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Investigating the Effect of Agricultural Products Insurance on Acceptance of Adaptation to Climate Change in Agricultural Sector

Nasrollah Habibi Fath Abadi[a*], Elham Khajehpour[b], Sedigheh Nabieyan[b]

[a]MSc Student, Department of Agricultural Economics, Shahid Bahonar University of Kerman, Kerman, Iran.
[b]Assistant Professor, Department of Agricultural Economics, Shahid Bahonar University of Kerman, Kerman, Iran.

[*]Corresponding Author, E-mail address: habibi69nasrollah@gmail.com
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Abstract

Climate change is a worldwide issue impacting all living beings and their surroundings. In Iran, drought is a critical climatic factor. The initial response to climate change involves comprehending its potential impacts and assessing their scope and nature accurately. On the other hand, focusing on social aspects and perspectives is crucial for assessing adaptation solutions and engaging people in addressing current water issues and crises amidst climate change conditions. Climate change adaptation involves adjusting natural or human systems to mitigate damage and capitalize on opportunities arising from climate change impacts. Iran is among the countries greatly impacted by climate change. The recent droughts in the country have notably affected agricultural production. Adapting to climate change is crucial for effective management in agriculture. This study aimed to explore the factors influencing the acceptance of climate change adaptation in agriculture in 2018. The sample consists of 247 farmers from Baft city, and the questionnaire's questions demonstrate good validity and reliability (Cronbach's alpha coefficient 76.9%). The research employs the logit model, chosen as the suitable model after investigation. The descriptive and inferential results suggest that factors like agricultural product insurance have a positive impact on the acceptance of climate change adaptation. Additionally, it is important to identify and study the factors influencing the acceptance of agricultural product insurance in the targeted area.

Keywords: Adapting to climate change, Agriculture, Baft city, Climate change.

1. Introduction

The rise in population and the growing demand for food pose a significant challenge in today's world. Agriculture, being crucial for food provision, constantly seeks solutions to address this issue. Research indicates that agricultural practitioners encounter risks like pests, diseases, and limited control over environmental factors (Qambarali et al., 2012). Given that agricultural output relies on weather conditions, any shifts in climate patterns will impact agricultural yields (Khaledi et al., 2015). In this way, adapting to climate change can have a significant impact on arid regions like the Baft region. Farmers can sustain their farming practices by identifying the appropriate climate change adaptation strategies and implementing them in response to climate variations and other influences. This necessitates farmers prioritizing climate change awareness.

The unpredictability of future weather conditions is a major challenge in agriculture, an essential issue in the realm of climate change. Despite facing harsh climates, people have adapted to climate change, enduring extreme cold and hot temperatures (Bahonar et al., 2018). Climate change is expected to lead to water and resource shortages, soil degradation, desertification, increased disease and pest outbreaks in agriculture. Farmers can mitigate these threats through appropriate adaptation methods, which involve voluntary actions to reduce risks in agriculture (Pazokinejad and Bageriyan, 2018).

In studies related to factors influencing acceptance of compatibility, these factors can lead to management opportunities. Understanding the factors affecting farmers' acceptance of climate change adaptation is crucial for adjusting educational programs, using various crop varieties and insurance for agricultural products, allocating subsidies for agricultural inputs, and recognizing compatibility acceptance. This is essential for policymakers to prioritize effective factors in a practical and scientific manner. Climate change stands out as a key challenge in the present era. High-intensity floods, erratic hot and cold spells, and increased drought occurrences underscore the gravity of this global issue in the current decade (Birjandi et al., 2015).

Climate change globally has resulted in shifts in surface temperatures, alterations in rainfall patterns, and varying climate conditions regionally. These shifts in agriculture impact agricultural output, water requirements, pest and disease prevalence, and production costs (McCarl et al., 2016). Forecasting the economic and environmental consequences holds significance for human endeavors, with agriculture particularly susceptible to weather conditions (Bradshaw et al., 2004). Farmers' decisions and outcomes have long been influenced by rainfall, temperature, and other climatic factors, requiring them to constantly adjust to changing conditions (Suarez, 2005).

Arid and semi-arid regions, like Iran, are highly susceptible to climate change, making them more vulnerable. The impact of climate change in Iran is significant, particularly on agricultural production systems (Fischer et al., 1994). Iran faces extreme water stress, being one of the most at-risk nations concerning climate change. The dwindling of lakes, rivers, and wetlands, along with the depletion of groundwater, land subsidence, deterioration of water quality, and soil erosion (Madani, 2014) all point to this critical situation. Climate change poses a threat to biodiversity and agriculture (Gok, 2010), as studied by (Reid, 2003) who analyzed the effects of climate risks on farms and the responses of farmers to these risks. The gathered data outlined an intricate decision-making setting with numerous internal and external factors impacting agricultural activities that can influence management choices. Within this intricate decision-making setting, weather plays a significant role in agricultural operations, as it consistently impacts farms. Farmers have devised a variety of responsive and anticipatory management tactics to adapt. Nevertheless, overall, farmers may be unaware of the risks and potential opportunities associated with climate change, or they may not be concerned. Zhang and Nearing (2005) investigated the effect of climate change on soil erosion, runoff and winter wheat function. In this study, by using the results of the general circulation model (HADCM3) under climate change scenarios GGa1, B2a, A2a, they simulated the amount of change in erosion, runoff and function of winter wheat under management conditions for the period of 2070-2099. And for the function of wheat under scenario B2a, they predicted an increase of about five percent, that they knew the change in winter wheat function to be the usual interaction of the negative effect of increasing temperature and the positive effect of increasing CO_2 concentration.

Abdul-Razak and Kruse (2017) investigated the adaptive capacity of smallholder farmers to climate change in northern Ghana. Climate change is expected to affect the production of agricultural products. This review presents an index-based framework for assessing adaptive capacity. Farmers were divided into six adaptive capacity factors: economic resources, social capital, awareness and training, technology, infrastructures and institutions, where three to five indicators were determined for each factor. They have concluded that economic resources, awareness and training, as well as technological capacities are suitable for adaptation of smallholder farmers. Adaptive capacity of respondents are few. Capacity in terms of gender and education was also examined. Factors determining the capacity of adaptation on female farmers are significantly less.

Fagariba et al. (2018) investigated the methods of adapting to climate change and the ways to deal with it in the western region of Sissala, the northern part of Ghana using the logit model and a sample of 330 small farmers. The survey showed that irregular rains, high temperature, weather information and high evaporation are the factors that strongly affect the farmers due to climate change of which drought and temperature have the greatest effect. In addition to this, adaptation methods include: drought-resistant products and forestry, and also if the environment improves, farmers can accept adaptation better. Also, the ability of water management to check the weather change challenge will be improved. Eitzinger et al. (2018), investigated whether farmers understand the risks of climate change or not. They also showed in their study that to implement adaptation effective methods, it is necessary to understand farmers. The risks perceived by farmers in the face of adaptation to climate change, were lack of access to sanitary and medical services, failure to produce agricultural products, and uncertainty to the climate change as the main factor.

Climate change is a natural phenomenon that occurs on a long-term time scale. The most important factors that intensify climate change include changes in reflected solar radiation, changes in the Earth's orbit, greenhouse gases, and continental drift (Mahsafar et al., 2010). Rainfall as one of the most important phenomena of hydrology has long been the focus of researchers and the relationships between characteristics of rainfall data have been analyzed. The construction of dams and water facilities, which is for the development of water, soil, drinking and agricultural water projects, requires extensive studies on rainfall (Ahmadzadeh et al., 2010).

Khajehpour (2018) studied adaptation to climate change in agriculture. Climate change is currently a global phenomenon that has affected all aspects of living organisms and their environment. Iran is one of the countries that have been significantly affected by climate. Climate change, especially the recent droughts in the country, has visibly affected production in agricultural part. Adaptation to climate change is one of the most basic and important strategies of climate change management in agriculture. As a result, more awareness about the management solutions of climate change can be effective in improving the subsistence conditions of the villagers and also improving production and function in agricultural part. Pazokinejad and Bageriyan (2018) examined farmers' attitudes towards agricultural entrepreneurship in response to the negative impacts of climate change and its influencing factors. Their findings indicated a positive attitude among farmers towards agricultural entrepreneurship. Normative pressure and belief in climate change emerged as the key determinants influencing farmers' inclination towards agricultural entrepreneurship.

To deter migration, factors like support from village councils and Islamic councils play a significant role in enhancing farmers' awareness, boosting their environmental knowledge, and acquainting them with experts.

In extensive research on climate change, factors influencing the acceptance of climate change adaptation in agriculture, including farmer age, crop pattern changes, resilient plant varieties, low-water species, mixed cropping, crop insurance, and fast-growing products, have been explored across various regions. This study aims to analyze the factors impacting the adoption of climate change adaptation in agriculture, focusing on Baft city, Kerman, Iran as a case study.

The aim of this study is to explore the factors that impact the acceptance of climate change adaptation in the agricultural sector (a case study of Baft city, Kerman, Iran) using the logit model. Various factors can influence the acceptance of climate change adaptation in the Baft area. Factors such as the personality, job, and management characteristics of farmers including age, gender, marital status, father's occupation, education level, sponsorship, and the number of family members employed.

2. Materials and Methods

2.1. Research Methodology

Management characteristics comprised factors like income type, agricultural and non-agricultural income amount, satisfaction with both types of income, ownership type, agricultural credit usage, expert promotional activities, cooperative company services, cultivated area, total area, number of land plots, water supply, and labor. In this study, factors influencing acceptance were identified. Econometric models were used along with appropriate tests to examine various variables. Effective explanatory variables on acceptance were identified and included in the model. Logit and probit models were utilized for cases with a binary dependent variable. The logit model, a form of logistic regression, was employed in this analysis.

One commonly used function is the logistic function. The logistic distribution function for the random variable Z can be expressed as:

$$G(Z) = \frac{1}{1+e^{-z}} = \frac{e^z}{1+e^z} \quad (1)$$

and the density function is similar to normal distribution functions, the probability of $y_i=1$ and the probability of $y_i=0$ is equal to:

$$P(y_i=0|x_i) = 1-p(y_i=1|x_i) = \frac{1}{1+e^{xi\beta}} \quad (2)$$

To estimate β, the likelihood function is formed (for simplicity, we denote $\acute{x}_\iota \beta G$ by G_i):

$$L(\beta) = \prod_i^n = 1 G_i^{Y_i}(1-G_i)^{1-y_i} \quad (3)$$

The maximum likelihood estimator in the logit model is obtained by solving the Eq. 4:

$$\sum_i^N = Y_i \frac{g_i}{G_i} - \left\{(y_i)\frac{g_i}{1-G_i}\right\} x_i = 0 \quad (4)$$

Since $g_i=G_i(1-G_i)$, so we have:

$$\sum_i^N = 1[y_i(1-G_i) - (1-Y_i)G_i]x_i = 0 \quad (5)$$

Y_i-G($\acute{x}$ β) is similar to the errors (e_i) and therefore the above equation is similar to the normal equations in the OLS method (Khajehpour, 2018).

2.2. Final effects

In a regression study, the parameter β represents the final effects of the explanatory variables on the independent variable. To investigate the final effects, we measure the effect of changes X_i on Y. In models that Y^* is a qualitative and unobservable variable, the parameter β measures the effect of X_i' changes. If β is positive, the desirability of choosing the intended mode will increase along with the increase of X_i, but the amount of this increase cannot be determined. This equation can be expressed by the following equation:

$$\frac{dp(y_i=1)}{dx_{ki}} = \varphi(\widehat{\beta_1} + \hat{\beta}_1\widehat{\beta_1}\hat{x}_2 + \ldots \hat{\beta}_k\bar{x}_k)\widehat{\beta_k}, \text{ k=1,2,3,…} \quad (6)$$

The most significant impact occurs when $\hat{\beta}$ and $\bar{x}_k$or in other words $\widehat{\beta_1} + \hat{\beta}_1\widehat{\beta_1}\hat{x}_2 + \ldots\hat{\beta}_k\bar{x}_k$ equals zero. In the standard normal distribution, the maximum value is associated with *φ(0)* which is approximately 0.4. If X_i is a virtual explanatory variable, we determine the impact of a change in X_i on Y through the following equation (Pourkhaleghi et al., 2015):

$$= p(Y=1|X_i\ X_{\widehat{other}}) - p(Y-1|X_i=0X_{\widehat{othrer}})\frac{\Delta y}{\Delta x} \quad (7)$$

2.3. Statistical society

The current study applies targeted and descriptive-inferential methods. The target population consists of all beneficiaries in the Baft city, Kerman, Iran, encompassing three areas (Gughar, Bezenjan, and Dashtab). The statistical population under scrutiny includes 7500 agricultural beneficiaries from this region. Secondary data utilized in this study were gathered through documentary and library reviews. Primary data collection involved field studies incorporating questionnaire design and interviews, using a simple random sampling technique. Initially, a set of pre-test questionnaires was distributed to 20 beneficiaries for this purpose. After reviewing and revising the questions based on expert feedback, adjustments were made to the questionnaire. Subsequently, the sample size was calculated using the appropriate formula considering the success rate. A total of 247 individuals were then interviewed, comprising 230 men and 17 women. The questionnaire was administered over a three-month period in the winter of 2018. Following data collection, the responses were input into Excel for statistical analysis, utilizing software such as SPSS and Eviews for both descriptive and inferential analysis. The research methodology employed in this study is logit.

2.4. Determining the sample size

The sample size is calculated based on the following equation.

$$N = \frac{z_{\frac{a}{2}}^2 p(1-p)}{\varepsilon^2} \quad (8)$$

where N is Sample size, Z is standard normal probability value, ε is estimate accuracy, α is error level, and P is success ratio. At the error level of 0.05, the value of $z_{\frac{a}{2}}^2$ is equal to 1.96 (Khajehpour, 2018).

2.5. General information

Agricultural information related to factors affecting the acceptance of adaptation to climate change in agriculture. Questions about age, gender, marital status, education level, and sponsorship aim to assess personality traits. Questions about father's occupation, husband's occupation, head of household's occupation, type and amount of income (agricultural and non-agricultural) aim to examine occupational characteristics.

Questions about ownership type, cultivation changes, previous cultivation area, agricultural and garden cultivation area, total area, and number of land plots aim to investigate the management characteristics of the farmer. Questions regarding the use of agricultural credits, extension activities by experts, services provided by cooperative companies, and the presence of a village council have been posed to assess the risk-taking, sociability, and participation of beneficiaries.

2.6. Assessing the validity and reliability of the questionnaire

The questionnaire's validity ensures that the measuring tool accurately captures the intended characteristics and attributes. Without full validity, research outcomes lack credibility. Hence, the questionnaire exhibits the essential validity and reliability required for assessing the targeted attribute. Reliability signifies how consistently a measuring instrument yields similar outcomes in identical circumstances.

In essence, when utilized across various instances and statistical groups, minimal disparity exists in the outcomes. Cronbach's alpha is utilized to assess questionnaire reliability. A coefficient above 0.7 indicates good reliability, between 0.5 and 0.7 is considered average, and below 0.5 signifies poor reliability. (Khajehpour, 2018).

2.7. Validity

Sarmad et al. (2007) argue that validity addresses how well a measurement tool captures the intended trait. Without understanding the validity of the tool, the accuracy of the obtained data remains uncertain. While a measurement instrument may effectively measure one trait, it may lack validity in assessing another characteristic in a different context. The questionnaires in this study have been employed in prior research with confirmed nominal and content validity. Furthermore, in this study, expert opinions and input from professors have been sought to establish the validity of the measurement tool for assessing the research variables.

2.8. Reliability

The aim of assessing questionnaire reliability and stability is to ensure its applicability across various times and locations. A study is deemed reliable when its measurement instrument is valid; if the research is replicated by a different individual or the same researcher at different times and places, consistent results should be obtained.

Cronbach's alpha coefficient is a prevalent method for assessing questionnaire validity and reliability. This metric ensures that attributes measured using the same instrument, under identical conditions and at various times, yield consistent results. Cronbach's alpha formula is a key tool for calculating reliability. This approach assesses the internal consistency of measurement instruments like surveys or tests gauging diverse attributes.

Responses to each query in such tools may carry distinct numerical values. Cronbach's alpha typically serves as a reliable gauge for assessing tool reliability and internal consistency among its components. Thus, questionnaire reliability is commonly assessed through Cronbach's alpha. This coefficient ranges from zero to one, representing data correlation across various instances; a value of 1 signifies maximum correlation, while zero denotes minimum correlation. (Hafeznia, 2001).

3. Results and Discussion

3.1. Data descriptive results

In this study, various factors can impact the acceptance of climate change adaptation. Variables such as age, gender, marital status, parental and spousal occupation, education level, agricultural and non-agricultural income, income satisfaction, sponsorship, family employees, ownership type, credit use, promotional activities, cooperative services, land area, plots, training, insurance, and subsidies play a crucial role in accepting climate change adaptation. The study's average age is 52 years. 93.1% of beneficiaries are men, with 63.9% of them accepting climate change adaptation. Among women beneficiaries, 70.6% have accepted climate change adaptation. 90.3% of farmers are married, with the highest acceptance rate for climate change adaptation seen in this group. Farmers whose spouse works in farming or a related field show the highest acceptance rate for adapting to climate change. 66% of farmers have education below diploma level, with the highest acceptance rate for climate change adaptation found among those with a master's degree or higher. 50.6% of beneficiaries have both agricultural and non-agricultural income. Farmers' average agricultural income is approximately 2400 Dollars per year. 40.40% of farmers earn between 1200 and 2400 Dollars per year agriculturally, with this group showing the highest acceptance rate of climate change adaptation. Among those who do not engage in gardening at all, 11 individuals (42.3% of the total sample) exhibit non-acceptance of climate change adaptation in agriculture. On the other hand, 126 individuals (equivalent to 51%) of the farmers engage in agricultural cultivation on plots under one hectare, with this group showing the highest acceptance rate for adapting to climate change in agriculture.

Among the 128 individuals (equivalent to 51.8% of the total sample) utilizing agricultural services, 67.2% have embraced adaptation to climate change in farming. Notably, the highest level of acceptance towards adapting to climate change is observed among a subset of farmers who have altered their cultivation practices (95 individuals, equivalent to 74.2%). 150 farmers (60.7%) have decreased rainfed cultivation area recently, with 99 (66%) embracing climate change adaptation. 205 beneficiaries (83%) reduced water crop cultivation area, and 130 (63.4%) adjusted to climate change. Regarding water scarcity, 217 beneficiaries (87.9%) acknowledge it, with 139 (64.1%) adapting to climate change.

Also, 229 farmers (92.7%) consult with other farmers about agricultural issues, of which 155 farmers (67.7%) have adapted to climate change. 61.1% of the beneficiaries are in families with less than 3 employees. Also, 78.9% of the beneficiaries have real estate ownership, of which 61.4% have adapted to climate change. About 1.6% of the farmers who have share ownership, 60% have adapted to climate change. 132 farmers used agricultural credits, with 74.2% accepting climate change adaptation. 53.4% of farmers utilize experts' extension activities, indicating high beneficiary participation.

In regions with a village council, 85.8% of beneficiaries accepted climate change adaptation, while 51% of farmers belong to groups with less than three hectares of cultivated area. 37.2% of farmers own between 3 and 6 hectares of land, while the remainder possess over 6 hectares. The group with the most significant adaptation rate comprises farmers with less than 3 hectares of cultivated land, with 64% having adjusted to climate change. 55.9% of farmers utilize aqueducts for irrigation, whereas 24.7% rely on well water. Additionally, 7.7% of all farmers utilize springs for irrigation, and all individuals in this category have embraced climate change adaptation.

Table 1. Descriptive results of some quantitative variables

Variable	Min	Max	Average
Age	21	80	51
Household agricultural income (Dollars per year)	800	16000	2400
Household non-agricultural income (Dollars per year)	200	4800	1200
sponsorship	1	7	3
The number of plots of land	1	20	4

Table 2. Descriptive results of some qualitative variables (Chi-square test to check the significant level of coefficients)

Level	Variable	Percentage	Number
Post-diploma and diploma education		66	163
Associate and Bachelor		30.8	76
Masters and above	education	2.8	7
Total		99.6	246
Type of rental property		15	37
share	ownership	6.1	15
property		78.9	195
Total		100	247

Of the total of 247 beneficiaries, 174 individuals are insured, with 129 of them, accounting for 74.1%, having agreed to adapt to climate change. Among the total beneficiaries, 127 have availed agricultural input subsidies, and out of them, 103 individuals, equivalent to 81.1%, have accepted adaptation to climate change. Tables 1-4 and 4-2 display the descriptive findings of certain variables.

Among the studied factors, only insight into climate change, participation in training classes, use of agricultural credits, change in cropping patterns, adoption of new crops, satisfaction with crop performance, consultation with other farmers, use of mass media information, use of short growing period products, seasonal labor, use of different crop varieties, mixed cultivation, agricultural product insurance, adjustment of crop planting dates, agricultural input subsidies, grants, and new irrigation methods have shown significance with an error level below 0.05.

Table 3. Chi-square test to check the significant level of the correlation between different factors and adaptation to climate change in agricultural part

Variable name	number	result	significant level	Chi-squar
Understanding climate change (w1)	1	significant	0.035	4.45
Extension classes (q_1)	2	significant	0.000	92.093
Agricultural credits (q3)	3	significant	0.001	11.504
Changing the cultivation pattern (q7)	4	significant	0.001	11.231
Using new product (q8)	5	significant	0.000	18.413
Satisfaction with product function (q14)	6	significant	0.000	15.964
Consultation with other farmers (q15)	7	significant	0.000	13.499
Use of mass media information (q16)	8	significant	0.035	4.454
Products with a short growing period (q17)	9	significant	0.000	12.993
Use of different varieties (q18)	10	significant	0.000	23.315
mixed cultivation (q19)	11	significant	0.072	3.244
Product insurance (q22)	12	significant	0.000	24.481
Changing the planting date (q23)	13	significant	0.000	22.482
Agricultural inputs subsidy (q24)	14	significant	0.000	31.902
Non-reciprocal donations (subventions) (q25)	15	significant	0.003	8.892
seasonal labor supply (q26)	16	significant	0.000	30.583
New methods of irrigation (q28)	17	significant	0.006	7.635

To start the research method, first the normality was checked, if the error component is normal, the Probit method, otherwise, the Logit method is used. The normality of the dependent variable distribution was checked and the results were shown in Table 4.

According to the table 4, it can be seen that the distribution of the dependent variable is not normal. Therefore, the Logit model has been used to investigate the factors affecting adaptation to climate change. So Eviews software has been used. Among all available variables, significant variables and their final effects are given in Table 5. In table 5, the significant coefficients for each variable have been calculated.

Table 4. Normality results

Chi-Square		Kolmogorov-Smirnov Test	
significant level	Value of	significant level	Value of
0.000	20.409	0.000	0.415

The initial variable pertains to engagement in educational courses. The estimated coefficient value of 1.7164, with a positive sign, indicates that individuals embracing climate change adaptation are more likely to engage in educational classes. The resulting effect, at 0.3784, signifies that participation in educational classes raises the likelihood of accepting climate change adaptation by 37.84 percent.

Considering the significant relationship between participation in educational and promotional classes and the adaptability of beneficiaries, it is suggested that Jahad Keshavarzi organization centers conduct training classes on understanding climate changes to enhance beneficiaries' adaptability and expand services in this area.

The second variable, linked to various varieties, with an estimated coefficient value of (0.6042), indicates that farmers embracing climate change adaptation utilize a greater number of varieties per product; moreover, employing diverse varieties boosts the likelihood of embracing climate change adaptation by 15.44%. The third variable, associated with agricultural input subsidies, has a coefficient value of 0.6286, indicating a positive and significant impact.

This results in a 0.1331 increase in the probability of farmers accepting adaptation to climate change, suggesting that utilizing agricultural input subsidies leads to a 13.31% rise in acceptance probability.

The fourth variable, related to modern irrigation methods, has a coefficient value of 0.4665, indicating a negative and significant relationship between accepting climate change adaptation and using modern irrigation methods. The use of modern irrigation methods increases the likelihood of accepting climate change adaptation by 12.03%.

The fifth variable, concerning agricultural credits, has an estimated coefficient of -0.4509. This suggests that the use of agricultural credits decreases the probability of accepting climate change adaptation by 10.18%. In other words, farmers with greater access to credits tend to adopt fewer adaptation strategies.

Table 5. Logit results

Variable name	Final effects	The significant level	z statistic	standard deviation	Coefficient
Width from origin (C)	0.2052—	0.0014	3.1985—	0.6018	1.9251—
Extension classes (q_1)	0.3784	0.0000	6.3288	0.2712	1.7194
Use of different varieties (q18)	0.1544	0.016	2.4082	0.2508	0.6042
Agricultural inputs subsidy (q24)	0.1331	0.0124	2.5016	0.2512	0.6286
New methods of irrigation (q28)	0.1203	0.0921	1.6841	0.2770	0.4665
Agricultural credits (q3)	0.1018—	0.1000	1.6418—	0.2746	0.4509—

Table 6. Checking the significant of the coefficients by chi-square test to examine the hypotheses

Variable name	Chi-square statistic	Significance level	Result
Insurance of agricultural products	24.481	0.000	The third hypothesis is accepted

3.2. The result of the hypothesis tes:

The second hypothesis suggests that agricultural input subsidies are effective in promoting acceptance of climate change adaptation.

H0: Agricultural input subsidies are not effective in promoting acceptance of climate change adaptation.

H1: Agricultural input subsidies are effective in promoting acceptance of climate change adaptation.

Based on the values presented in the table above, it is evident that the significance level is below 0.05. Consequently, the null hypothesis is rejected, confirming the research hypothesis (H1). A positive correlation coefficient signifies a direct and increasing relationship. The closer the correlation coefficient is to positive 1, the stronger the relationship between the two variables.

The third hypothesis proposes that insuring agricultural inputs contributes to the acceptance of climate change adaptation.

In Table 6 at level of 0.05, the null hypothesis is rejected, confirming the research hypothesis (H1). The chi-square statistic indicates the significant impact of agricultural product insurance on climate change adaptation acceptance. With a significance level below 0.05, the null hypothesis is rejected, affirming H1.

A positive correlation coefficient signifies a direct and incremental relationship; a value closer to 1 indicates a stronger relationship between variables. The correlation coefficient value suggests an average intensity of the relationship in this hypothesis. .

4. Conclusion

Climate changes, whether short-term or long-term, can impact human activities, particularly agricultural activities. Factors such as rainfall, drought, economic indicators like income levels and access to agricultural credit, and farmers' management knowledge including access to services and support centers, government credit, and use of mass media play crucial roles. These indicators and components can significantly influence the adoption of climate change adaptation strategies (Bahonar et al. 2018). Among the solutions proposed to facilitate adaptation to climate change, cultivating low-water crops like rapeseed stands out as a viable alternative. The Baft region, grappling with the agricultural impacts of climate change, has prompted local farmers to consider embracing adaptive practices. Through a research study employing survey and random sampling methods, along with econometric analysis, this research explored the key factors influencing the acceptance of climate change adaptation in agriculture within Baft city.

The acceptance percentage of climate change adaptation among farmers with both agricultural and non-agricultural jobs who are satisfied with their agricultural income is higher. A significant number of farmers utilize agricultural credits, suggesting a lower risk aversion. Among farmers using agricultural credits, the acceptance percentage for climate change adaptation is higher. Furthermore, an increase in credit value correlates with a rise in acceptance percentage for climate change adaptation.

53.4% of beneficiaries engage with promotion experts, indicating good beneficiary participation. However, the acceptance percentage for climate change adaptation is relatively low among farmers utilizing cooperative companies' promotional activities and services. In the intended sample, 64.1% of total beneficiaries have accepted climate change adaptation due to water scarcity. Among the 63.2 farmers who changed their crops, 74.4% accepted climate change adaptation, while 25.6% did not. 59.9% of farmers are satisfied with their crop function, with 74.3% of them accepting climate change adaptation. All farmers using springs for water supply accepted climate change adaptation, whereas 74.3% of those relying on aqueducts also accepted it. The innovation of the research compared to other review studies lies in not only identifying factors influencing the acceptance of climate change adaptation, but also examining the impact of agricultural insurance and subsidies on such acceptance in the agricultural sector.

Results highlight the significance of variables like household head occupation, climate change awareness, participation in extension programs, agricultural credit utilization, cultivation pattern changes, new product adoption, product satisfaction, peer consultation, media usage, short-term growth products, diverse varieties, mixed cultivation, crop insurance, planting date adjustments, input subsidies, seasonal labor provision, and irrigation advancements. The research findings indicated that as farmers' awareness of climate change increases, the likelihood of farmers accepting climate change adaptation decreases. This decline highlights the adverse impact of climate change perception on the acceptance and adaptation to climate change in the agricultural sector. Factors such as the spread of agricultural land, pest and disease outbreaks, costly adaptation methods, and low productivity have led many farmers in the region to be reluctant to accept climate change. Even participation in educational programs has limited influence on the acceptance of climate change adaptation. The reluctance to accept adaptation is primarily attributed to the region's low productiveness and the lack of assurance from Jahad Keshavarzi Organization for the beneficiaries. The results and suggestions of this study are summarized as follows:

A: The initial step should be taken by relevant organizations, particularly the Agricultural Jihad Organization, to inform beneficiaries who are not yet severely impacted by climate change. By embracing climate change adaptation, beneficiaries can make better choices in selecting their product type. Promotional workshops and brochures can be utilized for this purpose.

B: Also, it is important to raise awareness about the consequences of certain events like depleting groundwater. Despite the significant costs involved, the water levels in wells may decrease again after one or two years, leading to recurring problems. This approach is not an effective solution for addressing the need to adapt to climate change.

C: In this context, a key strategy to address climate change is shifting towards cultivating crops that need less water and can withstand fluctuations. Focusing on crops like rapeseed and barberry, which have low water needs, and adopting efficient methods like rain and drip irrigation, along with promoting mechanization, can be impactful.

5. Disclosure statement

No potential conflict of interest was reported by the authors

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