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Effectiveness of Agriculture forestry and environment committee (AFEC) in adoption of Sustainable Soil Management Practices (SSMP) technology in Ramechhap and Dolakha, Nepal

Nepal'in Ramechhap ve Dolakha İllerinde Sürdürülebilir Toprak Yönetim Uygulamaları (SSMP) Teknolojisinin Benimsenmesinde Tarım Ormancılık ve Çevre Komitesinin Etkinliği

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ABSTRACT

This research was conducted in the Ramechap and Dolakha regions of Nepal to analyze the role of AFEC in the adoption of SSMP technology. A total of 120 samples were randomly collected from 4 VDC, namely Sindrawoti, Chisapani, Namdu and Puranogaun. Both qualitative and quantitative information were collected using a semi-structured questionnaire, household survey, important informative interview and focus group discussion. As a result of the study, it was found that the effectiveness of these committees was very important in participatory planning, resource mobilization and agriculture service presentation. Participation of farmers in local level planning is significantly higher in village development committee (VDC) with AFEC (73.3%) than VDC without AFEC (43.3%). AFEC farmers have begun to receive technical service with 2.84 index values compared to farmers without AFEC. The average adoption level is significantly higher in VDC with AFEC (43.69% household(HH)) than with non-AFEC (11.78%). According to the Logit regression model, HH development training and the presence of AFEC were statistically significant in determining the adoption of SSMP technology.

Anahtar kelimeler:

Teknoloji Benimseme
Katılım
Hibe
Kaynak Seferberliği

ÖZET

Bu araştırma, AFEC'in SSMP teknolojisinin benimsenmesindeki rolünü analiz etmek için Nepal'in Ramechap ve Dolakha ilçelerinde gerçekleştirildi. Toplam 40 örnek, 4 VDC'den, yani Sindrawati'den ve Chisapani Namdu, Puranogaun'dan rasgele toplanmıştır. 2 VDC'deki bu 4 VDC'nin içinden AFEC kuruldu. Hem nitel hem de niceliksel bilgi yarı yapılandırılmış anket kullanılarak hanehalkı araştırması, önemli bilgilendirici görüşme ve odak grup tartışması ile toplanmıştır. Çalışmadan, katılımcı planlama, kaynak seferberliği ve tarım hizmeti sunumunda bu komitelerin etkinliğinin son derece önemli olduğu ortaya çıkmıştır. Çiftçilerin yerel düzey planlamasına katılımı AFEC'li VDC'de (% 73,3) AFEC'siz VDC'lere (% 43,3) göre anlamlı derecede yüksektir. AFEC'li çiftçiler, AFEC'siz çiftçilere kıyasla 2.84 endeks değeri ile teknik servis almaya başlamıştır. Ortalama benimseme düzeyi AFEC'li VDC'lerde (yüzde 43.69 HH), AFEC olmayan VDC'ye (yüzde 11.78) göre anlamlı derecede yüksektir. Logit regresyon modeline göre HH geliştirme eğitimi ve AFEC varlığı SSMP teknolojisinin benimsenmesinin belirlenmesinde istatistiksel olarak anlamlı bulunmuştur.

1. INTRODUCTION

Agriculture is considered to be the back bone of Nepalese economy. It is the major source of livelihood for the Nepalese people. About 65.6 percent of the economically active population are engaged in agriculture and one-third (34 percent) of the gross domestic product (GDP) comes from the agriculture and forestry sector. It is apparent that agriculture has an immense role in reducing poverty, ensuring food security and balance of trade of Nepal (MoAD, 2012/13). Contrary to the very important position of agriculture sector in the development of Nepal, the growth rate of agriculture has not been very encouraging due to low investments both by the government and the farmers themselves. Agriculture Forestry and Environmental Committee (AFEC) was first introduced and initiated by SSMP in its project district. AFEC is formed at the VDC level in line with LSGA 1999, and LSGR 2000, regulation 26. To make this committee inclusive, participation of both women and Dalit people and representative from each ward of the VDC is necessary (SSMP, 2014). There are 1,377 Agriculture Service Centres (ASC) and Livestock Service Centres (LSC) distributed across the 75 districts, but they are understaffed, deprived of resources, lacking motivation and declining in number. In the field, one ASC has to cover over 8.000 farming households (Dahal, 2010), and the frontline extension worker to farm family ratio is 1:1.500. Such a high ratio indicates the poor access of farm families to technical manpower, especially considering Nepal's difficult and remote physiographic setting (Shrestha, 2012). According to several literature available, gains from new agricultural technology have influenced the poor directly, by raising incomes of farm households, and indirectly, by raising employment, wage rates of functionally landless laborers, and by lowering the price of food staples (Winters et al., 1998 & Irz et al., 2001). Regular visit of extension worker is necessary to enhance information dissemination, knowledge building and skills in order to enhance rate of adoption. An extension service popularizes the innovation by providing necessary information, knowledge and skills in order to enable farmers to apply innovations (Abebaw et al., 2001). Thirtle et al. (2003) pointed out that with the increase in off farm income; there are increases in the rate of adoption by mitigating the shortage of capital input. Farmers with the project support are supposed to get the material support, managerial support, followed by timely availability of knowledge and skills which apparently helped them apply new technology (Karki et al., 2004). Promotion of advance sustainable technology and wider adoption by resource poor farmer is key to break the stagnant and diminishing growth and reducing food insecurity prevalent with poor farmers.

2. METHODOLOGY

Two districts, Ramechhap and Dolakha, in Central Development Region of Nepal were purposively selected for this study. From each district 2 VDC (one with AFEC and another without AFEC) was selected. Simple random sampling technique was adopted to select sample household. A total of 120 samples were collected randomly from 4 VDCs. Both primary and secondary sources were used for collecting information. Semi structured interview questionnaire was used to collect information from sampled household using pre tested semi-structured questionnaire. Household survey, key informant interviews, focus group discussion was used for collection of data. The collected data were analyzed using statistical software packages, STATA version 13, SPSS version 21 and Microsoft Excel 2007. Both descriptive and analytical statistical analysis was done.

2.1. Methodological approach of effectiveness evaluation

In this study with without approach was used to study the impact and effectiveness study of AFEC.

2.2. Level of technology adoption

First of all adoption score was calculated by doing sum of assigned points to the respondents. The level of technology adoption was calculated by using following formula
The level of technology adoption was calculated by using following formula:

$$\text{Level of adoption} = \frac{\text{Total score secured by the respondent}}{\text{Maximum score}} \times 100$$

2.2. Logit Regression Model

Binary logit regression model was applied for analyzing the factors affecting the level of adoption of sustainable soil management practices which can be expressed as:

Yi = f (βi xi) = f (formation of AFEC, Economically active members, Education, Training, Farm size, Extension Visit Livestock standard unit, gender.).
The logit transformation can be expressed as: (Gujrati,2003).

Li = logit and [pi / 1- pi] = Odd ratios

3. RESULTS AND DISCUSSION

3.1. Role of AFEC on farmer's participation at local level planning and resource mobilization

Study revealed that the households participation in local level (ward, VDC) planning was more in VDCs with AFEC (73.3 percent) than in the VDC without AFEC (43.3 percent) and the Pearson chi square value ($\chi 2 = 12.20$) was significant ($P<0.01$) (Table 1).

Table 1. Farmers' participation at local level planning across study area

Participation	AFEC Status		Total
	with	without	
Yes	44 (73.3)	26 (43.3)	50 (41.7)
No	16 (26.7)	34 (56.7)	70 (58.3)
Total	60 (100)	60 (100)	120 (100)

Figures in the parentheses indicate percent. $\chi 2=12.20$***
*** Significant at 1 percent level of significance

Several factors were found to play the important role in people's participation in local level planning. An attempt was made to identify the factors responsible for hindering people's participation at local level meeting/planning. It was found that in VDCs with AFECs busy in household work (68.75 percent) followed by felt no significance of being involvement in planning meeting (47.37 percent) and lack of information on time and venue (35 percent) were the factors hindering the people's participation. However in VDCs without AFEC, lack of knowledge on importance of participation (89.47 percent) followed by busy in household work (61.76 percent), lack of information on time and venue of meeting (47.06 percent) and inappropriate time and venue of meeting (20.59 percent) were key factors that affecting the participation. This showed that though the AFEC was quiet effective in increasing the public participation in planning meeting, it still needs to improve in above areas for further increment in participation. Thus, it can be said that the improvement in such factors definitely increase the participation of farmers at local level planning meeting. Factors affecting farmer's participation in local level planning is presented in Figure 1.

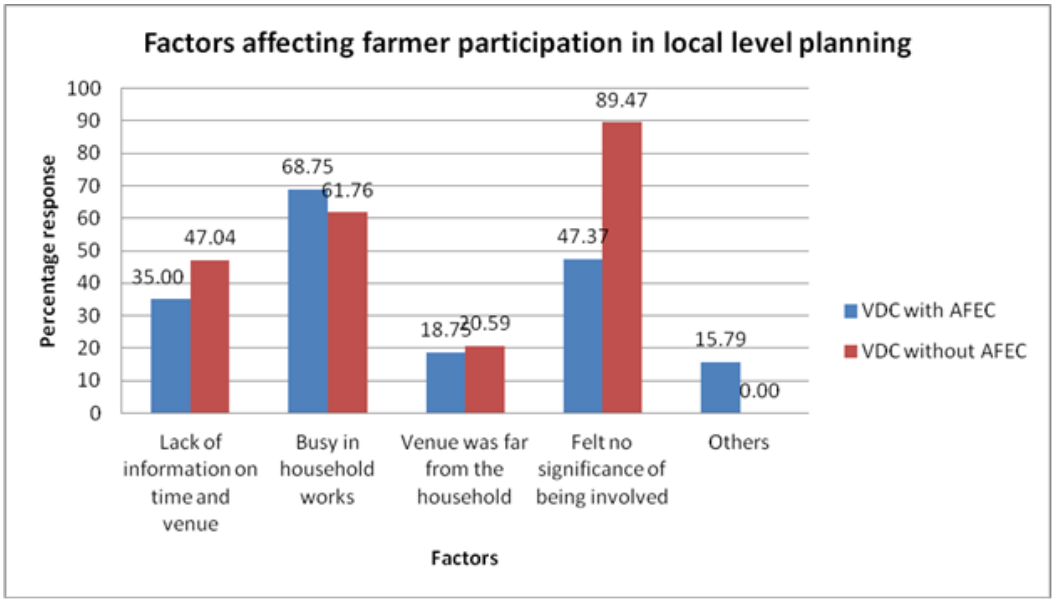

Figure 1. Factors affecting farmer participation in local level planning

3.2. Knowledge on VDC block grant

VDC block grant is the grant allocated for development of different sectors from the core funds by VDCs. The block grants are the major source of funds for development at local level. According to this survey, 58.3 percent of respondent from AFEC had knowledge on VDC block grant which is higher than the respondent (30 percent) in VDCs without AFEC. The Pearson chi square ($\chi 2=20.26$) is significant at 95 percent confidence interval (Table 2).

Table 2. Farmer's knowledge on VDC block grant across the study area

Knowledge on VDC block grant	AFEC Status		Total
	with	without	
Yes	35 (58.3)	18 (30)	53 (44.17)
No	25 (41.6)	42 (60)	67 (55.83)
Total	60 (100)	60 (100)	120 (100)

Figures in the parentheses indicate percent. $\chi 2=20.26$**
** Significant at 5 percent level of significance

3.3. Access to technical services and capacity build-up

Study revealed that in both category of respondent, majority of the responses on number of extension visit was less than two. However the percent of household receiving less than two extensions visit was higher in VDC without AFEC (53.3 percent) than the VDC with AFEC (31.6 percent). Similarly, household receiving 2- 4 number of visit was more in VDC without AFEC (40 percent) than the VDC with AFEC (28.3 percent). It is noteworthy to mention that higher number of extension visits (more than 4 visits per year) was received by respondent in VDCs with AFEC (40 percent) compared to non AFEC (Table 3).

Table 3. Number of extension visit received by households during last year across the study area

Number of extension visit	AFEC Status		Total
	with	without	
less than two	19 (31.6)	32 (53.3)	51 (42.5)
2 to 4	17 (28.3)	24 (40.0)	41 (34.2)
4 to 6	12 20.0)	4 (6.67)	16 (13.3)
more than 6	12 (20.0)	0 (0.00)	12 (10.0)
Total	60 (100)	60 (100)	120 (100)

*Figures in the parentheses indicate percent.

Index value was calculated using 3 point scale to measure the easiness in getting technical services. According to index value, 3 indicate easy, 2 medium and 1 hard to receive technical service. The study revealed that it was easy to get technical services in VDCs with AFEC than in VDCs without AFEC with index value 2.48 and 1.15 percent respectively (Table 4)

Table 4. Household perception on easiness to receive technical services across the study area

Easiness to receive technical service	AFEC Status		Total
	with	without	
Index value	2.48	1.15	1.82

*Figures in the parentheses indicate percent.

According to the study, farmers were getting technical services from different sources like District Agriculture Office (DADO), Agriculture service centre (ASC), experienced leader farmer and NGO/INGOs supported person. Among the service provider majority of HH were getting service from experienced leader farmer (51.7 percent) followed by NGO/INGOs supported person (33.33 percent). Similarly, the percent of HH getting technical services from experienced leader farmer was higher in VDCs with AFECs (61.7 percent) than in VDCs without AFEC (41.7 percent). Household receiving technical services from different sources is presented in Table 5.

Table 5. Technical service provider across the study area

Technical service provider	AFEC Status		Total
	with	without	
DADO	2 (3.3)	1(1.7)	3 (2.5)
ASC	1(1.7)	1(1.7)	2 (1.7)
Experienced leader farmer	37 (61.7)	25 (41.7)	62 (51.7)
NGO/INGOs supported person	19 (31.7)	21 (35.0)	40 (33.3)
Others	1(1.67)	12 (20)	13 (10.8)
Total	60 (100)	60 (100)	120 (100)

*Figures in the parentheses indicate percent.

The study showed that farmer's access to participation in training for capacity build up was higher in VDCs with AFEC as 71.6 percent respondent participated in training related to agriculture during last one year than in the VDCs without AFECs as 26.67 percent.

Table 6. Farmers' access to training during last year across the study area

AFEC Status		Total
with	without	
43(71.66)	16(26.67)	59(49.16)

*Figures in the parentheses indicate percent.

From these findings it can be stated that the farmers' access in technical services was good in VDCs with AFEC than in VDCs without AFEC. It was mainly due to decentralized extension services adopted or implemented by AFEC in support of SSMP, which mobilizes the local experience farmer which were the effective means of service provider.

3.4. Impact of AFEC in technology adoption

3.4.1. Adoption of SSMP technology

The study revealed that the percent of Household adopting at least one SSMP technology was more in VDCs with AFEC (90 percent) as compared to non AFEC (35 percent) with overall 62.5 percent adopter. The Pearson chi square value (48.46) was significant (P<0.01) (Table 7).

Table 7. Technology adoption by sample household across the study area

Technology adoption	AFEC Status		Total
	without	with	
Non adopter	39 (65.0)	6 (10.0)	45 (37.5)
Adopter	21(35.0)	54 (90.0)	75 (62.5)
Total	60 (100)	60 (100)	120 (100)

Figures in the parentheses indicate percent. $\chi 2$ 48.46***
*** Significant at 1 percent level of significance

3.4.2. Level of technology adoption

The mean level of technology adoption was found 27.73; however the level of adoption was significantly higher in VDCs with AFEC (43.69) than in VDC without AFEC (11.78) across the study area. The level of technology adoption is presented in Table 8.

Table 8. Level of technology adoption across the study VDCs

Level of technology adoption	AFEC status		Total
	With	Without	
<50 %	37 (61.67)	57 (95.0)	94 (78.3)
50-75 %	6 (9.10)	2 (3.33)	8 (6.6)
>75%	17 (28.33)	1 (1.67)	18 (18.3)
Total	60 (100.0)	60 (100.0)	120 (100)
Mean level	43.69	11.78	27.73

Figures in the parentheses indicate percent. $\chi 2$ 59.67***, t=6.028***
*** Significant at 1 percent level of significance

When categorizing the level of technology adoption into three categories, on an average 78.3 percent household' level of adoption was less than 50 percent. Majority of the respondent in VDC with AFEC (61.67 percent) and VDCs with non AFEC (95.0 percent) were found to have lower level of technology adoption (< 50 percent). Higher level of technology adoption in VDC with AFEC, was due to the farmers with the project support received the material support, managerial support, followed by timely availability of knowledge and skills which apparently helped them in applying new technology (Karki et al., 2004).

3.4.3. Motivating factors for adoption of SSMP technology were

The responses on major motivating factors for the adoption of SSMP technology is presented in Figure 2. The figure reveals that main factors responsible for adoption of technology were availability of funds followed extension visit, perceived benefit from the adoption on which 54.05, 54.00, 49.00 percent respondent had expressed their opinion. These factors affecting technology adoption are in line with the factors stated by Rogers and Shoemaker (1971). Similarly Chi and Yamada (2002) indicated that lack or shortage of credit was important limiting factors for adoption of technology.

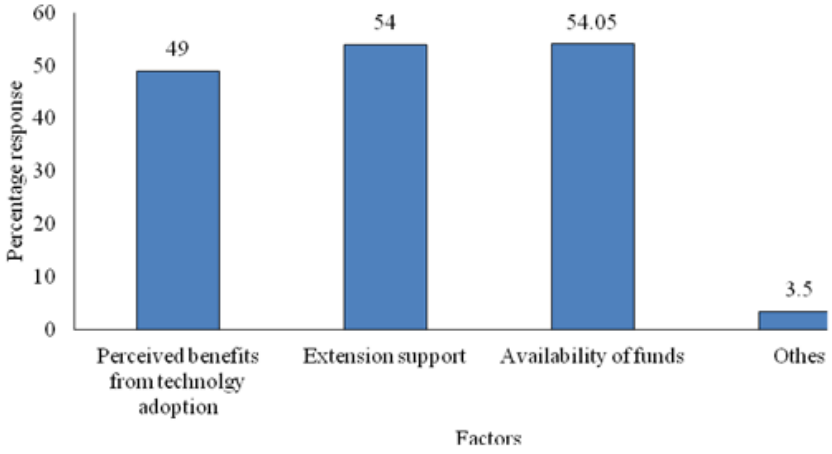

Figure 2. Motivating factors for adoption of technology by the respondents

3.4.4. Econometric estimates for adoption decision of SSMP practices

Binary logit model was used to determine the determinants of SSMP technology adoption in the study area. The model assumed the farmer's decision on the adoption of the sustainable soil management practices at household level as a binary dependent variable ( ) with '1 for higher adaptation (adoption level >75 percent) and '0 lower level of adoption (< 75 percent). In this model, the dependent variable was level of technology adoption of SSMP technology whereas explanatory variable used were number of economically active member in household, education of household head, gender of HH head, training received, extension agent's visit, total cultivated land, presence of AFEC and Livestock standard unit (LSU).

Logit regression analysis shows that among the hypothesized nine explanatory variables to influence the adoption decision, three variables were found to be statistically significant. These variables were training, education of household head and presence of AFEC. It was found that age, economically active members, gender of HH head, extension, total cultivated land were fond statistically insignificant in determining adoption of technology.

Educational status of the head of household was found to affect the probability of adoption of soil management practices significantly (P<0.05). Being educated than only literate and uneducated, would result in a 1.9 percent increase in the probability to adapt new technology. This may be because education is expected to increase one's ability to receive, decode, and understand information relevant to making innovative decisions and educated farmers may have better understanding on benefit from adaptation measures. Similarly training was found to have positive and significant impact on probability of adoption. Farmers may receive the training from formal or informal sources which raises their awareness level and skill in adoption of technology. The analysis revealed that farmers receiving more than one trainings than not receiving increases the probability of adopting SSMP technology by 14 percent, other things ramaining constant. Likewise, the probability of adoption of soil management practices was positively affected by the agriculture and forestry committee. Presence of AFEC was a significant (P<0.01) factor affecting adoption of SSMP technology. Other things remaining constant, presence of AFEC increased the adoption of technology by 58 percent. This may be the due to several reasons as these committees were effective in mobilizing the funds which had increased the farmer's access to capital needed for adoption.

Table 9. Factors affecting adoption of SSMP technology (Logit regression)

Variables	Coefficients	P>|z|	Standard error	dy/dx[b]	S.E[b]
Economically active members	0.18	0.309	0.17	.019	0.20
Education of household head	1.73**	0.012	0.69	0.19	0.11
Training	1.31*	0.073	0.73	0.14	0.09
Total cultivated land	-.0.87	0.360	0.57	-0.09	0.10
AFEC	4.69***	0.000	1.17	0.58	0.09
Livestock holdings	-0.10	0.275	0.09	-0.01	0.01
Gender of household head	-0.66	0.425	0.83	-0.08	0.13
Extension visit	-0.48	0.469	0.67	-0.05	0.77
Constant	-4.70***	0.004	1.62		
Summary statistics					
Number of observation(N) 114					
Log likelihood -36.89					
LR $chi^2(8)$ 65.14					
Pseudo R^2 0.468					
Pearson Chi^2= 38.63 Prob> Chi^2= 0.00					

* Significant at 10 percent level of significance
** Significant at 5 percent level of significance
*** Significant at 1 percent level of significance

3. CONCLUSION

Though agriculture was a major source of occupation for majority of the household, the mean annual income from non-agriculture sector was found to be higher than the agriculture sector. Lower agriculture productivity and income from this sector was associated with several factors, out of which most important factors identified were lack of technical services, lower or very minimal investment in the agriculture sector, lack or poor knowledge on the part of the farmers and decreasing fertility status of soil, lower rate of improved technology adoption. The SSMP's and Government's strategy to decentralized extension approach via institutionalization of Agriculture forestry and environmental committee was found to be very effective in improving level of technology adoption. These committee's role in increasing public participation in local level planning meeting, pulling the government (VDC block grant) and non-government resources and investing for local level agriculture development based on the demand of farmers associated with mechanism for monitoring for proper and optimum utilization of funds were very much effective and appreciative. Committee role in providing technical services at local level by experienced leader farmers and allocating funds for agriculture development could be attributed to higher level of technology adoption.

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