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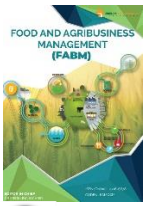

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RESEARCH ARTICLE

AGRICULTURE INSURANCE SERVICE BUSINESS IN NEPAL

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ABSTRACT

A study was conducted to assess the agriculture insurance service business in Nepal. Due to the limited number of service providers, a comprehensive census survey was conducted between October and December 2019 in Kathmandu, focusing on the head offices of different insurance companies. The gathered data was coded and analyzed utilizing Microsoft Excel and R-Studio. The study encompassed both descriptive and inferential analyses, leveraging primary and secondary data sources. A Probit model was employed to delve into the sustainability prospects of agriculture insurance, alongside conducting Marginal effect calculations. Key findings revealed that age and education played pivotal roles in the adoption of agriculture insurance. Additionally, three variables—crop weather index, staff mobilization, and interconnection between companies—emerged as highly significant factors. Livestock insurance was recognized for covering a wide range of risks, whereas crop insurance displayed the most extensive array of risks compared to other agricultural insurance practices. Despite its diverse offerings and potential benefits, crop insurance faced challenges in garnering interest from businesses. The study aimed to build upon existing insights within the insurance sector to delineate the conducive environment necessary for the growth and success of agriculture insurance in Nepal.

KEYWORDS

Agriculture, Insurance, Livestock, Peril, Sustainability

1. INTRODUCTION

The model of agriculture that is supposed to have originated from foraging has dramatically changed (Conwy, 2004). There have been many agrarian movements that changed human lives. First, domestication swept away foraging, making it the most successful adaptation, and agriculture began independently in different parts of the globe, which is now shifted towards commercialization (Johnson and Earle, 2000). Agricultural disruptions can have profound economic implications, particularly in nations where agriculture plays a significant role in the overall national income (Počuča et al., 2013). In Nepal, agriculture stands as a cornerstone of the economy and a primary livelihood source for a large portion of the population. Despite its importance, challenges such as reliance on traditional farming methods, rain-fed irrigation systems, weather-dependent cultivation practices, inadequate infrastructure, and small land holdings impede the sector's growth (Ghimire, 2013). Nepal's susceptibility to natural disasters further compounds these challenges, with property damage and livelihood disruptions escalating over the past few decades (Subedi, 2010).

Disease outbreaks are one of the major obstacles for farmers engaged in animal husbandry and poultry farming (Yemane et al., 2016). Similarly, agricultural pests have wreaked havoc on crops such as paddy, wheat, maize, and other cereals, undermining food security and farmers' livelihoods (Anon., 2016). Safety is the utmost priority of the people, whether it is related to their assets or their living condition (Chambers, 1987). As a result of rapid economic and industrial development, several social and environmental changes have occurred, so people today are more vulnerable to uncertainty; they are in a hustle to have physical and economical security (Cohen, 2016). In agriculture, risks and uncertainties are normal, as there is a gap between making decisions and achieving returns. Numerous external factors influence agricultural productivity, most of which are beyond the control of farmers (Shashi and Umesh, 2015).

For agricultural producers, insurance is a strategy for shifting risk away from themselves to an insurance provider, against the payment of a specified premium (World Bank, 2011). It is recognized as a potent method for managing risk within the agricultural sector (Hazell, 1992). The insurance agreement involves two key parties: the insurance provider and the insured party. The organization offering the insurance can be referred to as the insurer, insurance carrier, or underwriter (Romanosky, 2019). Meanwhile, the individual or entity purchasing the insurance is identified as the insured or policyholder (Cowley and Cummins, 2016).

2. METHODOLOGY

The study was conducted in Kathmandu, the capital city of Nepal covering an area of 49.45 km^2. It is geographically located with longitudes of 85.300140° E and latitudes of 27.700769 ° N (Do et al., 2010). Kathmandu was chosen as the study area due to its concentration of non-life insurance companies' headquarters and the presence of the Insurance Board (Rastriya Beema Samiti/National Insurance Committee). This autonomous body established under the Ministry of Finance, Government of Nepal, is tasked with the development, organization, standardization, and regulation of Nepal's insurance industry.

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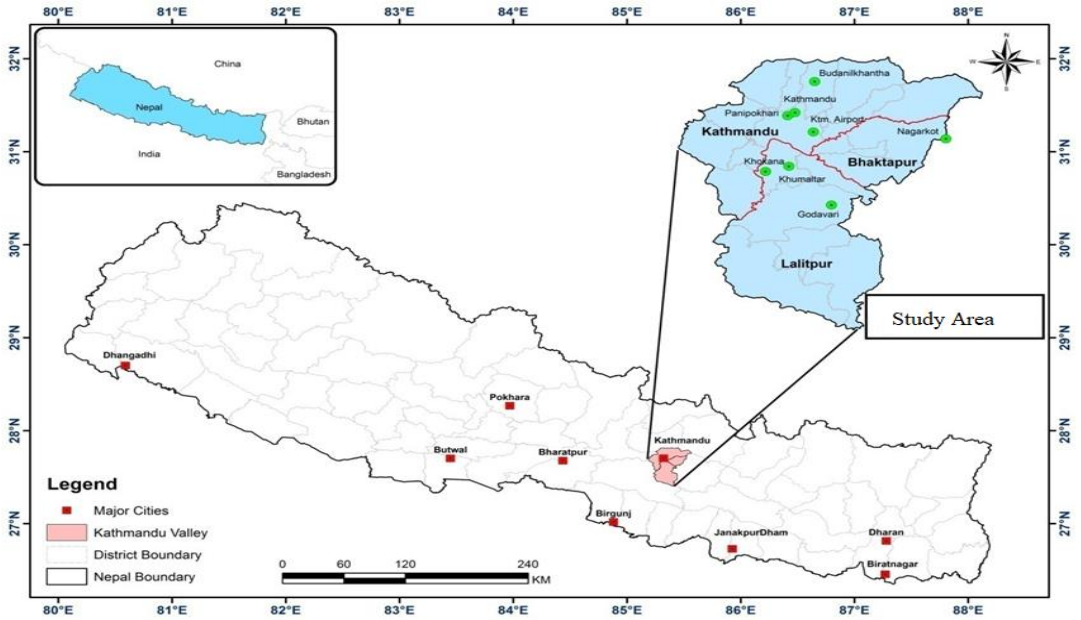

Figure 1: Map of Study Area

For this study, purposive sampling was utilized, incorporating data from both primary and secondary sources. Initially, information from all insurance companies in Kathmandu was gathered. Among the 40 registered insurance companies in Kathmandu as of 2019, only 20 were actively involved in non-life insurance. Consequently, these 20 non-life insurance companies were selected for primary data collection. Primary data were acquired through semi-structured questionnaires and key informant interviews with designated representatives from the chosen insurance companies. Furthermore, secondary data were compiled from a variety of published and some unpublished sources to grasp recent developments. These sources included journals, books, reports, and unpublished documents. Additionally, supplementary insights on agriculture insurance in Nepal were sourced from the National Insurance Committee.

Descriptive statistics, including measures such as mean, percentage, and frequency, were employed to elucidate the characteristics and status of the gathered data. Data analysis and visualization through graphs and tables were conducted using Microsoft Excel and R-Studio. Microsoft Excel facilitated the analysis of data based on Likert and rating scales, while R-Studio was utilized for regression analysis. The Probit model was utilized for Marginal effect calculations and Pearson's correlation analysis. In assessing the sustainability of agriculture insurance (Y), which signifies the durability and viability of its performance over time, a dichotomous variable was employed. This variable assumes a value of 1 if companies anticipate long-term sustainability and 0 otherwise.

2.1 Variables used in regression model

$$Y = ß_0 + X_i + e_i$$

ß0 = intercept , ßi = matrix of coefficient , Xi = matrix of variable

Matrix of variable = Single peril, Named Peril, Revenue insurance, Aggregate short fall insurance, Area yield index insurance, Crop weather index insurance, Rural residency, Proper knowledge, Moral hazard, Staff mobilization, Satisfaction of Government scheme, Company connection, Employee satisfaction

3. Result and Discussions

3.1 Age of the insured clients

The term "economically active population" refers to individuals aged between 16 and 60 years old. The age groups were segmented into four sections, and respondents were tasked with ranking the number of insured individuals. Utilizing a rating scale, the analysis revealed that the age group of 30-60 exhibited the highest level of activity, followed by the age groups of '16-30', '60 and above', and 'up to 15' in descending order. Thus, age is among various factors that ultimately determine the product's demand for insurance (Tsikirayi et al., n.a.).

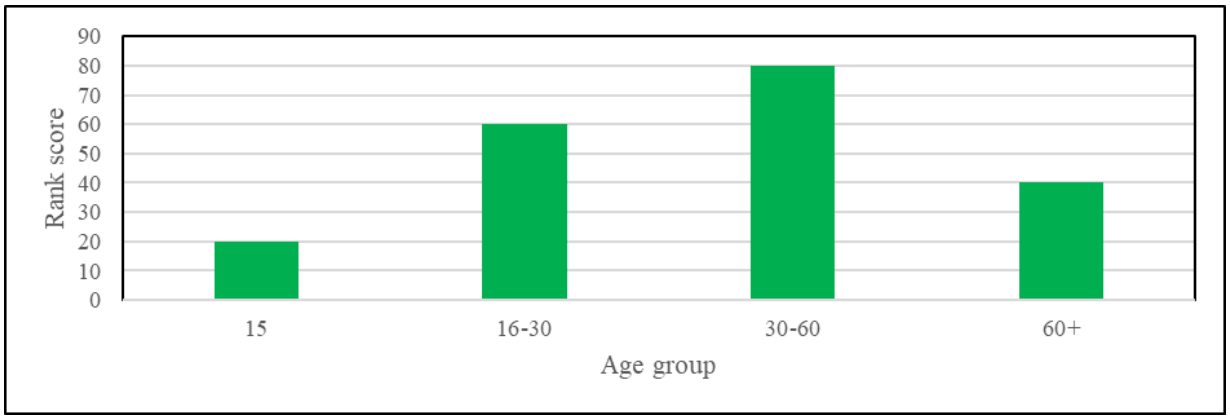

Figure 2: Graphical representation of insured based on age

3.2 Education status of the insured population

The educational achievement of farmers has a vital role in raising awareness for the adoption of agricultural insurance. The level of farmer's education has been linked as a key factor for farmer's preference for insurance (Tsikirayi et al., n.a.). The probability of insurance adoption increases with the awareness of insurance scheme among the farmers (Mohammed and Ortmann, 2005). The study categorized educational levels into five groups: Illiterate, Primary, Secondary, Intermediate, and University. Utilizing a rating scale, the analysis revealed that clients with secondary education exhibited the highest level of activity among insured individuals. Following this group, those with intermediate education ranked second, trailed by primary, illiterate, and university-educated individuals.

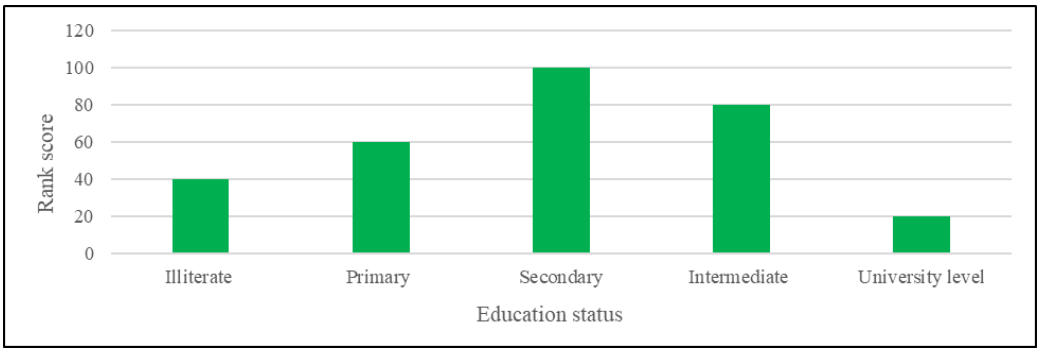

Figure 3: Graphical representation of insured based on educational status

3.3 Preference to insurance practices

Agriculture insurance has a long history in Nepal, spanning seven decades. However, it was only in 2013 that it was implemented as a separate policy. Despite its critical need, the Nepalese government only recently introduced an agriculture insurance policy in 2013. In Nepal, there are a total of 20 non-life insurance companies. All of these companies receive services from the government across all 77 districts (BeemaSamiti, 2017). Despite the potential and opportunities, companies show limited interest in agriculture, particularly crop insurance. It is observed that crop insurance requires improved technologies such as seeds, fertilizers, pesticides, and regular supervision, posing higher risks for companies compared to livestock insurance. Consequently, livestock insurance is evidently favored over crop insurance. The insurance markets work perfectly if the underlying risks are independently distributed, risk position of the insured is known, and the insured has no control over the event or the claim. In the case of crop insurance, these conditions are seldom met, leading to market failure (Ahsan et al., 1982). The overall insurance market is particularly higher for livestock than the crop sector (Beema Samiti, 2017).

Utilizing internationally recognized crop insurance practices and assessments by the World Bank regarding their suitability, the agriculture insurance companies were asked to rank their preference and availability of the practices. The ranking of preferred livestock activities permitted by insurance companies was determined using a rating scale. All companies indicated that "all risk" was their most preferred practice, followed by "accident and mortality" in second place, and "epidemic" in third place, with index-based practices being the least preferred.

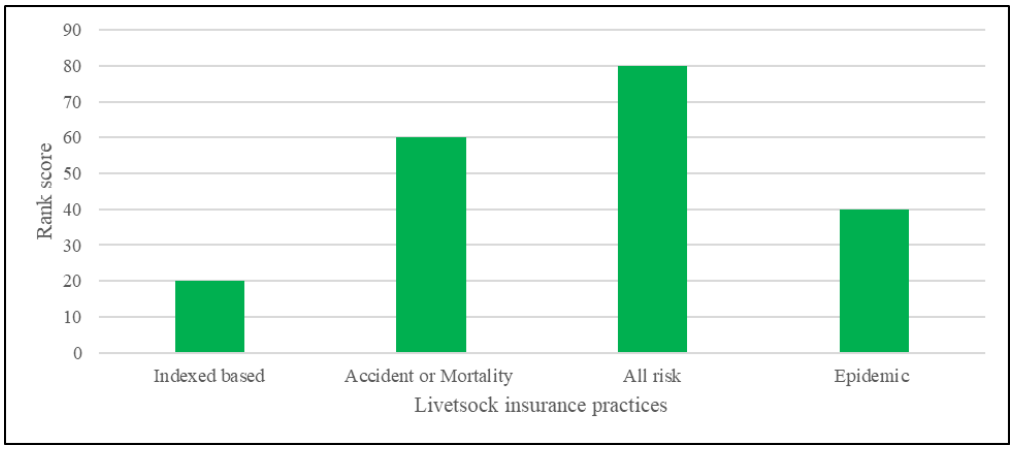

Figure 4: Livestock insurance practices

Also, a rating scale was used to rate the agriculture practices available in insurance companies. Multiple perils were the most favored agricultural insurance method in all businesses, followed by area yield index and crop weather index insurance, respectively. Weather index insurance enables farmers to insure their crops against weather risk in areas where traditional agricultural insurance is not practical. Micro-weather index insurance (individual farmers), meso-weather index insurance (financial institutions), macro-weather index insurance (governments) was the recently introduced concept available in Shikhar insurance but only applicable to the apples. Rashtriya Beema also adopted this method to some extent, particularly for apples. This partial adoption might be because assessing field losses is often expensive or not practical, especially in regions with many small-scale farmers or where insurance markets are not well-established (WFP and IFAD, 2015). All the insurance practices are graphically represented.

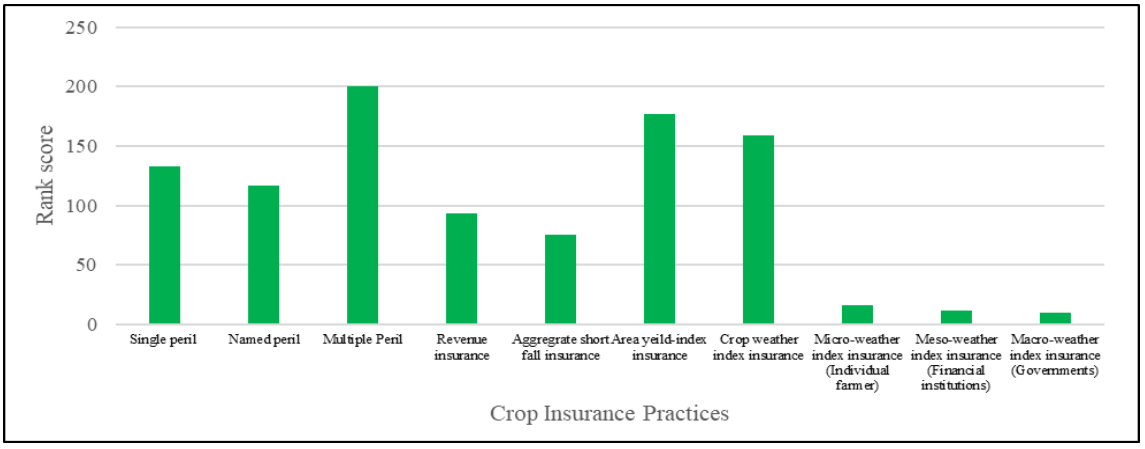

Figure 5: Crop Insurance Practices

3.4 Compensation triggers and product compensations

When companies were surveyed regarding the most compensated product, goats emerged as the top choice. This is evident from the table results, which highlighted the loss of animals due to disease as the most triggering event. A study focusing on Shikhar insurance in Dhading also corroborated these findings, showing goats to be the most insured livestock (Bidari, 2017). Similarly, cardamom claimed the second position due to its high susceptibility to viral diseases, a fact supported by the table indicating plant disease as the second most triggering factor for compensation events. While all compensated productions are meticulously tabulated and ranked graphically, it is noteworthy that irrigation and declining crop prices do not feature among the primary causes of compensatory events based on realistic scenarios.

Table 1: Compensation triggering events

SN.	Compensation	Rank Score	Rank
1	Flood	200	3
2	Drought	137	5
3	Variability in rainfall	105	8
4	Insect pest attack	167	4
5	Plant disease	211	2
6	Fire	94	9
7	Irrigation	130	6
8	Decline in crop prices	123	7
9	Failure of new technology	85	10
10	Unsuccessful investment	43	11

3.5 Sustainability of crop insurance

Climate change has led to a gradual rise in temperature, increased variability in rainfall, rising sea levels, and more frequent, intense, and prolonged extreme weather events, significantly heightening the risk to agricultural production (IPCC, 2007; Swain, 2014). Furthermore, the rapid pace of globalization has increased the integration of domestic markets with the global food market, significantly escalating price risk (Swain, 2008). A major challenge in implementing crop insurance is the uneven knowledge distribution between insurers and insured individuals regarding the causes of crop failure, potentially leading to adverse selection issues. Therefore, there is a high demand for subsidized packages, as subsidizing premiums can greatly enhance farmer enrollment and contribute to the sustainability of schemes (Liang, 2014; Babcock, 2015).

Table 1: Test for significance of sustainability

S.N	Variables	Test of Significance				
		Values	Coefficient	Standard Error	Z value	Pr(>|z|) value
1	Sustainability vs. Single Peril	Single Peril 5	5.9533	973.4983	0.006	0.995
		Single Peril 7	-5.1985	688.3673	-0.008	0.994
2	Sustainability vs. Named Peril	Named Peril 5	-5.953	973.498	-0.006	0.995
		Named Peril 8	-11.152	1192.287	-0.009	0.993
3	Sustainability vs. Revenue Insurance	Revenue Insurance 7	-5.3529	973.4983	-0.005	0.996
		Revenue Insurance 9	-5.3529	688.3673	-0.008	0.994
4	Sustainability vs. Aggregate short fall insurance	Aggregate short fall 7	-5.58E+00	9.74E+02	0.005	0.996
		Aggregate short fall 10	-2.16E-09	1.19E+03	0	1
5	Sustainability vs. Area yield index insurance	Area yield index 3	6.0066	973.4983	0.006	0.995
		Area yield index 4	-5.1451	973.4983	-0.005	0.996
6	Sustainability vs. Crop Weather Index Insurance	Crop Weather Index 4	5.8759	605.1021	0.01	0.992
7	Sustainability vs. Rural Residency	Rural Residency 5	5.497	784.256	0.007	0.994
		Rural Residency 6	11.5	1753.65	0.007	0.995
8	Sustainibility Vs Proper Knowledge	Proper Knowledge 4	-0.97101	0.68176	-1.424	0.154
9	Sustainability vs. Moral Hazard	Moral Hazard 4	5.75	1109.00	0,005	1.00
		Moral Hazard 5	11.50	1921.00	0.01	1.00
		Moral Hazard 6	0.00	1358.00	0.00	1.00
		Moral Hazard 7	0.00	1921.00	0.00	1.00
10	Sustainability vs. Staff Mobilization	Staff Mobilization 6	5.42	486.75	0.01	0.99
11	Sustainability vs. Satisfaction of Government Scheme	Satisfaction of Government Scheme3	-0.84	0.60	-1.40	0.16
12	Sustainability vs. Company connection	Company connection 2	-5.19	427.87	-0.01	0.99
		Company connection 3	-0.22	0.64	-0.34	0.73
13	Sustainability vs. Employee Satisfaction	Employee Satisfaction 5	0.27	0.58	0.47	0.64

As illustrated above, thirteen different models were set to check the significance level between sustainability and different independent variables. None of the models were found significant at a 95% confidence level (Pr (>|z|) value 0.05). The disagreement of the model may be due to other influential factors that may have been missed during the model grounding.

Table 2: Correlation analysis

	Sustainability	Single Peril	Rural Residency	Proper Knowledge	Moral Hazard	Staff Mobilization	Satisfaction Gv Scheme	Company Connection	Employe Satisfaction
Sustainability	1	-0.167	0.424	-0.319	-0.244	0.367	-0.314	-0.105	0.105
Single Peril	-0.167	1	-0.615	0.409	0.436	-0.632	-0.055	0.25	0.055
Rural Residency	0.424	-0.615	1	-0.559	-0.629	0.967	-0.293	-0.332	-0.293
Proper Knowledge	-0.319	0.409	-0.559	1	0.342	-0.681	0.105	0.361	-0.105
Moral Hazard	-0.244	0.436	-0.629	0.342	1	-0.699	0	0.673	0.093
Staff Mobilization	0.367	-0.632	0.967	-0.681	-0.699	1	-0.25	-0.444	-0.25
SatisfactionGvScheme	-0.314	-0.055	-0.293	0.105	0	-0.25	1	-0.111	0.2
Company Connection	-0.105	0.25	-0.332	0.361	0.673	-0.444	-0.111	1	-0.222
EmployeE Satisfaction	0.105	0.055	-0.293	-0.105	0.093	-0.25	0.2	-0.222	1

The above-illustrated table represents the correlation among various factors that affect the adoption of agricultural insurance among stakeholders. Within the nine factors, the highest positive correlation was between Staff Mobilization and Rural Residency, with a strong positive relationship of 0.967. The second greatest positive correlation was between Connection among company and Moral Hazard with a moderately positive relationship of 0.673. An increase in any one of the two factors results in almost a perfect linear rise in the other factor and vice versa.

On the other hand, the relationship between Staff mobilization and Moral Hazard showed the highest negative correlation with a strongly negative value of -0.699. It was closely followed by the relationship between Proper Knowledge and Staff Mobilization with a moderately negative value of -0.681. For each pair of factors showing negative correlation among each other, an increment in one factor results in a decrement of its corresponding one. The correlation coefficient value explains the rate at which its corresponding factor decreases.

In conclusion, some factors show a great positive correlation with each other and work great in synergy. There are also equally many negative correlations that negatively affect each other and are best avoided. Some of the relations are exhibiting very low correlation as well and are not worth going after. Each factor relationship is explained by the correlation table above, and one can easily determine the best factor combinations herewith.

Table 3: Marginal effect on sustainability

S.N	Variables	Marginal effect test				
		Values	Coefficient	Standard Error	Z value	Pr(>|z|) value
1	Sustainability vs. Single Peril	Single Peril 5	0.82	18.36	0.04	0.96
		Single Peril 7	-0.47	19.36	-0.02	0.98
2	Sustainability vs. Named Peril	Named Peril 5	-0.93	15.63	-0.06	0.95
		Named Peril 8	-0.70	51.00	-0.01	0.99
3	Sustainability vs. Revenue Insurance	Revenue Insurance 7	-0.22	20.60	-0.01	0.99
		Revenue Insurance 9	-0.31	17.22	-0.02	0.99
4	Sustainability vs. Aggregate short fall insurance	Aggregate short fall 7	0.41	46.40	0.01	0.99
		Aggregate short fall 10	0.00	281.02	0.00	1.00
5	Sustainability vs. Area yield index insurance	Area yield index 3	0.75	15.33	0.05	0.96
		Area yield index 4	-0.45	19.25	-0.02	0.98
6	Sustainability vs. Crop Weather Index Insurance	Crop Weather Index 4	0.68	0.11	6.42	0.00
7	Sustainability vs. Rural Residency	Rural Residency 5	0.63	33.22	0.02	0.99
		Rural Residency 6	0.95	20.80	0.05	0.96
8	Sustainability vs. Proper Knowledge	Proper Knowledge 4	-0.32	0.19	-1.67	0.10
		Moral Hazard 4	0.72	129.92	0.01	1.00
		Moral Hazard 5	0.99	6.85	0.14	0.89
		Moral Hazard 6	0.00	122.40	0.00	1.00
		Moral Hazard 7	0.00	173.11	0.00	1.00
10	Sustainability vs. Staff Mobilization	Staff Mobilization 6	0.44	0.12	3.53	0.00
11	Sustainability vs. Satisfaction of Government Scheme	Satisfaction of Government Scheme	-0.30	0.20	-1.48	0.14
12	Sustainability vs. Company connection	Company connection 2	-0.39	0.12	-3.39	0.00
		Company connection 3	-0.06	2.22	-0.03	0.98
13	Sustainability vs. Employee Satisfaction	Employee Satisfaction 5	0.10	0.21	0.47	0.64

All illustrated above, all the thirteen models used for the test of significance were used to calculate the marginal effect of sustainability with different variables. Here, three variables: weather index, staff mobilization, and company connection, were found to have a highly significant marginal effect on sustainability. Research conducted in Thailand also suggests that the crop weather index can mitigate the impact of drought and increase the adoption of agriculture insurance which may also be true for a country like Nepal, where agriculture depends highly on rainfall (Sinha et al., 2016). Proper knowledge had a significant marginal effect on sustainability, whereas the remaining nine of the variables had no marginal effect on the likelihood of sustainability. For each model, different values were checked, considering a reference point just below the values used.

4. Conclusion

The agricultural sector in comparison to industries like manufacturing, mining, and services exhibits significantly lower insurance adoption rates. This disparity arises from farmers viewing insurance as an unnecessary cost rather than a proactive risk management tool. Factors such as age, experience, education level, land size, insurer credibility, and satisfaction play crucial roles in shaping farmers' preferences, directly impacting their risk aversion and influencing insurance demand. A key obstacle in Nepal's agriculture insurance uptake is the lack of confidence among users and providers, influenced by various consumer-related factors. Nevertheless, the utilization of agricultural insurance to expand operations into the life insurance sector by providers is observed. A gap exists between technological advancements and farmers' comprehension, necessitating the implementation of diverse mitigation strategies like advertising, extension services, and the development of appealing insurance policies. Farmer awareness of insurance products is enhanced through active engagement in social and community-based organizations such as farmers' unions, self-help groups, watershed unions, and cooperative credit societies. An immediate requirement for a structured agricultural insurance system is evident, underscoring the effectiveness of a program that integrates with agricultural insurance.

Recomendations

Recommendations include facilitating discussions among insured individuals, insurers, and governmental bodies to streamline compensation and subsidy processes. The creation of a national database offering precise agricultural data, yield metrics, production losses, mortality rates, and meteorological information to insurers can bolster product enhancement. Further research is advised to evaluate basis risk scale, farmers' acceptance of innovative programs, willingness to pay, and the impact on agricultural practices. Enhancing staff mobilization through local technician recruitment and contract hiring is suggested, along with empowering insurance companies to tailor individualized schemes for agriculture insurance.

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