

Market Risk Analysis - Microeconomic Aspect of Vegetable Farms in Guri i Zi Administrative Unit, Shkodër in Albania

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Abstract: The risk of entrepreneurship in agriculture is complex. The purpose of this study is to identify and analyze the primary market risks that farmers face, which will help them better understand these risks and make informed decisions to mitigate them. The research uses a mixed methodology involving descriptive statistical analysis and multifactorial regression analysis to examine four critical risk factors: changes in consumer preferences, price fluctuations, high competition, and shifts in consumer incomes. The findings show that only high market competition is statistically significant and has a substantial impact of 79%. Farmers can use this information to adjust their production focus towards areas of comparative advantage in a single crop to improve their financial stability. In summary, market risk analysis is an essential tool that empowers farmers to understand and manage risks effectively to safeguard their income streams.

Key-Words: - Farm, agriculture, risk, market, perception, technical, management.

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1 Introduction

Smallholder farmers in many developing countries face numerous challenges in accessing inputs, technologies, and modern agricultural markets, [1], [2], [3]. Other risks they are exposed to include low agricultural productivity, crop failure, and product quality that barely meets market consumer demands. These risks stem from a lack of adequate knowledge of best farm management practices, limited access to improved farm management technologies, high transaction costs to enter input markets, frequent occurrence of pests and diseases, weather-related uncertainties, etc., [4], [5], [6].

In a society where agriculture is a fundamental part of the country's economy and development, studying and analyzing the various risks that influence vegetable farms is important to understand and manage the challenges faced by farmers and the agricultural sector. Albania's economy is dominated by the agriculture sector, which accounts for 19,26% of the gross domestic product, [7]. This

research will analyze market risk in vegetable farms in Albania, offering a special focus on the study area, Guri i Zi administrative unit in Shkodra County, Albania.

In agriculture, risk is present in many aspects of the farmers' activities. These aspects include production risk, market risk, financial risk, legal risk, and human resources risk, [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], (Figure 1). We will focus specifically on market risk analysis in this study, as this is one of the five main challenges facing farmers in Albania and our study area.

In the current century, agriculture is facing significant challenges regarding food safety and sustainable development. In this context, risk management has become a key focus to ensure that agricultural production is efficient, sustainable, and safe. A fundamental component of this management is the identification and treatment of various risks that may affect farmers and agricultural operations.

One of the main goals of risk management in agriculture is to identify and predict potential risks that may impact agricultural production. In this context, the five key risks, known as "major risks", "general risks", or primary risks, have been a significant reference point, [14], [17], [21]. These risks include aspects such as extreme weather, plant and animal diseases, climate change, and economic, legal, financial, human, and political factors.

An interesting fact is that the classification of these five risks was initially identified in the United States and later spread to other countries such as New Zealand, Britain, and Europe, [11], [18], [19]. This global expansion indicator demonstrates the importance of a common approach to risk management in agriculture at the international level.

Today, international organizations such as the Organization for Economic Cooperation and Development (OECD) have made it clear that studying and treating these five key risks is an important part of agricultural policies and practices worldwide, [16]. Improving farmers' ability to manage these risks has a direct impact on food safety and the sustainability of agricultural systems overall.

However, it is important to emphasize that despite progress in this field, challenges remain numerous. Climate change continues to pose significant concerns for agricultural production, while economic and political aspects are also factors that can affect the stability of the agricultural sector. Therefore, farmers, agricultural organizations, and governments need to continue working together to develop appropriate strategies for managing these risks.

In conclusion, risk management in agriculture is a complex and important challenge that requires ongoing commitment and international cooperation. Improving access to risks in this sector will contribute to food safety and the sustainability of agricultural production in the future.

Albania has favorable conditions for agricultural development, especially for vegetable production. The study area, Guri i Zi administrative unit in Shkodra District, is one of the areas with a developed vegetable farm, which contributes about 42% of the needs of the regional market (Shkodra District) for vegetables, [7]. Nevertheless, the lack of detailed analysis of marketing risk in this area and at the national level, has made farmers exposed to unexpected and unexplained risks coming from the market.

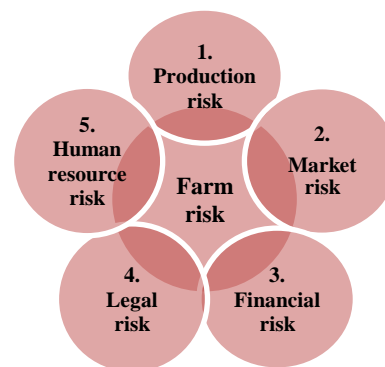


Fig. 1: The five main risks of the farm
Source: Authors' elaboration

Our study has a specific significance, as it begins to fill a gap in the literature and analysis of agricultural risk in Albania. The advantages of this study consist in the fact that it is unique and will provide valuable information to farmers and other interested groups regarding the levels of market risks in vegetable production.

Even though this analysis has a flaw, which is the impossibility of extending the results and conclusions to a wider region than Guri i Zi, the market risks in this region have the same approach throughout the country and the results of the study of market risk in this region can be directly applied across the country.

Through this research study, we aim to support farmers and market actors to better understand and manage market risks in the vegetable sector in Albania, thereby contributing to the development and sustainability of this crucial sector of the country.

2 Literature Review

Risks have existed and will continue to exist. Old risks are replaced by new ones. In 1999, it was found that agricultural producers expressed more concerns regarding the risks of price volatility and input quality, [10]. A study conducted in the Netherlands in 2001 focused on completing surveys on farmers' perceptions of risk sources. The focus of this study was on livestock, and the findings highlighted price as a significant risk source, followed by epidemic animal diseases and farmer deaths, [22]. Another study in the Netherlands in 2011 focuses on the management of catastrophic risks by promoting public-private partnerships, such as the Veterinary Livestock Fund, to control the costs of livestock epidemics and insurance companies for covering specific types of risks, [23]. The study conducted in 2010 in the Caribbean and Pacific Islands aimed to gather information by

conducting surveys on stakeholders' perceptions of risk sources in the value chain. Fruit and vegetable farmers were the focus, and the study concluded that marketing and production risks were the most significant, [24]. In 2014, a study in Lithuania aimed to study general agriculture. The method used to conduct this study was a survey focused on building a farm risk index using various risk factor analyses. The study's findings showed a higher risk in production, mainly from non-productive inputs and plant diseases, [20]. Three years later, another study was conducted in Slovakia, which also focused on general agriculture and farmers' perceptions of risk sources. However, this time, marketing risk was seen as more prioritized, arguing that price and competition risks were the major concerns for farmers, followed by natural disasters and contract violations, [18]. Another study focusing on livestock in 2018 in India identified marketing risk as the most influential on-farm risk, followed by adverse weather and delays in veterinary services, [25]. In Chile, in 2018, a study was conducted on onion production. The conclusions highlighted climate-related phenomena as significant concerns, followed by price fluctuations and currency exchange rates, [26]. In 2019, a comparative study was conducted in the United States to assess the importance of one type of risk compared to others, concluding that production, market, and financial risks were more significant concerns than personal or legal risks, [27]. Another study in the United States a year later concluded that non-climatic resources, bring more concern to the farm than climatic ones, [28]. Surveys on farmers' perceptions of risk sources have also been conducted in Norway, focusing on dairy products. This 2005 study concluded that insecurity about expected profits, fear of inability to continue payments to the state, or fear of debt and credit repayment were the most significant risk sources, [29]. Another study in 2018, this time in Pakistan, conducted similar surveys to previous studies, concluding that frequent changes in agricultural policies were the main concern, followed by the price of agricultural equipment and the lack of agricultural cooperatives, [30]. In the same year, a study in Turkey aimed to identify farmers' knowledge of risk sources in beekeeping. Its findings identified low-profit risk as the most significant concern, followed by disease risk and professional skills shortages, [31]. In 2022, an empirical study was conducted in Kosovo for the period 2017-2021, focusing on five risks in intensive chicken farms. The study findings showed that farmers had high-risk factors, such as legal and

financial risk, medium-risk factors, such as market risk and human resource risk, and low-risk factors, such as production risk, [32], [33], [34].

In a 2023 study in the Guri i Zi administrative unit in Shkodër, vegetable farmers had high perceptions of the five main risks (production risk, market risk, financial risk, legal risk, and human resource risk). Based on the regression analysis of production risk events, it was found that drought and floods were the most important for the farm in this region, [22]. This reveals the importance of the influence of weather conditions on the performance of vegetable farms.

From a preliminary survey with Guri I Zi farmers, it was concluded that the most important market risk events were the fluctuation of product prices in the market, high competition, changes in consumer preferences, and the reduction of consumer incomes.

Therefore, the research hypothesis of this study is:

H₁: The events of fluctuating prices of products in the market, high competition, changes in consumer preferences, and a decrease in consumer income have serious impacts on market risk.

In conclusion, the literature review shows that the number of studies on market risk in vegetable farms is relatively small, [7]. Furthermore, the research studies are not focused on the five main risks of agriculture (production risk, market risk, financing risk, legal risk, and human resources risk). Our research paper aims to fill this gap with a quantitative analysis of the four most significant market risk events in vegetable farms, in the study area. This will help in developing further strategies for managing this risk and improving the sustainability of one of the most important sectors of the economy.

3 Materials and Methods

3.1 Description of Statistical Concepts

The main concepts of the study are “Market risk” as a dependent variable and “Sources of market risk” as independent variables (Table 1).

Table 1. Concepts of the model

Market Risk (Y)	1) Changes in consumer preferences (X ₁)
	2) Price fluctuation (X ₂)
	3) High competition (X ₃)
	4) Changes in consumer income (X ₄)
Dependent variable	Independent variables

Source: Adapted for our research study, [7]

3.2 Qualitative Assessment of the Variables

A 5-point Likert scale was used to evaluate the variables in this study, ranging from 1 (very low-risk factor) to 5 = very high-risk factor), for the four most important risk events of the vegetable market in the Guri i Zi administrative unit. (Table 2).

Many researchers widely use assessment using the Likert scale. There are several similar studies regarding the examination of risk factors in vegetable farms, [7], [12], [15], [25], [32], [33], [34], [35].

Table 2. Turning concepts into variables

Method of measurement	Assessment
1-Very low risk	1-260
2-Low risk	261-520
3-Average risk	521-780
4-High risk	781-1,040
5-Very high risk	1,041-1,300

Source: [7]

3.3 Preliminary Survey Preparation

In order to assess the importance of the three variables related to financial risk, a preliminary survey was conducted with the participation of 30 farmers. The selection process of farmers was based on criteria such as education, experience, and farm size. These criteria were used as key indications to ensure a qualitative and appropriate representation of the opinion and experience of farmers in the field of studying financial risk in vegetable farms.

Then the study was extended to 3500 farmers and the reliability of the sample was calculated with the following formulas:

For larger populations, the representativeness of the sample is calculated with the formula, [35], [36], [37].

$$n_0 = \frac{Z^2pq}{e^2} \quad (1)$$

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

$$n_0 = \frac{1.96^2 * 0.5 * 0.5}{0.05^2} = 385 \text{ farmers} \quad (2)$$

The population consists of 3,500 farmers, and we can slightly reduce it, [35], [36].

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

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

The sample size of the study is:

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

3.4 Survey, Data Collection and Analysis

For this study, 260 farmers who operate in the Guri I Zi administrative unit, were interviewed face-to-face. A random sampling technique was used, and the responses of the farmers were recorded and presented in Table 3.

Table 3. Farmers' responses on the perceptions of market risk events

Market risk events	Likert rating				
	1	2	3	4	5
Fluctuation of product prices in the market	10	15	70	70	95
High competition	15	25	50	70	100
Changes in consumer preferences	35	60	70	50	45
Decrease in consumer income	10	60	90	60	40
Market risk	5	15	20	115	105

Source: Authors' elaboration

Survey data were gathered and managed using Excel before undergoing regression analysis. The relationship between variables was examined employing the multiple linear regression model, a widely recognized approach in agricultural risk analysis, [38], [39], [40], [41].

$$Y = a + bX_1 + cX_2 + \dots nX_i + e \quad (5)$$

3.5 Statistical Model Estimation

A statistical model evaluation was performed using Fisher's Factic (F_f) and Fisher's Critical (F_c) to determine whether the model was statistically significant. The statistical significance of the dependent variable is determined through the P-value. The coefficient of determination (R^2) shows how much of the change in the independent variable is determined by the change in the dependent variable. This method provides a consistent way to assess and analyze the importance of sources of market risk in the context of the study.

4 Problem Solution

In another study, the perception of vegetable farmers in this area for the five main risks was measured and evaluated according to the Likert scale, [7]. The data are presented in Table 4 and Figure 2.

Table 4. Farmers' perception of the five main risks on the farm

Segment	Five main risks	Perceptions	
1,041-1,300	Production risk	1,220	(i) Very high
1,041-1,300	Marketing risk	1,080	(ii) Very high
781-1040	Financial risk	995	(iii) High
781-1040	Human risk	850	(v) High
521-780	Legal risk	670	(iv) Average

Source: [7]

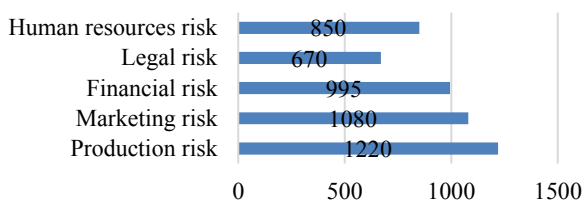


Fig. 2: Farmers' perception of the five main risks
Source: [7]

As we can see from Table 4 and Figure 2, market risk is rated second in terms of importance, after production risk, followed by financial risk, human resources risk, and legal risk at the end.

4.1 Descriptive Analysis of Market Risk

The suggested resources are perceived as important (Table 5 and Figure 3).

Table 5. The importance of the market risk variables

Segment	Source of market risk	Perception	
[781-1040]	Fluctuation of product prices in the market	1005	(i) Important
[781-1040]	High competition	995	(ii) Important
[781-1040]	Decrease in consumer income	840	(iii) Important
[781-1040]	Changes in consumer preferences	790	(iv) Important

Source: Authors' elaboration

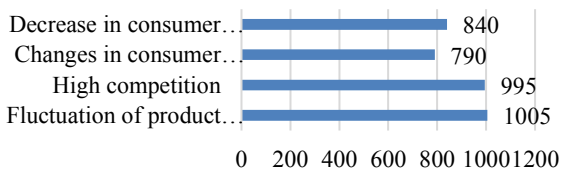


Fig. 3: The importance of the market risk variables
Source: Authors' elaboration

All four events are perceived as important, as shown in Table 5 and Figure 3. But within the assessment segment [781-1040] the price fluctuation of products in the market is rated higher (1.050),

followed by competition, a decrease in consumer income, and finally a change in consumer preferences. Table 6, illustrates the perception in percent of the 260 farmers interviewed for the four market risk events.

Table 6. Evaluation of Perceptions in Percentage

1	2	3	4	5	Likert scale
4%	6%	27%	27%	37%	Fluctuation of ...
6%	10%	19%	27%	38%	High competition
13%	23%	27%	19%	17%	Changes in ...
4%	23%	35%	23%	15%	Decrease in ...
2%	6%	8%	44%	40%	Marketing risk

Source: Authors' elaboration

The perception of 260 surveyed farmers in percent, about price fluctuations in the market is presented in Figure 4.

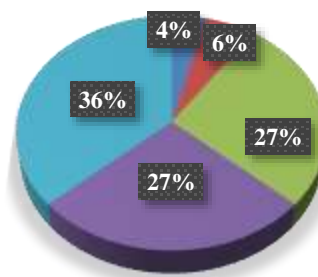


Fig. 4: Perception of price fluctuations
Source: Authors' elaboration

Regarding the perception of the risk of price fluctuation by 260 surveyed farmers, 4% or 10 farmers evaluate it with very low impact, 6% or 15 farmers evaluate it with low impact, 27% or 70 farmers evaluate it with medium impact, 27% or 70 farmers rate it as high impact, and 37% or 95 farmers rate it as very high impact.

The perception of the 260 surveyed farmers in percent about the high competition in the market is presented in Figure 5.

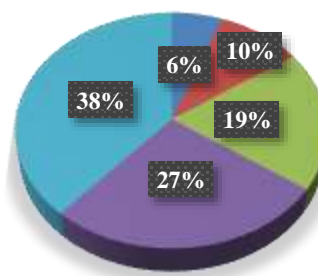


Fig. 5: Perception of competition
Source: Authors' elaboration

Regarding the perception of the risk of competition in the market by 260 surveyed farmers,

6% or 15 farmers evaluate it with very low impact, 10% or 25 farmers evaluate it with low impact, 19% or 50 farmers evaluate it with medium impact, 27% or 70 farmers rate it as high impact, and 38% or 100 farmers rate it as very high impact.

The perception of 260 surveyed farmers in percent, for the decrease in consumer income is presented in Figure 6.

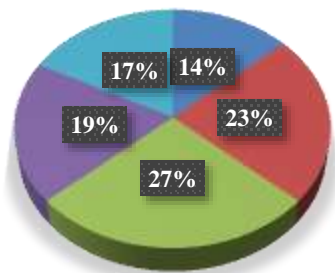


Fig. 6: Perception of consumer income fluctuation
Source: Authors' elaboration

Regarding the perception of fluctuation in consumer income from 260 surveyed farmers, 13% or 35 farmers rate it with very low impact, 23% or 60 farmers rate it with low impact, 27% or 70 farmers rate it with impact on average, 19% or 50 farmers rate it as high impact, and 17% or 45 farmers rate it as very high impact.

The perception of 260 surveyed farmers in percent, about changes in consumer preferences is presented in Figure 7.

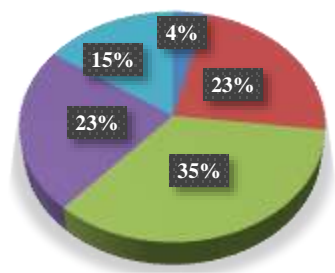


Fig. 7: Perceptions of changing consumer preferences
Source: Authors' elaboration

Regarding the perception of risk in the change of consumer preference from 260 surveyed farmers, 4% or 10 farmers evaluate it with very low impact, 23% or 60 farmers evaluate it with low impact, 35% or 90 farmers evaluate it with medium impact, 23% or 60 farmers rate it as high impact, and 15% or 40 farmers rate it as very high impact.

The perception of 260 surveyed farmers in percent for market risk is presented in Figure 8.

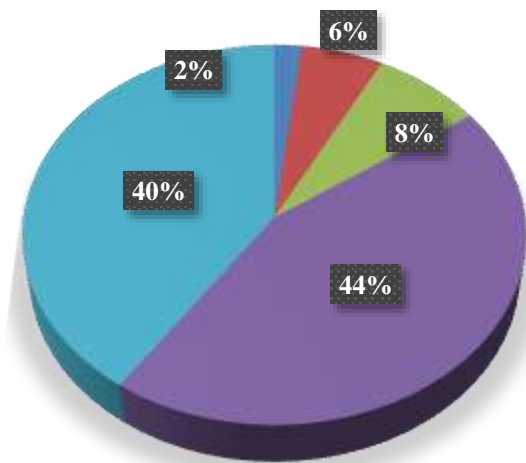


Fig. 8: Perception of market risk
Source: Authors' elaboration

Regarding the perception of market risk by 260 farmers, 2% or 5 farmers evaluate it with very low impact, 6% or 15 farmers evaluate it with low impact, 8% or 20 farmers evaluate it with medium impact, 44% or 115 farmers rate it with high impact and 40% or 105 farmers rate it very high.

Based on the data in Table 3, and the statistical description in Figure 4, Figure 5, Figure 6, Figure 7, and Figure 7, the individual perceptions of 260 surveyed farmers, towards the four market risk events are very different. This variability in perception has almost the same trend for each market risk event. However, price fluctuation is evaluated with higher perception, followed by high competition, a decrease in consumer income, and finally changes in consumer preferences.

Nevertheless, farmers' perception is important for all four market risk events.

4.2 Analysis of Statistical Results

Farmers' perception of the four market risk events is important. The trend of perception of fluctuating prices of products in the market, high competition, decreasing consumer income, and change in consumer preferences is almost the same. The perception of these events is in the qualitative evaluation segment [781:1040] (Table 5).

The multiple regression model is significant because the actual Fisher (F_f) is greater than the critical Fisher (F_k) (Table 7).

Table 7. ANOVA

	df	SS	MS	F	Sig.
Regression	4	196.0914	49.02286	448.1682	.509279
Residual	25	27.89315	0.109385		
Total	25	223.9849			

Source: Authors' elaboration

Sometimes the perception does not match the reality. From the multiple regression analysis, it was found that the variable X₃- "High competition" statistically is significant.

From the multiple regression analysis, it was found that the variable X₃- "High competition" is statistically significant, because the P-value is 0.000439, which means it is less than 0.05. While the other three variables are not statistically significant, because the P-value of each variable is greater than 0.05. In conclusion, hypothesis H₁ will be accepted for variable X₃ and rejected for variables X₁, X₂, and X₄ (Table 8). Regression equations can take the form:

$$Y = dX_3 + e \quad (6)$$

Tabela 8. P-Value

Coefficient	S. Error	T Stat	P-value	
Intercept	0.88747	0.101366	8.755129	2.8E-16
X ₁	0.370484	0.077114	4.8044351	2.65E-06
X ₂	0.29541	0.064453	4.582243	7.17E-06
X ₃	-0.21875	0.061414	-3.5618	0.000439
X ₄	0.377691	0.058897	6.412731	6.89E-10

Source: Authors' elaboration

Based on the data from column two of Table 8, we construct the regression equation.

$$Y = -0,21875X_3 \quad (7)$$

Competition is considered as the pressure of rivalry among farmers to gain customers and increase their influence in the market. In a highly competitive market, farmers are compelled to be more innovative and offer better products and services to withstand competition and ensure the sustainability of their businesses.

In this context, the analysis of the data of the regression equation provides a powerful tool to study the relationship between the levels of competition in the market and the levels of risk for farmers. Referring to the data from column two of Table 8, we observe that variable X₃ (High competition) is positively correlated with variable Y

(Market risk), which represents the levels of risk for farmers.

Therefore, returning to the analysis of the data from the regression equation, we notice that the relationship between variables X₃ and Y indicates that the increase in levels of competition may be accompanied by an increase in levels of risk for farmers (customer loss). However, it is important to also evaluate the positive role that competition may have in stimulating innovation and advancement in the agricultural sector.

In conclusion, regression equation analyses are an important tool for understanding the complex interactions in the agricultural market and for identifying more effective strategies for managing risks for farmers. Understanding this relationship can lead to the development of appropriate policies and strategies to enhance the stability and competitiveness of the agricultural sector as a whole.

In addition to the importance of the variables, we also look at the importance of the model as a whole. The coefficient R² shows that 79% of market risk is determined by high competition. The connection between them is very strong (Table 9).

Tabela 9. Coefficient R²

Regression Statistics	
Multiple R	0.893974
R Square	0.799189
Adjusted R Square	0.797626
Standard Error	0.418346
Observations	260

Source: Authors' elaboration

5 Conclusions and Recommendations

The study of the five main risks in the farm is a trend in today's studies, and it has a key role in farm management. This study provides a wide range of information in the specific literature, especially in the field of agribusiness. In addition, this analysis provides important insights from a country that is going through a period of transition and development in this sector, [42], [43], [44]. Farmers' perception of the five main risks is relatively high, with the greatest importance attached to production risk and market risk, [7], but financial risk, legal risk, and human resources risk also should be analyzed, to create a complete strategy for risk management in vegetable farms in the study area.

The results of the market risk study show that the three variables, X₁- "Changes in consumer preferences", X₂- "Price fluctuation", and X₄- "Changes in consumer income", are not statistically

significant, while the X_3 - “High competition” has a considerable influence.

This can be explained by the fact that expenses for the vegetable’s consumption, take a small specific weight to the total consumption expenses. Therefore, the consumption of vegetables is not influenced by the consumer's income and preferences, nor by high prices.

The 79% impact of high competition (variable X_3) on market risk is due to a lack of market knowledge. To reduce this impact, farmers should direct production toward comparative advantages for a specific crop and not for several crops. Their specialization in a specified production will reduce the negative impact of high competition in the market.

Market risk management is an essential aspect of any business, especially in a dynamic and uncertain environment such as the current market. Some of the tools for market risk management include the formulation of marketing plans, market research, and analysis, expanding the market by motivating customers, separate rent agreements, as well as reviewing production contracts, [7], [24].

Formulating a marketing plan is a critical step in market risk management. By developing a detailed marketing plan, a business can identify its sales objectives, market segments, and strategies to address market competition and risks. Through the use of market analysis and understanding potential customers deeply, a well-crafted marketing plan can help prevent potential risks and prepare for future market developments. Market studies and analyses are another key tool for managing market risks. By utilizing market analyses and conducting careful studies, a business can identify market trends, customer preferences, and potential competition. This can aid in identifying potential risks and developing strategies to mitigate them. Expanding the market by motivating customers is an important strategy for addressing market risks. By identifying ways to increase customer base and improve relationships with existing customers, a business can diversify its revenue and reduce the impact of risks from a single market, [33]. Separate rental agreements are another tool for market risk management. By paying a portion of the rent based on the quantity of production, a business can reduce fixed costs and increase flexibility to adjust production scale according to market demands. Reviewing production contracts is an important tool to ensure that agreements are suitable and meet the business's needs. By periodically reviewing and reaffirming contracts, a business can identify and address potential risks, such as changes in market

conditions, payment terms, and supply conditions, [7].

In conclusion, market risk management is a complex process that involves a wide range of tools and strategies. Through the formulation of marketing plans, market studies, expanding the market by motivating customers, separate rent agreements, and reviewing production contracts, a business can reduce market risks and enhance its ability to address challenges and opportunities in the current market.

Farmers should be focused on production risks mainly floods and droughts, [7] and market risks specifically to competition, but they are not enough. To have a complete situation regarding the exposure of all risks in vegetable farms in this area, it is recommended to analyze the other three risks, financial risk, legal risk, and human resources risk.

In addition to risk management by vegetable farmers themselves, the government needs to develop subsidy programs and policies that can help them reduce the negative impacts of production risk, market risk, financial risk, and human resource risk. Furthermore, they may include crop insurance, support for farm infrastructure development, and training for farmers.

These conclusions and recommendations, it is intended to improve risk management in vegetable farms and to help in sustainable development in the vegetable production sector.

The agriculture sector in Albania, as one of the five countries of the Western Balkans (Albania, Kosovo, Serbia, Montenegro, North Macedonia, and Bosnia & Herzegovina) should be supported by the European Union, [45], [46], [47], [48]. The support and consultancy of the European Union will ensure a sustainable development of this sector, [49], [50].

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