

Human Capital Behavior in the Renewable Energy Sector of Nepal

Dr. Maheshwar Prasad Yadav

Head of Department, Planning, Monitoring, and Reporting Department
Nepal Water for Health (NEWAH), Headquarters, Kathmandu, Nepal

Orcid ID: 0000-0002-9573-1134

mpyadav2006@gmail.com

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Abstract

Purpose: *The paper aims at analyzing human capital behavior in the context of the renewable energy sector in Nepal.*

Design/methodology/approach: *The study comprises a descriptive research design based on both primary and secondary data. The required 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, the secondary data were collected through relevant publications. The collected data were analyzed using simple statistical tools to derive results leading to major findings of the study.*

Results/findings: *The study shows that human capital factors, entrepreneur's education, age, work history, and support networks have positive contributions to business success. The study further reveals that entrepreneurs must be jacks of all trades who need not excel in any one skill but are competent in many.*

Originality/value: *This study is useful for renewable energy entrepreneurs to grow their businesses by focusing on the relevant human capital behavior in the context of the renewable energy sector in Nepal. This work may potentially be useful to academia for future studies.*

Future avenue: *The study can be extended by incorporating the opinion and views of respondents from customers, regulating authorities, and development actors in the sector in future studies.*

Paper type: *Research paper*

Keywords: Education, experience, human capital behavior, renewable energy

Introduction

Human capital is defined as the knowledge, qualifications, experiences, and skills of employees that are taken with them after leaving the firm (Zeghal & Maaloul, 2010). It consists of the competence and capabilities (i.e., learning and education, experience and expertise in innovation and creation) of the employees. Rose *et al.* (2006) found that education, experiences, and financial support are the major factors affecting business success. Similarly, education, training in the specific sector and prior experience may have a positive relationship with entrepreneurial success. Human resources play an essential role in so far as they can encourage or hinder corporate entrepreneurship (Montoro-Sánchez & Soriano, 2011). An individual having diverse work experience and diverse educational backgrounds has much more possibility to start an enterprise than one who has experience in one role and concentration in one subject at school (Lazear, 2005). Human capital is a key determinant of entrepreneurial success. A study by Zahoor *et al.* (2023) concluded that individual-level antecedents relate to the attributes of entrepreneurs or managers range from the personal characteristics of entrepreneurs (e.g., age, experience, and language) to manager's propensities (e.g., risk-takers or dispositional optimists). Human capital has a positive effect on financial performance (Laing *et al.*, 2010). The knowledge and skills gained through education and experience represent a great resource for an enterprise that is regarded as human capital. Human capital is an important element for starting and running an enterprise.

Human capital is a major factor affecting entrepreneurial success [(Schoar, 2010), (Alvarez & Busenitz, 2001), (Bates, 1990)]. Human capital in the form of education and experience is the key factor affecting entrepreneurial success (Becker, 1975). Education and experience are important factors to identify and exploit an opportunity (Chandler & Hanks, 1998; Shane & Venkataraman, 2000; Anderson & Miller, 2003). A study by Thapa (2007) found that education has a positive effect on entrepreneurial success. Similarly, formal education is one of the important factors of human capital that may assist in the accumulation of explicit knowledge and skills for entrepreneurs (Gimeno *et al.*, 1997). Human capital constitutes the abilities and skills of workers that affect the overall productivity of a venture (Marshall & Samal, 2006). In addition to market segmentation, lack of skills and knowledge are the main constraints to micro-business growth (Villanger, 2015). Moreover, Yadav *et al.* (2018) found a strong role played by education, and experience in determining entrepreneurial success. Similarly, Rao *et al.* (2013) revealed that education, training in a specific sector and prior experience have a positive relationship with entrepreneurial success. Likewise, A study by Zhouqiaoqin *et al.* (2013) found that human capital, women's characteristics, and motivation have a significant influence on the success of women entrepreneurs while the family background has a less significant influence on the success of women entrepreneurs in China. However, Zhao & Xing (2022) found that the shadow of adverse childhood experiences is significantly detrimental to entrepreneurship in adulthood by losses in human capital, physical capital, and social capital, and developing a risk-averse personality. Moreover, 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. In the context of the renewable energy sector of Nepal, it is yet unknown about the human capital behavior in determining entrepreneurial success.

To sum up the above discussion, the purpose of this study is to examine human capital behavior by analyzing the education and experience of the owners/managers and other related factors in the renewable energy sector of Nepal. Thus, the study dealing with human capital behavior in the context of the renewable energy sector in Nepal is of greater significance.

Materials & Methods

The study adopts a descriptive research design based on primary and secondary data. The study contains the renewable energy sector comprising a sample from biogas solar, solar sector, and micro-hydro sector in Nepal. The required primary data were collected from 264 owners/managers of 118 renewable energy enterprises (REEs) through 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 for this study.

In this connection, there are 260 renewable energy enterprises (REEs) in Nepal with having age of 3 years or more 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 of the 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:

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

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

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

Thus, the minimum sample size should be 116 REEs. It seems to be representative of the renewable energy sector in Nepal.

To achieve the objective of this study, 130 REEs has 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 are 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. Thus, 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 one from which to extract general conclusions on human capital behavior in the renewable energy sector of Nepal.

The collected data were analyzed using simple statistical tools such as percentage, rank, table, and descriptive statistics 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 human capital behavior in the renewable energy sector of Nepal.

Result & Discussion

In this section, an attempt is made to analyze human capital behavior in the renewable energy sector of Nepal. The human capital behavior was determined by analyzing the education and experience of the owners/managers and related variables in the context of the renewable energy sector in Nepal.

In this perspective, Table 1 presents the number of owners/managers with the level of education in terms of years of schooling by gender. As regards the total responses, most of the respondents (33.3 percent) have 12 years of schooling followed by 15 years of schooling (33 percent), 16 or more years of schooling (16.7 percent), 14 years of schooling (9.8 percent) and 10 years of schooling (7.2 percent). Similarly, the majority of female owners/managers (38.2 percent) have 12 years of schooling followed by 15 years of schooling (32.4 percent), 14 years of schooling, and 16 or more years of schooling (11.8 percent for each category), and 10 years of schooling (5.9 percent). However, many male owners/managers (33 percent) have 15 years of schooling followed by 12 years of schooling (32.6 percent), 16 or more years of schooling (17.4 percent), 14 years of schooling (9.6 percent), and 10 years of schooling (7.4 percent). It indicates that male owners/managers have a higher level of education than female owners/managers.

Table 1: Number of owners/managers with years of schooling by gender

The table consists of the level of education in terms of years of schooling of the 264 owners/managers from 118 renewable energy enterprises in Nepal by gender.

Years of schooling	Gender of respondents		Total
	Male	Female	
10 years	17 (7.4)	2 (5.9)	19 (7.2)
12 years	75 (32.6)	13 (38.2)	88 (33.3)
14 years	22 (9.6)	4 (11.8)	26 (9.8)
15 years	76	11	87

	(33.0)	(32.4)	(33.0)
16 years or more	40	4	44
	(17.4)	(11.8)	(16.7)
Total	230	34	264
	(100.0)	(100.0)	(100.0)

Source: Field survey

Note: Figures in parentheses are percentages over total responses.

In addition, the level of education in terms of years of schooling of 264 owners/managers from 118 renewable energy enterprises in Nepal by sector of enterprises is presented in Table 2.

Table 22: Number of owners/managers with years of schooling by sector of enterprises

The table consists of the level of education in terms of years of schooling of the 264 owners/managers from 118 renewable energy enterprises in Nepal by sector of enterprises.

Years of schooling	Biogas sector	Solar sector	Micro-hydro sector	Total
10 years	3 (5)	12 (12)	4 (4)	19 (7)
12 years	31 (49)	24 (23)	33 (34)	88 (33)
14 years	12 (19)	2 (2)	12 (12)	26 (10)
15 years	13 (21)	45 (44)	29 (29)	87 (33)
16 years or more	4 (6)	19 (19)	21 (21)	44 (17)
Total	63 (100)	102 (100)	99 (100)	264 (100)

Source: Field survey

Note: Figures in parentheses are percentages over total responses.

In the context of the biogas sector, most of the owners/managers (49 percent) have 12 years of schooling followed by 15 years of schooling (21 percent), 14 years of schooling (19 percent), 16 or more years of schooling (6 percent), and 10 years of schooling (5 percent). Similarly, most of the owners/managers (44 percent) have 15 years of schooling followed by 12 years of schooling (23 percent), 16 or more years of schooling (19 percent), 10 years of schooling (12 percent), and 14 years of schooling (2 percent) in the context of the solar sector. Moreover, most of the owners/managers (34 percent) from the micro-hydro sector has 12 years of schooling followed by 15 years of schooling (29 percent), 16 or more years of schooling (21 percent), 14 years of schooling (12 percent), and 10 years of schooling (4 percent). The results

indicate that the owners/managers from the solar sector have a higher level of education than that of the biogas and micro-hydro sectors.

Table 3 presents the number of owners/managers with years of schooling by designation. It shows the level of education in terms of years of schooling of the owners/managers in the context of the renewable energy sector in Nepal. The results reveal that most of the owners (42.7 percent) have 15 years of schooling followed by 12 years of schooling (17.6 percent), 16 or more years of schooling (21.4 percent), 14 years of schooling (11.5 percent) and 10 years of schooling (6.9 percent). Likewise, most of the managers (48.9 percent) have 12 years of schooling followed by 15 years of schooling (23.3 percent), 16 or more years of schooling, 14 years of schooling (8.3 percent), and 10 years of schooling (7.5 percent). The owners have a higher level of education than those managers in the renewable energy sector of Nepal.

Table 3: Number of owners/managers with years of schooling by designation

The table consists of the level of education in terms of years of schooling of the 264 owners/managers from 118 renewable energy enterprises in Nepal by designation.

Years of schooling	Owners	Managers	Total
10 years	9 (6.9)	10 (7.5)	19 (7.2)
12 years	23 (17.6)	65 (48.9)	88 (33.3)
14 years	15 (11.5)	11 (8.3)	26 (9.8)
15 years	56 (42.7)	31 (23.3)	87 (33.0)
16 years or more	28 (21.4)	16 (12.0)	44 (16.7)
Total	131 (100.0)	133 (100.0)	264 (100.0)

Source: Field survey

Note: Figures in parentheses are percentages over total responses.

Having analyzed the above, it would be necessary to analyze the experience of the owners/managers in different sectors. The number of responses and descriptive statistics on the experiences of the owners/managers in different sectors is presented in Table 4.

Table 4: Number of responses and descriptive statistics on experience by the owners/managers in different sectors

This table comprises the number of responses, min, max, mean, standard deviation, and overall rank based on the mean of experience by the respondents.

An experience by the owners/managers	Total responses	Total experience (in years)	Mean	SD	Min	Max	Overall rank
Experience as an employee in the renewable energy business	243	1,159	4.77	3.35	1	18	1
Experience as an employee in the non-renewable energy business	100	128	1.28	2.25	1	15	3
Prior involvement as an entrepreneur in the renewable energy business	117	339	2.90	4.06	1	18	2
Experience as an entrepreneur in other business	22	9	0.42	1.96	1	20	4

Source: Field survey

The respondents were asked to provide their experience in different sectors. Some of them have experience in more than one sector and they provided their expertise accordingly. The results reveal that the majority of the owners/managers (243 responses) have experience as an employee in the renewable energy business followed by prior involvement as an entrepreneur in the renewable energy business (117responses), experience as an employee in the non-renewable energy business (100 responses), and experience as an entrepreneur in other business (22 responses).

Table 5 presents the opinions of the owners/managers based on the importance of human capital both in terms of education and experiences for entrepreneurial success.

Table 5: Opinion of the owners/managers on basis of the importance of human capital both in terms of education and experience for entrepreneurial success

This table consists of the frequency, percentage, mean weight, and rank based on the mean weight of opinion of the owners/managers on human capital 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 as strongly disagree (SD), 2 as disagree, 3 as undecided, 4 as agreed, and 5 as strongly agree (SA).

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Statement	strongly disagree	Disagree	Undecided	agree	strongly agree	Total responses	Weighted Value	Mean weight	Overall rank
	1	2	3	4	5				
Education, age, work history, and support networks positively contributed to business success.	5 (1.9)	1 (0.4)	3 (1.1)	148 (56.1)	107 (40.5)	264	1,143	4.33	1
Entrepreneurs having higher education and experience have greater chances of success.	3 (1.1)	7 (2.7)	14 (5.3)	158 (59.8)	82 (31.1)	264	1,101	4.17	3
Entrepreneurs must be jacks of all trades who need not do in any one skill but are competent in many.	8 (3.0)	23 (8.7)	36 (13.6)	154 (58.3)	43 (16.3)	264	993	3.76	5
Human capital factors are positively related to becoming a nascent entrepreneur and entrepreneurial success.	2 (0.8)	1 (0.4)	14 (5.3)	195 (73.9)	52 (19.7)	264	1,086	4.11	4
Human capital is as a key determinant of entrepreneurial success.	2 (0.8)	5 (1.9)	12 (4.5)	167 (63.3)	78 (29.5)	264	1,106	4.19	2

Source: Field survey

Note: Figures in parentheses are percentages over total responses.

The respondents were asked to rank various statements based on the importance of human capital both in terms of education and experience for entrepreneurial success. The respondents gave the first priority to 'education, age, work history, and support networks positively contributed to business success' and the second priority to 'human capital is as a key

determinant of entrepreneurial success.' The statement 'entrepreneurs must be jacks-of-all-trades who need not do in any one skill but are competent in many' received the last priority.

Moreover, the majority of respondents (96 percent) believe that an 'entrepreneur's education, age, work history, and support networks have positive contributions in business successes'. This is consistent with the finding of Hattab (2014). The majority of respondents (75 percent) also state that 'entrepreneurs must be jacks-of-all-trades who need not excel 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), Davidson and Honing (2003), Korunka *et al.* (2003), Yadav *et al.* (2018), and Anderson and Miller (2003). Additionally, the majority of respondents (93 percent) are of opinion that human capital is a significant element of entrepreneurial success which is consistent with the findings of Bates (1990), Schoar (2010), and Zahoor, Khan, Meyer, & Laker (2023).

Conclusion, Implication & Recommendation

The major conclusion of the study is human capital factors, entrepreneur's education, age, work history, and support networks have positive contributions to business successes. The study further concludes that entrepreneurs must be jacks of all trades who need not excel in any one skill but are competent in many. The findings also show that the owners/managers from the solar sector have a higher level of education than that of the biogas and micro-hydro sectors. The owners have a higher level of education than those managers in the renewable energy sector of Nepal. Likewise, it indicates that male owners/managers have a higher level of education than female owners/managers. Moreover, the study reveals that most of the owners/managers have experience as an employee and/or an entrepreneur in the renewable energy sector of Nepal.

This study is useful for renewable energy enterprises (REEs), development actors, 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 relevant human capital behavior in the sector. It is also useful for the development actors in the sector and policymakers as reference material for more commercialization of the sector by formulating entrepreneur-friendly policies. This work may potentially be useful to academia for future studies by generating at least some new knowledge in the literature on entrepreneurship.

The extension of this study can be made by incorporating the opinion and views of respondents from customers, regulating authorities, and development actors in the sector in future studies. The study can be extended by conducting a detailed analysis of the impact of financial, social, and human capital on entrepreneurial success in the context of the renewable energy sector in Nepal.

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