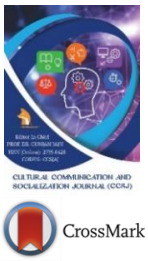
ZIBELINE INTERNATIONAL™ PUBLISHING

ISSN: 2735-0428 (Online)
CODEN: CCSJAJ

Cultural Communication and Socialization Journal (CCSJ)

DOI: http://doi.org/10.26480/ccsj.02.2023.92.97



RESEARCH ARTICLE

COMPARE AND CONTRAST THE PERCEPTIONS TOWARDS THE SAFE PRODUCTION BEHAVIOR BETWEEN COOPERATIVE MEMBERS AND NON-COOPERATIVE MEMBERS IN ANBUKHAIRENI RURAL MUNICIPALITY, NEPAL

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ARTICLE DETAILS

Article History:

Received 10 August 2023
Revised 14 September 2023
Accepted 17 October 2023
Available online 23 October 2023

ABSTRACT

Nepal government has prioritized cooperative development for easy access to agricultural inputs, the adoption of improved technology, and the development of a sustainable market. A study was conducted to compare and contrast the perceptions towards the safe production behavior between cooperative members and non-cooperative members in Anbukhaireni Rural Municipality, Nepal Milijuli Krishi Utpadak Sahakari and Akala Krishi Sahakari were purposefully selected for the study. Ninety-one (91) cooperative members were randomly selected and ninety (90) non-cooperative members were selected through convienence sampling. A convergent parallel method was adopted, a face-to-face method of interview schedule followed by the mWater surveyor application was used for data collection. The five likert scale technique was used to indicate the extent of the perception of farmers' towards various statements. The perception of the respondents was analyzed using chi-square test, and the Mann-Whitney U test. Probit regression was used to determine socio-economic factors affecting farmers participation in cooperatives. The cooperative members had the nearest market distance ($z=-6.99$, $p<0.01$) and were more involved in commercial farming ($z=4.40$, $p<0.01$). The probability of farmers' participation was 12 % and 4.3 % higher for the farmers with gender as head of the household ($z=2.52$, $p<0.05$) and farmers who have received training related to cooperatives ($z=2.09$, $p<0.05$). In the perception study, the cooperative members agreed with the statements of input supply situation, saving/credit facility provided, technology adoption, and adoption on post-harvest operations as compared to non-cooperative members. The cooperative and non-cooperative members showed differences in the marketing behaviours with the point of sale ($\chi^2=326.98$, $p<0.01$), mode of transportation ($\chi^2 = 250.65$, $p<0.01$), and the price determination ($\chi^2 =288.042$, $p<0.01$).Therefore, training on the importance of agricultural cooperatives especially targeted to females, farmers with large farm sizes, and farmers whose farms are a bit farther from the market was suggested for safe agricultural production. Moreover, widespread development of the agricultural market (if not collection centers) should be made for sustainable agricultural production.

KEYWORDS

cooperatives, safe production behavior, cooperative services

1. INTRODUCTION

The constitution of Nepal 2015 accepts cooperative as one of the three pillars of economic development (public, private, and cooperative). Cooperatives provide comprehensive service support for farmers throughout the whole production procedure (Li et al., 2021). An agricultural cooperative plays a pivotal role in agricultural development by disseminating necessary information to farmers, imparting skills to them, and providing inputs (such as fertilizers, and seeds, etc) at an affordable price (Aref, 2011; **Tefera et al., 2017)**. Smaller units of agricultural business (small farms, small agro-based enterprises, and consumer units) can't compete with large industries and farms in free-market conditions because of higher transaction costs in operation and marketing. This situation can be overcome if these small units join together to work in the form of cooperatives. Through the collective action of cooperative smaller units of agricultural business can negotiate better prices for inputs, transport, and storage facilities (Tefera et al., 2017). Cooperatives play an important role in shaping farmers towards safe production behavior (Ji et al., 2019). Therefore, it is crucial to study the contribution of agricultural cooperatives in the agricultural extension service sector.

Nepalese farmers face challenges due to lack of regular market for farm inputs and outputs, inaccessibility of appropriate farming technology, lack of skills, and lack of proper information. The individual efforts of farm comprise higher transaction cost in terms of bargaining, information searching, and transportation (Abe, 2016; Terfera et al., 2017). Collective action in the form of cooperatives can be a possible way to address the constraints of production and marketing (Naziri et al., 2014). Agricultural cooperatives have been playing significant roles by the disbursement of off-farm credit, farm supplies, farm subsidies, marketing, and agro-processing in Nepal (Bharadwaj, 2012).

Although cooperatives have the magnificent potential to supply farm inputs and establish sustainable market agricultural development, attempts to organize farmers into cooperatives have often failed in

Quick Response Code	Access this article online	
	Website: www.ccsj.com.my	**DOI:** 10.26480/ccsj.02.2023.92.97

Cite The Article: Pratap P, Milan Subedi, Mahesh Jaishi, Raju Ghimire (2023). Compare and Contrast the Perceptions Towards the Safe Production Behavior Between Cooperative Members and Non-Cooperative Members in Anbukhaireni Rural Municipality, Nepal. *Cultural Communication and Socialization Journal, 4(2): 92-97.*

developing economics like Nepal. This is due to a lack of fundamental understanding of the importance of agricultural cooperatives in strengthening input supply, technical assistance, technology adoption, and assurance of the market (Simkhada, 2013). There are a plethora of agricultural cooperatives in Nepal but they are not significant in providing technology and input services to their members (Neupane, 2015). Additionally, most of the farmers were unaware of the benefits they get after the involvement in cooperatives (Neupane, 2015). Despite having immense potential, Nepalese cooperatives have less impact on the overall agricultural development of the nation. The main functions of cooperatives are largely confined to the distribution of credit, fertilizers, and procurement of farm products for national food stocks.

Marketing and agro-processing activities employing agriculture cooperatives are still not satisfactory. Many agricultural cooperatives have only become the venue in implementing some of the government-sponsored programs. A study reported that farmer cooperatives have often failed because of problems in holding management accountable to the members leading to inappropriate political activities or financial irregularities in management (Niroja et al., 2015). Cooperative acts as a vehicle for input supply, provide various services, and provide technical assistance about the use of inputs (Markelova et al., 2009; Dorward et al., 2004; Kindness and Gordon, 2001). The cooperatives increase the chance of adoption of fertilizers, pesticides, improve technical efficiency of crop production and adoption of modern recommended technologies (Tefera et al., 2017; Abate et al., 2014). Besides, agricultural cooperatives provide training in improved crop production techniques which increases the chance of technology adoption. A group researchers reported about agricultural cooperatives increase the chance of adoption of agricultural technologies (Wossen et al., 2017; Zhang et al., 2020; Manda et al., 2020).

Cooperative provides low-cost credit for agricultural production and the procedure of obtaining the credit from cooperative is quite easier compared to other institutions (Tefera et al., 2017). The soft loan provided by the cooperatives aspires farmers towards commercial farming. Additionally, the farmers who are involved in cooperatives are more likely to adopt modern technology which increases the chances of commercialization in agriculture (Bernard et al., 2008). Similarly, reported that cooperatives strengthen the transportation system of agricultural commodities and increase the efficiency of farmers by providing various training in post-harvest storage and processing (Tefera et al., 2017). Further, some researchers reported that the adoption of post-harvest technologies is higher for cooperative members (Tiamiyu et al., 2014; Udoh, 2016). The collective action of cooperative creates all smallholders farmer to poll all the resources and information to overcome risk related to market and can access market easily (Tefera et al., 2017).

Additionally, agricultural cooperatives provide collective market information, vertical coordination in value chains (Tefera et al., 2017). A study reported high transaction cost is the major constraint for small farmers' participation in the market (Holloway et al., 2000; Gabre-Madhin, 2001). Additionally, reported the high transaction cost in the market is due to poor market information, weak bargaining power, and small farm size (Abebe et al., 2016; Tefera et al., 2017). Gyau, Mbugua, and Oduol found that collective action taken by farmers' organizations in Kenya could improve farmers' access to agricultural assets as well as credit, improve farmers' income, and technology adoption (Gyau et al., 2016). The agricultural cooperative provides training on agricultural technologies (Udoh, 2016; Tefera et al., 2017). Adoption of agricultural technologies increases the chance of commercialization. Socio-economic factors like gender, age, type of family, distance to market, size of the farm, etc. influence the farmer's participation in cooperatives (Karlı et al., 2006; Olila, 2014). Small farmers benefit from input subsidies, low-cost credit, and market information, therefore increase the chance of participation in agricultural cooperatives (Tefera et al., 2017; Karlı et al., 2006).

Therefore, this study seeks the answer to the following objectives:

- To compare and contrast the perceptions towards the safe production behavior between cooperative members and non-cooperative members in Anbukhaireni Rural Municipality, Nepal

To examine and determine socio-economic factors affecting farmers' participation in the cooperatives.

2. Materials and Method

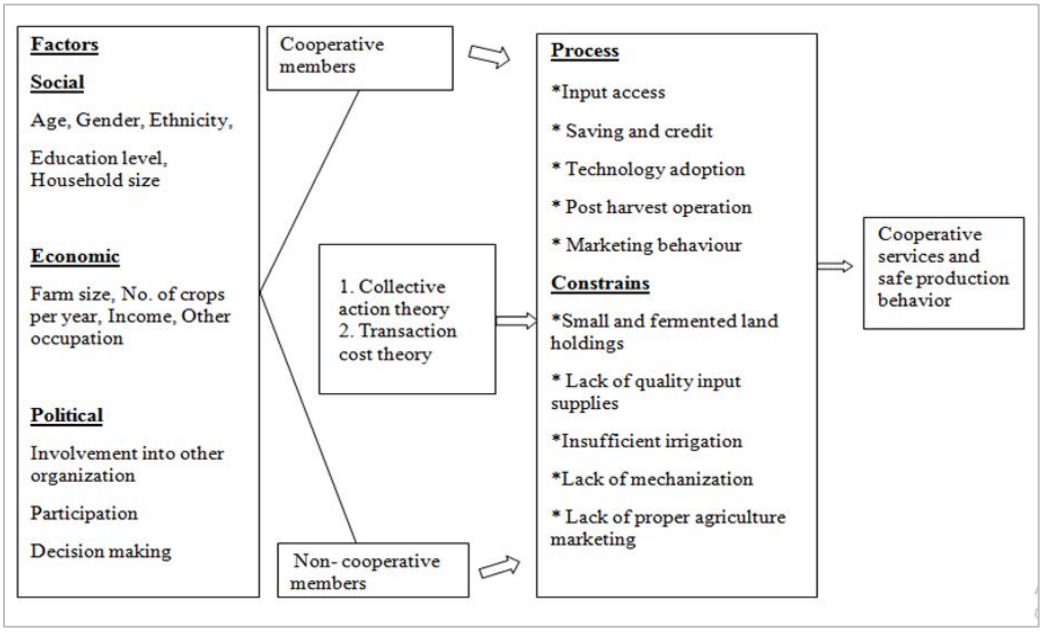

Figure 1: A conceptual framework for cooperative services and safe production behavior

2.1 Study Area

The study was conducted in Anbukhaireni rural municipality, a typical mid-hill of Tanahun district of Gandaki Province, Nepal. Two co-operatives, Milijuli Krishi Utpadak Sahakari and Akala Krishi Sahakari from Anbukhaireni rural municipality were purposefully selected because of the large number of farmers were involved in those cooperatives.

2.2 Research Method and Design

The nature of the research was cross-sectional; therefore, a convergent parallel method design was used. In this type of research design, both quantitative and qualitative data were collected in parallel, analyzed separately, and then finally merged. Additionally, the Likert scale was used for the perception. Perception on a five-point scale was measured as;

Highly agree=1, Agree=2, Cannot decide=3, Disagree=4, Highly disagree=5

2.3 Probit Regression

Factor affecting farmer's participation in cooperatives was binary, a farmer either participates in cooperatives or not. Therefore, factors affecting farmers' participation in cooperatives were binary and can be analyzed by using binary models. If the farmer was a member of cooperatives it takes 1 and 0 otherwise. Therefore, the probit model was used to determine the socioeconomic factors affecting farmers' participation in cooperatives. The probit model was based on the cumulative normal probability distribution. The binary dependent

variable, y< takes on the values of zero and one (Aldrich and Nelson, 1984; Adhikari et al., 2019). It was assumed that the i^{th} farmers obtain maximum utility, it has farmers participation in cooperative over non-participation. The probability Pi of choosing any alternative over not choosing it can be expressed by the following equation, where φ represents the cumulative distribution of the standard normal random (Adhikari et al., 2019).

$$P_i = \text{prob}\,[Y_i=1\ \text{lxl} = \int_{-\infty}^{xi'ß} (2\,\pi^{\frac{-1}{2}} \exp(-\frac{t^2}{2})dt = \varphi(x_i'ß)$$

Table 1: Description of variables used in the probit model

Variables	Variables description
Age of respondent	Years
Gender of household head	1= male and 0=female
Household size	Number of family members in a house
Type of family	1= nuclear and 0= joint
Schooling years	Years of schooling
Farm size	size of farm in ropani
Type of farm	1=commercial and 0= subsistence
Training received	Number of training received
Distance to the nearest market	Distance of nearest market from the farm in kilometers

3. Results and Discussion

3.1 Perception of The Input Supply Situation

The perception of cooperative members and non-cooperative members towards the input supply situation is presented in Table 2. The cooperative members were highly agreed with the statements; getting inputs as per demand (1.47), on time (1.53), getting easily (1.51), getting at an affordable price (1.70), getting quality inputs (1.94), and availability of inputs nearby farm (1.87).

Similarly, non-cooperative members also agreed with these statements-but the extent was higher among cooperative members. Mann-Whitney U value was significant at P<0.01 which indicates the extent of agreement on listed statements of cooperative members was higher than non-cooperative members. The average index of the cooperative members toward the input supply situation was 1.67 whereas that of non-cooperative members was 2.79. A plausible explanation to this statement is attributed to the fact that cooperative acts as a vehicle for input supply, provide various services, and provide technical assistance about the use of inputs (Kindness and Gordon, 2001; Dorward et al., 2004; Markelova et al., 2009). Additionally, cooperatives supply quality inputs at low cost than other input suppliers (Tefera et al., 2017).

Table 2: Perception on Input Supply Situation in The Study Area of Anbukhaireni Rural Municipality, 2020

Statements	Cooperative members	Non- cooperative members	Mann-Whitney U
Getting inputs as per demand	1.4725	2.2697	1495.500***
Getting inputs on time	1.5385	2.3034	1688.500***
Getting inputs easily	1.5165	2.7865	1233.000***
Getting inputs at an affordable price	1.7033	3.3483	1150.000***
Getting quality inputs	1.9451	2.7528	2181.500***
Availability of inputs nearby farm	1.8571	3.3258	1453.000***
Average index	1.6722	2.7978	

*** indicate significant at p< 0.01 Source: Field survey, 2020

3.2 Perception on Saving/Credit Facility Provided by Cooperatives

The perception of cooperative members and non-cooperative members towards saving/credit facilities provided by cooperatives is presented in Table 3. Based on the respondent's perception the cooperative members were highly agreed with the listed statements of saving/credit facility provided.

Mann-Whitney U value was significant at P<0.01 which indicates the extent of agreement on listed statements of cooperative members was higher than non-cooperative members. The average index of the cooperative members toward the saving credit facility was 1.73 whereas that of non-cooperative members was 3.17. The index value depicted that the cooperative members were highly agreed towards statements of saving/credit facility provided by cooperatives as compared to non-cooperative members. This can be attributed to the fact that cooperative provides low-cost credit for agricultural production, and the procedure of obtaining the credit from cooperative was quite easier as compared to other institutions (Tefera et al., 2017).

Table 3: Perception on Saving/Credit Facility Provided by Cooperatives in The Study Area of Anbukhaireni Rural Municipality, 2020

Statements	Cooperative members	Non-cooperative members	Mann Whitney U value
Credit facility as per demand	1.6264	2.8764	1378.000***
Scientific interest rate	1.7253	3.0562	1411.000***
Easier procedure for saving/credit	1.7473	3.2584	1281.500***
Timely availability of credit	1.7143	3.1685	1236.000***
Feel secured on saving in cooperatives	1.6044	2.6180	1595.000***
Getting information on saving/credit	2.0220	4.0449	918.000***
Average index	1.7399	3.1704	

*** indicates significant at p< 0.01 Source: Field survey, 2020

3.3 Adoption of Improved Farming Technology

The perception of cooperative members and non-cooperative members towards the statement of adoption of improved technology is presented in Table 4. The cooperative members agreed to the statement of using machines in farming (1.84).

Mann-Whitney U value was non-significant for the statements of using poly house technology and production of off-season vegetables among cooperative and non-cooperative members. There was significant at P<0.01 for other listed statements which indicates the extent of agreement of cooperative members was higher than non-cooperative members. The index value of the cooperative members toward adoption of improved farming technology was 3.02 whereas that of non-cooperative members was 3.49. The cooperative increases the chance of adoption of fertilizers, pesticides, improve technical efficiency of crop production, and adoption of modern recommended technologies (Abate et al., 2014; Abebaw and Haile, 2013; Tefera et al., 2017). Additionally, agricultural cooperatives provide training in improved crop production techniques which increases the chance of technology adoption. A group researchers reported about agricultural cooperatives increasing the chance of adoption of agricultural technologies (Wossen et al., 2017; Zhang et al., 2020; Manda et al., 2020).

3.4 Level of Adoption on Post-Harvest Operations

The adoption behavior of cooperative members and non-cooperative members with the processing of the agricultural commodity before marketing is presented in Table 5. Most of the statements related to the adoption of post-harvest operations were agreed upon by the cooperative members.

However, two statements, namely proper storage and proper packaging were not agreed upon by cooperative members. Mann-Whitney U value was significant at P<0.01 which indicates the extent of agreement on listed statements of cooperative members was higher than non-cooperative

members. The average index of the statements of cooperatives members towards adoption of post-harvest technologies was 2.03 whereas that of non-cooperative members was 3.09. The positive perception of cooperative members towards post-harvest processing might be because cooperatives provide various training in post-harvest storage and processing (Tefera et al., 2017). Similarly, some researchers reported that the adoption of post-harvest technologies is higher for cooperative members (Tiamiyu et al., 2014; Udoh, 2016).

Table 4: Level of Adoption of Improved Farming Technology in The Study Area Anbukhaireni Rural Municipality, 2020

Statements	Cooperative Members	Non-cooperative members	Mann-Whitney U
Using of ploy house technology	4.1099	3.9551	3574.500
Using mulching practices	3.1758	3.8539	2854.500***
Adoption of drip irrigation	3.7143	4.2360	3737.500***
Production of off-season vegetables	2.5495	2.6629	3150.000
Using machines in farming	1.8462	3.0000	3228.000***
Adoption of IPM practices	2.7473	3.2584	1819.000***
Average index	3.0238	3.4944	

*** indicates significant at p< 0.01 Source: Field survey, 2020

Table 5: Adoption of Post-Harvest Operations In The Study Area of Anbukhaireni Rural Municipality, 2020

Statements	Cooperative members	Non-cooperative members	Mann-Whitney U
Harvesting on time	1.3187	1.9438	2071.500***
Harvesting with an appropriate method	1.3516	1.9663	1560.500***
Applying cleaning procedures	1.6374	2.9663	1551.500***
Applying sorting procedures	1.7802	3.1124	1367.500***
Proper grading procedures	1.8571	3.7753	1133.500***
Proper packaging	3.2637	4.0449	2014.000***
Proper storage	3.0333	3.8315	2183.000***
Average index	2.0345	3.0915	2071.500***

*** indicates significant at p< 0.01 Source: Field survey, 2020

3.5 Impact of Cooperatives in Marketing

The impact of cooperatives in marketing is presented in Table 6. The table depicted that there was a statistically significant difference between cooperative members and non-cooperative members for marketing behavior, mode of transportation, and price determination.

The main market for cooperative members was the collection center, however, the vendor for non-cooperative members. The difference was statistically significant at the 1 % level. Pick up and Person (manual transportation) were the major mode of transportation of the agricultural produce to markets. A study reported that cooperatives strengthen the transportation system of agricultural commodities (Tefera et al., 2017). 22.8% of cooperative members and 53.3% among the non-cooperative members used manual methods of transportation of their agricultural produce. Additionally, the result revealed that among the cooperative members, agricultural traders and cooperatives were the major price determiners of agricultural produce; however, among the non-cooperative members, traders and vendors were major price makers. The result indicates that the collective action of cooperative promotes smallholder's participation in markets and enhances bargaining power (Tefera et al., 2017).

Table 6: Marketing Behaviors of Members and Non-Members of The Study Area of Anbukhaireni Rural Municipality, 2020

Marketing behaviours	Cooperative member (91)	Non-cooperative member (90)	Chi-square value	P-value
Point of sale				
Farmgate	9(9.9)	13(14.4)		
Collection center	75 (82.4)	28(31.1)		
Mandi	3 (3.3)	6 (6.7)	326.984***	0.00
Vendor	2 (2.2)	30 (33.3)		
others	2(2.2)	13 (14.4)		
Mode of transportation				
Pick up van	19 (20.9)	31(34.4)		
Motorcycle	8 (8.8)	3 (3.3)		
Cycle	1 (1.1)	1 (1.1)	250.65***	0.00
Bus	6 (6.0)	2 (2.2)		
Manual	57 (22.8)	40 (53.3)		
Price determination				
Traders	43 (47.3)	37 (41.4)		
Cooperatives	33 (36.3)	11 (12.2)		
Farmers	4 (4.4)	8 (8.9)	288.042***	0.00
Vendors	8 (8.8)	31 (34.4)		
Mandi	0 (0.0)	1 (1.1)		
Others	3 (3.3)	2 (2.2)		

*** indicates significant at p< 0.01 Source: Field survey, 2020

3.6 Marketing Perception of Cooperative Members And Non-Cooperative Members

The perception of cooperative members and non-cooperative members towards marketing is presented in Table 7. Based on the perception of respondents, the cooperative members were highly agreed with the statements of selling of agriculture commodities (1.659). However, cooperative members were not agreed with the statement using ICTs tools for marketing. Mann-Whitney U value was significant at P<0.01 which indicates the extent of agreement on listed statements of cooperative members was higher than non-cooperative members. The average index of the cooperative members toward the marketing was 2.66 whereas that of non-cooperative members was 3.65.

A group researchers reported high transaction cost is the major constraint for small farmers' participation in the market (Holloway et al., 2000;

Gabre-Madhin, 2001). Additionally, some researchers reported the high transaction cost in the market is due to poor market information, weak bargaining power, and small farm size (Abebe et al., 2016; Tefera et al., 2017). The collective action of cooperative creates all smallholders farmer to poll all the resources and information to overcome risk related to market and can access market easily (Tefera et al., 2017). Additionally, agricultural cooperatives provide collective market information, vertical coordination in value chains (Tefera et al., 2017). Therefore; the cooperative members agreed with the statements than non-cooperative members.

Table 7: Marketing Perception Between Cooperative Members and Non-Cooperative Members in The Study Area of Anbukhaireni Rural Municipality, 2020

Statements	Cooperative member	Non-cooperative member	Mann-Whitney U
Selling all of agriculture commodity	1.6593	2.8315	1523.000***
Receiving better price	2.0659	3.573	1297.500***
Easy marketing channel	2.2308	3.5169	1784.000***
Receiving reliable market information	2.4615	3.5281	1927.500***
Doing market research	2.978	3.8539	2013.000***
Using ICTs tool for marketing	3.978	4.3258	3199.000**
Average index	2.6656	3.6533	

*** indicates significant at p< 0.01 Source: Field survey, 2020

3.7 Socio-Economic Factors Affecting Farmers' Participation in Cooperatives

The probit model was used to assess the factor influencing the farmer's participation in cooperatives. The good explanatory power of the model was revealed through likelihood ratio Chi-square (LR chi^2) which was found statistically significant at a 1% level. The pseudo R^2 ratio was 0.636. Among the nine variables included under the model, farm size, type of farm, and distance to the nearest market were statistically significant at a 1% level. However, the gender of household head and the number of training received on agricultural cooperatives were statistically significant at a 5% level. (Table 8). It has been found that farmers with commercial farms and short distances between farms and markets were more likely to participate in cooperatives. The probability of farmers, participation in cooperatives was 20.3% and 8.3% higher for the farmer with commercial farms and a short distance to market.

The positive relation between commercialization in farms and participation in cooperatives is attributed to the fact that an agricultural cooperative provides training on agricultural technologies (Tiamiyu et al., 2014; Udoh, 2016; Tefera et al., 2017). Additionally, the dissemination of information about modern technology was higher among cooperative members. Further, the adoption of agricultural technologies increases the chance of commercialization (Asfaw et al., 2011). The negative relation between market distance and farmer's participation in the agricultural cooperative is attributed to the fact that farmers with the nearest market easily gain market and other agricultural information and farmers with equipped knowledge in agricultural production and marketing are more likely to participate in cooperatives.

Similarly, the probability of farmers' participation in cooperatives was 12.0% and 4.3% higher for the farmers with gender as head of household and farmers who have received training about cooperatives. Consistent with our assumption, males as household heads had a positive relationship with the farmers' participation in cooperatives. A similar result was observed by (Olila, 2014). A plausible explanation for this statement is attributed to the fact that the education level of the male is higher than females in Nepal (Adhikari et al., 2019).

Table 8: Socio-Economic Factors Affecting Farmers' Involvement in Cooperatives Activities in The Study Area of Anbukhaireni Rural Municipality, 2020

Variables	Coefficients	Robust Marginal effects	Std. Err.	z	P>z
Age (years)	-0.015	-0.002	0.014	-1.09	0.274
Gender	0.849	0.120	0.336	2.52**	0.012
HH size	0.026	0.004	0.155	0.17	0.868
Family type	-0.335	-0.047	0.438	-0.76	0.445
Schooling years	-0.006	-0.0009	0.038	-0.17	0.863
Farm size	-0.079	-0.011	0.032	-2.52***	0.012
Type of farm	1.434	0.203	0.326	4.40***	0.00
Training received (number)	0.303	0.043	0.145	2.09**	0.037
Distance to nearest market	-0.576	-0.082	0.082	-6.99***	0.00
Constant	0.551		1.190	0.46	0.643
Number of observation = 181					
Log pseudo likelihood = -45.634202					
Wald $chi^2(9)$= 75.82					
Prob> chi^2 =0.00					
Pseudo R^2 =0.636					

Additionally, educated people are more aware of the benefits of agricultural cooperatives and increase the chances of participation (Karlı et al., 2006). Further, farmers who have received training about the influence of cooperatives in agricultural cooperatives were more likely to participate in cooperatives. Contrast with our expectation, farm size had a negative relationship with farmers' participation in cooperatives. A plausible explanation for this statement is attributed to the fact that real farmers of Nepal are small landholders and huge landholders are wealthier and are involved in a profession other than agriculture. Additionally, a study reported that small farmers are more likely to participate in agricultural cooperatives than wealthier farmers (Karlı et al., 2006). Similar negative relation is also observed by (Olila, 2014). Small farmers benefit from input subsidies, low-cost credit, and market information, therefore increase the chance of entrance into agricultural cooperatives (Tefera et al., 2017; Karlı et al., 2006).

4. Conclusion

Prioritizing farming through cooperatives or focusing on farmers' participation in cooperatives is government focus in Nepal these days. In this context, survey research was conducted to evaluate the farmers' safe production behavior and cooperative service in Anbukhaireni rural municipality of Tanahun district of Nepal. Milijuli Krishi Utpadak Sahakari and Akala Krishi Sahakari were selected purposefully because large numbers of farmers were involved in these cooperatives. Based on Yamane's formula, 91 cooperative members and 90 non-cooperative members were selected. A deductive approach and convergent parallel method were adopted for the study. Cooperative members were randomly selected from the list of agricultural cooperatives. However, a convenience sampling technique was used to collect data for non-cooperative members. Mwater application was used for data collection and MS-Excel

was used for data cleaning and editing. The statements were prepared on input supply situation, saving/credit, technology adoption, post-harvest operations, and marketing behaviors. Additionally, the perception of the respondents was evaluated using Cronbach's chi-square test. Probit regression was used to determine socio-economic factors affecting farmers' participation.

There was a difference in socio-economic characteristics between the co-operative and non-cooperative farmers associated with agriculture production. The cooperative members had the nearest market distance, were more involved in commercial farming, agriculture was their major source of income, and their major source of saving/credit was cooperative. Additionally, farmers involved in cooperatives were aged (more experienced), and have attained better education than non-members. However, the cooperative non-members had greater land coverage than cooperative members. Cooperatives members showed safe production behavior in input supply, saving/credit, improved technology adoption, post-harvest operations, and marketing. The extent of agreement on listed statements on input supply, saving/credit, technology adoption, post-harvest operations, and marketing behaviors of cooperative members was higher than non-cooperative members. Distance to market and farm size is negatively related to the farmer's participation in cooperatives. The collection center was the major point of sale for cooperative members. In cooperative members, both cooperative members and traders determine the price of the agricultural commodity but traders and vendors fix the price in the case of non-members. The number of training positively affects the membership decision. Family with male household heads and commercial farmers have a higher probability to be cooperative members.

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Cite The Article: Pratap P, Milan Subedi, Mahesh Jaishi, Raju Ghimire (2023). Compare and Contrast the Perceptions Towards the Safe Production Behavior Between Cooperative Members and Non-Cooperative Members in Anbukhaireni Rural Municipality, Nepal. *Cultural Communication and Socialization Journal, 4(2): 92-97.*