Full Length Research Paper

Relationship between social capital and the performance of vegetable production program (VPP) in western region Nepal

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The performance of agricultural extension program varies among communities and households. The performance of such program is traditionally analyzed looking at human, physical, financial and natural capital related factors. This study aimed at knowing the relationship between social capital and the performance of vegetable production program (VPP) in selected sites in the far western region of Nepal. Social capital at household and site level was measured in its six dimensions expressed as networks, trust, collective action and cooperation, social norms, reciprocity, and proactivity. The result of simple linear regression (OLS) model showed in general that the adoption index of vegetable farming at household level is found positively correlated with social capital index. However, some expressions of social capital, like interpersonal trust and bonding network, negatively affect the adoption of vegetable farming by the household. The collective action, existing general ethical norms and reciprocity have positive contribution in adoption of vegetable farming by the household. At the site level, social capital significantly contributes to increase community participation and promote gender equity in the program. The sites with higher level of social capital were found adopting vegetable farming at larger proportion. The interpersonal trust and bonding networks of households create inertia for change in farming system at the initial stage, and their effect can be reduced by improving general trust level and strengthening bridging and linking networks in communities. The reinforcement of ethical norms, increment in reciprocity and cooperation among the households also help to increase the adoption of vegetable farming by the households.

Key words: Social capital, vegetable production program, adoption.

INTRODUCTION

There is diversity in the development of performance/acceptance, collective behavior, household wellbeing, diversity acceptance and common property resource management among the communities and households, though social capital is found a contributing factor in this respect. Several studies have found positive associations between indicators of social capital and outcomes as lower crime rates (Putnam, 2000), improved health (Grant et al., 2004), educational attainment

(Putnam, 2000), governmental efficacy (Putnam, 1993), individual income (Narayan and Princhitt, 1997), community development (Krishna, 2004) and at the aggregate level economic performance (Knack and Keefer, 1997). The development practitioners have long been aware that program results vary considerably from one location to another, but so far it has been hard to account for these differences. A number of different reasons like quality of leadership, effectiveness of program staffs, etc., can be suggested to explain these observed differences; social capital is another possible explanation that must be considered (Krishna, 2004). The existing level of trust, networks, collective actions and ethical norms in the communities and among

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development actors are important to achieve intended outcomes. The key role of social capital is identified in irrigation system management, integrated pest management, watershed management and participatory research and learning (Pretty, 2003). Studying the success of training and visit system of agriculture in Mali, Reid et al. (2000) found that the degree of social cohesion already existing in a particular community is the most important single factor determining the success of any external intervention. Social capital is more important for the farming communities where agriculture production largely depends on collective action, cooperation, reciprocity and interrelation among the households. Knowledge and innovations are shared and disseminated among households and communities due to these inherent attributes. In this context, it is worth to understand the performance of community development programs like vegetable production program with respect to social capital stock and its expressions.

The vegetable production and marketing program is being implemented in potential sites throughout the country by district agricultural development offices. At present, the department of agriculture has two programs; one is to develop self-propelling broad-based farmer's groups and the other is to promote vegetable production through these groups in selected sites. In general, the observed performance of the program in different sites varies in terms of area coverage, scale of adoption, participation in production groups and gender equity. Social capital, which might be important in the performance of the program, is excluded in past studies. Past studies regarding performance of agricultural extension programs mostly concentrated on suitability of technology, community characteristics and market based variables, but social capital at different levels has generally not been included. Understanding the role of social capital in performance of the vegetable production program will help in planning and implementation of new programs to promote commercialization of agriculture. Therefore, this study aims to:

- Assess household level social capital in selected vegetable production program areas.
- Determine the relationship between social capital and performance of vegetable production program.

METHODOLOGY

Stratified random sampling procedure was used to select one hundred sixty two households from twenty vegetable production pockets (sites) of six districts from far western development region, namely Darchula, Baitadi, Dadeldhura, Doti, Kailali and Kanchanpur. The rank scale (Likert scale) questionnaires were constructed for household survey to measure the social capital in its six expressions (networks, trust, collective action and cooperation, reciprocity, social norms and proactivity).

The data regarding performance of vegetable farming

were collected from district agriculture offices and other relevant sources. The social capital index was constructed by combining normalized dimensional indices and their micro constituents. The household level indices are averaged to get site level indices of social capital and its dimensions. In this study; the performance of vegetable production program is analyzed at household and community level using adoption index, income index, community participation index, average adoption index and women's participation index. The linear regression models are conceptualized for analyzing contribution of social capital to vegetable production performance at both household and community level.

Selection of social capital dimensions

Social capital is an elusive multidimensional term and it is measured through different manifestations in communities or using its expressions as proxy measures. The measurement criteria used for one community do not apply for another community with different socio-cultural and economic settings. In Nepalese context, farming communities do not possess formal networks and other kind of formal civic engagement so it cannot be used as proxy measure of social capital. Similarly, political participation, voter turnout, density of civic organizations, tax compliance, diversity acceptance and some others used by different authors are found irrelevant in the context of farming communities in the study area. After rigorous literature review on expression of social capital and proxy measures used for its estimation at different levels, six important dimensions: 1) networks, 2) trust, 3) reciprocity, 4) proactivity, 5) collective action and cooperation and 6) social norms are selected to measure the social capital stock in farming communities. The selected six dimensions are central in rural agrarian livelihood framework and their status can be used as close proxy of existing stock of social capital.

Survey questionnaires

The rank scale (Likert scale) questionnaires were constructed for household survey and questions under each dimension were constructed carefully to capture the local ways of social capital manifestation. It is assumed that a single question cannot measure closely the level of selected dimension and one dimension of social capital has different distinct faces which cannot be covered by a single question. This difficulty is solved through using four to five questions to measure each dimensions of social capital expression.

The questionnaires for the measurement were adapted from extensive literature review (Grootaert et al., 2003; Onyx and Bullin, 1997; Krishna, 2004). Further, the questionnaires were designed based on the basic knowledge about the farming communities in the study area.

Weighting social capital dimensions and questions

The selected six dimensions of social capital were weighted using Analytical Hierarchy Process (AHP) procedure to make the index of social capital. AHP is one useful tool for qualitative judgments in multi criteria decision models. It formalizes and renders systematic what is largely a subjective decision process and as a result facilitates "accurate" judgments (Alphonce, 1997).

Social capital is one multidimensional concept and the relative importance of each dimension can be understood well by using the AHP in a particular social context. The social capital is at the top of the problem hierarchy and six dimensions as criteria's in at second level. Thus two hierarchy AHP was used to assign the weight to six dimensions of social capital. It provides the idea about relative importance of social capital dimensions in particular social context. The weight was assigned through group discussions involving agricultural officers available at Agriculture Development Office and three farmers from the selected sites, using the AHP process. The six dimensions were weighted against each other based on relative importance perceived by individuals using pair wise ranking procedure and final weight for each dimension was obtained. Each dimension of social capital is considered as criteria and social capital as the objective in AHP. The assigned weight shows the relative importance of six expressions in farming as social resource representing stock of social capital. The consistency ratio is calculated to test the consistency of assigned weights. Secondly, there were 4-5 questions under each of these dimensions and it was assumed that all the questions did not carry equal contribution in measurement of the selected dimension. The questions under the dimension were considered as criteria and the respective dimension as the objective in AHP. The pair wise comparison for each question was made to judge how closely the particular question measures level of particular dimension of the social capital at the household level. The same procedure used to weight six dimensions of social capital was used to weight the questions under each dimension.

Social capital index construction

The individual index of six dimensions of social capital is prepared using the weighted questionnaires under each dimension at household level. The household level indices are averaged to get site level indices of social capital and its dimensions. The following steps were followed to construct the social capital index. The value of the index shows the level of social capital endowment at household level in communities.

Construction of dimensional indices

There are four to five questions under each dimension and each question has 4-5 options. These questions measure different aspects of the dimensions. The weight is assigned to each question by using the AHP technique. For example, there are five questions in network dimension; these questions measure different aspects of the network. The assigned weight shows the relative importance of the question to measure the status of particular dimensions of social capital. Further, the weight assigned to each question provides basis to combine these questions to a summary measure of network at household level. The flowing steps were followed to make the index of particular dimension.

Step-1: The options under the question were arranged highest to lowest rank as shown in the following question. For this question, the options were ranked from the lowest one to the highest four. This 1-4 scale is converted to 0-1 scale to make similarity for all questions. The question is as follows:

Trust question-1: Generally speaking, "how many people in the community could be trusted"?
- All the people with some exceptions;
- More than half of the people;
- Half of the people;
- Very few people.

Step-2: Before combining all the questions, the 0-1 scale score of each question is multiplied by the weight of the question (obtained from AHP). Suppose assigned weight for question 1 under trust dimension is X, and Y is normalized score (0-1scale) for the question, then the converted value for question 1 is:

TQ_1 value = X*Y
TQ_1 = Trust question 1

Suppose the assigned weight (X) for question one (from AHP) under trust dimension is 0.25, therefore:

TQ_1value = 0.25*0.25 / 0.625

Similarly, the converted value of each question under trust dimensions is obtained. The value for all questions under trust dimension is summed to get the trust index:

T_{Index} = TQ_1value + TQ_2value + TQ_3value + TQ_4value + TQ_5value

Similarly network, collective action and cooperation, reciprocity, proactivity and social norms index were constructed separately.

Construction of social capital index: The six dimensions selected as a measure of social capital were weighted using AHP technique based on their relative importance for individual as well as community wellbeing

and a community to be considered as a good community. Analytical Hierarchy Process (AHP) is used in the premises that all six dimensions of social capital do not carry equal value for the community households. For example, reciprocity is more important than collective action for a community household. Index of each dimension was multiplied by assigned weight, and the final index of social capital was obtained by adding those values of the six dimensions:

The normalized weight of trust index = $T_{Index}*W_t$
Here, W_t is assigned weight to the trust dimension from AHP process.
Example: When the trust index is 0.625 and the assigned weight (W_t) is 0.20, then the normalized weight of trust index = 0.625*0.20 = 0.1250.
The social capital index is obtained as:

Social capital index = $T_{Indx}*W_t+N_{Indx}*W_n+C_{Indx}*W_c+R_{Indx}*W_r+P_{Indx}*W_p+S_{Indx}*W_s$

Outside the social capital index, analysis is made to understand the status of different micro expressions of social capital. This analysis has focused on different types of networks, trust and trust radius, social norms, reciprocity and collective action at household as well as community level.

Performance measures of vegetable production program

The performance of vegetable production program can be analyzed in different ways, for example, level of commercialization, increased income of the household, community participation, annual transaction of the output, farmers group functioning, developed marketing system, efficiency in service delivery, equity regarding gender and poor category of members and others. Here in this study, the performance of vegetable production program is analyzed at household and community level using some selected measures.

Household level performance: The vegetable production adoption index (scale of adoption of vegetable farming) and income index are selected as household level performance measures. The adoption index measures what proportion of potential land suitable for vegetable cultivation is utilized by the household for vegetable farming and income index measures the contribution of income from vegetable farming to gross annual farm income of the household. These two indices are calculated as:

$$Adoption\ Index\ (AI) = \frac{Existing\ area\ under\ vegetable\ crops(ha)}{Total\ potential\ area\ for\ vegetable\ crops\ (ha)}$$

$$Income\ Index\ (II) = \frac{Gross\ annual\ income\ from\ vegetable\ crops(NRs)}{Gross\ annual\ income\ from\ all\ crops(NRs)}$$

Site (community) level performance: The performance of vegetable production program could be either measured using three separate or one combined measure. The three performance measures are community participation, average adoption of vegetable farming and women's participation in groups. It is known that wider participation of the community people in the program indicates better performance of the program in terms of vegetable production and marketing. The higher average adoption index indicates the acceptance of the vegetable production as income generating enterprise by the community households. The third performance measure selected, which is women's participation in groups, measures the gender equity and women's empowerment. These performance measures are calculated as:

$$Community\ Participation\ Index\ (CPI) = \frac{Number\ of\ household\ organized\ in\ groups}{Total\ household\ in\ community}$$

$$Average\ Adoption\ Index\ (AAI) = \frac{Average\ area\ of\ vegetable\ crops\ per\ household\ (ha)}{Average\ potential\ area\ per\ household\ for\ veg.\ crops\ (ha)}$$

$$Women's\ Participation\ Index\ (WPI) = \frac{Total\ female\ members\ in\ groups}{Total\ group\ members}$$

These three measures were weighted to construct a single measure of performance. This measure is considered as program performance index. The weight is assigned through focus group discussion. The household participation in groups is fundamental to produce momentum in the program and it is assigned with 0.35 weight. Secondly, adoption of the vegetable production is core progress of the program. Only community participation does not produce outcome, average adoption rate of vegetable farming in the community is the most important measure. By this reason, adoption index is thus assigned with 0.45 weight. Finally, women empowerment and gender equity is government priority to reduce gender disparity and it is assigned with 0.20 weight. Thus, the program performance index is constructed as:

$$Program\ Performance\ Index\ (PPI) = 0.35CPI + 0.45AAI + 0.20WPI$$

Regression analysis

The linear regression models are conceptualized for analyzing contribution of social capital to vegetable production performance at both household and community level. It is hypothesized that many social and physical resources owned by the household, infrastructure and support services available in the program sites govern the performance outcomes of the program. The main purpose of these models is to understand the role of social capital variables in the

program performance.

Household level performance model

In order to know the role of social capital adoption of vegetable farming by the household, regression of Model 1 was employed.

Model 1

$$Adoption\ Index\ (AI) = f\ (DFS, BNET, DGS, DC, DB,$$
$$TGO, TT, THT, RL, RSB, GR, LHS, GGN, GC, MD, \varepsilon_i)$$
…….. (i)

Dependent variable: Adoption index of vegetable farming (AI).

Independent variables:

- Household food self sufficiency (DFS) - Dummy variable: 1 if household is food self sufficient, 0 otherwise.
- Bonding network (BNET) – Numeric variable value from 0-1.
- Government support (DGS) – Dummy variable: 1 if household got any government support, 0 otherwise.
- Four dummy variables were used for five caste categories in the model. Bhramin was selected as the reference category.
(i) Dummy for Chettri (DC): 1 if household is Chettri, 0 otherwise
(ii) Dummy for Baisaya (DB): 1 if household is Baisaya, 0 otherwise.
(iii) Dummy for Sudra (DS): 1 if household is Sudra, 0 otherwise.
(iv) Dummy for ethnic tribe (DET): 1 if household is ethnic group, 0 otherwise.

- Migration status (DM) – Dummy variable: 1 if household is migrant within last five years, 0 otherwise
- Linking networks (LNET) - Numeric variable value from 0-1.
- Education level of the family head (ELFH) - Numeric variable value in number of years of schooling
- Trust in government officials (TGO) – Numeric variable value in 0-1 scale.
- Thick trust (TT) – Numeric variable value in 0-1 scale.
- Thin trust (THT) - Numeric variable value from 0-1.
- Reciprocity of labor (RL) - Numeric variable value from 0-1.
- Reciprocity of seeds and breeds (RSB) - Numeric variable value from 0-1.
- General reciprocity (GR) - Numeric variable value from 0-1.
- Land holding size (LHS) - Value in ha.
- General ethical norms (GGN) - Numeric variable value from 0-1.

- General cooperation (GC) - Numeric variable value from 0-1.
- Distance from market center (MD) - Value in kilometer (km).

Model 2

$$Income\ Index\ (II) = f\ (LHS, TT, MD, AR, SCI, EAVC, \varepsilon_i)$$
…………….(ii)
$$DS, DET, DM, LNET, ELFH,$$

Dependent variable: Income index for vegetable farming (II)

Independent variables:

- Land holding size (LHS) – Value in ha.
- Trust to traders (TT) – Value 0-1.
- Market distance (MD) – Value in Km.
- Access to road (AR) – Dummy variable: 1 if yes, 0 otherwise.
- Social capital index at household level (SCI_h) – Value from 0 – 1.
- Existing area under vegetable crops (EAVC) – Value in ha.

Community level performance models

Three separate linear regression models were constructed to understand the role of social capital on performance of program in different sites (Models 2 to 4). Secondly, the fourth linear model (Model 5) was constructed for the combined performance measure of the program.

Model 3

$$CPI = f\ (SCI_c, MD, MA, IA, APLVF, ALHS, AAOI, TT, TGO, \varepsilon_i)$$
……………….(iii)

Dependent variable: Community participation index (CPI).

Independent variables:

- Social capital index at community level (SCI_c) – Value from 0-1.
- Distance from market center (MD) – Value in kilometer (km).
- Market access (MA) – Dummy variable: 1 if yes, 0 otherwise.
- Input availability (IA) – Dummy variable: 1 if yes, 0 otherwise.
- Average potential land for vegetable farming (APLVF) – Value in ha.
- Average land holding size (ALHS) – Value in ha.
- Average annual off farm income of the household (AAOI) – Value (NRs).

- Average trust level to traders (TT) - Value from 0 -1.
- Average trust level to government officials (TGO) - Value 0-1.

Model 4

$$AAI = f(SCI_c, ALHS, AAOI, LR, WPI, IA, TGO, TT, \varepsilon_i)$$
……………………… (iv)

Dependent variable: Average adoption index (AAI).

Independent variables:

- Social capital index at community level (SCIc) – Value from 0-1.
- Average land holding size (ALHS) – Value in ha.
- Average annual off farm income of the household (AAOI) – Value (NRs).
- Literacy rate (LR) – Value in percentage.
- Women's participation index (WPI) – Value from 0-1.
- Input availability (IA) – Dummy variable: 1 if yes, 0 otherwise.
- Trust to government officials (TGO) – Value from 0-1.
- Trust to traders (TT) – Value from 0-1.

Model 5

$$WPI = f(SCI_c, ALHS, AAI, FLR, TGO, AAOI \; \varepsilon_i) \dots$$
……………………… … (v)

Dependent variable: Women's participation index (WPI)

Independent variables:

- Social capital index at community level (SCIc) – Value from 0-1.
- Average land holding size (ALHS) – Value in ha.
- Average adoption index (AAI) – Value from 0-1.
- Female literacy rate (FLR) – Value in percent.
- Trust to government officials (TGO) – Value from 0-1.
- Average annual off farm income of the household (AAOI) – Value (NRs).

Model 6

$$PPI = f(SCI_c, MD, MA, IA, ALHS, LR, AAOI, TT, TGO \; \varepsilon_i)$$
………………… (vi)

Dependent variable: Program Performance Index (PPI).

Independent variables:

- Social capital index at community level (SCIc) – Value from 0-1.
- Distance from market center (MD) – Value in kilometer (km).

- Market access (MA) – Dummy variable: 1 if yes, 0 otherwise.
- Input availability (IA) – Dummy variable: 1 if yes, 0 otherwise.
- Average land holding size (ALHS) – Value in ha.
- Literacy rate (LR) – Numeric variable value in percentage.
- Average annual off farm income of the household (AAOI) – Value (NRS).
- Trust to traders (TT) – Numeric variable value from 0-1.
- Trust to government officials (TGO) – Numeric variable value from 0-1.

RESULTS AND DISCUSSION

The hypothesis in this context which is existing social capital endowment plays an important role in the performance of the vegetable production program. The performance of vegetable production program is analyzed at household and community level to understand the contribution of social capital.

Household level performance measures

Adoption index

Adoption index is the ratio of existing area under vegetable crops to total potential area suitable for vegetable farming owned by household. The higher adoption index value indicates that household is growing vegetable crops in larger proportion of this potential land. The mean adoption index at household level is found as 0.61 which shows on average that farm households in the sites have adopted vegetable farming by more than 60% of their potential land suitable for vegetable crops.

Income index

The second index is the ratio of annual gross income from vegetable crops to annual gross income from farming. The average value of income index is found as 0.55 with a range of 0 to 1. It means on average that vegetable crops contribute 55% to the farm income of a farm household in vegetable production sites. Income index is found less reliable as compared to the adoption index as a measure of program performance at household level and not analyzed in detail.

Role of social capital in household level performance

The adoption index at the household level is selected as a single measure of the program performance to understand the role of social capital empirically.

Regression models

Adoption index

The adoption index was regressed with social capital

Table 1. Result of linear regression (OLS) for household level adoption index.

Variable	Unstandardized coefficient		Standardized coefficient	t	Sig. (P)
	B	Std. Error	Beta		
(Constant)	0.571**	0.205		2.789	0.006
Other variables					
Dummy for food security (DFS)	-0.233**	0.056	-0.326	-4.138	0.000
Dummy for government service (DGS)	0.120*	0.056	0.141	2.120	0.036
Dummy Chettri (DC)	-0.055	0.072	-0.058	-0.764	0.446
Dummy Baisaya (DB)	-0.234**	0.054	-0.361	-4.353	0.000
Dummy Sudra (DS)	-0.208**	0.081	-0.184	-2.573	0.010
Dummy ethnic tribe (DET)	0.062	0.076	0.072	0.821	0.413
Dummy for migrants (DM)	-0.084	0.049	-0.110	-1.704	0.091
Land holding size (LHS)	-0.061**	0.024	-0.182	-2.584	0.010
Education level of the family head (ELFH)	-0.011*	0.005	-0.131	-2.006	0.047
Market distance (MD)	-0.014*	0.006	-0.155	-2.323	0.022
Network variables					
Bonding network (BNET)	-0.353**	0.120	-0.209	-2.953	0.004
Linking networks (LNET)	0.181	0.118	0.104	1.529	0.129
Trust variables					
Trust to government officials (TGO)	0.027	0.017	0.101	1.599	0.112
Thin trust (TT)	0.034	0.090	0.025	0.376	0.707
Thick trust (THT)	-0.198*	0.092	-0.149	-2.154	0.033
Reciprocity variables					
Reciprocity of labor (RL)	-0.423**	0.141	-0.206	-2.996	0.003
Reciprocity seeds and breeds (RSB)	0.182	0.103	0.117	1.767	0.079
General reciprocity (GR)	0.254	0.177	0.098	1.432	0.154
Social norms variable					
General ethical norms (GEN)	0.260**	0.068	0.272	3.847	0.000
Collective action variable					
General cooperation (GC)	0.378**	0.152	0.189	2.481	0.010
Other variables					
R = 0.701	Significance F = 0.00				
R^2 = 0.491	Standard error = 0.242				

** Significant at (P<0.01) level; * Significant at (P<0.05) level.

index and some other variables. This model produced small R^2 however the social capital index has positive coefficient. Further, social capital index was decomposed in its constituents and a new regression model was conceptualized. Both positive and negative coefficients were found showing mixed contribution of social capital in adoption of vegetable farming by the farm household.

Ten expressions of social capital were introduced in the model to know the contribution of social capital in

household level adoption index of vegetable farming. Out of these ten variables, five are found significant (Table 1).

Trust variables

Thin trust and trust to government officials both have insignificant coefficients. The level of thick trust endowment for the household has significant negative coefficient (B = -0.198, P<0.05), which implies thick trust

level for the household retards adoption of vegetable farming by the household. The coefficient shows keeping the other variables constant one unit increase in thick trust reduces 0.19 unit adoption index of vegetable farming. The thick trust endowment narrows down individual freedom of decision making, though producing inertia regarding any change is a traditional setup in farming system. This finding is consistent with that of Adler et al. (2000) (cited in Productivity Commission, 2003). They mentioned that strong solidarity within the group might overembed the actor in the relationship. This overembedness reduces the flow of new ideas into the group, resulting in parochialism and inertia. The correlation coefficients showed the inhibitory effect of thick trust endowment for adoption of vegetable farming which is higher for the poor households (less than 0.5 ha of land holding size). The high thick trust has also positive implication as strong social cohesiveness, which helps in producing better outcomes regarding development interventions once the initial inertia due to the cohesion (thick trust) with respect to change is broken and momentum is initiated.

Network variables

The bonding network of the household has significant negative coefficient (B = -0.353, P<0.05) which shows one unit change in bonding networks reduces the adoption index of vegetable farming by 0.35 units. The effect is very similar to that of thick trust as thick trust mostly resides on bonding networks. Carroll (2001) described the effect of bonding and bridging networks as "what binds can also exclude or divide, and sometimes groups constrain their own members". Bridging, that is, cross-cutting ties, can counteract the adverse effects of certain bonding relationships". Woolcock (1998) mentioned "too much social control can restrict individual initiatives".

General cooperation variable

The level of general cooperation of the household has positive and significant coefficient (B = 0.378, P<0.01) which shows one unit increase in level of general cooperation increase 0.378 units in scale of adoption of vegetable farming. The high level of cooperation provides informal insurance to the individual household and creates confidence to take risky decisions and promotes the adoption of vegetable farming.

General ethical norms

The significant positive coefficient (B = 0.26, P<0.05) of general ethical norms shows that higher endowment of such norms encourage people to go ahead and provide moral support even in cases of failure which bolsters the adoption of new practices by the farm households.

In contrast where general ethical norms are weak, people discourage the individuals from getting ahead to initiate downward leveling competition. The communities with poor general ethical norms do not ensure crop security against theft and destruction by the livestock, which has negative effect in adoption of the vegetable farming. It is more important in Nepalese farming context where a farm household owns a number of operational parcels of land scattered over an area.

Reciprocity variables

Out of the three reciprocity variables in the model, one is significant with negative coefficient. The level of reciprocity of labor has negative effect (B = 0.423, P<0.01) as large scale vegetable producers reciprocate less labor in the community. The general observation in the area shows that there is very limited reciprocity of labor in vegetable farming. Reciprocity of labor is high only in case of traditional subsistence crops. The high reciprocity of seeds and breeds has positive effect in adoption of vegetable farming but it has insignificant positive coefficient.

Other variables

The food security, education level of household head, land holding size, market distance, *Sudra* and *Baisaya* caste categories have negative coefficients which show these variables negatively affect the adoption of vegetable farming by the household. The *Sudra* is the professional caste category that might be one reason for the low adoption of vegetable farming. The supports available from government have positive coefficient, which shows that government support has positive effect on adoption of vegetable farming by the household. The food secure households have lesser tendency to adopt vegetable farming than food insecure households. The food insecure households always try new farm practices to get food sufficiency.

Site level performance measures

Three indices covering community participation, average adoption and gender equity were calculated to measure site level performance of the vegetable production program empirically. Some sites are better in community participation and gender equity but poor in scale of adoption, while other sites show the opposite picture making difficulty to conclude the performance of the program at site level (Table 2).

Community participation index

The community participation index is found highest for Pratappur site (0.74) and lowest for Dasrath Chand Municipality (0.19). This variation in participation of the

Table 2. Vegetable production program performance measures in different sites.

Site name	Community participation index (CPI)	Women's participation index (WPI)	Average adoption index (AAI)	Program performance index (PPI)
Amargadi	0.52	0.52	0.67	0.59
Bhagwati	0.46	0.46	0.10	0.30
Bhatkanda	0.37	0.43	0.99	0.66
Chapari	0.42	0.46	0.62	0.52
Dasrath Chand Municipality	0.19	0.44	0.69	0.47
Dehimandu	0.40	0.56	0.50	0.48
Dhangadi	0.40	0.57	0.67	0.56
Dipayal	0.34	0.44	0.53	0.45
Dodhara	0.49	0.62	0.24	0.40
Geta	0.34	0.35	0.78	0.54
Ghurukhola	0.55	0.35	0.64	0.55
Jogbuda	0.46	0.72	0.33	0.45
Khalanga	0.48	0.49	0.56	0.52
Kumali Deval Hat	0.43	0.48	0.81	0.61
Malakheti	0.37	0.47	0.42	0.41
Pratappur	0.74	0.62	0.68	0.69
Siddhaswor	0.42	0.45	0.54	0.48
Suda	0.37	0.74	0.36	0.44
Tikapur	0.37	0.62	0.33	0.40
Tilachaud	0.57	0.70	0.57	0.60
Average	0.44	0.52	0.55	0.51

households is affected by many social, economic, physical, leadership related factors. On average, the community participation in the program is found at 44%, which shows a large number of the households are outside the program umbrella. Out of twenty sites, only four sites have more than 50% participation of the community households (Table 2).

Women's participation index

The second selected measure for site level performance of the program is women's participation index, which shows the gender equity in the program. The minimum level of women participation is found in Geta and Gurukhola site, which is 35% while the highest (74%) is found in Suda of Kanchanpur district (Table 2). The observed trend of women participation is higher in Terai sites in comparison to sites in hills and mountains. Women play important role in farming activities and their participation in groups provide opportunities to enhance their knowledge and skills which ultimately support to achieve program objectives.

Average adoption index

The commercialization of the vegetable production in sites is only possible when the households adopt

vegetable farming in full scale. The average adoption index in different sites ranges from lowest (0.1) for Bhagwati of Darchula district to highest (0.99) for Bhatkanda of Dadeldhura district (Table 2). In Bhagwati site, the adoption is low due to many constraints but in the case of Bhatkanda the farmers are growing vegetables in full scale as cash generating enterprise. This range of adoption index shows that some communities already adopted vegetable production as a commercial enterprise using their full potential land, but others are still in the preliminary stage.

Program performance index

This is the combined measure of performance of program in three aspects: participation, adoption and equity. The program performance index showed Pratappur site is best and Bhagwati is poorest in vegetable production program performance among twenty selected sites (Table 2). Among the selected twenty sites, ten sites are below fifty percent performance level. On average, the performance of the program in twenty sites is found as 0.51, which shows the program is not performing so well.

Role of social capital on community participation

The community participation index is regressed with a

Table 3. Result of linear regression (OLS) for community participation index.

Variable	Unstandardized coefficients		Standardized coefficient	t	Sig. (p)
	B	Std. Error	Beta		
(Constant)	-0.542	0.389		-1.394	0.193
Social capital index (SCI$_c$)	1.170*	0.457	0.490	2.562	0.028
Distance from the nearest market (MD)	0.011*	0.005	0.405	2.316	0.043
Market access (MA)	-0.051	0.042	-0.206	-1.235	0.245
Availability of input (IA)	-0.064	0.038	-0.280	-1.673	0.125
Average potential land per household for vegetable production (APLVF)	-0.126	0.110	-0.243	-1.143	0.279
Average land holding size ha (ALHS)	-0.096	0.046	-0.387	-2.107	0.061
Average annual off farm income (AAOI)	-1.79E-006	0.000	-0.319	-1.827	0.098
Trust to traders (TT)	0.056	0.064	0.159	0.865	0.407
Trust in government officials (TGO)	0.081*	0.034	0.389	2.376	0.039

R = 0.89   Significance F = 0.010
R^2 = 0.79   Standard error = 0.069

* Significant at ($P<0.05$) level.

number of explanatory variables including social capital. The regression result shows that social capital stock in communities significantly contributes (B = 1.17, P<0.05) to promote household participation in the groups and ultimately vegetable production program. Wider and dedicated community participation in vegetable production groups depends on community cohesion, which is the product of existing thin trust, neighborhood networks and general ethical norms. It can be concluded here that the whole evolution process of group and its dynamics over time is largely contributed by the social capital stock available in communities.

Similarly, the level of trust to government officials positively contribute (B = 0.081, P<0.05) in community participation in vegetable production program. Among other variables, only the distance from market has positive significant coefficient. This indicates that the communities far from the market have greater tendency to participate in producer groups (Table 3). The communities near the markets have larger choice of activities to perform and are more independent for input and output marketing. In the case of vegetable farming, the households in the communities far from the market have higher tendency to participate in groups input accessibility and output marketing.

Role of social capital on women's participation

The women participation index is regressed with social capital index and other explanatory variables mentioned in this study's methodology. The result shows that social capital stock available in communities significantly contributes (B = 1.308, P<0.01) to promote gender equity

in vegetable production program (Table 4). The communities endowed with richer stock of social capital facilitate women's participation in groups. The trust and general ethical norms are important to promote the gender equity in development programs.

Among other variables, average annual off farm income per household in the community have significant positive coefficients. This shows that higher income promotes gender equity in the program. In case of higher off farm income, male members are more involved in off farm employment and women have better opportunity to participate in groups. The average land holding size and average adoption index of vegetable farming have negative significant coefficients. The large landholders mostly do not keep interest in group activities. In communities where the vegetables are grown in larger scale, women participate less in group activities than men.

Role of social capital on average adoption index in the sites

The adoption index is regressed with social capital index and other explanatory variables, and the empirical result shows that social capital stock in the communities contributes significantly (B = 2.469, P<0.05) in adoption of vegetable farming in the site (Table 5).

The social capital expressed in the form of proactivity, general ethical norms, cooperation, collectivity, trust and networks promote the collective decision making to adopt new farm practices by community members. Among other variables, average land holding size and women participation in groups negatively affect the adoption rate

Table 4. Result of linear regression (OLS) for women participation index.

Variable	Unstandardized coefficients		Standardized coefficient	t	Sig. (p)
	B	Std. error	Beta		
(Constant)	-0.275	0.312		-0.881	0.394
Social capital index (SCIc)	1.308**	0.454	0.530	2.882	0.013
Average land holding size ha (ALHS)	-0.200**	0.062	-0.775	-3.235	0.007
Average adoption index for vegetable crops (AAI)	-0.532**	0.112	-0.954	-4.768	0.000
Literacy rate female (FLR)	0.006	0.003	0.400	1.993	0.068
Trust in government officials (TGO)	0.031	0.036	0.144	0.866	0.402
Average annual off farm income (AAOI)	2.83E-006*	0.000	0.487	2.629	0.021

R = 0.824   Significance F = 0.010
R^2 =0.679   Standard error = 0.078

** Significant at (P< 0.01) level, * Significant at (P< 0.05) level.

Table 5. Result of linear regression (OLS) for adoption index.

Variable	Unstandardized coefficients		Standardized coefficient	t	Sig. (p)
	B	Std. error	Beta		
(Constant)	-1.424	0.552		-2.580	0.026
Social capital index (SCIc)	2.469**	0.601	0.543	4.111	0.002
Average land holding size (ALHS)	-0.310**	0.055	-0.653	-5.614	0.000
Average annual off farm income (AAOI)	3.63E-006**	0.000	0.340	3.043	0.010
Total literacy rate (LR)	0.006	0.004	0.222	1.735	0.111
Women's participation index (WPI)	-1.123**	0.206	-0.611	-5.465	0.000
Availability of input (IA)	0.114*	0.050	0.265	2.263	0.045
Trust in government officials (TGO)	0.095	0.046	0.239	2.050	0.065
Trust to traders (TT)	0.167	0.087	0.250	1.921	0.081

R = 0.94   Significance F = 0.00
R^2 = 0.88   Standard error = 0.095

** Significant at (P<0.01) level, * Significant at (P<0.05) level.

of vegetable farming in the sites. Average annual off farm income and availability of input positively contributes in adoption rate of vegetable farming.

Role of social capital on overall performance of the program

The program performance index is regressed with social capital index and other explanatory variables show that social capital stock in the farming communities significantly (B = 1.347, P<0.05) contributes in performance of the vegetable production program. The regression coefficient for social capital index shows one unit increase in social capital stock in the communities increases the program performance by 1.347 units when other explanatory variables held constant (Table 6). The trust to government officials by the community people also positively contributes to performance of the program. Among other variables, average land holding size have negative and significant coefficient. This shows that vegetable production program can better perform among small holders than large holder. Generally, large landholders have tendency to grow cereal crops and other cash crops rather than vegetables.

CONCLUSION AND RECOMMENDATION

Social capital endowment both at the household and community level significantly contributes in performance of vegetable production program. The different

Table 6. Result of linear regression (OLS) for program performance index.

Variable	Unstandardized coefficients		Standardized coefficient	t	Sig. (p)
	B	Std. error	Beta		
(Constant)	-0.962	0.344		-2.800	0.019
Social capital index (SCIc)	1.347**	0.390	0.647	3.451	0.006
Distance from nearest market (MD)	0.002	0.004	0.096	0.602	0.561
Market access (MA)	0.004	0.035	0.020	0.121	0.906
Inputs availability (IA)	0.015	0.033	0.077	0.464	0.653
Average land holding size (ALHS)	-0.175**	0.035	-0.805	-4.952	0.001
Total literacy rate (LR)	0.003	0.002	0.237	1.373	0.200
Average annual off farm income (AAOI)	8.40E-007	0.000	0.172	1.123	0.288
Trust to traders (TT)	0.123*	0.053	0.405	2.332	0.042
Trust in government officials (TGO)	0.072*	0.029	0.397	2.504	0.031

R = 0.898   Significance F = 0.013
R^2 = 0.806   Standard error = 0.058

** Significant at ($P<0.01$) level; * Significant at ($P<0.05$) level.

expressions of social capital contribute both positively and negatively in agriculture extensions programs. The social capital expressed in the form of thick trust and bonding networks produces inertia for change in traditional farming system by the households but once this inertia is broken, these attributes accelerate the change. Other expressions of social capital like collectivity, reciprocity, thin trust, trust to government officials and traders have positive contribution in adoption of new farm enterprise (vegetable farming) by the farm households. At the community level, social capital significantly contributes in performance of vegetable production program or other similar community development programs by promoting participation, equity and adoption of recommended practices by the development actors.

Social capital is found to be the critical resource for the farming communities after the natural resources and if deteriorated below certain critical level, it makes the livelihood system more vulnerable. It is recommended that social capital should be included with other resources in the feasibility study of the agriculture development programs to know the possible level of community participation in the program.

RECOMMENDATION FOR FURTHER RESEARCH

This study has found that social capital expressed in the form of thick and thin trust, level of trust in extended and traditional radius, status of bonding, bridging and linking networks have different roles to play in performance of agriculture development programs. The most important area to be studied is to find out the ways of overcoming the negative effect of thick trust and bonding networks in

the context of agriculture/community development interventions with respect to adoption of new technology.

The community group approach is widely used for participatory people centered development in recent years. Such groups are intended to enhance social capital in the communities and households. The research is needed to determine the extent to which the present group approach is enriching social capital stock in the communities.

It is important to study the level of social capital existing in the communities to initiate participatory community development activities. The participatory approach may be a new tyranny (not opportunity) for the people where there is poor social capital endowment. Such study should focus on the basic level of social capital endowment required for participatory development. This will provide insights in the success and failure of participatory processes in agriculture and community development.

This study has covered social capital in the communities (recipient part) which is not enough to understand all aspects of agriculture and community development program performance from social capital perspective. In this context, there is a need to study the social capital endowment among all actors (service delivery organizations, staff, marketing actors, leaders, farmers and others) operating in a particular environment and have stake in development interventions.

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