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THE WILLINGNESS OF INSURANCE COMPANIES IN BOSNIA AND HERZEGOVINA TO INTRODUCE INDEX-BASED INSURANCE OF AGRICULTURAL PRODUCTION

ABSTRACT

Agricultural production is the sector most affected by extreme weather conditions. Insurance, as the risk management tool, should provide an adequate response to the challenges that economies and households will increasingly face in the future. Given the importance of agricultural production for Bosnia and Herzegovina, a study was initiated to examine the interest of insurance companies to introduce index-based agricultural insurance products into their portfolios. Index-based (parametric) insurance is a model in which compensation payments are triggered by a reference index, in contrast to traditional insurance models that provide indemnification based on the actual loss incurred.

The main objective of the research was to determine how insurance companies perceive the agricultural insurance segment, specifically to identify the key factors influencing their attitudes toward index-based agricultural insurance. Secondary data sources included official publications and reports from state insurance agency. Primary data were collected through a survey conducted among insurance companies in Bosnia and Herzegovina registered for non-life insurance. The degree of agreement with statements in the questionnaire was assessed using a five-point Likert scale. The collected data were analyzed using methods of descriptive and inferential statistics. The research revealed that insurance companies are indifferent on this matter. Their focus on the development of other insurance products and skepticism about the profitability of agricultural and index-based insurance products negatively affect their interest in introducing index-based agricultural insurance products. The companies agree that premium subsidies for agricultural insurance are essential, but they show a low level of initiative for negotiating with government authorities on this issue. The legal framework is an area that needs improvement in order to make significant progress in the wider application of insurance in agricultural production. Efforts should also be directed towards continuous education in the field of insurance and the development of new insurance products.

Keywords: *index insurance, agricultural insurance, Bosnia and Herzegovina, innovative insurance products.*

JEL: G22, O13

1. INTRODUCTION

The need for risk management in agricultural production has emerged due to the significant role agriculture plays in every society. The fact that agricultural production accounts for 4.65% of Bosnia and Herzegovina's Gross Domestic Product (GDP) in 2023 (Agency for Statistics of Bosnia and Herzegovina, 2025), ranking as the sixth largest sector in the overall GDP structure, highlights the importance of this economic activity for our society. In Bosnia and Herzegovina, insurance companies are the primary providers of property insurance products, while the state has the role of market regulator. Currently, insurance companies in the country offer agricultural insurance services primarily through traditional models that cover individual or grouped risks for related crops, based on indemnity payments for incurred losses. Index-based insurance, on the other hand, is a relatively new insurance model that relies on a reference index as a trigger for compensation payouts. In the context of agricultural insurance, the index may be based on the monitoring of specific weather (climatic) events, such as temperature

levels, precipitation amounts, or soil moisture content, economic parameters such as agricultural yield per square meter, satellite-based crop monitoring, or any other parameter that can be accurately tracked over an extended period.

Given that agricultural insurance is underdeveloped in Bosnia and Herzegovina, there is a clear need to explore the root causes of this issue and to propose new models that could improve the state of the market. The central premise of this research is that, for index-based insurance to be utilized as an effective risk management tool in agricultural production, there must first be a concrete supply of such products on the market. This premise arises from the straightforward conclusion that agricultural producers, along with other stakeholders (e.g., the state and various levels of government), lack adequate knowledge of modern risk management techniques and innovations in risk transfer mechanisms. As a result, they are unable to generate initial demand for such protection tools. Since no index-based agricultural insurance products currently exist on the domestic market, this study focuses on examining the attitudes of insurance companies in Bosnia and Herzegovina regarding their interest in introducing index-based insurance products for agricultural production into their offering portfolios.

2. PREVIOUS RESEARCH

When discussing risks in agricultural production, the focus is primarily on their negative consequences, such as reduced yields and decreased financial income. On the other hand, taking on greater risk can potentially lead to higher yields and increased financial returns. Agricultural producers are therefore continuously engaged in the process of selecting the optimal business strategy. In 2020, Komarek, De Pinto, and Smith presented the results of a comprehensive review of the published literature on agricultural risks. The literature they examined included 3,283 peer-reviewed studies published between 1979 and 2019. Their analysis concluded that the vast majority of studies focused on production risks (Komarek et al., 2020, p. 2). Production risks arise from the inherent uncertainty of the biological growth processes of crops and livestock, with typical sources of such risks being related to weather conditions, climate impacts, pests, and diseases.

Risk management strategies in agriculture can generally be classified into risk mitigation strategies, risk transfer strategies, risk diversification, and retained risk management (Yang, 2010, p. 100). Alternative strategies include reliance on government disaster relief programs or increasing income from non-agricultural activities. In practice, production risk in agriculture is most commonly managed in two ways: through production diversification and risk transfer — by insurance. Production diversification has certain limitations: it is not spatially applicable everywhere (e.g., due to soil type, parcel size, climatic conditions), it is materially constrained (e.g., specific production equipment and available infrastructure), and it often leads to reduced production efficiency. Insurance, on the other hand, does not face these limitations. The use of insurance to manage losses caused by natural disasters varies significantly across the world. The forms and types of insurance products, as well as their market penetration, depend on risk factors, cultural context, regulatory requirements, and the economic environment. The application of insurance in agricultural production is primarily reflected in its stabilizing function at both the macro and micro levels. At the macro level, the national budget experiences less pressure from emergency expenditures in cases of unforeseen weather-related events. At the micro level, it enables agricultural producers to recover from damages and continue regular operations. Additionally, possessing an insurance policy also improves a farmer's creditworthiness.

Index-based insurance has been the focus of numerous academic studies, particularly in the context of agricultural production. One of the most prominent scholars associated with the concept of index-based agricultural insurance is Miranda, who in his 1991 study provided theoretical foundations and mathematical proofs supporting the applicability of this insurance model (Miranda, 1991, p. 233). A significant body of literature has focused on the implementation of index insurance in agricultural production in developing countries. Moreover, numerous studies have examined the willingness of agricultural producers to purchase insurance policies, both globally (Pérez-Blanco & Gómez, 2015, p. 1; Aina et al., 2018, p. 1; Gairola & Dey, 2023, p. 1) and in the regional context (Kozarević et al., 2019, p. 303; Kozarević & Četković, 2022, p. 15). The primary advantage of index-based insurance is in its significant reduction of moral hazard and adverse selection. Compensation is triggered by an index that is transparent, precisely defined, and therefore not susceptible to manipulation by either the insured or

the insurer. Another advantage of this model is its low operational costs, including costs associated with underwriting, monitoring contracts, assessing losses, and processing claims. The main drawback of index-based insurance is basis risk. This arises from the inconsistency between the payout determined by the defined index and the actual loss experienced by the insured event.

Prabhakar and Solomon (2015, p. 20) conducted a review of available methodologies for evaluating the effectiveness of insurance and proposed indicators for assessing the efficiency of agricultural insurance in terms of climate change adaptation and natural disaster risk reduction. Cole and Xiong (2017, p. 236) reviewed studies on agricultural insurance in developing countries with the aim of examining its relationship with economic development. Li et al. (2022, p. 10) investigated how climate forecasts and agricultural production functions influence the effectiveness of government policies and agricultural insurance. Furthermore, the use of digital technologies in agriculture not only increases the efficiency of agricultural production but also contributes to reducing the risk associated with agricultural operations, which in turn leads to lower insurance premiums (Yekimov et al., 2023, p. 5).

3. METHODOLOGY

The subject of this study was to examine the interest of insurance companies in Bosnia and Herzegovina in introducing index-based agricultural insurance into their product offerings, and whether such interest is associated with their current offering of agricultural insurance products. In order to obtain a comprehensive understanding of the research topic, it was necessary to address the following questions: Do insurance companies recognize potential for the development of index-based agricultural insurance in Bosnia and Herzegovina? Is there a relationship between the level of satisfaction of insurance companies with the current legal framework regarding the introduction of index insurance and the perceived need for its improvement? Do the characteristics of insurance companies determine their interest in introducing innovative insurance products into their offering? Do insurance companies in Bosnia and Herzegovina consider flooding to be the most significant threat in agricultural production? Do insurance companies view the lack of interest among agricultural producers in purchasing agricultural insurance policies as the greatest obstacle to the introduction of index-based agricultural insurance? Do insurance companies consider government subsidies for agricultural insurance premiums to be essential?

Primary data were collected using a survey method. The instrument used for collecting primary data was a survey questionnaire, consisting of a total of 50 questions. The survey was conducted among insurance companies in Bosnia and Herzegovina registered for non-life insurance. A total of 18 completed questionnaires were analyzed. The level of agreement with the statements in the questionnaire was measured using a five-point Likert scale. The collected data were analyzed using descriptive statistical methods, including absolute and relative frequencies, measures of central tendency (mean), and measures of dispersion. To compare the mean values of defined variables between two independent groups, the independent samples t-test and its non-parametric alternative, the Mann-Whitney U test, were applied. Differences in interest in introducing innovative insurance products, depending on specific characteristics of insurance companies, were examined using analysis of variance (ANOVA) and the Kruskal-Wallis test. The analysis was processed using Microsoft Excel and IBM SPSS Statistics software packages.

4. RESEARCH RESULTS

The focus of the research was to explore the attitudes of insurance companies regarding index insurance for agricultural production. Therefore, the target group consisted of individuals within each company who were most knowledgeable about this topic. The first part of the questionnaire contained questions related to general information about the respondents and their respective insurance companies. The majority of responses were provided by company management (55,56%), followed by operational staff (27,78%). Three respondents (16,67%) held other positions. Most respondents held a higher education degree (66,67%), while a significant proportion held master's or doctoral degrees (27,78%). Only one respondent had completed secondary education (5,56%). Ten respondents (55,56%) reported having between 10 and 20 years of work experience in the insurance sector, while a substantial proportion (33,33%) had over 20 years of experience. One respondent had up to 5 years of

experience, and one had between 5 and 10 years, each representing 5,56% of the sample. Insurance companies headquartered in the Federation of Bosnia and Herzegovina and supervised by the Insurance Supervisory Agency of the Federation of Bosnia and Herzegovina accounted for 50% of the responses, while 50% came from companies based in the Republic of Srpska and Brčko District of Bosnia and Herzegovina and supervised by Insurance Agency of Republic of Srpska. The distribution of responses was balanced and did not significantly deviate from the spatial distribution of insurance companies across the country. Ten surveyed companies were predominantly foreign-owned (55,56%), while eight were predominantly domestically owned (44,44%).

4.1. Examining the attitudes of insurance companies regarding the potential for the development of index insurance in agricultural production

In order to determine whether insurance companies perceive potential for the development of index insurance for agricultural production in our country, it was necessary to examine their views regarding the current state of development of agricultural insurance, the potential for further development, the profitability of existing agricultural insurance products, the potential profitability of index-based insurance products for agriculture, as well as their opinions on the existence of potential for the development of index insurance for agricultural production in Bosnia and Herzegovina.

Table 1. Descriptive parameters of attitudes about the potential for the development of index insurance of agricultural production

<i>Statement</i>	<i>N</i>	<i>Min.</i>	<i>Max.</i>	<i>Avg.</i>	<i>Std. Dev.</i>	<i>Mode</i>	<i>Median</i>
Agricultural insurance in our country is poorly developed.	18	2	5	4,22	1,060	5	5,00
Agricultural insurance in our country could be more developed.	18	3	5	4,06	0,873	5	4,00
Agricultural insurance offers profitable potential for insurance companies.	18	1	5	2,17	1,249	1	2,00
Index (parametric) insurance of agricultural production offers profitable potential for insurance companies.	18	1	5	2,61	1,195	3	3,00
There is potential for the development of index (parametric) insurance of agricultural production in our country.	18	2	5	3,17	0,985	4	3,00

Source: Authors

Analyzing the answers, the hypothesis that insurance companies see the potential for the development of index insurance of agricultural production in our country cannot be confirmed.

4.2. Examining the level of satisfaction of insurance companies with the existing legal framework regarding the introduction of index insurance

The insurance market in our country follows the administrative organization of the state. The fragmentation of the legal and institutional framework and its incompatibility with European standards imposes the need to pay special attention to the analysis of the legal framework with the purpose of examining its suitability for the introduction of innovative products and following modern trends in the insurance field.

Table 2. Descriptive parameters of views on the adequacy of the legal framework

<i>Statement</i>	<i>N</i>	<i>Min.</i>	<i>Max.</i>	<i>Avg.</i>	<i>Std. Dev.</i>	<i>Mode</i>	<i>Median</i>
Statement 1	18	1	5	3,39	1,092	3	3,00
Statement 2	18	1	5	3,61	1,092	3	3,00
Statement_1 = The currently valid entity laws, primarily the FBiH Law on Insurance and the RS Law on Insurance Companies, are not suitable for the introduction of index insurance products for agricultural production. Statement_2 = Paragraph (2) of Article 925 of the Law on Obligations of the FBiH and RS, which states: "The amount of compensation cannot be greater than the damage suffered by the insured person due to the occurrence of the insured event," prevents the introduction of index insurance products for agricultural production in our country.							

Source: Authors

In order to examine the connection between the level of satisfaction of insurance companies with the currently applicable legal framework regarding the introduction of index insurance and the need for its improvement, a

survey questionnaire was used to investigate whether the company had discussed this issue with government representatives.

Table 3. Descriptive parameters of responses about discussions with state authorities regarding legal framework and views on the adequacy of current laws

<i>Resposne</i>	<i>Statement</i>	<i>N</i>	<i>Min.</i>	<i>Max.</i>	<i>Avg.</i>	<i>Std. Dev.</i>	<i>Mode</i>	<i>Median</i>
Yes, it is	Statement 1	1	3	3	3,00	-	3	3,00
	Statement 2	1	4	4	4,00	-	4	4,00
No, it's not	Statement 1	13	1	5	3,23	1,092	3	3,00
	Statement 2	13	1	5	3,46	1,127	3	3,00
No, but intends to	Statement 1	2	3	3	3,00	0,000	3	3,00
	Statement 2	2	3	3	3,00	0,000	3	3,00
No, and don't have intention	Statement 1	2	5	5	5,00	0,000	5	5,00
	Statement 2	2	5	5	5,00	0,000	5	5,00

Source: Authors

The majority of companies expressed a neutral stance regarding the legal framework, as well as on willingness to engage in negotiations with government representatives on this issue.

4.3. Examining the impact of selected characteristics of insurance companies on the interest in introducing innovative insurance products

Table 4. Results of the independent samples t-test according to the company's headquarters and supervisory agency criterion

		<i>Levene's Test for Equality of Variances</i>		<i>t-test for Equality of Means</i>						
		<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>	<i>Mean Difference</i>	<i>Std. Error Difference</i>	<i>95% Confidence Interval of the Difference</i>	
									<i>Lower</i>	<i>Upper</i>
Stmt. _1	Equal variances assumed	0,604	0,448	1,372	16	0,189	0,889	0,648	-0,485	2,262
	Equal variances not assumed	-	-	1,372	15,914	0,189	0,889	0,648	-0,485	2,263
Stmt. _2	Equal variances assumed	1,226	0,284	0,753	16	0,463	0,444	0,591	-0,807	1,696
	Equal variances not assumed	-	-	0,753	14,743	0,464	0,444	0,591	-0,816	1,705
Stmt. _3	Equal variances assumed	0,057	0,814	0,712	16	0,487	0,333	0,468	-0,659	1,326
	Equal variances not assumed	-	-	0,712	15,971	0,487	0,333	0,468	-0,659	1,326
Stmt. _4	Equal variances assumed	0,011	0,917	0,270	16	0,791	0,111	0,412	-0,762	0,985
	Equal variances not assumed	-	-	0,270	15,995	0,791	0,111	0,412	-0,762	0,985
Stmt. _5	Equal variances assumed	0,236	0,634	2,334	16	0,033	0,889	0,381	0,081	1,696
	Equal variances not assumed	-	-	2,334	15,935	0,033	0,889	0,381	0,081	1,697
Stmt. _6	Equal variances assumed	2,352	0,145	1,565	16	0,137	0,778	0,497	-0,276	1,831
	Equal variances not assumed	-	-	1,565	13,306	0,141	0,778	0,497	-0,293	1,849

Statement_1 = We are interested in introducing innovative insurance products into our offering. Statement_2 = The introduction of innovative insurance products would lead to significant time savings in contract monitoring, damage assessment, and claim settlement compared to the current product offerings. Statement_3 = By introducing innovative insurance products, we would more efficiently utilize available financial capital. Statement_4 = By introducing innovative insurance products, we would engage available human resources more efficiently. Statement_5 = The financial costs required to introduce innovative insurance products are low. Statement_6 = Market research for the purposes of introducing innovative insurance products is not demanding.

Source: Authors

The next step in the research was to determine whether certain characteristics of insurance companies, such as the number of employees, the level of education of employees, ownership structure, company headquarters, amount of capital and revenue, have an impact on their interest in introducing innovative insurance products into their offering. Only the results of those characteristics where an correlation was determined are presented.

There is a statistically significant difference between the mean values of the opinions of companies based in the Federation of Bosnia and Herzegovina and under the supervision of the Insurance Supervisory Agency of the Federation of Bosnia and Herzegovina and companies based in the Republic of Srpska and the Brčko District of Bosnia and Herzegovina and under the supervision of the Insurance Agency of the Republic of Srpska in the tested statement “The financial costs required to introduce innovative insurance products are low”.

Eta square is 0,254, and according to Cohen's criteria (0,01 = small effect, 0,06 = medium effect, 0,14 = large effect), this would be considered as large effect.

Table 5. Ranks of the Mann-Whitney U test according to the criterion of the company's headquarters and supervisory agency criterion

<i>Statement</i>	<i>Company's headquarters and supervisory agency</i>	<i>N</i>	<i>Mean Rank</i>	<i>Sum od Ranks</i>
Statement_5	Federation of BiH - Insurance Supervisory Agency of the FBiH	9	11,89	107,00
	Republic of Srpska and Brčko District - Insurance Agency of the Republic of Srpska	9	7,11	64,00

Source: Authors

Table 6. Results of the Mann-Whitney U test according to the criterion of the company's headquarters and supervisory agency criterion

<i>Statement</i>	<i>Mann-Whitney U test</i>	<i>Z</i>	<i>Asymp. Sig. (2-tailed)</i>
Statement_5	19,000	-2,015	0,044

Source: Authors

Mann-Whitney U test confirmed previous results that there is a statistically significant difference between companies headquartered in the Federation of Bosnia and Herzegovina and those based in the Republic of Srpska and the Brčko District of Bosnia and Herzegovina regarding their view that the financial costs required to introduce innovative insurance products are low. In our case, the Z-value is -2,015 (N=18), resulting in $r=-0,475$.

According to Cohen's criteria (0,1 = small effect, 0,3 = medium effect, 0,5 = large effect), this would be considered as large effect. Greater agreement with the statement that the financial costs required for introducing innovative products are low is found among companies headquartered in the Federation of Bosnia And Herzegovina (11,89) than among companies from the Republika Srpska and the Brčko District of Bosnia and Herzegovina (7,11), $U=19,000$, $Z=-2,015$, $p=0,044$, $r=-0,475$.

Companies with predominantly more highly educated employees expressed a higher level of interest in introducing innovative products into their offerings (mean value=4,67) compared to those with predominantly less educated employees (mean value=3,50).

Table 7. Results of the independent samples t-test according to the employee education level criterion

		<i>Levene's Test for Equality of Variances</i>		<i>t-test for Equality of Means</i>						
		<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>	<i>Mean Difference</i>	<i>Std. Error Difference</i>	<i>95% Confidence Interval of the Difference</i>	
									<i>Lower</i>	<i>Upper</i>
Stmt. _1	Equal variances assumed	8,696	0,009	-1,753	16	0,099	-1,167	0,665	-2,577	0,244
	Equal variances not assumed	-	-	-2,338	14,766	0,034	-1,167	0,499	-2,232	-0,102
Stmt. _2	Equal variances assumed	0,078	0,783	-0,394	16	0,699	-0,250	0,634	-1,595	1,095
	Equal variances not assumed	-	-	-0,401	10,588	0,696	-0,250	0,623	-1,628	1,128
Stmt. _3	Equal variances assumed	0,219	0,646	-0,844	16	0,411	-0,417	0,493	-1,463	0,629
	Equal variances not assumed	-	-	-0,824	9,498	0,430	-0,417	0,505	-1,551	0,718
Stmt. _4	Equal variances assumed	0,046	0,832	-0,775	16	0,450	-0,333	0,430	-1,245	0,578
	Equal variances not assumed	-	-	-0,720	8,419	0,491	-0,333	0,463	-1,391	0,725
Stmt. _5	Equal variances assumed	4,000	0,063	-1,109	16	0,284	-0,500	0,451	-1,455	0,455
	Equal variances not assumed	-	-	-1,291	14,801	0,217	-0,500	0,387	-1,326	0,326
Stmt. _6	Equal variances assumed	0,265	0,614	0,444	16	0,663	0,250	0,563	-0,942	1,442
	Equal variances not assumed	-	-	0,427	9,139	0,679	0,250	0,585	-1,070	1,570

Source: Authors

Table 8. Results of the Mann-Whitney U test according to the ownership structure of the company

<i>Statement</i>	<i>Mann-Whitney U test</i>	<i>Z</i>	<i>Asymp. Sig. (2-tailed)</i>
Statement 1	30,000	-0,950	0,342
Statement 2	31,500	-0,776	0,438
Statement 3	29,500	-1,038	0,299
Statement 4	34,000	-0,637	0,524
Statement 5	16,500	-2,216	0,027
Statement 6	39,000	-0,093	0,926

Source: Authors

Companies with majority foreign ownership expressed a higher level of agreement with the statement that the financial costs required for introducing innovative insurance products are low (mean=3,10, median=3,00) compared to those with predominantly domestic ownership (mean=2,13, median=2,00) ($U=16,500$, $Z=-2,216$, $p=0,027$, $r=-0,522$).

4.4. Examining attitudes toward the greatest sources of risk in agricultural production

Taking into account the specific characteristics of the production environment in our country, it was necessary to examine insurance companies' perceptions of the risk level associated with selected weather (climatic) events.

Table 9. Descriptive parameters and risk ranking in agricultural production

<i>Risk description</i>	<i>N</i>	<i>Min.</i>	<i>Max.</i>	<i>Avg.</i>	<i>Std. Dev.</i>	<i>Mode</i>	<i>Median</i>	<i>Rank</i>
Hail	18	3	5	4,28	0,752	5	4,00	1
Drought and insufficient rainfall	18	2	5	4,22	0,943	5	4,50	2
Storm and strong wind	18	2	5	4,06	0,639	4	4,00	3
Flood and flash flood	18	2	5	3,78	0,878	4	4,00	4
Excessive precipitation	18	2	5	3,67	0,970	4	4,00	5
Frost and low temperatures	18	3	5	3,61	0,698	3	3,50	6
Fire	18	1	4	2,56	0,984	3	3,00	7
Earthquake and landslide	18	1	4	2,11	0,963	2	2,00	8

Source: Authors

The highest average score was recorded for the risk of hail, amounting to 4,28. The lowest average score was recorded for the risks of earthquakes and landslides, at 2,11.

4.5. Examining the attitudes toward the most significant barriers to the introduction of index insurance in agricultural production

The responses to the question regarding the greatest barriers to the introduction of index insurance products in agricultural production were analyzed.

Table 10. Descriptive parameters and ranking of barriers to the introduction of index insurance of agricultural production

Statement	N	Min.	Max.	Avg.	Std. Dev.	Mode	Median	Rank
Statement_1	18	4	5	4,56	0,511	5	5,00	1
Statement_2	18	1	5	3,83	1,249	5	4,00	2
Statement_3	18	1	5	3,78	1,060	4	4,00	3
Statement_4	18	1	5	3,72	1,074	4	4,00	4
Statement_5	18	1	5	3,33	1,328	4	4,00	5
Statement_6	18	1	5	3,28	1,074	3*	3,00	6
Statement_7	18	1	5	3,22	1,003	4	3,00	7
Statement_8	18	1	5	3,17	1,200	2*	3,00	8
Statement_9	18	2	4	3,11	0,676	3	3,00	9
Statement_10	18	2	4	3,11	0,471	3	3,00	9
Statement_11	18	1	5	3,06	1,392	4	3,50	10
Statement_12	18	1	5	2,89	1,278	4	3,00	11
Statement_13	18	1	4	2,17	1,150	1	2,00	12

Statement_1 = There are other insurance products we are focused on.
Statement_2 = Agricultural producers are uninformed about the availability and features of agricultural insurance products.
Statement_3 = We do not have precise data on the frequency of natural disasters in a particular area.
Statement_4 = We do not possess precise instruments for determining the parameters related to the magnitude and effects of natural disasters required for the application of index insurance in a given area (e.g., temperature levels, precipitation amounts, river water levels, etc.).
Statement_5 = We do not have accurate data on the extent of damage caused by natural disasters in agricultural production.
Statement_6 = Available data on the average yield and size of agricultural holdings are scarce.
Statement_7 = Available data on the number and structure of agricultural holdings are scarce.
Statement_8 = We are not familiar with the index (parametric) insurance model.
Statement_9 = The costs of creating index insurance products are high.
Statement_10 = The premium for insurance policies based on index model would be too high.
Statement_11 = We do not have a sufficient number of qualified workers.
Statement_12 = Agricultural producers are uninterested in contracting agricultural insurance policies.
Statement_13 = We do not have an adequate amount of capital.

* Multiple modes exist. The smallest value is shown.

Source: Authors

The highest average score was recorded for the statement: “There are other insurance products we are focused on” (4,56). The lowest average score was recorded for the statement: “We do not have an adequate amount of capital” (2,17).

4.6. Examining the attitudes toward government subsidies in the agricultural sector

Given that government subsidies for agricultural insurance premiums have been of great importance for the success of many pilot projects introducing index insurance programs, it was necessary to examine the attitudes of insurance companies in our country on this issue. Additionally, a question was included regarding whether insurance companies have engaged in discussions with representatives of local and/or national authorities about the subsidization of agricultural insurance premiums.

Table 11. Descriptive parameters of responses to discussions with authorities about insurance premium subsidies and attitudes towards state subsidies in agriculture

<i>Response</i>	<i>Statement</i>	<i>N</i>	<i>Min.</i>	<i>Max.</i>	<i>Avg.</i>	<i>Std. Dev.</i>	<i>Mode</i>	<i>Median</i>
Yes, it is	Statement 1	3	4	5	4,67	0,577	5	5,00
	Statement 2	3	1	3	2,33	1,155	3	3,00
	Statement 3	3	3	4	3,67	0,577	4	4,00
No, it's not	Statement 1	11	3	5	4,09	0,701	4	4,00
	Statement 2	11	1	4	2,82	0,874	3	3,00
	Statement 3	11	3	5	4,00	0,894	3*	4,00
No, but intends to	Statement 1	4	4	5	4,50	0,577	4*	4,50
	Statement 2	4	1	4	2,00	1,414	1	1,50
	Statement 3	4	3	4	3,75	0,500	4	4,00
Statement 1 = Government subsidization of agricultural insurance policy premiums is necessary. Statement 2 = Government financing of protective measures in agriculture (such as income support for farmers, production incentives, or capital investments) reduces the importance of agricultural insurance for agricultural producers. Statement 3 = Local and state governments should enable the payment of production subsidies and other forms of support only to those farmers who have a contracted agricultural insurance policy.								
* Multiple modes exist. The smallest value is shown.								

Source: Authors

Companies that expressed a greater willingness for negotiations with representatives of authorities regarding the subsidization of agricultural insurance premiums also showed a higher level of agreement with the statement that government subsidies for agricultural insurance premiums are necessary. On the other hand, it is important to emphasize that no companies expressed a lack of need for such negotiations.

4.7. Assessment of insurance companies' interest in the introduction of index-based insurance products of agricultural production

It was necessary to collect data on whether and to what extent companies currently offer products from group 9.11 Crop and plantation insurance and/or group 9.12 Livestock insurance, and to compare this with responses regarding interest in introducing index (parametric) insurance products for agricultural production into their portfolio.

Table 12. Descriptive parameters of responses on the current offer of agricultural insurance products and attitudes on interest in introducing index (parametric) insurance products

<i>Response</i>	<i>Statement</i>	<i>N</i>	<i>Min.</i>	<i>Max.</i>	<i>Avg.</i>	<i>Std. Dev.</i>	<i>Mode</i>	<i>Median</i>
We offer product(s) from group 9.11.	Statement	1	3	3	3,00	-	3	3,00
We offer product(s) from groups 9.11 and 9.12	Statement	11	2	4	2,91	0,701	3	3,00
We do not offer products from the aforementioned groups	Statement	6	1	4	2,50	1,378	1*	2,50
Statement = We are interested in introducing index (parametric) agricultural production insurance products into our offer.								
* Multiple modes exist. The smallest value is shown.								

Source: Authors

Most companies express a neutral stance regarding their interest in introducing index insurance products for agricultural production into their offerings, regardless of their current portfolio of agricultural insurance products.

5. DISCUSSION AND CONCLUSION

Risk management in agricultural production involves the use of a strategy that financially protects the agricultural producer from the negative effects of risks that arise during the production process. When making a decision about purchasing an insurance policy, agricultural producers should consider two key factors: the magnitude of a potential catastrophic event and the financial capacity of their agricultural holding, or alternatively, the availability of external financing. In cases of potentially significant losses that exceed the agricultural holding's financial capacity, or when borrowing is either undesirable or unavailable, producers should consider obtaining an insurance policy. Experience has shown that, in our region, agricultural producers often rely on available government aid programs after natural disasters.

Index insurance can be applied as a new method of risk management in agricultural production in Bosnia and Herzegovina, but only under certain conditions. First, it is necessary to harmonize the legal framework governing this area. Dialogue between insurance companies and government authorities on this issue needs to be intensified. Second, the level of interest among companies in introducing index insurance, and to a certain extent other innovative products, is not satisfactory. This research has identified several reasons for the low level of interest, one of which is the prevailing view among companies that both traditional agricultural insurance and index-based agricultural insurance are not sufficiently profitable. Furthermore, companies have demonstrated a strong commitment to the development of other (traditional) insurance products. There is a need for continuous education of employees in the insurance sector, as well as the general public, regarding modern advancements in insurance and the development of new products. This recommendation is supported by the finding that companies with better-educated employees showed greater interest in adopting innovative products. Insurance companies also emphasized the necessity of premium subsidies for agricultural insurance. Therefore, attention should also be directed toward proposing the allocation of a portion of available public funds to support preventive measures in agricultural risk management in Bosnia and Herzegovina.

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