

Role of Macroeconomic Variables in Entrepreneurship Development: Evidence from Renewable Energy Sector of Nepal

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Abstract

This study analyzes the impact of macroeconomic variables on entrepreneurship development in renewable energy sector of Nepal. This study examines the effect of GDP, market size in terms of population and number of households, and sales in terms of number of renewable energy systems installed on entrepreneurship development, i.e., number of renewable energy enterprises (REEs) using data from 1992/93 to 2016/17 by estimating various logarithmic models. The study concludes that the most important factor affecting entrepreneurship development is market size followed by GDP and sales in the context of renewable energy sector in Nepal. This study is considered to be useful for REEs, development actors, academia and policy makers creating employment by increasing production and providing energy in the country. The study can be further extended by incorporating the opinion and views of respondents from customers, regulating authorities and development actors in the sector to get greater insight into the results.

Keywords: Entrepreneurship development, macroeconomic variables, GDP, market size and sales

Introduction

Entrepreneurship can be described as a process of action that undertakes the entrepreneur to establish an enterprise (Loss & Bascunan, 2011). Entrepreneurship is a creative activity and

the phenomena to capitalize opportunities through innovation. The ratio of successful innovations is rather small (Loeckenhoff, 2017). Entrepreneurship deals with opportunities over threats (Krueger *et al.*, 2000). Entrepreneurship though looks a simple term is highly encompassing.

According to Alvarez and Busenitz (2001), entrepreneurial resources might be unique to entrepreneurial success. The new venture growth depends upon access to resources (Aldrich & Martinez, 2001). The access to resources develops capacity to discover an opportunity (Davidsson & Honig, 2003). In this perspective, the studies showed that the formation of new enterprise is customary when an individual has access to finance (Evans & Jovanovic, 1989; Holtz-Eakin *et al.*, 1994 and Blanchflower *et al.*, 2001). An individual having finance is able to acquire necessary resources in order to grasp an opportunity to start an enterprise (Clausen, 2006). On the other side, the various studies are in distinction to the above-mentioned model as it is observed that several entrepreneurs start new enterprise without ample financial capital (Aldrich, 1999; Kim *et al.*, 2003; Davidsson & Honig, 2003 and Hurst & Lusardi, 2004). It shows that an enterprise can start without ample capital. Accordingly, access to finance by entrepreneur is a key element for the growth of the firm, however, it is not essentially important to start an enterprise (Hurst & Lusardi, 2004).

Human capital constitutes the abilities and skills of workers that affect the overall productivity of a venture (Marshall & Samal, 2006). Human capital in the form of education and experience is the key factor affecting entrepreneurial success (Becker, 1975). Human capital is regarded as the knowledge, qualifications, experiences and skills of employees (Zeghal & Maaloul, 2010; Deakins & Whittam, 2000). The education and experience are important factors to identify and exploit an opportunity (Chandler & Hanks, 1998; Shane & Venkataraman, 2000; Anderson & Miller, 2003). Similarly, formal education is one of the important factors of human capital that may assist in the accumulation of explicit knowledge and skills to entrepreneurs (Gimeno *et al.* 1997; Reynolds *et al.* 2002). Alvarez and Busenitz (2001) stated that an entrepreneurial individual has specific resources which expedite to identify an opportunity and the accumulating of new resources to create new enterprise. The studies showed that few individuals have capacity to recognize and exploit an opportunity than others as they have better access to information and knowledge (Aldrich, 1999; Shane, 2000; Shane & Venkataraman, 2000 and Anderson & Miller, 2003).

Entrepreneurs should have skills in diverse field instead of any one skill- must be jacks-of-all-trades (Lazear, 2005). Investments in human and social capital enhance entrepreneurial performance (Bosma *et al.*, 2002). The social capital and individual's resources are an important factors in the growth of the firm (Roomi, 2011). The experience and the financial capital are the key elements affecting success of an enterprise (Bosma *et al.*, 2000). David (2004) and Rose *et al.*, (2006) opined that high level of education, role model and ownership of the business are important elements for the growth of the firm. Zafar (1984) found that entrepreneurial success is affected by entrepreneur's traits, opportunity, skills, business plan,

financial capital, infrastructure and environment. Consequently, entrepreneurship is regarded as a dynamic process and affected by multiple factors.

In the context of Nepal, access to finance, raw materials and policy related issues are regarded as the key barriers of entrepreneurial success (Jha & Upadhaya, 2002). The economic development cannot be initiated without the pioneering efforts of entrepreneurs. However, it is attributed that entrepreneurs in Nepal are very shy to invest capital in industrial sector (K.C., 2003). There is a growing need to promote entrepreneurial ideas and skills and make the people more economically active (Karki, 2007). Furthermore, Pokharel (2006) highlighted the importance of renewable energy sector by indicating that sustainable development can be possible by creating enterprises on renewable energy technologies. AEPC (2011) revealed that 50 percent higher income to electrified households from small business while upon electrification, prospect of starting such business increases by 5 percent. Likewise, livestock income is higher by Rs. 2,600 for electrified households compared to non-electrified households. According to AEPC/ESAP (2010), solar home system is likely to increase the probability of initiating small business by 3 percent. It also shows that the monthly income is 60 percent higher than the average income from small business for non-users of solar home system.

The entrepreneurship is regarded as the major contributor in building and sustaining economic growth. It is related to the process of generating new enterprise (Sharma, 2008). The entrepreneurial essence is seen as the engine of economic growth and development (Agarwal, 2003 and Sigdel, 2015). The sustainable economic development depends upon products and services produced in the country rather than remittances-based economy like Nepal. Due to acute unemployment situation in Nepal, about 1,800 youths have been departing abroad day by day for employment (www.dofe.gov.np). The economy of the country has gone remittances-based economy. As a proportion of GDP, Nepal is the highest recipients of remittances (31.3 percent) in the world followed by Kyrgyzstan (30.4 percent) and Tajikistan (26.9 percent) in 2016 (Desilver, 2018). In these circumstances, entrepreneurship can generate employment locally and convert remittances-based economy into sustainable economy.

The above discussion shows that the studies dealing with entrepreneurship development in renewable energy sector of Nepal are of greater significance. This study is the first of its kind as no study has so far been conducted to examine the macroeconomic factors affecting entrepreneurship development in renewable energy sector of Nepal.

Review of Literature

Financial, social and human capital are the important factors affecting entrepreneurial success (Alvarez & Busenitz, 2001). Timmons (1989) found that entrepreneurial success is affected by entrepreneur, founders' team, opportunity and resources. In this connection, planning and

decision making are the key factors of success (Rauch & Frese, 2000). There is interdependence between the SMEs' profitability and bank loans, while a significant relationship between profitability and the size of business (Olutunla & Obamuyi, 2008). Thus, financial capital is one of the most visible resources.

The social capital has enjoyed a remarkable rise to prominence in both the theoretical and applied social science literature over the last decade (Grootaert *et al.*, 2003). Social capital in the form of network ties, trust and shared vision have an influence on firm performance (Andersson *et al.*, 2002; Koka & Prescott, 2002; Uzzi & Gillespie, 2002; Kotabe *et al.*, 2003; Wu, 2008 and Gronum *et al.*, 2012). Network ties, trust and shared vision have a positive impact on firm performance (Saha & Banerjee, 2015). Likewise, Sengupta (2011) revealed that network plays a key role in facilitating access to business finance by building trust between entrepreneurs and investors. The network connectivity has strong and additive effects on performance specifically in case of rural entrepreneurs in developing countries (Aarstad, 2012). Martins (2016) revealed that networks provide opportunities to accomplish sustainable competitive advantages and compete successfully in the marketplace. The important variables are entrepreneurial orientation followed by managerial traits in determining organizational performance (Bhuan *et al.*, 2012). The entrepreneurial success has relationship with will to start a business and identification of an opportunity (Kumar, 2007). Omrani *et al.* (2013) showed that professional risk-taking, courage and innovation are the top three significant factors for technology entrepreneurs. Furthermore, Roomi (2011) concluded that the firm growth is affected by social capital and entrepreneur's resources.

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). Human capital has a positive effect on financial performance (Laing *et al.*, 2010; Salman, *et al.*, 2012 and Mosavir *et al.*, 2012). Rose *et al.* (2006) found that the education, experiences and financial support are the major factors affecting business success. Similarly, Rao *et al.* (2013) revealed that the education, training in the specific sector and prior experience have positive relationship with entrepreneurial success. An individual having diverse works 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). Bates (1990) and Schoar (2010) concluded that human capital is a key determinant of entrepreneurial success. In the context of renewable energy sector of Nepal, it is not yet known about the role of human capital in entrepreneurship development.

Moreover, Woldie *et al.* (2008) revealed that SME growth is influenced by certain owners/managers characteristics namely, age, level of education, previous experience, and three motivational variables such as finance, employment creation, and self-fulfillment. Rajput (2011) showed that innovation plays an important role for entrepreneurial success followed by other micro and macro factors such as entrepreneur, network, opportunity, culture, environment and resource. Hattab (2014) found a positive relationship of entrepreneurship education with intentions and perceived desirability. Wickham (2001)

showed that firm performance is affected by individual motivation, managerial skills, people skills and knowledge of respective industry. The firm performance is related to entrepreneur's capability, commitment and entrepreneur's motivation (Erikoson, 2002). The success of an enterprise has relationship with education, experience, size of initial investment, number of workers, family business and promising demand of products/services in the context of India (Thapa *et al.*, 2008).

Economic growth may be related to the formation of new businesses (Lazear, 1995). A positive interaction between economic growth and entrepreneurship indicates that the economic growth could affect entrepreneurship and expected payoffs (Dejardin, 2000). Economic development, i.e., GDP per capita has positive impact on production per MSME, i.e., indicator of entrepreneurship development (Amit, 2014). Sato *et al.* (2012) concluded that market size in terms of population density has positive relationship with entrepreneurship. However, Korez-Vide and Tominc (2016) revealed that there is no significant relationship between the average growth of quality of early-stage entrepreneurship indices and average growth of GDP per capita. The financial capital constraint is negatively related to the firm size, the aggregate capital and the fraction of entrepreneurs (Cagetti & Nardi, 2006).

Several studies on renewable energy discussed on importance, potentials and challenges of renewable energy technologies (RETs) in the context of developing countries. Martinot *et al.* (2002) showed that past donor efforts achieved modest results in developing countries. According to Elojärvi *et al.* (2012), Nepal, Ghana, Bangladesh and Zambia have adequately addressed the challenges faced by rural electrification, however, some are more successful than others. The main barriers are lack of finance, poor management and unnecessary bureaucracy. Yadoo and Cruickshank (2010) revealed that the socially orientated cooperative businesses play a vital role in extending and managing rural electricity services efficiently and effectively in developing countries. Mills (2005) found that there is a strong relationship between increasing household income and higher electricity consumption levels in the United States. However, Kammen and Kirubi (2008) showed that the distributional characteristics of household electricity consumption depend on a combination of the countries' wealth, income distribution and historical government infrastructure-building policies in developing countries. Fukuda & Siagian (2010) found that the growth of the renewable energy sector supported by technology transfer from funding partners contributes to ensure sustainability of the renewable energy supply system in Indonesia. Karekezi and Kithyoma (2002) revealed that sub-Saharan African countries need to develop renewable energy technology strategies that rely on a diverse set of technologies and best fit for incomes of poor, who constitute the majority of sub-Saharan Africa inhabitants. According to Arthur *et al.* (2011), the harmful environmental, health and social effects of the use of traditional biomass and fossil fuel have increased the growing interest in the search for cleaner source of energy in Ghana.

In the contxt of Nepal, 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 success of entrepreneurship are easy access to finance followed by easy access to raw materials (Shrestha, 2007). Thapa (2007) found that the education has 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. Likewise, Pokharel (2006) showed that creation of enterprises on renewable energy technologies is vital for sustainable development in Nepal. However, many electricity schemes in developing countries failed due to lack of entrepreneurship and opportunity forward/backward linkages and the market (Pandey, 2009). Entrepreneurship and small business have an important impact on national development for both developed and developing countries (Karki, 2007). Moreover, social and cultural factors such as family background, caste, gender, migration, education and training influence people to become entrepreneur (Pant, 2013). Sigdel (2015) revealed that age, experience and export promotion are important factors affecting the success of women entrepreneur while education does not appear to be an important factor affecting the success of women entrepreneur. Women can become active entrepreneurs, if they have access to the finance (Rakhal, 2015). In addition to market segmentation, access to capital, lack of skills and knowledge are the main constraints to microbusiness growth (Villanger, 2015). Moreover, AEPC (2011) and AEPC/ESAP (2010) found that there are the higher income to electrified households from small business compared to non-electrified households in the context of Nepal leads to increase the probability of starting small business.

Though there are the above-mentioned findings in the context of other countries and Nepal, no such findings using more recent data exist in Nepalese renewable energy sector. This study, therefore, deals with the following issues in the context of Nepalese renewable energy sector: What is the impact of macroeconomic variables such as, GDP, population, number of households and number of renewable energy systems installed on entrepreneurship development?

Operational Definition and Research Hypothesis

This section deals with the definition of dependent and independent variables along with research hypothesis employed in this study. This study has employed entrepreneurship development as the dependent variables and the independent variables are macroeconomic variables such as, GDP, market size and sales. The operational definition of keywords along with research hypothesis are as under:

Entrepreneurship Development

An entrepreneur is one who combines the land of one, the labor of others and the capital of yet another, and, thus produces a product (Khanka, 2010). Entrepreneurship is an important process which creates something new and assuming the risks and rewards (Hisrich *et al.*, 2011). Entrepreneurship is the creation of a new organization that introduces a new product, services or creates a new market or utilizes a new technology (Khanka, 2010). Thus,

entrepreneurship development is regarded as an increase in number of enterprises in the country. In this connection, number of renewable energy enterprises (REEs) are considered as the indicator of entrepreneurship development for renewable energy sector of Nepal as a whole. The number of biogas companies (BCs) are considered as the indicator of entrepreneurship development for biogas sector while number solar companies (SCs) are considered as the indicator of entrepreneurship development for solar sector. Likewise, the number micro-hydro construction companies (MHCCs) are considered as the indicator of entrepreneurship development for micro-hydro sector.

Gross domestic product (GDP)

GDP is the sum of consumption, investment, government spending and net exports (Zhu & Kot, 2010). According to International Monetary Fund (2008), GDP measures the monetary value of goods and services that are bought by the final user-produced in a country over a period of time. Economic growth is the increase in goods and services produced by an economy over a period of time. It is an ability of an economy to increase its productive capacity through which it becomes more capable of producing additional units of goods and services (Chughtai *et al.*, 2015). Economic growth may be related to the formation of new businesses (Lazear, 2005). According to Amit (2014), production per MSME i.e., indicator of entrepreneurship development is positively influenced by economic development, i.e., GDP per capita. There is a positive interaction between economic growth and entrepreneurship (Dejardin, 2000). However, Korez-Vide and Tominc (2016) revealed that the average growth of quality of early-stage entrepreneurship indices have no significant relationship with average growth of GDP per capita. Likewise, the number of new firm establishment has no significant relationship with income of the poor and income in equality (Yanya *et al.*, 2013). Based on it, this study develops the following hypothesis:

H₁: There is positive relationship between gross domestic product (GDP) and entrepreneurship development, i.e., number of renewable energy enterprises (REEs).

Market size (i.e., population or number of households)

Market size can be measured in terms of population (Addario and Vuri, 2010 and Sato *et al.*, 2012). Market size in terms of population and number of households has been considered as independent variable in this study. Addario and Vuri (2010) found that market size in terms of province population has positive impact on entrepreneurs' net monthly income. Market size in terms of population density is positively related to entrepreneurship (Sato *et al.*, 2012). Besides, population/energy dependency shows that increase in population leads to increase in energy consumption and increase in energy consumption leads to increase in energy resources which indicates positive relationship between them (Zabel, 2009). Based on it, this study develops the following hypothesis:

H₂: There is positive relationship between market size and entrepreneurship development, i.e., number of REEs.

Sales (i.e., number of renewable energy systems installed)

In the perspective of the entrepreneurial process, the entrepreneurial manager creates new value through identifying new opportunities, attracting the resources needed to pursue those opportunities, and building an organization to manage those resources (Bhave, 1994). Entrepreneur as an agent who buys factors of production at certain prices in order to combine them into a product with a view to selling it at uncertain prices in future (Cantillion, 1971). Entrepreneur produces products or services by combining factors of production with an anticipation to sale them for profits. Thus, the sale is an integral part of entrepreneurship. In this connection, number of renewable energy systems installed are considered as sales of the sector. The number of biogas systems installed are considered as the sales of biogas sector while number and capacity of solar home systems installed are considered as sales of solar sector. Likewise, the number (i.e., hydro power schemes having the capacity up to 10 MW) and capacity of micro-hydro systems installed are considered as the sales of micro-hydro sector. Based on it, this study develops the following hypothesis:

H₃: There is positive relationship between sales i.e., number of renewable energy systems installed and entrepreneurship development, i.e., number of REEs.

Methodology

Research design

The study adopts descriptive and causal-comparative research design. The study is based on fact finding operation searching for adequate information on entrepreneurship development in renewable energy sector of Nepal. In this connection, it assesses the impact of GDP, population, number of households, sales, i.e., number of systems installed on entrepreneurship development, i.e., number of REEs. Hence, this study employs descriptive research design. Moreover, it has also adopted causal-comparative research design in order to determine the effect of GDP, population, number of households, number of systems installed on entrepreneurship development in renewable energy sector of Nepal. Causal-comparative research design attempts to determine the cause and effect relationship between dependent variables and independent variables.

Nature and sources of data

The study covers renewable energy sector of Nepal considering the samples from biogas solar, solar sector and micro-hydro sector. This study is based on secondary data that contain the information on macroeconomic factors of the renewable energy sector in Nepal. The secondary data on GDP, population, number of households, number of renewable energy

systems installations, renewable energy enterprises (REEs) and other related data were collected from the annual reports of Alternative Energy Promotion Centre (AEPC), Biogas Sector partnership Nepal (BSP-Nepal), Solar Electric Manufacturers' Association, Nepal (SEMAN), Nepal Micro-hydro Power Development Association (NMHDA), Statistical Year Book of Central Bureau of Statistics and Economic Survey of Nepal. Furthermore, the secondary data covering a period from fiscal year 1992/93 to 2016/17 was considered for estimating regression equations to analyze effect of macroeconomic variables on entrepreneurship development.

The Models

The econometric models employed in this study attempts to analyze the effect of gross domestic product, market size in terms of population and number of households, and sales in terms of number of renewable energy systems installed on entrepreneurship development in renewable energy sector of Nepal by estimating various logarithmic models. The number of renewable energy enterprises has been taken as the indicator of entrepreneurship development while number of renewable energy systems installed has been taken as the sales of the respective sector. The theoretical statement of the models is that number of renewable energy enterprises may be regarded as subject to constraints of gross domestic product, population, number of households, and number of renewable energy systems installed. The equation has been specified as under:

$$\text{Entrepreneurship development (ED)} = f(\text{GDP, MSIZE, SALES}) \quad \dots (1)$$

The equation to be estimated has, therefore, been specified as under:

$$\ln \text{ED} = \beta_0 + \beta_1 \ln \text{GDP} + \beta_2 \ln \text{MSIZE} + \beta_3 \ln \text{SALES} + \varepsilon_i \quad \dots (2)$$

Where,

$\ln \text{ED}$ = Log value of entrepreneurship development, i.e., number of renewable energy enterprises ($\ln \text{REE}$), or number of biogas companies ($\ln \text{BC}$), or number of solar companies ($\ln \text{SC}$), or number of micro-hydro construction companies ($\ln \text{MHCC}$)

$\ln \text{GDP}$ = Log value of real gross domestic product

$\ln \text{MSIZE}$ = Log value of market size, i.e., population ($\ln \text{POP}$) or number of households ($\ln \text{HH}$)

$\ln \text{Sales}$ = Log value of number of renewable energy systems installed ($\ln \text{TSYSTEM}$), or number of biogas systems installed ($\ln \text{BSYSTEM}$), or number of solar systems installed ($\ln \text{SSYSTEM}$), capacity of solar systems installed ($\ln \text{SCAP}$), or number of micro-hydro systems installed ($\ln \text{MSYSTEM}$) or capacity of micro-hydro systems installed ($\ln \text{MCAP}$).

ε_i = Error term or disturbance

Results and Discussion

In this section, an attempt is made to determine the role of macroeconomic variables in entrepreneurship development through correlation analysis and regression analysis in renewable energy sector of Nepal. The analysis is devoted to biogas sector, solar sector, micro-hydro sector and renewable energy sector as whole. The dependent variables are specified as number of biogas companies, number of solar companies, number of micro-hydro construction companies and number of renewable energy enterprises as the indicators of entrepreneurship development while the independent variables are GDP, population, number of households, number of biogas systems installed, number of solar systems installed, number of micro-hydro systems installed and number of renewable energy systems installed.

Descriptive statistics

This section explains the descriptive statistics of the data that provides a summary of the variables incorporated in this study. Table 1 presents the descriptive statistics of entrepreneurship development and macroeconomic variables.

Table 1: Descriptive statistics related to effect of macroeconomic variables on the entrepreneurship development for biogas sector, solar sector, micro-hydro sector and overall renewable energy sector in Nepal

This table presents the descriptive statistics for the entrepreneurship development related variables and macroeconomic variables. The entrepreneurship development related variables are number of biogas companies (BC), number of solar companies (SC), number of micro-hydro construction companies (MHCC) and number of renewable energy enterprises (REE). The macroeconomic variables are gross domestic product (GDP, rupees in billion), population (POP in million), number of households (HH in thousand), number of biogas systems installed (BSYSTEM), number of solar home systems installed (SSYSTEM), capacity of solar home systems installed (SCAP, in Wp), number of micro-hydro systems installed (MSYSTEM), capacity of micro-hydro systems installed (MCAP, in kW) and number of renewable energy systems installed (TSYSTEM).

Variables	Number of observations	Minimum	Maximum	Mean	Standard deviation
Number of biogas companies (BC)	25	1	120	61	38
Number of solar companies (SC)	25	0	105	34	35
Number of micro-hydro construction companies (MHCC)	25	0	78	32	30

Number of renewable energy enterprises (REE)	25	1	303	127	100
Gross domestic product (GDP, Rs. in billion)	25	171	743	463	166
Population (POP, in million)	25	20	29	24	3
Number of households (HH, in '000)	25	3,548	5,875	4,598	769
Number of biogas systems installed (BSYSTEM)	25	3,318	31,765	15,395	7,116
Number of solar home systems installed (SSYSTEM)	25	8	103,271	27,124	31,507
Capacity of solar home systems installed (SCAP)	25	272	2,026,000	576,683	574,701
Number of micro-hydro systems installed (MSYSTEM)	25	3	253	128	52
Capacity of micro-hydro systems installed (MCAP)	25	27	7,492	1,601	1,652
Number of renewable energy systems installed (TSYSTEM)	25	3,329	133,593	42,647	37,673

Source: Appendix-1.

The table shows that a quantitative description of the variables. Descriptive statistics include minimum, maximum, mean and standard deviation of the variables. The results show that number of biogas companies ranges from minimum of one company to maximum of 120 companies with an average of 38 companies while number of solar companies ranges from minimum of zero company to maximum of 105 companies with an average of 34 companies. Similarly, number of micro-hydro construction companies ranges from minimum of zero company to maximum of 78 companies over a period of time. Likewise, number of renewable energy enterprises ranges from minimum of one enterprise to maximum of 303 enterprises, leading to an average of 127 enterprises.

Similarly, the gross domestic product ranges from minimum of Rs. 171 billion to maximum of Rs. 743 billion with an average of Rs. 463 billion. The population ranges from minimum of 20 million to maximum of 29 million, leading to an average of 24 million. Likewise, the number of households ranges from minimum of 3.55 million to maximum of 5.88 million with an average of 4.60 million.

Furthermore, number of biogas systems installed ranges from minimum of 3,318 systems to maximum of 31,765 systems, leading to an average of 15,395 systems. Number of solar home systems installed ranges from minimum of 8 systems to maximum of 103,271 systems with an average of 27,124 systems. Capacity of solar home systems installed ranges from minimum of 272 Wp to maximum of 2,026,000 Wp with an average of 576,683 Wp.

Moreover, number of micro-hydro systems installed ranges from minimum of 3 systems to maximum of 253 systems with an average of 128 systems. The capacity of micro-hydro systems installed ranges from minimum of 27 kW to maximum of 7,492 kW with an average of 1,601 kW. Likewise, number of renewable energy systems installed ranges from minimum of 3,329 systems to maximum of 133,593 systems, leading to an average of 42,647 systems.

Correlation analysis

Table 2 presents the correlation matrix for the variables used in estimating the relationship of entrepreneurship development with macroeconomic variables. The result shows that number of biogas companies is positively related to GDP, population, number of households and number of biogas systems installed. It shows that higher GDP, population, number of households and number of biogas systems installed, higher would be the number of biogas companies. The results also reveal that number of solar companies has positive relationship with GDP, population, number of households and number of solar systems installed which indicates that higher GDP, population, number of households and number of solar systems installed, higher would be the number of solar companies. Furthermore, number of micro-hydro construction companies is positively related to GDP, population, number of households and number of micro-hydro systems installed which reveals that higher GDP, population, number of households and number of micro-hydro systems installed, higher would be the number of micro-hydro construction companies. Moreover, the results present that number of renewable energy enterprises is positively related to the GDP, population, number of households and number of renewable energy systems installed reveals that higher GDP, population, number of households and number of renewable energy systems installed, higher would be the number of renewable enterprises.

Table 2: Correlation matrix for estimating the relationship of entrepreneurship development with macroeconomic variables

This table provides correlation matrix for estimating the relationship of entrepreneurship development with macroeconomic variables. The entrepreneurship development related variables are number of biogas companies (BC), number of solar companies (SC), number of micro-hydro construction companies (MHCC) and number of renewable energy enterprises (REE). The macroeconomic variables are gross domestic product (GDP, rupees in billion), population (POP in million), number of households (HH in thousand), number of biogas systems installed (BSYSTEM), number of solar home systems installed (SSYSTEM), capacity of solar home systems installed (SCAP, in Wp), number of micro-hydro systems installed (MSYSTEM), capacity of micro-hydro systems installed (MCAP, in kW) and number of renewable energy systems installed (TSYSTEM).

Correlation	BC	SC	MHC C	REE	GDP	POP	HH	BSYSTE M	SSYSTE M	SCAP	MSYSTE M	MCA P	TSYSTE M
BC	1												
SC	0.743 *	1											
MHCC	0.739 *	0.991*	1										
REE	0.980 *	0.947*	0.929*	1									
GDP	0.909 *	0.925*	0.919*	0.988*	1								
POP	0.825 *	0.960*	0.944*	0.980*	0.979*	1							
HH	0.785 *	0.929*	0.911*	0.944*	0.952*	0.980*	1						
BSYSTE	0.925	0.816*	0.830*	0.893*	0.928*	0.865*	0.821*	1					

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M	*												
SSYSTE M	0.886 *	0.849*	0.863*	0.918*	0.947*	0.895*	0.845*	0.946*	1				
SCAP	0.876 *	0.807*	0.828*	0.874*	0.917*	0.850*	0.795*	0.938*	0.995*	1			
MSYSTE M	0.655 *	0.329	0.323	0.177	0.522*	0.400*	0.408*	0.575*	0.581*	0.594*	1		
MCAP	0.864 *	0.767*	0.753*	0.837*	0.872*	0.817*	0.815*	0.874*	0.880*	0.866*	0.767*	1	
TSYSTE M	0.859 *	0.877*	0.882*	0.905*	0.936*	0.913*	0.882*	0.942*	0.966*	0.946*	0.515*	0.879*	1

Source: Appendix-1.

Note: The asterisk signs (*) and (**) indicate that the results are significant at 1 percent and 5 percent level of significance (2-tailed) respectively.

Since there is a very high degree of correlation coefficient among explanatory variables, the multicollinearity may be generated while estimating models showing the effect of independent variables on dependent variable. Thus, variance inflationary factor (VIF) has been computed to measure degree of multicollinearity as well as to mitigate by skipping the independent variable having multicollinearity. If VIF_j is greater than 5, X_j is highly correlated with the other explanatory variables. The multicollinearity can be alleviated by skipping highly correlated explanatory variable from the model. Thus, the regression models were estimated in this study with no multicollinearity effect among the explanatory variables used in the models.

Regression analysis

In this section, an attempt is made to analyze effect of macroeconomic variables such as, GDP, market size and sales on entrepreneurship development in the context of biogas sector, solar, micro-hydro sector and overall renewable energy sector in Nepal. As the indicator of entrepreneurship development, number of biogas companies, number of solar companies, number of micro-hydro construction companies and number of renewable energy enterprises are used as the dependent variables. The macroeconomic variables such as GDP, population, number of households, number of biogas systems installed, number of solar home systems installed, number of micro-hydro systems installed and number of renewable energy systems installed are used as independent variables.

Table 3 shows the regression results relating to effect of macroeconomic variables on entrepreneurship development for the biogas sector. The table presents logarithmic models to estimate the effect of GDP, population, number of households and number of biogas systems installed on number of biogas companies. The estimated beta coefficients of GDP, population, number of households and number of biogas systems installed are all positive for various models. All the beta coefficients are significant at 1 percent level of significance except the coefficient of population in equation 5. The beta coefficient of GDP is positive and significant at 1 percent level of significance. It indicates that the GDP has positive impact on entrepreneurship development in biogas sector. It means that higher the GDP, higher would be the entrepreneurship development. The beta coefficients of population are positive and significant at 1 percent level of significance in equation 2 only. The population has positive impact on entrepreneurship development. It means that higher the population, higher would be entrepreneurship development in biogas sector of Nepal.

Moreover, the beta coefficients of number of households are positive and significant at 1 percent level of significance. It shows that the number of households has positive impact on entrepreneurship development in biogas sector. It means that higher the number of households, higher would be the entrepreneurship development. Likewise, the beta coefficients of number of biogas systems installed are positive and significant at 1 percent level of significance. It indicates that there is positive impact of number of biogas systems

installed on entrepreneurship development. It also shows that increase in number of biogas systems installed leads to increase in entrepreneurship.

The overall results suggest that the most important factor affecting entrepreneurship development is number of biogas systems installed followed by number of households, population and GDP in biogas sector of Nepal.

Table 3: Estimated effect of GDP, population, number of households and number of biogas systems installed on number of biogas companies in Nepal from 1992/93 to 2016/17

The results are estimated on national level secondary data for biogas sector from fiscal year 1992/93 to 2016/17 with 25 observations for each variables by using logarithmic models. The model is, $\ln BC = \beta_0 + \beta_1 \ln GDP + \beta_2 \ln POP + \beta_3 \ln HH + \beta_4 \ln BSYSTEM + \epsilon_i$. Where, $\ln BC$, $\ln GDP$, $\ln POP$, $\ln HH$, and $\ln BSYSTEM$ are log values of number of biogas companies, gross domestic product, population, number of households, and number of biogas systems installed respectively. Results for various subsets of independent variables are given as well. The results consist of intercept, regression coefficients, t-statistics, adjusted R^2 , standard estimate of error (SEE), F value and variance inflationary factor (VIF) that are calculated using SPSS.

Equation	Intercept	Regression coefficient of				Adj. R^2	SEE	F	VIF
		$\ln GDP$	$\ln POP$	$\ln HH$	$\ln BSYSTEM$				
1	-5.81 (8.16)*	2.82 (10.45) *				0.818	0.237	109.2	
2	-10.73 (6.09)*		8.93 (7.01) *			0.667	0.321	49.2	
3	-20.96 (5.65)*			6.17 (6.08)*		0.600	0.352	37.0	
4	6.77 (9.45)*				2.03 (11.71)*	0.850	0.215	137.2	
5	-7.47 (5.54)*		1.06 (0.62)		1.84 (5.26)*	0.846	0.218	66.9	3.98
6	-8.42 (2.73)* *			0.61 (0.55) *	1.89 (6.13)*	0.845	0.219	66.7	3.08

Source: Appendix-1.

Note: (1) Figures in parentheses are t-values.

(2) Dependent variable: Log value of number of biogas companies ($\ln BC$).

(3) The asterisk signs (*) and (**) indicate that the results are significant at 1 percent and 5 percent level of significance (2-tailed) respectively.

Table 4 shows that the regression results relating to effect of macroeconomic variables on entrepreneurship development for the solar sector. The table presents logarithmic models to estimate the effect of GDP, population, number of households, number of solar home systems installed and capacity of solar home systems installed on number of solar companies.

The beta coefficient of GDP is positive and significant at 1 percent level of significance. It indicates that GDP has positive impact on entrepreneurship development. It also shows that increase in GDP leads to increase in entrepreneurship development. The beta coefficients of population and number of households are positive and significant at 1 percent level of significance. It reveals that the population and number of households have positive impact on entrepreneurship development in solar sector. It also shows that higher the population and number of households, higher would be the entrepreneurship development in solar sector of Nepal.

Moreover, the beta coefficients of number solar home systems installed are positive and significant at 1 percent level of significance except in equation 8. It indicates that there is a positive impact of number of households on entrepreneurship development. It reveals that increase in number of solar systems installed leads to increase in the entrepreneurship development. The beta coefficients of capacity of solar home systems installed are positive for equation 5 and 7 while it is negative for equation 6. The beta coefficient of the capacity of solar home systems installed is significant for equation 5 only. It does not show clear explanation of the capacity of solar home systems installed in determining entrepreneurship development in solar sector of Nepal.

Table 4: Estimated effect of GDP, population, number of households, number and capacity of solar home systems installed on number of solar companies in Nepal from 1992/93 to 2016/17

The results are estimated on national level secondary data for solar sector from fiscal year 1992/93 to 2016/17 with 25 observations for each variables by using logarithmic models. The model is, $\ln SC = \beta_0 + \beta_1 \ln GDP + \beta_2 \ln POP + \beta_3 \ln HH + \beta_4 \ln SSYSTEM + \beta_5 \ln SCAP + \epsilon_i$ Where, $\ln SC$, $\ln GDP$, $\ln POP$, $\ln HH$, $\ln SSYSTEM$, and $\ln SCAP$ are number of solar companies, gross domestic product, population, number of households, number of solar home systems installed and capacity of solar home systems installed respectively. Results for various subsets of independent variables are given as well. The results consist of intercept, regression coefficients, t-statistics, adjusted R^2 , standard estimate of error (SEE), F value and variance inflationary factor (VIF) that are calculated using SPSS.

Equation	Intercept	Regression coefficient of					Adj. R^2	SEE	F	VIF
		$\ln GDP$	$\ln POP$	$\ln HH$	$\ln SSYTE$	$\ln SCA$				

					M	P				
1	-9.85 (10.53) *	4.149 (11.71) *					0.850	0.312	137. 0	
2	-19.69 (15.57) *		15.03 (16.43) *				0.918	0.231	269. 9	
3	-37.59 (11.74) *			10.57 (12.08) *			0.858	0.304	145. 8	
4	-1.20 (3.89)*				0.60 (7.71)*		0.709	0.434	59.5	
5	-2.13 (4.27)*					0.61 (6.56) *	0.63 6	0.48 6	43.0	
6	-20.13 (9.68)*		15.44 (8.72)*			-0.02 (0.28)	0.915	0.235	129. 6	3.5 9
7	-32.18 (6.77)*			8.89 (6.33) *		0.14 (1.50)	0.865	0.296	78.0	2.7 2
8	-30.35 (5.53)*			8.43 (5.31) *	0.16 (1.59)		0.867	.294	79.1	3.5 1

Source: Appendix-1.

Note: (1) Figures in parentheses are t-values.

(2) Dependent variable: Log value of number of solar companies (lnSC).

(3) The asterisk sign (*) indicates that the results are significant at 1 percent level of significance (2-tailed).

The overall results suggest that the most important factor affecting entrepreneurship development is the population followed by number of households, GDP, number of solar home systems installed and capacity of solar home systems installed in the context of solar sector in Nepal.

Table 5 shows that the regression results relating to effect of macroeconomic variables on entrepreneurship development for the micro-hydro sector. The table reveals logarithmic models to estimate the effect of GDP, population, number of households, number of micro-hydro systems installed and capacity of micro-hydro systems installed on number of micro-hydro construction companies. The first five equations include one of the five independent variables at a time. The equations 6 to 9 include different combinations of the macroeconomic variables.

Table 5: Estimated effect of GDP, population, number of households, number and capacity of micro-hydro systems installed on number of micro-hydro construction companies in Nepal from 1992/93 to 2016/17

The results are estimated on national level secondary data for micro-hydro sector from fiscal year 1992/93 to 2016/17 with 25 observations for each variables by using logarithmic models. The model is, $\ln MHCC = \beta_0 + \beta_1 \ln GDP + \beta_2 \ln POP + \beta_3 \ln HH + \beta_4 \ln MSYSTEM + \beta_5 \ln MCA P + \varepsilon_i$ Where, $\ln MHCC$, $\ln GDP$, $\ln POP$, $\ln HH$, $\ln MSYSTEM$, and $\ln MCA P$ are log value of number of micro-hydro construction companies, gross domestic product, population, number of households, number of micro-hydro systems installed and capacity of micro-hydro systems installed respectively. Results for various subsets of independent variables are given as well. The results consist of intercept, regression coefficients, t-statistics, adjusted R^2 , standard estimate of error (SEE), F value and variance inflationary factor (VIF) that are calculated using SPSS.

Equation	Intercept	Regression coefficient of					Adj. R^2	SEE	F	VIF
		$\ln GDP$	$\ln POP$	$\ln HH$	$\ln MSYTEM$	$\ln MCA P$				
1	-9.577 (9.99)*	4.05 (11.16) *					0.837	0.32	125	
2	-18.99 (12.93) *		14.54 (13.68) *				0.886	0.27	187	
3	-36.20 (10.28) *			10.19 (10.60) *			0.823	0.33	112	
4	-0.380 (0.416)				0.73 (1.64)		0.065	0.77	2.68	
5	-2.46 (3.75)*					1.19 (5.49)*	0.548	0.53	30.14	
6	-9.90 (11.28) *	4.55 (11.80) *			-0.48 (2.46)**		0.867	0.29	78.98	1.37
7	-19.24 (12.76) *		14.93 (12.80)*		-0.14 (0.85)		0.884	0.27	92.79	1.19
8	-35.29 (6.26)*			9.91 (5.84) *		0.05 (0.21)	0.815	0.34	53.83	2.98
9	-36.90 (9.84)*			10.46 (9.79) *	-0.131 (0.61)		0.818	0.34	54.80	1.20

Source: Appendix-1.

Note: (1) Figures in parentheses are t-values.

- (2) Dependent variable: Log value of number of micro-hydro construction companies (lnMHCC).
- (3) The asterisk signs (*) and (**) indicate that the results are significant at 1 percent and 5 percent level of significance (2-tailed) respectively.

The beta coefficients of GDP, population and number of households are positive and significant at 1 percent level of significance. It indicates that GDP population and number of households has positive impact on entrepreneurship development in micro-hydro sector of Nepal. It also reveals that higher the GDP, population and number of households, higher would be the entrepreneurship development. However, the beta coefficients of number of micro-hydro systems installed are negative for equations 6, 7 and 9 while it is positive for equation 4. It does not show clear explanation of number of micro-hydro systems installed in determining entrepreneurship development. On the other hand, the beta coefficient of capacity of micro-hydro systems installed are positive as given in equation 5 and 8 but the coefficient for equation 5 is only statistically significant at 1 percent level of significance. It indicates that the capacity of micro-hydro systems installed has positive impact on entrepreneurship development. It also reveals that increase in the capacity of micro-hydro systems installed leads to increase in entrepreneurship development in the context of micro-hydro sector in Nepal.

The results reveal that a strong role played by GDP, population and number of households in determining entrepreneurship development while a weak role played by the capacity of micro-hydro systems installed and number of micro-hydro systems installed in micro-hydro sector. The overall results further suggest that the most important factor affecting entrepreneurship development is the population followed by GDP, number of households, capacity of micro-hydro systems installed and number of micro-hydro systems installed in the context of micro-hydro sector of Nepal.

After analyzing the factors affecting entrepreneurship development for biogas, solar and micro-hydro sectors, it is also felt important to analyze the results for total sample. Table 6 reveals that the regression results relating to effect of macroeconomic variables on entrepreneurship development in renewable energy sector of Nepal as a whole. The table presents logarithmic models to estimate the effect of GDP, market size in the form of population and number of households, and number of renewable energy systems installed on entrepreneurship development, i.e., number of renewable energy enterprises. The first four equations include one of the four independent variables at a time while equations 5 to 7 include different combinations of the macroeconomic variables.

Table 6: Estimated effect of GDP, population, number of households and number of renewable energy systems installed on number of REEs in Nepal from 1992/93 to 2016/17

The results are estimated on national level secondary data of renewable energy sector as a whole from fiscal year 1992/93 to 2016/17 with 25 observations for each variables by using logarithmic models. The model is, $\ln REE = \beta_0 + \beta_1 \ln GDP + \beta_2 \ln POP + \beta_3 \ln HH + \beta_4 \ln TSYSTEM + \varepsilon_i$ Where, $\ln REE$, $\ln GDP$, $\ln POP$, $\ln HH$, and $\ln TSYSTEM$ are log values of number of renewable energy enterprises, gross domestic product, population, number of households and number of renewable energy systems installed respectively. Results for various subsets of independent variables are given as well. The results consist of intercept, regression coefficients, t-statistics, adjusted R^2 , standard estimate of error (SEE), F value and variance inflationary factor (VIF) that are calculated using SPSS.

Equation	Intercept	Regression coefficient of				Adj. R^2	SEE	F	VIF
		$\ln GDP$	$\ln POP$	$\ln HH$	$\ln TSYSTEM$				
1	-41.47 (13.84)*	3.67 (14.26)*				0.732	0.393	203	
2	-93.45 (14.10)*		12.83 (14.29)*			0.733	0.392	204	
3	-58.52 (12.29)*			8.98 (12.56)*		0.679	0.430	158	
4	0.11 (0.50)				0.35 (5.29)*	0.267	0.649	28	
5	-37.72 (12.27)*	3.31 (12.32)*			0.13 (3.13)*	0.761	0.371	119	1.22
6	-84.23 (12.77)*		11.52 (12.79)*		0.15 (3.72)*	0.773	0.362	127	1.18
7	-52.24 (11.23)*			7.95 (11.26)*	0.17 (3.88)*	0.731	0.394	102	1.16

Source: Appendix-1.

Note: (1) Figures in parentheses are t-values.

(2) Dependent variable: Log value of number of renewable energy enterprises ($\ln REE$)

(3) The asterisk sign (*) indicates that the results are significant at 1 percent level of significance (2-tailed).

The beta coefficients of GDP, population, number of households and number of renewable energy systems installed are all positive and significant at 1 percent level of significance in all equations. It reveals that GDP, population, number of households and number of renewable energy systems installed have positive impact on entrepreneurship development. It

also shows that higher the GDP, population, number of households and number of renewable energy systems installed, higher would be the entrepreneurship development.

Furthermore, these results show the customary strong effect of GDP, population, number of households, and number of renewable energy systems installed on entrepreneurship development. In equation 1, it indicates that a one percentage point increase in GDP leads on the average to about 3.67 percent increase in number of renewable energy enterprises, holding other variables constant. The same is noticed to be 3.31 percent in equation 5. On the other side, one percentage point increase in population resulted in 12.83 percent increase in number of renewable energy enterprises, holding GDP, number of households and number of renewable energy systems installed constant. The same is noticed to be 11.52 percent in equation 6. Similarly, one percentage point increase in number of households leads to about 8.98 percent increase in number of renewable energy enterprises, holding other independent variables constant. The same is noticed to be 7.95 percent in equation 7. Moreover, one percentage point increase in number of renewable energy systems installed leads on the average to about 0.35 percent increase in number of renewable energy enterprises, holding other variables constant. The same is noticed to be 0.13 percent, 0.15 percent, 0.17 percent in equations 5, 6 and 7 respectively.

It indicates that economic development, i.e., GDP has positive impact on entrepreneurship development, which is consistent with the findings of Lazear (1995), Dejardin (2000), and Amit (2014). It also shows that market size, i.e., population or number of households have positive impact on entrepreneurship development, which is consistent with the findings of Addario and Vuri (2010) and Sato, Tabuchi and Yamamoto (2012). Likewise, it indicates that sales, i.e., number of renewable energy systems installed has positive impact on entrepreneurship development, which is consistent with the priori expectation.

However, market size in terms of population has stronger power in determining entrepreneurship development as compared to GDP and sales, i.e., number of renewable energy systems installed. The overall results suggest that the most important factor affecting entrepreneurship development is the market size followed by GDP and sales, i.e., number of renewable energy systems installed in the context of renewable energy sector in Nepal.

Based on the overall analysis of the data, the first hypothesis (H1) that there is positive relationship between GDP and entrepreneurship development, i.e., number of renewable energy enterprises is accepted. It indicates that when the GDP increases, the number of renewable energy enterprises will also increase. The second hypothesis (H2) has been accepted as the market size in terms of population or number of households have positive impact on entrepreneurship development. It reveals that larger the market size, higher would be number of renewable energy enterprises. Similarly, the third hypothesis (H3) is accepted as the sales, i.e., number of renewable energy systems installed has positive impact on entrepreneurship development. It shows that higher the number of renewable energy systems

installed, higher would be the entrepreneurship development, i.e., number of renewable energy enterprises.

Conclusions, Implications and Future Directions

The major conclusion of this study is that GDP, market size in terms of population or number of households, and sales, i.e., number of renewable energy systems installed are positively related to entrepreneurship development, i.e., number of renewable energy enterprises. The study further concludes that GDP, market size and sales have positive impact on entrepreneurship development. It indicates that increase in GDP, market size and sales leads to increase in entrepreneurship development.

This study is considered to be useful for renewable energy enterprises (REEs), development actors in the sector, academia and policy makers. The study is valuable to the REEs and the development actors of renewable energy sector for more commercialization of the sector. The study also helps in making entrepreneurship as a field of study. This study aims at generating at least some new knowledge in the literature of entrepreneurship and provides avenues for future research. This study is first of its kind in the field of renewable energy sector of Nepal. Finally, it is also useful for policy makers. It would be a reference materials to formulate entrepreneur-friendly policies to facilitate the existing and potential REEs. It would contribute to generate employment locally that plays a vital role for economic growth by increasing production and providing energy in the country. Since sales positively related to entrepreneurship development in terms of number of renewable energy enterprises, the government and development actors willing to expand the sector, should create conducive enabling environment to renewable energy enterprises to convert remittance based economy into sustainable economy. Entrepreneurship development in terms of number of renewable energy enterprises and GDP are positively related. Thus, government and development actors willing to increase GDP, should focus to increase number of renewable energy enterprises by creating entrepreneurs' friendly environment in the sector. Since market size in terms of population and number of households are positively related to entrepreneurship development, the renewable energy enterprises should consider market size in terms of population and number of households while expanding their business or creating new enterprises in the sector.

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 stove, wind technology, and biomass sectors to get greater insight into the results. The extension of this study can be made through conducting a detail analysis of sector-wise comparison of renewable energy enterprises to find out widespread results for the sector and their actors. It would be more worthwhile of incorporating the opinion and views of respondents from customers, regulating authorities and development actors in the sector in future studies.

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APPENDIX-1

Basic data related to renewable energy sector of Nepal

Fiscal Year	No. of biogas systems installed (BSYSTEM)	No. of Solar home systems installed (SSYSTEM)	Capacity of solar home systems installed in Wp (SCAP)	No. of micro-hydro systems installed (MSYSTEM)	Capacity of micro-hydro systems installed in KW (MCAP)	Total No. of renewable energy systems installed (TSYSTEM)	No. of biogas companies (BC)	No. of solar companies (SC)	No. of micro-hydro construction companies (MHCC)	Total No. of renewable energy enterprises (REE)	GDP (RS. in billion)	Population in million (POP)	No. of House holds in '000 (HH)
1992/93	3,318	8	272	3	27	3,329	1	-	-		171	20	3,548
1993/94	3,506	89	3,276	84	226	3,679	1	-	-		199	20	3,595
1994/95	5,117	36	1,247	128	316	5,281	11	-	-		219	20	3,599
1995/96	7,157	149	4,898	144	378	7,450	16	-	-		249	21	3,685
1996/97	8,387	562	20,398	100	406	9,049	19	-	-		281	21	3,773
1997/98	9,869	736	27,612	125	616	10,730	42	-	-		301	22	3,863
1998/99				148	613							22	

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	11,052	1,899	68,410			13,099	38	-	-		342		3,956
1999/00	13,265	8,279	316,540	152	933	21,696	49	-	-		378	23	4,050
2000/01	17,857	6,211	242,064	86	972	24,154	47	11	15		408	23	4,155
2001/02	15,527	13,745	543,486	95	505	29,367	44	11	21		421	24	4,346
2002/03	16,340	18,482	650,669	133	934	34,955	39	13	21		446	24	4,441
2003/04	11,259	15,106	411,095	101	562	26,466	37	13	20		449	24	4,443
2004/05	17,803	17,887	462,679	86	762	35,776	57	22	27		463	25	4,498
2005/06	16,118	6,788	175,052	88	994	22,994	60	29	28		480	25	4,553
2006/07	17,663	10,806	296,393	168	2,081	28,637	66	34	37		494	25	4,627
2007/08	14,884	38,375	888,334	118	2,091	53,377	72	38	42		522	26	4,682
2008/09	19,479	53,662	1,250,799	96	1,525	73,237	89	50	42		543	26	4,755
2009/10	21,158	57,058	1,285,476	177	1,938	78,393	83	64	42		566	26	4,829
2010/11	20,055	34,219	796,606	243	3,161	54,517	82	69	58		588	26	5,423
2011/12	18,584	45,752	990,494	172	7,492							27	

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						64,508	107	69	57		615		5,506
2012/13	22,112	91,879	2,026,000	133	3,239	114,124	108	69	78		638	27	5,568
2013/14	31,765	87,038	1,342,836	253	4,046	119,056	109	69	78		674	28	5,650
2014/15	30,196	103,271	1,593,281	126	3,346	133,593	113	69	78		690	28	5,731
2015/16	16,706	56,770	875,855	155	1,910	73,631	120	105	78		694	28	5,793
2016/17	15,707	9,291	143,300	75	957	25,073	120	105	78		743	29	5,875

Source: Statistical Year Book, Central Bureau of Statistics, Government of Nepal, various issues; Economic survey of Nepal, Ministry of Finance, Government of Nepal, various issues; Annual report of AEPC, various issues; annual report of BSP-Nepal, various issues; annual report of SEMAN, various issues; annual report of NMHDA, various issues, A year in review (July 2012 to July 2013), Making renewable energy mainstream supply to rural areas of Nepal, Alternative Energy Promotion Centre (AEPC), Ministry of Science, Technology and Environment, Government of Nepal; and NRREP Baseline Part B: Baseline of Renewable Energy Technology Installations in Nepal 2013, Alternative Energy Promotion Centre (AEPC), Ministry of Science, Technology and Environment, Government of Nepal.