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Early warning Climate system and factor influencing willingness to pay in Korca/Fier regions.

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Abstract
This study highlights the farmers' perception for climate changes conditions and the willingness to pay for the early warning climate system in the area of Korce/Fieri. From the sampled can be seen that 85.3% of the farmers are aware of the changes in climatic conditions. About 42.6% of the farmers are willing to pay an average of 23,618 Lek to obtain climate information throw early warning climate system. The willingness to pay is determined by the the farmers' ability to predict the climate, to use Tv/Mobile Applications as a means of information, main crop role in income, farm size, main crop cultivated, farmers' awareness of increasing in the period of drought, which is accompanied by delay in the arrival of rains and decrease in rainfall duration (days). Descriptive statistics will be used to describe the socio-demographic characteristics of the sample, the characteristics of the farm and farmers awareness of climate changes. A correlation on the variable WTP for early warning system will be used to see the factors that influence the variable, the effect on the variable and the strength of the relationship.
Keyword: Early warning climate system, willingness to pay, agriculture information.
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1. Introduction

The agricultural sector is the one of the main source of rural households' food and revenue in Albania , and it contributes approximately 21.7% to the national GDP. However, there are several constraints to the sector's development, including negative impacts of climate change, disbalance of market price information, lack of disease risk, hight transportation cost. Farmers need to obtain and process finan-cial, climatic, technical and regulatory information to manage their farms. However, inadequa-cies in this agricultural information system, such as the inability to consistently provide accurate, timely and easily accessible information, present several challenges to farmers(Just & Zilberman et al 2001). An agricultural information system can be defined as a system, in which agricultural information is generated, transformed, transferred, consolidated, received and fed back in such a manner that these processes function synergistically to underpin knowledge utilization by agricultural producers (Roling et al 1988). Accoring to Ozowa et al 1995, the information needs may be grouped into five headings: agricultural inputs; extension education; agricultural technology; agricultural credit; and marketing. Modern farm inputs are needed to raise small farm productivity. These inputs may include fertilizers, improved variety of seeds and seedlings, feeds, plant protection chemicals, agricultural machinery, and equipment and water. An examination of the factors influencing the adoption and continued use of these inputs will show that information dissemination is a very important factor. It is a factor that requires more attention than it now gets.

In Albania since 1998, several AMIS have been implemented which have subsequently failed to function when support for donor assistance projects has been exhausted. Despite repeated failures, there is no comprehensive, survey-based study to assess demand and preferences for agricultural information (price, information on production methods, weather forecast, disease risk, etc.). A latest studies was conducted by Zhllima et al 2024 where findings are useful for establishing a feasible AMIS, and designing its services according to the characteristics, needs, capacities and preferences of the identified potential users. In a study conducted by Imami at al 2023, was analyzed the risks from climate change and the adaptive capacity of farmers based on an expert evaluation, despite this, there is no other study in Albania that analyzes the demand for early waringn climate systems. The extent of farmer's awareness and perceptions of climate change impacts influences these strategies and hence farmers' level of adaptation.

Due to rapid climate changes and the impact of changes in farmes decision making and adaptions strategies , the objective of the research work is to explore the demand of farmers in Albania for early warning climate system by assessing their preferences about information and sources of information, identifying the characteristics of those seeking information, assessing the willingness to pay for information.

Different adaptation strategies have been implemented to reduce the vulnerability of smallholder farmers to climate risks in various contexts. Early warning systems (EWSs) in smallholder farming are crucial for adapting to climate variability and change. Therefore, shifting towards prevention through early warning systems remains one of the most important ways to build resiliency and best use the already limited resources (Sternberg et al., 2023). EWSs encompass a range of abilities to generate and share timely prompts that enable individuals, communities, and organizations to prepare and take action to mitigate climate-related harm or loss (Glantz, Baudoin, Ahmed, Tozier, Poterie, Naranjo, Pradhananga, Wolde-Georgis,Fakhruddin, Berhane et al 2014). Despite these advantages, however, access to EWS remains challenging for one-third of the population, especially in developing countries

2. Theoretical background

Agricultural information systems have been defined as an information system in which agricultural information is generated, transformed, and consolidated with the intention of underpinning knowledge utilization by agricultural producers (de Oliveira, Painho, Santos, Sian, & Barriguinha et al. 2014). The AIS consists of subsystems, processes, mechanisms and system operations (Vidanapathirana et al. 2019). The users of AIS could include the government decision makers, policy makers, universities, researchers, extension workers, and farmers (Vidanapathirana et al. 2019). Although AIS have been in existence and have evolved over the last three decades, the use and adoption of these information systems has not been uniform. There is a significant difference in the adoption and usage rates between developed and developing countries because of obvious infrastructural

and financial issues. The adoption of new agricultural technologies is often very slow by farmers as the research is often not focusing on the actual needs of the farmers and the link between the research and advisory services is also very poor (Vidanapathirana et al. 2019).

The slow adoption rates are also partly because of the ineffective technology delivery systems and poor methodologies adopted that do not meet the actual needs of the local farming community (Vidan-apathirana et al. 2019).

A key issue in the use and adoption of AIS is that farmers often do not send data to the systems as they do not believe that there is any benefit for them in doing so (Lombardelli et al., 2020; Sutoyo & Sensuse et al. 2018). The prior experience of an individual in using technology is an integral part of technology accep

tance, adoption, and use. Carrer, Filho, Batalha, and Rossi et al 2015 state that while there may be initial benefits for farm owners using information systems as compared to their counterparts who are not using information systems, these benefits may not continue in the long-term unless the adoption and usage of these information systems are continual. Considering the benefits of using AIS, the use of AIS is still low in developing (Santoso & Delima et al, 2017). Some of the reasons include the lack of willingness of the farmers to change the way they cultivate and process their fields (Santoso & Delima et al. 2017). Other factors influencing the decision to adopt and use AIS also include demographic factors, such as the age, income level, and educational level of the farmers apart from operational and technical skills (Lu et al., 2015). The evolving nature of agricultural information systems and technology also requires to continually explore and identify the factors influencing the adoption and the use of these information systems.

3. Methods

The theory underpinning the study is the theory of consumer behavior, where a rational consumer aims to maximize utility from any set of goods subject to a given constraint. The appropriate method to analyze this behavior is the Conditional Valuation (CV) Method. This method has been widely used in willingness-to-pay studies. CV is a stated preference approach to measuring consumer utility and was developed by Ciriacy-Wantrup (1947). This method has become a major economic tool for deriving the market value of a non-market commodity. The basic principle is to analyze the reaction of people within a hypothetical perspective. The method has been used for a wide range of applications, including cost benefit analysis and environmental analysis (Verbicˇ et al., 2016; Venkatachalam et al, 2004) as some essential environmental assets are public goods in nature and also have intangible economic values. . Carson and Hahnemann (2005) cited by Oerlemans et al. (2016) highlighted these advantages of the CV method. These are:

- solves the challenge by collecting some information for consumers;
- the ability to design different scenarios for new or refurbished goods;

Since climate information is theorized to be a positive function of farm yield, farmers were asked to indicate the amount of money they were willing to pay for climate predictions. CV has been applied in a number of studies (Ndebele & Forgie, 2017; Latinopoulos et al., 2016; Giudice & Paola, 2016; Verbicˇ et al., 2016; Guo et al., 2014; Abdullahu & Jeanty, 2011).
Data collection was carried out in the period July-September 2023 through a structured questionnaire. The questionnaire was organized in 4 sections: general data section, farm characteristics section; the section of awareness from climate condition changes; section of WTP for early warning climate system.

The main focus of our study will be those counties that have the highest presence of planting field plants. As we can also start from an analysis of the autumn of Agriculture provided by Instat (2022), we come to the conclusion that the plants of the fields with the largest planted area are, respectively, the cereal family and vegetables/horticulture.

The largest area planted with wheat in Albania is occupied by the district of Fier and Korce according to the sources of instat 2022.
The largest area planted with maize in Albania is occupied by the district of Fier according to the sources of instat 2022.

Depending on the nature of the variables and their behavior, parametric or non-parametric methods were used, which according to Schober et al (2018) in the case of data that do not meet the normal distribution, give us more stable indicators.
Correlative analysis was used to study if the willingness to pay for an early warning climate system depends on other variables such as: age, farm size, cultivate costs, farmers experience, market orientation, average price, yield and income from main crop.

Spearman's correlation coefficient can be used to test the dependence between two variables. It is suggested to be used when the data are qualitatively ordinal, when they do not meet the assumption of normal distribution or in the case of problematic surveys (Schober et al 2018), while when the data are quantitative with normal distribution, the use of the Pearson correlation coefficient is suggested(Sedgwick 2012).

Variables	Description	Assumptions	Expected effect on WTP
Age	Age of the farmer	Young farmers have more access to information compared to older farmers (Diederen, Van, Arjan, & Katarzyna, 2003).	+
Education	Education of the farmer	The training of farmers promotes the adoption of agricultural innovations (He, Cao, & Li, 2007). Educated farmers are supposed to be more interested in the of climate information compared to the illiterate ones.	+
Experience	Farmer experience	An increase in the number of years that an individual has been engaged in agricultural activities causes a 7% increase in the probability that the farmer has access to climate information. (Antwi-Agyei & Amanor & Hogarh & Dougill et al. 2020)	+
Farm size	Size of farm in HA	Household income and farm size were found to be factors considered by users when deciding how much they were willing to pay for monthly weather information. (Awolala & Mutemi & Antwi-Agyei & Taylor & Muita & Bosire & Mutai & Nkiaka et al.2023).	+
Incomes	Incomes of farm	Farmers with large farm sizes and higher farm incomes show interest in paying higher prices while mobile phone distribution channel and farm location specific weather information were the main factors influencing how much farmers would be willing to pay for improved weather information services (Awolala &	+/-

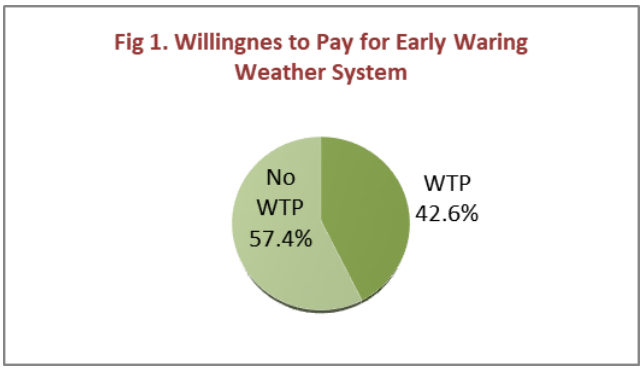
		Mutemi & Antwi-Agyei & Taylor & Muita & Bosire & Mutai & Nkiaka et al.2023). Farmers are interested in and use the climate information but they will be reluctant to sell their produce to pay for it.	
Market orientation		Market orientation is expected to positively influence willingness to pay for CIS. This is due to the fact that income from the sale of plant products has a positive impact on income and on the other hand income has a positive impact on WTP for CIS (Ouédraogo & Barry & Zougmoré & Partey & Somé & Baki et al. 2018)	+
Information source channels	Source of information that farmer use to predict weather forecast	For Lugen et al.2019, usability and communication channels (radio, TV, farmer-based organizations, churches, mosques) of climate information services were important in assessing their needs.	+
Impacts of climatic conditions	Likert scale information that measure the impact of each climate change in farmer productivity cycle	Information on the date of the beginning of the rainy helps to choose the planting date (Traore et al., 2014). It is supposed to encourage farmers' WTP for climate information. Information on date of the end of rainy season indicates the beginning of the harvest. It help choose varieties based on their cycle (Traore et al., 2014). It is supposed to encourage farmers' WTP for climate information. Information on the during of the rainy season helps to choose types of varieties based on their cycle (Traore et al., 2014). It is supposed to encourage farmers' WTP for climate information.	+

Note. + expected positive effect; - expected negative effects. Source: Own elaboration

4. Results

Distribution of people's WTP for climate information by demographic data.

The results show that about 42.6% of respondents were willing to pay for weather forecasting, while 57.4% were not willing (Fig 1).



Source: Field surveys (July – September 2023)

There is a higher percentage of men (about 93.3%) (Figure 1) who were willing to pay for climate information than women (about 6.7%).

From the results, it can be seen that the characteristics of farmers interested in climate information fluctuate in different areas, where Korca takes the main place with 69.3% possibility to pay for climate information.

Indeed, the analysis revealed that most of the potential for climate information was found among young farmers (69.3%), educated farmers, i.e. with secondary education (89.6%), and whose main work is in the agricultural sector (92.5%).

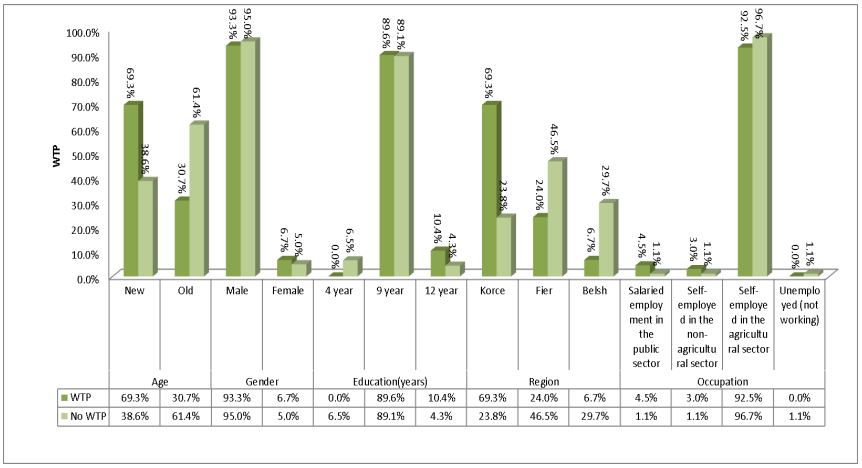


Figure 1. Distribution of WTP on early warning climate system by socio-demografic charasteristics

Source: Field surveys (July – September 2023)

The analysis of the results of the respondents, it appears that farmers with 10-20 (32%) and 20-30 (34%) years of experience have a higher approach to climate information.

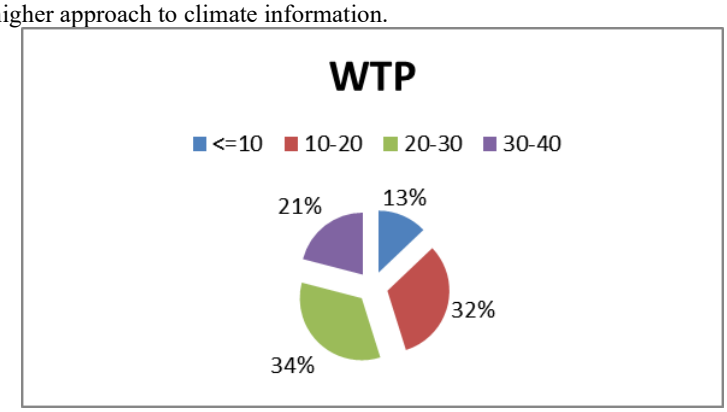
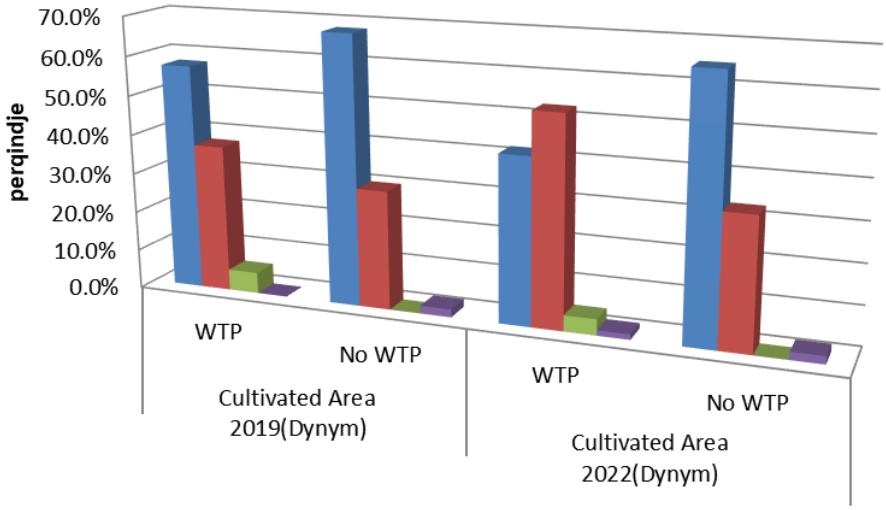


Figure 2. Distribution of WTP depending on the experience of the farmer on the farm.

- ✓ ***Distribution of farmers based on WTP for early warning climate system according to farm characteristics.***

The results show that the number of farms with an area of 100-500 dynam has increased in these 4 years taken in the analysis 2019/2022. From the result of figure 3, we see that the WTP for information on climatic conditions has increased from 37.5% in 2019 to 52.7% in 2022. So the increase in the area planted with production also increases the demand and willingness to pay for climatic information.



	Cultivated Area 2019(Dynym)		Cultivated Area 2022(Dynym)	
	WTP	No WTP	WTP	No WTP
<=100	57.3%	68.0%	41.9%	65.0%
100-500	37.3%	30.0%	52.7%	33.0%
500-1000	5.3%	0.0%	4.1%	0.0%
>1000	0.0%	2.0%	1.4%	2.0%

Figure 3 . Distribution of farmers according to farm size and WTP for Early warning climate system

Regarding to the results of the table below regarding the % of income generated by the main crops, it can be seen that those farmers who generate over 90% of their income from the main crops are more willing to pay for early information of the weather (68.2%).

Table 2. % of income from the main Maize/Wheat crops.

			WTP for early warngin climate system		
			WTP	No WTP	Total
% of income from main crop	<30%	Amount	38	80	118
		%	32.2%	67.8%	67.4%
	30%-50%	Amount	12	2	14
		%	85.7%	14.3%	8.0%
	50%-90%	Amount	10	11	21
		%	47.6%	52.4%	12.0%
	>90%	Amount	15	7	22
		%	68.2%	31.8%	12.6%

The results presented in the table below show data on the part of the respondents who responded positively to the possibility to pay. It can be seen that

- 58% of the area cultivated with wheat in 2022 is owned by farmers who have shown a willingness to pay, who make up 42% of the respondents. A decrease in % of the area of farmers ready to pay is observed from 2019 (67%) to 2022 (58%), even though the total area planted with wheat has increased.

- 55% of the area cultivated with corn in 2022 is owned by farmers who have shown a willingness to pay, who make up 42% of respondents.
- 54% of wheat production is obtained from farmers who are willing to pay in 2022.
- 49% of corn production is obtained from farmers who are ready to be paid in 2022.
- 64% of the amount of wheat sold is carried out by farmers who are willing to pay in 2022. Orientation from the market increases the willingness to pay according to the results of table 3.
- 83% of the amount sold of the trowel is carried out by farmers who are willing to pay in 2022.
- A farm is able to pay 23,618 Lek to benefit from an early weather forecast system.

Table 3 Descriptive statistics

	N	Range	Minimum	Maximum	Sum	Mean	Mean Std. Error	Std. Deviation	Variance	% WPT	% sum
Cultivated area with wheat 2022 (Dynym)	72	410	10	420	5,080	71	11	91	8,254	0	1
Cultivated area with wheat 2019 (Dynym)	72	394	6	400	4,365	61	10	89	7,879	0	1
Cultivated area with maize 2022 (Dynym)	69	700	-	700	5,114	74	13	106	11,153	0	1
Cultivated area with maize 2019 (Dynym)	69	600	-	600	4,431	64	11	93	8,615	0	1
Wheat production 2022(kv)	72	2,075	25	2,100	24,525	341	53	448	201,075	0	1
Wheat production 2019(kv)	71	1,970	30	2,000	21,674	305	54	455	206,609	0	1
Wheat sales 2022(kv)	64	2,000	-	2,000	14,680	229	44	351	123,318	0	1
Wheat sales 2019(kv)	68	2,000	-	2,000	16,117	237	50	411	169,156	0	1
Maize production 2022(kv)	66	4,165	35	4,200	35,085	532	84	684	468,057	0	0
Maize production 2019(kv)	66	4,192	8	4,200	39,722	602	85	692	479,071	0	0
Maize sales 2022(kv)	63	3,300	-	3,300	18,514	294	68	542	293,829	0	1
Maize sales 2019(kv)	60	2,700	-	2,700	20,473	341	69	533	283,707	0	1
Amount of WTP	76	35,000	5,000	40,000	1,795,000	23,618	911	7,941	63,065,789	0	1

Souce: Field survey (July - September 2023)

✓ ***Dissemination source of climacteric information***

Table 4 shows that TV and weather mobile applications are the most suitable source through which climate information can reach more farmers. Only 2.3% and 11.1% of farmers thought that Extension Services and NPOs could be the most appropriate channel to reach more farmers.

Table 4. Appropriate channels for the distribution of climate information

Source of information	Frequency	Percentage	Valid percentage	Cumulative Percentage
Other	3	1.1	1.1	1.1
Radio	1	0.4	0.4	1.5
TV	138	***52.9***	52.9	54.4
Extension service	6	2.3	2.3	56.7
Mobile Applications	82	***31.4***	31.4	88.1
NPO	29	11.1	11.1	99.2
Farmer/neighbors	2	0.8	0.8	100.0

Souce: Field survey (July - September 2023)

Table 5 shows an average distribution of the amount that farmers are willing to pay in relation to their awareness of climatic conditions and the source of information from which they are informed about these changes. Table 5 shows that farmers who use weather applications on their phones are more willing to pay more to receive climate information (9,242 Lek) than farmers who use TV as a means of information (8,415 Lek).

Table 5. Appropriate channels for the distribution of climatic information and awareness of changes in climatic conditions.

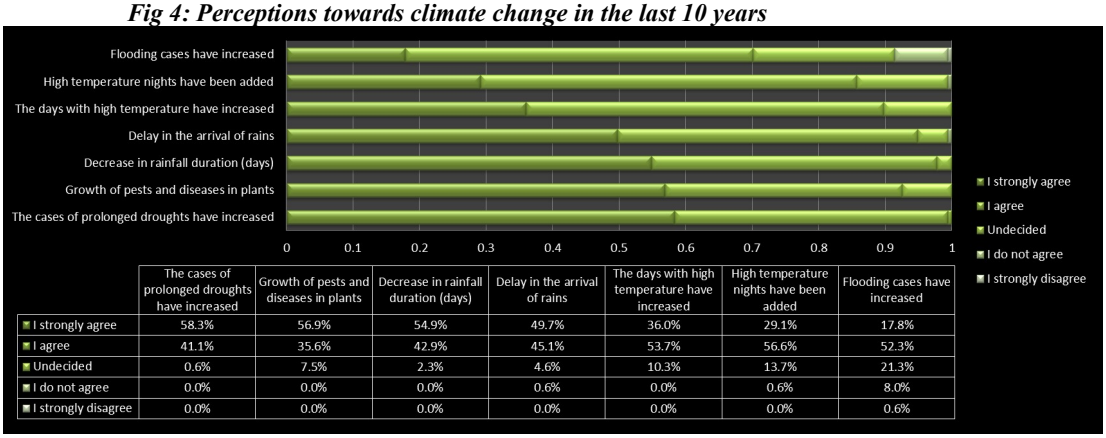
	Awareness of changes in climatic conditions	
Source of information	**Yes**	**No**
TV	*8,415*	*10,667*
Mobile Applications	*9,242*	*20,938*

Souce: Field survey (July - September 2023)

✓ ***Perceptions towards climatic conditions changes***

Based on farmes reponses, it was noticed that in the last 10 years, farmers have perceived high changes in the occurrence of natural events, such as the increase in the period of drought, the decrease in the number of days in a row and the increase in days with high temperatures.

Fig 4: Perceptions towards climate change in the last 10 years



	The cases of prolonged droughts have increased	Growth of pests and diseases in plants	Decrease in rainfall duration (days)	Delay in the arrival of rains	The days with high temperature have increased	High temperature nights have been added	Flooding cases have increased
I strongly agree	58.3%	56.9%	54.9%	49.7%	36.0%	29.1%	17.8%
I agree	41.1%	35.6%	42.9%	45.1%	53.7%	56.6%	52.3%
Undecided	0.6%	7.5%	2.3%	4.6%	10.3%	13.7%	21.3%
I do not agree	0.0%	0.0%	0.0%	0.6%	0.0%	0.6%	8.0%
I strongly disagree	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%

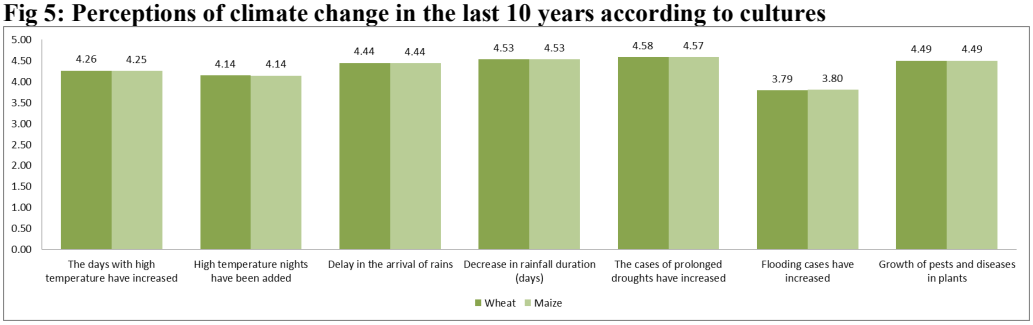
Souce: Field survey (July - September 2023)

The evaluation was requested with the Likert scale: 1= I do not agree at all,..., 5 = I strongly agree. As can be seen from the figure below, there is a high perception of the occurrence of climatic events with which the farms almost completely agree that they have occurred in the last 10 years.

Table 6: Average Likert scale on the effects of climatic conditions

	Wheat	**Maize**
The days with high temperature have increased	I strongly agree	I strongly agree
High temperature nights have been added	I agree	I agree
Delay in the arrival of rains	I strongly agree	I strongly agree
Decrease in rainfall duration (days)	I strongly agree	I strongly agree
The cases of prolonged droughts have increased	I strongly agree	I strongly agree
Flooding cases have increased	I agree	I agree
Growth of pests and diseases in plants	I strongly agree	I strongly agree

Fig 5: Perceptions of climate change in the last 10 years according to cultures



Souce: Field survey (July - September 2023)

Factors affecting WTP for early weather forecasting system

From the Correlative analysis we can see that the willingness to pay for an early weather forecasting system has a statistically significant positive relationship with the income provided by agricultural activity, the quantity produced by agricultural crops, market orientation, average selling price, size of the farm, as well as a negative impact of factors such as the age of the farm manager, the cost per force for wheat cultivation is observed. From the table of the correlation matrix, it can be seen that the years of experience of the farmer in agriculture do not affect the willingness to pay. Willingness to pay for an early system is strongly positively related to the % of income that the farmer provides from wheat (Spearman's rho=.373, sig<.05).

Table 7. Spearman's rho rank correlation coefficient

		Age	*Wheat cultivated Area 2022 (Dynym)*	*The cultivation cost of wheat /dynym*	*Total amount of wheat produced 2022*	*Total amount of Wheat sold 2022(kv)*	*% of income from Agriculture*	*Average selling price of wheat 2022*	*Number of years of experience of the primary decision maker*
WTP	***Correlation Coefficient***	*-.312***	*.241***	*-.404***	*.210***	*.349***	*.373***	*.265***	*0.001963*
	Sig. (2-tailed)	*0.000*	*0.001*	*0.000*	*0.006*	*0.000*	*0.000*	*0.000*	*0.980*
	N	*173*	*176*	*171*	*171*	*157*	*175*	*176*	*169*

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The correlative analysis now applied to the maize crop, reveals that the willingness to pay for an early weather forecasting system has a statistically significant positive relationship with the income provided by the activity, market orientation, average selling price, as well as a negative influence of such factors as the age of the farm manager is also observed, while the cost per force for the cultivation of corn, the size of the farm, the years of experience of the farmer in agriculture do not affect the willingness to pay. Willingness to pay for an early system is strongly positively related to the farmer's market orientation trend (Spearman's rho=.484, sig<.05).

Table 8. Spearman's rho rank correlation coefficient Maize

		Age	The maize cost of cultivation/dynym	% of income from Agriculture	*Number of years of experience of the primary decision maker*	*Maize cultivated Area 2022 (Dynym)*	*Total amount of maize produced 2022*	*Total amount of maize sold 2022(kv)*	*Average selling price of maize 2022*
WTP	**Correlation Coefficient**	-.312**	-0.09324	.373**	0.001963	0.134053	-0.01355	.484**	.420**
	Sig. (2-tailed)	0.000	0.242	0.000	0.980	0.076	0.867	0.000	0.000
	N	173	159	175	169	176	156	142	176

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

This paper addressed the role of DS security and privacy methods, while maintaining integrity and performance, regardless of the specifics or number of heterogeneous applications located in this distributed environment. The paper addressed the various ways that exist to integrate specific applications in organizations and not just to make these systems more secure, which makes their development and use as flexible as possible. People asked about knowing security methods answered that they knew very little about some of the methods.
These systems and applications enable more secure data transfer and storage. Intentionally or unintentionally, the current reality on the Internet and everywhere in computer networks is influencing the use of cryptography-based applications to become standard at the user level.

- In order to increase safety it is necessary to create some habits which are done instinctively during work. Shutting down the computer or open accounts when we leave the computer, disconnecting the Internet connection from the computer when we are not using it or occasionally checking security measures such as updating, occasionally scanning the computer with antivirus software, removing of unnecessary programs etc., are some of the basic actions.
- Using passwords is a very important element in ensuring that unauthorized persons do not gain access to your systems or personal information. Most people use short passwords that relate to personal information that can be easily remembered by them (birthdays, baby names, etc.) but it also makes it easy for other people to find it. It is suggested that passwords be as strong as possible containing letters (uppercase and lowercase), numbers, characters, and of considerable length. It is also advisable to use different passwords for different systems.
- Unfortunately many people use unlicensed software on their computers to save money doing so in addition to breaking the law and increasing their exposure to risk. Based on the analysis carried out by various laboratories, it results that more than 70% of them contain "malware" codes which are included in it and are not captured by protection systems.
- For any virus or attack that comes up, software developers in a short time create which fix the vulnerability of the affected system ensuring that that type of attack is blocked in the future. These settings are distributed to users via the update and are free. Keeping your computer and software up to date is very important as it creates opportunities for protection against known viruses. In many cases computers are affected by viruses which can be blocked by the updated system itself even in the absence of antivirus.
- One of the most important elements for our protection is the installation of antivirus, anti-spyware and firewall software. Using them can often reduce the performance of the computer but the installation and very significantly increases our defense. Using these licensed programs and keeping them up to date are two essential elements of personal safety. For example: AVAST software, AVG antivirus, 360Security, Avira antivirus, etc. for both PC and mobile devices.
- We can verify people who have physical access to our computers but it is very difficult to identify those who connect remotely when we are connected to a network or use a computer that is not personal. When we connect to networks that are not in our control or are open (such as when traveling to airports,

internet cafes, etc.) care must be taken because in parallel with us in these networks can be connected and slaughtered persons who have malicious intent.

- Thanks to the use of the internet the speed with which we today communicate, buy or exchange information has become almost zero. But while performing these actions hackers can obtain information which brings financial consequences to the user. Using a trusted website for online shopping, taking precautions on the computer, checking the security options of "web browser" programs or updating them regularly are some minimal measures. AppScan is an application that enables website verification.

As a result, it was seen that the information and application of the program will be very valuable to anyone. It should be noted that despite all the measures taken, the systems will always have a percentage of risk of breach of security and privacy. Therefore, every other organization or unit is working to ensure that the security of DS applications is in line with all norms, based on cryptographic methods, which is already a well-established standard.

5. Conclusions

This study analyzed the perception and WTP for early warning climate system in region of Korca/Fier. It showed that a large majority 83.5 of farmers expresses awareness about climate changes in last 10 years. Farmers have perceived high changes in the occurrence of natural events, such as the increase in the period of drought (58.3%), the decrease in the number of days with precipitation (56.9%) and the increase in days with high temperatures (54.9%). Despite the farmers' high awareness and perceptions towards climatic conditions, again the 43.2% of them who are willingness to pay for early warning climate system was low because they see that Mobile Applications and Tv are a good and reliable source of climate information.

The determining factors related statisticaly positively with the demand for early warning climate system are the income from agricultural activity, quantity produced from agricultural crops, market orientation, average selling price, farm size, , as well as a negative impact of factors such as the age of the farm manager, the cost of cultivation is observed. About 43.2% of the farmers willing to pay would pay an average of Lek 23,618.42 to obtain climate information from an early warning climate system.

As a conclusion, we can emphasize that the use of climate information can help farmers in making decisions, but it is not clear how this type of information affects farm income and adaptation strategies to these climatic changes.

References

Abdullah, S., & Jeanty, P. W. (2011). Willingness to pay for renewable energy : Evidence from a contingent valuation survey in Kenya. Renewable and Sustainable Energy Reviews, 15(6), 2974–2983. https://doi.org/10.1016/j.rser.2011.03.016

Antwi-Agyei, Philip & Amanor, Kofi & Hogarh, Jonathan & Dougill, Andrew. (2020). Predictors of access to and willingness to pay for climate information services in north-eastern Ghana: A gendered perspective. Environmental Development. 37. 100580. 10.1016/j.envdev.2020.100580.

Awolala, David & Mutemi, J. & Adefisan, Elijah & Antwi-Agyei, Philip & Taylor, Andrea & Muita, Richard & Bosire, Emily & Mutai, Bethwel & Nkiaka, Elias. (2023). Economic Value and Latent Demand for Agricultural Drought Forecast: Emerging Market for Weather and Climate Information in Central-Southern Nigeria. Climate Risk Management. 39. 100478. 10.1016/j.crm.2023.100478.

Budi Santoso, H., Delima, R., (2017):Stakeholder Definition for Indonesian Integrated Agriculture Information System (IAIS), IOP Conference Series: Materials Science and Engineering, Volume 185, Issue 1, pp. 012014 .

Carrer MJ, de Souza Filho HM, Batalha MO, Rossi FR (2015) Farm Management Information Systems (FMIS) and technical efficiency: an analysis of citrus farms in Brazil. Comput Electron Agric 119:105–111. https://doi.org/10.1016/j.compag.2015.10.013

Diederen, P., Meijl, H., Wolters, A., Bijak,K., (2003). "Innovation adoption in agriculture : innovators, early adopters and laggards," Cahiers d'Economie et de Sociologie Rurales (CESR), Institut National de la Recherche Agronomique (INRA), vol. 67.

Environ. Int., 77 (2015), pp. 5-15

Giudice, V. D., & Paola, P. D. (2016). The contingent valuation method for evaluating historical and cultural ruined properties. Social and Behavioral Sciences, 223, 595–600. https://doi.org/10.1016/j.sbspro.2016.05.360

Glantz, M.H.; Baudoin, M.; Ahmed, A.K.; Tozier, A.; Poterie, D.; Naranjo, L.; Pradhananga, D.; Wolde-Georgis, T.; Fakhruddin, B.; Berhane, M.; et al. Working with a Changing Climate, Not Against It. Hydro-

Meteorological Disaster Risk Reduction: A Survey of Lessons Learned for Resilient Adaptation to a Changing Climate; Consortium for Capacity Building/Instaar, University of Colorado, Boulder Support; University of Colorado, Boulder: Boulder, CO, USA, 2014; Volume 4, pp. 1–21. [Google Scholar]

Guo, X., Liu, H., Mao, X., Jin, J., & Chen, D. (2014). Willingness to pay for renewable electricity : A contingent valuation study in Beijing , China. Energy Policy, 68, 340–347. https://doi.org/10.1016/j.enpol.2013.11.032.

Hall, P.H. Early Warning Systems: Reframing the Discussion. Aust. J. Emerg. Manag. 2006, 22, 13.

He, X.F., Cao, H. and Li, F.M. (2007) Econometric Analysis of the Determinants of Adoption of Rainwater Harvesting and Supplementary Irrigation Technology (RHSIT) in the Semiarid Loess Plateau of China. Agricultural Water Management, 89, 243-250.
https://doi.org/10.1016/j.agwat.2007.01.006

Huffaker, R. G., & Castellini, M. (2011). Detecting deterministic food-system dynamics from observed price data. In *5th International European Forum on System Dynamics and Innovation in Food Networks, University of Bonn, Germany, February 14-18, 2011, Innsbruck-Igls, Austria*.

Impacts of soil and water pollution on food safety and health risks in China

Just D. ,Zilberman D., (2002). "Information Systems in Agriculture." ARE Update 6(1): 3-6. University of California Giannini Foundation of Agricultural Economics.https://giannini.ucop.edu/filer/file/1453327732/16623/

Latinopoulos, D., Mallios, Z., & Latinopoulos, P. (2016). Land use policy valuing the benefits of an urban park project : A contingent valuation study in Thessaloniki , Greece. Land Use Policy, 55, 130–141. https://doi.org/10.1016/j.landusepol.2016.03.020.

Mol, L.; Sternberg, T. Changing Deserts: Integrating People and Their Environment; The White Horse Press: Winwick, UK, 2012; Available online: http://www.environmentandsociety.org/node/3643 (accessed on 21 April 2023).

Ndebele, T., & Forgie, V. (2017). Estimating the economic benefits of a wetland restoration programme in New Zealand : A contingent valuation approach. Economic Analysis and Policy, 55, 75–89. https://doi.org/10.1016/j.eap.2017.05.002.

Oerlemans, L. A. G., Chan, K., & Volschenk, J. (2016). Willingness to pay for green electricity : A review of the contingent valuation literature and its sources of error. Renewable and Sustainable Energy Reviews, 66(February), 875–885. https://doi.org/10.1016/j.rser.2016.08.054.

Oliveira, Tiago & Painho, M. & Santos, Vitor & Sian, Otávio & Barriguinha, Andre. (2014). Development of an Agricultural Management Information System based on Open-source Solutions. Procedia Technology. 16. 10.1016/j.protcy.2014.10.100.

Ouédraogo, M.; Barry, S.; Zougmoré, R.B.; Partey, S.T.; Somé, L.; Baki, G. Farmers' Willingness to Pay for Climate Information Services: Evidence from Cowpea and Sesame Producers in Northern Burkina Faso. Sustainability 2018, 10, 611. https://doi.org/10.3390/su10030611

Ozowa, V.N. (1995) Information Needs of Small Scale Farmers in Africa: The Nigerian Example. Quarterly Bulletin of the International Association of Agricultural Information Specialists, IAALD/CABI40.

Roling, N. (1988), Extension Science: Information Systems In Agricultural Development, Cambridge University Press, New York, NY

Schober, P., Boer, C., & Schwarte, L. A. (2018). Correlation coefficients: appropriate use and interpretation. Anesthesia & Analgesia, 126(5), 1763-1768

Sedgwick, P. (2012). Pearson's correlation coefficient. Bmj, 345.

Sutoyo, M., Sensuse,D., (2018). Designing a Conceptual Model for Rice Information Systems using Gamification and Soft System Methodology. 63-68. 10.1109/ICACSIS.2018.8618195.

Traore,B., Descheemaeker,K., van Wijk,M., Corbeels,M., Supit,I., Giller,K.,(2017)Modelling cereal crops to assess future climate risk for family food self-sufficiency in southern Mali, Field Crops Research, Volume 201, 2017,Pages 133-145,ISSN 0378-4290, https://doi.org/10.1016/j.fcr.2016.11.002.

United Nations Office for Disaster Risk Reduction UNDRR. Global Status of Multi-Hazard Early Warning Systems; WMO: Geneva, Switzerland, 2022; Available online: https://www.undrr.org/publication/global-status-multi-hazard-early-warning-systems-target-g (accessed on 11 July 2023).

United Nations Office for Disaster Risk Reduction. Terminology on Disaster Risk Reduction. In The Routledge Handbook to the Political Economy and Governance of the Americas; Routledge: London, UK, 2009.

Venkatachalam, L. (2004). The contingent valuation method : a review. Environmental Impact Assessment Review, 24, 89–124. https://doi.org/10.1016/S0195-9255(03)00138-0.

Verbicˇ, M., Slasyllabe-erker, R., & Klun, M. (2016). Contingent valuation of urban public space : A case study of Ljubljanica riverbanks. Land Use Policy, 56, 58–67. https://doi.org/10.1016/j.landusepol.2016.04.033.

Vidanapthirana, N., (2019). Agricultural information systems and their applications for development of agriculture and rural community, a review study.

Wolf, S., Just, D.R. and Zilberman, D. (2001), ‘‘Between data and decisions: the organization of agriculture economic information systems’’, Research Policy, Vol. 30, pp. 121–41.

Y. Lu, S. Song, R. Wang, Z. Liu, J. Meng, A.J. Sweetman, A. Jenkins, R.C. Ferrier, H. Li, W. Luo, T. Wang

Zhllima, E., Drini, I., Nam, J., Shoshi, P., Gjika, I., (2023). Awareness of Climate Change Impact and Adaptation in Agriculture – The Case of Albania. European Countryside. 14. 604-622. 10.2478/euco-2022-0030.

Zhllima, E., Skreli,E., Xhoxhi, O., Imami, I., (2024). Agricultural market information: How much and who is willing to pay for it?. THE ELECTRONIC JOURNAL OF INFORMATION SYSTEMS IN DEVELOPING COUNTRIES. 10.1002/isd2.12313.