2019. http://dx.doi.org/10.30682/nm1902d.

- [46] Murrja A., Maloku S., & Meço, M. (2021). "Turtle Diagram" as a Tool of Forecasting in the Management of Production Risk in Agriculture Literature Review. *Albanian j. agric. sci.*; 20 (1): pp. 36-40.
- [47] Roger Tourangeau, R. and Yan, T. (2007). Sensitive Questions in Surveys. *Psychological Bulletin*, 133(5):859-83. doi: 10.1037/0033-2909.133.5.859.
- [48] Carletto, C., Gourlay, S., Winters, P. (2015). From Guesstimates to GPStimates: Land Area Measurement and Implications for Agricultural Analysis. *J. Afr. Econ.*, 24, 593–628. https://doi.org/10.1093/jae/ejy011.
- [49] Lushi, I., Çera, G., Murrja, A. & Ujkani, S. (2023). Linking farmers' bargaining power in trade to their plans for future economic activities. *Southeast European Journal of Economics and Business*. 18 (2), p. 173-185. https://doi.org/10.2478/jeb-2023-0026.
- [50] Çera, G., Khan A. K., Ahmad, M. & Brabenec, T. (2021). Improving financial capability: the mediating role of financial behaviour, *Economic Research Istraživanja*, 34:1, 1265-1282. https://doi.org/10.1080/1331677X.2020.1820362.
- [51] Tourangeau, R., and T. Yan. (2007). Sensitive Questions in Surveys. *Psychological Bulletin* 133 (5): 859–83. https://doi.org/10.1037/0033-2909.133.5.859.
- [52] Radočaj, D., Plaščak, I., Heffer, G., & Jurišić, M. (2022). A Low-Cost Global Navigation Satellite System Positioning Accuracy Assessment Method for Agricultural Machinery. Applied Sciences, 12(2), 693. https://doi.org/10.3390/app12020693.
- [53] Ndregjoni, A. (2024, June). The importance of legal risk on the farm according to a regression analysis. *International Journal of Economics, Commerce and Management*, 12(6), 102.
- [54] Murrja, A., Kurtaj, D., Ndregjoni, A., & Prendi, L. (2023). Vegetable farmers' perception of production risk sources and environmental aspects Descriptive statistical analysis and multifactorial linear regression. WSEAS Transactions on Environment and Development, 19, 826–835. https://doi.org/10.37394/232015.2023.19.78.

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

The authors equally contributed to the present research, at all stages from the formulation of the problem to the final findings and solution.

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Conflict of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.

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APPENDIX

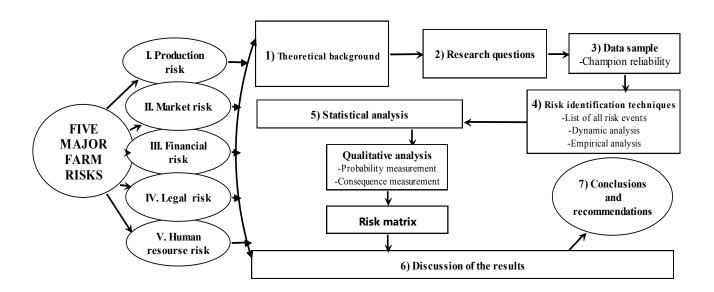


Fig. 2: Conceptual model Source: Based on previous studies, [9], [10], [11], [12], [13]

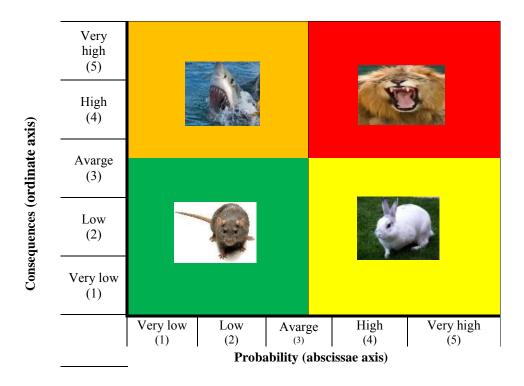


Fig. 3: Risk Matrixes

Source: Adapted for our study from previous research, [9], [10], [11], [12], [13], [14], [16]

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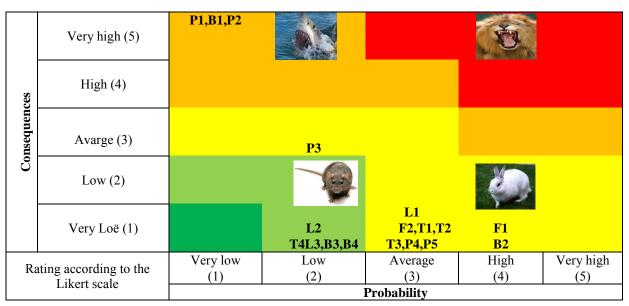


Fig. 4. Matrix analysis

Source: Adapted for our study from previous research, [9], [10], [11], [12], [13], [14], [16].

Table 2. Evaluation of risk events according to the Likert scale

	Table 2. Evaluation of risk events according to the Likert scale							
Nr.	Risk Event	Probability	Impact		Factor			
P.1	Flood	1	4.8	4,8	Very high			
P.2	Plant diseases/pests	1	4,2	4,2	Very high			
P.3	Very high/low temperatures	1,3	3	3,9	High			
P.4	Non-quality factors of production	2,3	1	2,3	Average			
P.5	Drought	1	2,3	2,3	Average			
P	Production risk	2,8	1,2	3,4	High			
T.1	Fluctuation of product prices in the market	2,7	1,2	3,1	High			
T.2	High competition	2,7	1,1	3,1	High			
T.3	Decrease in consumer income	2,3	1	2,2	Average			
T.4	Changes in consumer preferences	2,1	0,9	1,9	Low			
T	Market risk	2.4	1	2.6	Average			
F.1	Earnings lower than expected	3,2	1,4	4,5	Very high			
F.2	Excessive debts	2,5	1,1	2,7	Average			
F.3	Increase in loan interest	2,4	1	2,5	Average			
F	Financial risk	2,7	1,2	3,2	High			
L.1	Food safety	2,4	1,7	4,1	Very high			
L.2	Failure to comply with the labor code	2	1,4	2,7	Average			
L.3	Failure to comply with contracts	1,8	1,2	2,2	Average			
L	Legal risk	2,1	1,4	3	Average			
B.1	Death or illness of the farmer	1	4,8	4,8	Very high			
B.2	Professional disability of employees	1,2	2,9	3,5	High			
B.3	Lack of employee training	2,1	0,9	2	Low			
B.4	Removal of family members from the farm	2,1	0,9	1,8	Low			
В	Human resources risk	2,6	1,1	3	Average			

Source: By the Authors

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Table 3. Very high-risk factors

Nr.	Risk Event	Probability	Impact	Risk	Factor
P.1	Flood	1	4.8	4,8	Very high
P.2	Plant diseases/pests	1	4,2	4,2	Very high
F.1	Earnings lower than expected	3,2	1,4	4,5	Very high
L.1	Food safety	1,7	2,4	4,1	Very high
B.1	Death or illness of the farmer	1	4,8	4,8	Very high

Source: By the Authors

Table 4. High-risk factors

Nr.	Risk Event	Probability	Impact	Risk Facto	r
P.3	Very high/low temperatures	3	1,3	3,9	High
T.1	Fluctuation of product prices in the market	2,7	1,2	3,1	High
T.2	High competition	2,7	1,1	3,1	High
B.2	Professional disability of employees	2,9	1,2	3,5	High

Source: By the Authors

Table 5. Middle-level risk factors

Nr.	Risk Event	Probability	Impact	Risk	Factor
P.4	Non-quality factors of production	2,3	1	2,3	Average
P.5	Drought	1	2,3	2,3	Average
T.3	Decrease in consumer income	2,3	1	2,2	Average
F.2	Excessive debts	2,5	1,1	2,7	Average
F.3	Increase in loan interest	2,4	1	2,5	Average
L.2	Failure to comply with the labor code	2	1,4	2,7	Average
L.3	Failure to comply with contracts	1,8	1,2	2,2	Average

Source: By the Authors

Table 6. Low-level risk factors

Nr.	Risk Event	Probability	Impact	t Risk Facto	
T.4	Changes in consumer preferences	2,1	0,9	1,9	Low
B.3	Lack of employee training	2,1	0,9	2	Low
B.4	Removal of family members from the farm	2,1	0,9	1,8	Low

Source: By the Authors

Table 7. Risk factors with shark aggressivity

		00			
Nr.	Risk Event	Probability	Impact	Risk Factor	
P.1	Flood	1	4.8	4,8	Very high
P.2	Plant diseases/pests	1	4,2	4,2	Very high
B.1	Death or illness of the farmer	1	4,8	4,8	Very high

Source: By the Authors

Table 8 Risk factors with rabbit aggressivity

Nr.	Risk Event	Probability	Impact	Risk	Factor
P.3	Very high/low temperatures	1,3	3	3,9	High
P.4	Non-quality factors of production	2,3	1	2,3	Average
P.5	Drought	1	2,3	2,3	Average
T.1	Fluctuation of product prices in the market	2,7	1,2	3,1	High
T.2	High competition	2,7	1,1	3,1	High
T.3	Decrease in consumer income	2,3	1	2,2	Average
F.1	Earnings lower than expected	3,2	1,4	4,5	Very high
F.2	Excessive debts	2,5	1,1	2,7	Average
F.3	Increase in loan interest	2,4	1	2,5	Average
L.1	Food safety	2,4	1,7	4,1	Very high
B.2	Professional disability of employees	1,2	2,9	3,5	High

Source: By the Authors

Table 9. Risk factors with mouse aggressivity

Nr.	Risk Event	Probability	Impact	Risk	Factor
T.4	Changes in consumer preferences	2,1	0,9	1,9	Low
L.2	Failure to comply with the labor code	2	1,4	2,7	Average
L.3	Failure to comply with contracts	1,8	1,2	2,2	Average
B.3	Lack of employee training	2,1	0,9	2	Low
B.4	Removal of family members from the farm	2,1	0,9	1,8	Low

Source: By the Authors