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Analyzing Social Capital Behaviour in the Renewable Energy Sector of Nepal

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Abstract

This paper aims to analyze social capital behaviour in the context of the renewable energy sector in Nepal, comprising a descriptive cum analytical research design based on both primary and secondary data. Some necessary primary data were collected by conducting a field survey using a structured questionnaire on a sample of 118 Nepalese renewable energy enterprises having 264 respondents. Likewise, its secondary data were collected through relevant publications. The collected data were analyzed using simple statistical tools through SPSS to derive results leading to major findings of the study. The study concluded that renewable energy entrepreneurs feel closeness with family networks/members and social networks, but they have frequent contact with an internal network of employees as well as buyer-supplier networks. Furthermore, trust among networks provides an opportunity to create a high level of trust among the members while the shared vision provides an opportunity for personal socializing among entrepreneurs so that members expend resources in terms of time, money, equipment, or excess inventory for helping each other leading to achieving the goals of the enterprises. Policy implications and future avenues are also discussed for sustainable energy sector of Nepal.

Introduction

An entrepreneurial individual has specific resources that expedite the identification of an opportunity and the accumulation of new resources to

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create a new enterprise leading to entrepreneurial success. Social capital is the goodwill available to individuals or groups that lies in the structure and content of the actor's social relations (Adler and Kwon, 2002). Nahapiet and Ghoshal (1998) categorized social capital into three interrelated dimensions: cognitive (shared codes, language, and shared narratives), relational (trust, norms, obligations, and identification,) and structural (network ties, network configuration, and appropriate organization) for analytical purposes. Social capital has enjoyed a remarkable rise to prominence in both theoretical and applied social sciences literature over the last decade (Grootaert et al., 2003). Social capital in the form of network ties, trust, and shared vision influences firm performance (Koka and Prescott, 2002). Network ties, trust, and shared vision have a positive impact on firm performance (Saha and Banerjee, 2015).

Alam et al. (2012) showed that family support, social ties, and internal motivation are positively and significantly related to the success of women entrepreneurs. Likewise, Sengupta (2011) revealed that network plays a key role in facilitating access to business finance by building trust between entrepreneurs and investors. Network connectivity has strong and additive effects on performance specifically in the case of rural entrepreneurs in developing countries (Aarstad, 2012). Dua and Bhandarker (2017) showed that both forms of social capital: internal and external are important for bringing about overall organizational innovativeness in the product and the market.

Martins (2016) revealed that networks provide opportunities to accomplish sustainable competitive advantages and compete successfully in the marketplace. In the context of Nepal, a study by Poudyal (2002) revealed that faith in a business plan and willingness to stick to it can increase an entrepreneur's chances for success and profitability. The critical factors contributing to the success of entrepreneurship are easy access to finance followed by easy access to raw materials (Shrestha, 2007). Thapa (2007) found that education has a positive effect on entrepreneurial success. Moreover, Pokharel et al. (2006) showed that the five key aspects of a successful pro-poor enterprise are firm size, governance, skills, networking, and conducive policy.

Furthermore, Sigdel (2015) revealed that age, experience, and export promotion are important factors affecting the success of women entrepreneurs while education does not appear to be an important factor affecting the success of women entrepreneurs. Women can become active entrepreneurs if they have access to finance (Rakhal, 2015). In addition to market segmentation, access to capital, and lack of skills and knowledge are the main constraints to micro-business growth (Villanger, 2015). To sum up the above discussions, the objective of this study is to analyze social capital behaviour by examining network ties, trust, and shared vision in the context of micro, small, and medium enterprises (MSMEs) in Nepal. This study is the first of its kind as no study has so far been conducted to assess social

capital behaviour in the renewable energy sector of Nepal. Viewing from this perspective, the study dealing with social capital behaviour in the context of the renewable energy sector in Nepal is of greater significance.

Methods

This study contains a descriptive cum analytical research design based on both primary and secondary data. The required primary data were collected on a sample of 264 owners/managers from 118 Renewable Energy enterprises (REEs) by a field survey using a structured questionnaire. Furthermore, the Secondary data covering 42 years of the biogas sector, 25 years of the solar sector, and 55 years of the micro-hydro sector leading to a total of 122 observations have been collected through relevant publications in this study. In this connection, there are 260 REEs in Nepal with having age of 3 years or more experience in the sector. There are 162 REEs or 62 percent out of 260 lies in the Bagmati province of Nepal. A total of 162 REEs of the Bagmati province were considered as the population for this study. The study has determined its sample by using the simplified formula for proportions of a finite population (Yamane, 2007). The study assumes a 95 percent level of confidence. Based on these assumptions, the required sample size was calculated as under:

$$n = \frac{N}{1 + N(e)^2} \quad \ldots(1)$$

Where, n = sample size; N = population size; e = level of precision.

$$n = \frac{162}{1 + 162\,(0.05)^2} = 115.30 \cong 116\ REEs$$

Thus, the minimum sample size should be 116 REEs. It seems to be representative of the renewable energy sector in Nepal. For this study, 130 REEs have been selected out of 162 REEs based on the availability of data. For each sector, simple random sampling was used to determine the respondents. From 130 REEs, 390 owners/managers were selected as respondents for this study. Out of 390 questionnaires distributed, a total of 273 questionnaires were returned from 118 REEs, yielding a response rate of 70 percent. Out of the 273 questionnaires received, nine questionnaires were discarded as they were not filled up properly. Therefore, the primary data analysis is based on 264 questionnaires received from 118 REEs.

The selected REEs consist of 45 solar companies (SCs) followed by 40 micro-hydro construction companies (MHCCs) and 33 biogas companies (BCs). The profile of respondents reveals that the sample is a good mix of all types of owners/managers of the renewable energy sector in Nepal. Thus, the sample appears to be representative from which to extract general conclusions on human capital behaviour in the renewable energy sector of Nepal. The collected data were analyzed using simple statistical tools to derive results leading to major findings of the study. Descriptive statistics such as mean, standard

deviation, and minimum and maximum values have been used to describe social capital behaviour in the context of the renewable energy sector in Nepal.

Result

In this section, an attempt is made to analyze social capital behaviour in the renewable energy sector of Nepal. The social capital was determined by analyzing it in the form of network ties, trust, and shared vision in the context of the renewable energy sector in Nepal.

Network ties: Network ties are regarded as important vehicles for exchanging and transferring information in the context of small and medium-sized enterprises (Uzzi, 1997, Vanhaverbeke, 2001). It is important to exchange and share information within the networks. The network ties with industrial networks and/or business associations and provides information, ideas, capacity building, and legal/advocacy support.

Network ties comprise the perception of closeness, duration of the relationship, and frequency of contact in each network. In this connection, Table 1 presents the opinion of the owners/managers on the perception of closeness in the context of the Nepalese renewable energy sector. Table 1 comprises the number of responses, percentage, mean weight, and rank based on the mean weight of opinion of the owners/managers on the perception of closeness in the context of the Nepalese renewable sector. The statements are based on the opinion of 264 owners/managers on the perception of closeness and are measured on a five-point Likert scale (1 = very distant, 2 =distant, 3 = neutral, 4 = close, and 5 = very close).

Table 1: Rank-wise number of responses on the perception of closeness

Closeness with the members of the network	very distant	distant	neutral	close	very close	Total Responses	Weighted Value	Mean weight	Overall rank
	1	2	3	4	5				
Family networks/ members	2 (0.8)	2 (0.8)	21 (8.0)	73 (27.7)	166 (62.9)	264	1,191	4.51	1
Social networks	2 (0.8)	2 (0.8)	9 (3.4)	172 (65.2)	79 (29.9)	264	1,116	4.23	2
Informal networks	0 (0.0)	10 (3.8)	88 (33.3)	154 (58.3)	12 (4.5)	264	960	3.64	6
Internal networks of employees	2 (0.8)	2 (0.8)	25 (9.5)	165 (62.5)	70 (26.5)	264	1,091	4.13	4
Buyer–supplier networks	1 (0.4)	7 (2.7)	19 (7.2)	164 (62.1)	73 (27.7)	264	1,093	4.14	3
Industry/trade networks	0 (0.0)	14 (5.3)	30 (11.4)	183 (69.3)	37 (14.0)	264	1,035	3.92	5
Formal business associations	1 (0.4)	14 (5.3)	93 (35.2)	122 (46.2)	34 (12.9)	264	966	3.66	7

Source: *Author's calculation*

Note: Figures in parentheses are percentages over total responses

The various statements concerning the perception of closeness were given to them on a five-point Likert scale ranging from 1 for very distant to 5 for very close. The respondents were asked to rank various statements concerning the perception of closeness. The respondents gave the 'first' priority to 'family networks/members' and the 'second' priority to 'social networks.' The statement 'formal business associations' received the last priority. It indicates that informal/family networking has been given priority over formal business associations or networks.

Similarly, Table 2 summarizes the rank-wise number of responses on the relationship duration with networks. This table comprises the frequency, percentage, mean weight, and rank based on the mean weight of the opinion of the owners/managers on the duration of the relationship with networks in the context of the Nepalese renewable sector. The statement is based on the opinion of 264 owners/managers on the duration of their relationship with networks and is measured on a five-point Likert scale 1 as less than 1 year, 2 as 1 to 3 years, 3 as 4 to 6 years, 4 as 7 to 9 years and 5 as 10 years or more.

Years of relationships	less than 1 year	1–3 years	4–6 years	7–9 years	10 or more years	Total responses	Weighted value	Mean weight	Overall rank
	1	2	3	4	5				
Family networks/members	7 (3)	32 (12)	37 (14)	19 (7)	169 (64)	264	1,104	4.18	1
Social networks	4 (2)	48 (18)	64 (24)	50 (19)	98 (37)	264	982	3.72	2
Informal networks	57 (22)	44 (17)	51 (20)	55 (21)	57 (23)	264	803	3.04	6
Internal networks of employees	10 (4)	61 (23)	77 (29)	58 (22)	58 (22)	264	884	3.35	4
Buyer–supplier networks	10 (4)	60 (23)	65 (25)	67 (25)	62 (24)	264	903	3.42	3
Industry/trade networks	14 (5)	62 (24)	70 (27)	60 (23)	58 (22)	264	879	3.33	5
Formal business associations	68 (26)	50 (19)	46 (17)	50 (20)	50 (19)	264	755	2.86	7

Note: Figures in parentheses are percentages over total responses

The respondents were asked to rank various statements concerning the duration of the relationship. Based on the duration of the relationship with networks, the respondents gave the 'first' priority to 'family networks/members' and the 'second' priority to 'social networks.' The statement

'formal business associations' received the last priority. The results indicate that the duration of the relationship for informal/family networks is higher than the duration for formal networks. Having analyzed the above, it would be necessary to analyze the frequency of contacts in each network to communicate among networks as presented in Table 3.

Frequency of communication with the members of the network	once a year or less	six times a year	once a month	once a week	Daily	Total responses	Weighted Value	Mean weight	Overall rank
	1	2	3	4	5				
Family networks/ members	17 (6)	14 (5)	29 (11)	63 (24)	141 (53)	264	1,090	4.13	3
Social networks	7 (3)	18 (7)	63 (24)	102 (39)	74 (28)	264	1,011	3.83	5
Informal networks	81 (31)	32 (12)	61 (23)	57 (22)	33 (13)	264	721	2.73	6
Internal networks of employees	5 (2)	6 (2)	17 (6)	33 (13)	203 (77)	264	1,214	4.60	1
Buyer–supplier networks	7 (3)	8 (3)	23 (9)	44 (17)	182 (69)	264	1,177	4.46	2
Industry/trade networks	21 (8)	9 (3)	50 (19)	92 (35)	92 (35)	264	1,016	3.85	4
Formal business associations	77 (29)	40 (15)	68 (26)	61 (23)	18 (7)	264	694	2.63	7

Source: *Author's calculation*

Note: Figures in parentheses are percentages over total responses

Table 3 consists of the frequency, percentage, mean weight, and rank based on the mean weight of opinion of the owners/managers on the frequency of contact in each network in the context of the Nepalese renewable sector. The statement is based on the opinion of 264 owners/managers on the frequency of contact in each network and is measured on a five-point Likert scale 1 as once a year or less, 2 as six times a year, 3 as once a month, 4 as once a week, and 5 as daily.

The mean value of responses on the frequency of contacts in each network ranges from 2.63 to 4.60. The results reveal that a larger number of owners/managers have either daily or weekly contact in each network. Concerning the frequency of contacts in each network, the respondents gave the 'first' priority to 'internal networks of employees', the second priority to 'buyer-supplier networks', the third priority to 'family networks/members', the fourth priority to 'industry/trade networks', the fifth priority to 'social networks' the sixth priority to informal networks, and the last priority to 'formal business associations.' All respondents gave the 'first' priority based

on the frequency of contacts in each network while the fourth priority was based on the perception of closeness and duration of the relationship to 'internal networks of employees.' In this connection, the respondents feel closeness with family networks/members and social networks, but they do have frequent contact with an internal network of employees and buyer-supplier networks to achieve the goal of their enterprises. Moreover, the opinion of the owners/managers on network ties is shown in Table 4. The Table consists of the frequency, percentage, mean weight, and rank based on the mean weight of opinions of the owners/managers on network ties among networks in the context of the Nepalese renewable sector. The opinions were measured on a five-point Likert scale ranging from 1 for strongly disagree (SD) to 5 for strongly agree (SA). The statement is based on the opinion of 264 owners/managers on network ties among networks and is measured on a five-point Likert scale (1 = strongly disagree (SD), 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree (SA)).

Table 4: Rank-wise number of responses on network ties

I have good relationships/ ties with	strongly disagree	Disagree	Un decided	Agree	strongly agree	Total responses	Weighted Value	Mean weight	Overall rank
	1	2	3	4	5				
Family members/ networks	1 (0.4)	0 (0.0)	1 (0.4)	117 (44.3)	145 (55.9)	264	1,197	4.53	1
Social networks	1 (0.4)	0 (0.0)	8 (3.0)	167 (63.3)	88 (33.3)	264	1,133	4.29	2
Informal networks	0 (0.0)	2 (0.8)	57 (21.6)	170 (64.4)	35 (13.3)	264	1,030	3.90	6
Internal networks of employees	1 (0.4)	0 (0.0)	12 (4.5)	175 (66.3)	76 (28.8)	264	1,117	4.23	3
Buyer–supplier networks	0 (0.0)	2 (0.8)	26 (9.8)	177 (67.0)	59 (22.3)	264	1,085	4.11	4
Industry/ trade networks	0 (0.0)	3 (1.1)	39 (14.8)	187 (70.8)	35 (13.3)	264	1,046	3.96	5
Formal business associations	0 (0.0)	7 (2.7)	62 (23.5)	169 (64.0)	26 (9.8)	264	1,006	3.81	7

Source: *Author's calculation*

Note: Figures in parentheses are percentages over total responses

Our respondents were asked to rank various statements based on network ties among networks. The respondents gave the 'first' priority to 'I have good relationship/ties with family networks/members' and the 'second' priority to 'I have good relationship/ties with social networks.' Similarly, the

statement 'I have good relationships/ties with formal business associations' received the last priority.

Trust in network: Trust in the network is important to reduce transaction costs and conflict within the network. Trust is the expectation within the network with honest behaviour and cooperation based on shared norms. Neace (1999) has identified trust as a prime requisite for success and an important factor for establishing viable and sustainable small businesses.

In this connection, the opinions of the owners/managers based on the trust among networks in the context of the renewable energy sector of Nepal are given in Table 5. This table consists of the number of responses, percentage, mean weight, and rank based on the mean weight of opinions of the owners/managers based on trust among networks in the context of the Nepalese renewable sector. The statement is based on the opinion of 264 owners/managers on trust among networks and is measured on a five-point Likert scale (1 = strongly disagree (SD), 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree (SA)).

Table 5: Rank-wise number of responses on trust among networks

Statement	strongly disagreed	Disagree	Un decided	Agree	strongly agree	Total responses	Weighted Value	Mean weight	Overall rank
	1	2	3	4	5				
Trust the members of the network without fear	6 (2.3)	40 (15)	38 (14)	139 (53)	41 (16)	364	961	3.640	4
People in the network will always put their word	1 (0.4)	4 (2)	17 (6)	214 (81)	28 (11)	264	1,056	4.000	3
High level of trust among the members	0 (0.0)	5 (2)	13 (5)	202 (77)	44 (17)	264	1,077	4.080	1
Network members cooperate	1 (0.4)	6 (2)	13 (5)	196 (74)	48 (18)	264	1,076	4.076	2

Source: *Author's calculation*

Note: Figures in parentheses are percentages over total responses

The respondents were asked to rank various statements based on trust among networks. The respondents gave the 'first' priority to a 'high level of trust among the members', the 'second' priority to 'network's members cooperate', the 'third' priority to 'people in the network will always put their word', and the 'last' priority to 'trust on the members of the network without fear'.

Shared vision: The shared vision is regarded as individuals or organizations having a similar vision. In effective networks, members hold a common vision about what the members should accomplish, what is appreciated or interesting, and what is essential or anticipated from membership (Wollebaek and Selle, 2002). Inkpen and Tsang (2005) discuss this behaviour as 'shared goals.' In this connection, shared vision is viewed as either having a similar vision or a common vision or shared goals. The rank-wise number of responses on shared vision by the owners/managers is given in Table 6.

It consists of the number of responses, percentage, mean weight, and rank based on the mean weight of opinions of the owners/managers based on the shared vision in the context of the Nepalese renewable sector. The statement is based on the opinion of 264 owners/managers on the shared vision and is measured on a five-point Likert scale (1 = strongly disagree (SD), 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree (SA)). The respondents were asked to rank various statements based on network ties among networks. The respondents gave the 'first' priority to 'provide opportunities for personal socializing', the 'second' priority to 'members expend resources in terms of time, money, equipment or excess inventory, to help each other', the 'third' priority to 'members caring about the fortune of each other's business', and the 'last' priority to 'members grasp the same ambitions and visions'.

Table 6: Rank-wise number of responses on the shared vision

Statement	strongly disagree	Disagree	Un decided	Agree	strongly agree	Total responses	Weighted Value	Mean weight	Overall rank
	1	2	3	4	5				
Members grasp the same ambitions and visions	34 (12.9)	33 (12.5)	29 (11.0)	130 (49.2)	38 (14.4)	264	897	3.40	4
Members expend resources in terms of time, money, equipment, or excess inventory, to help each other	16 (6.1)	30 (11.4)	38 (14.4)	160 (60.6)	20 (7.6)	264	930	3.52	2
Provide opportunities for personal socializing	0 (0.0)	6 (2.3)	14 (5.3)	200 (75.8)	44 (16.7)	264	1074	4.07	1
Members care about the fortune of each other's business	12 (4.5)	52 (19.7)	34 (12.9)	138 (52.3)	28 (10.6)	264	910	3.45	3

Source: *Author's calculation*

Note: Figures in parentheses are percentages over total responses

Most of the respondents (96%) believe that 'an entrepreneur's education, age, work history, and support networks have positive contributions in business successes' which is consistent with the findings of Hattab (2014). The 'majority' of respondents (75 percent) also state that 'entrepreneurs must be jacks-of-all-trades, who need not excelling in any one skill but are competent in many' which is consistent with the findings of Lazear (2005). Similarly, the majority of owners/managers (94 percent) believe that human capital factors have a positive relationship with entrepreneurial success which is consistent with the findings of Kim et al. (2003), Korunka et al. (2003), and Anderson and Miller (2003).

Additionally, the majority of respondents (93 percent) believe that human capital is a significant element of entrepreneurial success which is consistent with the findings of Bates (1990), Schoar (2010), and Zahoor et al., (2023). Among others, the result reveals that network plays an important role in facilitating access to finance by building trust between entrepreneur and investor which is similar to the findings of Sengupta (2011) and Yadav (2024). The results also reveal that access to finance is a determining factor for micro, small, and medium enterprises (MSMEs) start-ups.

This is consistent with the findings of Macht and Robinson (2009), Underwood (2009), and Derera et al. (2014). Moreover, these results reveal that 'if they had enough capital, their business could have grown faster' which is similar to the findings of Derera et al. (2014). However, this contrasts with the findings of Aldrich (1999), and Hurst and Lusardi (2004). Furthermore, the results reveal that using different types of business finance such as family funding, subsidies, and bank loans is important for success. This is consistent with the findings of Sengupta (2011). The results reveal that the entrepreneur's access to capital is a significant factor affecting the growth of new enterprise which is similar to the findings of Yadav (2024), Blanchflower et al. (2001), Evans and Jovanovic (1989), and Holtz-Eakin et al. (1994) but it is in contrast to the findings by other studies (Aldrich, 1999; Hurst and Lusardi, 2004).

Conclusion

The results of this study led to important conclusions. The study concluded that renewable energy entrepreneurs give high priority to informal/family networks over formal business associations or networks. Likewise, the duration of the relationship for the informal/family networks is longer than the duration for formal networks. Based on the frequency of communication with the members of the network, the respondents give the 'first' priority to internal networks of employees. In this connection, the respondents feel closeness with family networks/members and social networks, however, they do have frequent contact with an internal network of employees and

buyer-supplier networks to achieve the goal of their enterprises. In the case of trust among networks, the respondents feel that they get an opportunity to create a high level of trust among the members. The responses on shared vision by the owners/managers showed that the shared vision provides an opportunity for personal socializing among entrepreneurs so that members expend resources in terms of time, money, equipment, or excess inventory to help each other leading to achieving the goals of the enterprises. This study is useful for renewable energy enterprises (REEs), development actors in the sector, academia, and policymakers. The study is valuable particularly for biogas companies, solar companies, and micro-hydro construction companies to grow their own business by focusing on the social capital behaviour in the sector. It is also useful for the development actors of the renewable energy sector for more commercialization of the sector.

The present study aims at generating at least some new knowledge in the literature on entrepreneurship and provides avenues for future research. This study may be useful to academia for future studies. Finally, it would be reference materials to formulate entrepreneur-friendly policies to facilitate the existing and potential REEs leading to generating employment locally that plays a vital role in economic growth by increasing production and providing energy in the country.

The first and foremost research avenue of this study is to make the study more fruitful by incorporating other sectors of renewable energy such as improved cooking stoves, wind technology, and biomass sectors to get greater insight into the results. The extension of this study can be made by conducting a detailed analysis of the impact of financial, social, and human capital on entrepreneurial success in the renewable energy sector. Further study can be extended by incorporating the opinions and views of respondents from customers, regulating authorities, and development actors in the sector in future studies.

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