

Key Factors of Enterprise Development: Evidence from Biogas Sector of Nepal¹

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ABSTRACT

This paper aims at determining key factors for enterprise development in biogas sector in Nepal. The variables are introduced via an extension of the econometric model, which explicitly includes Almon (1965) Polynomial Lag Model using SPSS. The number of biogas companies comprises as a dependent variable for the indicator of enterprise development while number of biogas plants, numbers of biogas plants constructed with loan, micro credit i.e., loan, and subsidy are included as independent variables. The empirical results were estimated using annual data of 22 years from fiscal year 1992/93 to 2013/14 with entire study period divided into different sub-periods. The study reveals that enterprise development is influenced not only by the current values of the key factors but also by the past values. The study also shows that number of biogas plants and subsidy play a very strong role while number of plants constructed with loan and loan play a weak role in enterprise development in the context of biogas sector of Nepal. The paper can be extended by investigating characteristics of renewable energy enterprises and renewable energy entrepreneurs to get a greater insight into the results.

Keywords: Biogas plants, enterprise development, key factors, loan, and subsidy.

INTRODUCTION

An entrepreneur is one who combines the land of one, the labour of others and the capital of yet another, and, thus produces a product (Khanka, 2010, p. 2). An entrepreneur is neither a scientific innovator nor salaried manager, who is assumed to be an opportunity seeker (Aryal, 1994, p. 36). Entrepreneurship is a process of identifying and evaluating an opportunity and bringing together the resources necessary for success. Entrepreneurship is the recognition and pursuit of opportunity without regard to the resources you currently control, with confidence that you can succeed, with the flexibility to change course as necessary, and with the will to rebound from setbacks (Thapa, Thulaseedharan, Joshi, & Goswami, 2008). It is also known as the art of finding profitable solutions to the problems. Entrepreneurship is a way of thinking that emphasizes opportunities over threats (Krueger, Reilly, & Carsrud, 2000). The major theme to all of them is the desire for breaking away from traditional ways of doing things.

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The importance of financial capital is a key determinant of entrepreneurial success and propensity to pursue entrepreneurial activities. Likewise, almost every firm needs a substantial financial input. The financial resources of the starting entrepreneur are important (Bosma, Praag, & Wit, 2000, p. 20). In order to succeed as an entrepreneur, the importance of optimal financing for enterprises is vital. Having capabilities in this respect can be indicated as owning financial capital for start-up and growth of an enterprise. Viewed in this perspective, key factor particularly financial capital and market size are important in determining enterprise development.

Furthermore, Nepal has over a half century history of promoting domestic biogas. Over 321,468 biogas plants were installed throughout the country by mid July 2014 (AEPC, 2014). In 1977 a private company called Gobar Gas and Agricultural Development Company (GGC) started its program in close cooperation with various donor agencies for building awareness and technical capability in the country. Currently, there is over 113 biogas companies are working in the sector (AEPC, 2014). In the very beginning, there was less than 1,000 biogas plants constructed yearly. Now, there are over 30,000 biogas plants constructed every year. This shows that the market size of the biogas sector and biogas enterprises have been growing over the year.

In order to expedite the progress rate towards achieving the biogas potential of Nepal, Biogas Support Program (BSP) was launched in 1992 (BSP-Nepal, 2012). Biogas Program came under the umbrella of Alternative Energy Promotion Centre (AEPC) in 1996 (AEPC, 2014). As the result, biogas plant installation was rapidly increased during 2000s. The trend of biogas development over the year is encouraging.

With the above backcloth, Nepalese biogas sector has two categories of enterprises: some of them are successful and others are only surviving. The patient question arises that do successful entrepreneurs have something special? Among others, this study is important attempts to get answers of this question. It analyses important key factors of entrepreneurial development which determine growth of biogas sector.

Review of Literature

Entrepreneurship in general is the phenomena to capitalize on identified opportunities or creation of new opportunities through innovation. Thapa, Thulaseedharan, Joshi, & Goswami, (2008) found that among many socio-economic and motivational factors, size of initial investment, number of workers, family business and promising demand of product/services are some of the major determinants of street entrepreneurial success. These factors provide opportunities, threats, information affecting all entrepreneurs within the environment.

Furthermore, the nine most acknowledged models of entrepreneurship were identified the diverse factors for entrepreneurial success. The Indigenous (Indian) Model on

Entrepreneurial Success by Zafar (1983) argues that entrepreneurship development is dependent on entrepreneurial traits (Et), opportunity (Op), skills (Sk), project report (Pr), finance (F), infrastructure (If) and environment (En). Likewise, the Model of the Entrepreneurial Process by Timmons (1989) showed the entrepreneur, the founding team, the opportunity, and the resources as that the factors for entrepreneurial success. Cagetti & Nardi (2006) constructs and calibrates a parsimonious model of occupational choice that allows for entrepreneurial entry, exit, and investment decisions in the presence of borrowing constraints. At the aggregate level, more restrictive borrowing constraints generate less wealth concentration and reduce average firm size, aggregate capital, and the fraction of entrepreneurs

Moreover, the General Model of Entrepreneurial Success by Rauch and Frese (2000) comprised that planning and decision making are the key factors of success. Similarly, Wickham Model of Entrepreneurial Performance consisted of better know-how of the industry, management and interpersonal skills and entrepreneurial motivation to make the firm successful.

The Entrepreneurial Capital Model of Erikoson (2002) argues that performance of an entrepreneurial venture is linked to entrepreneurial competence, commitment and motivation. Likewise, Hisrich and Peters (2002) Model of Entrepreneurial Process is an interdisciplinary model. The model showed that entrepreneurship research considers the personal, sociological and environmental factors.

The model by Morris et al. (2005) is An Integrative Model of Entrepreneurship. This is based on the concept that entrepreneurship is a result of interactions among a number of factors: process, entrepreneur, environment, business concept, resources and organizational context. This model uses a layer approach to explain each factor. The first layer identifies six critical factors of entrepreneurship and each factor represents a collectivity exhaustive set of factors which are important for the occurrence of an entrepreneurial event.

The Conceptual Model of Entrepreneurial Success of Kumar (2007) is based on Bilijan (2002) position that entrepreneurial success would require explaining three phenomena: willingness to start enterprise, identifying opportunities and success of the enterprise. The model is based on psychological and sociological theories as it assumes that information creation and management along with emotions are the heart of entrepreneurial decision-making. This model is more focused on the individual context of entrepreneurship less importance is given to the environmental context. Likewise, Rajput (2011) Model of Entrepreneurial Success showed that essentially four factors namely culture and environment, resources, innovation and opportunity are the major factors of the profitability and business success in the sector.

The models reviewed and discussed show that both types of factors: micro and macro, i.e., individual and environment contexts are important for business success as shown in Table 1.

Moreover, it can be argued that neither the micro factors alone nor macro factors can explain entrepreneurial success. The root cause of success may lie in the combination of different micro and macro factors within which an enterprise operates.

Table 1: Summary of Factors used in Models of Entrepreneurial Success

SN	Model	Author(s)	Individual Context	Environmental Context
1	Indian Model of Entrepreneurship	Zafar (1983)	Entrepreneurial traits, opportunity, Skills and Project report	Entrepreneurship development, Finance, Infrastructure and Environment
2	Timmons Model of the Entrepreneurial Process	Timmons (1989)	Opportunity and The team	Resources
3	General Model of Entrepreneurial Success	Rauch and Frese (2000)	Personality and Goals	Human Capital, Environment and Strategies
4	Wickham Model of Entrepreneurial Performance	Wickham (2001)	Personal motivation, Management skills and People skills	Industry knowledge
5	The Entrepreneurial Capital Model	Erikoson (2002)	Opportunity, Ability and Motivation	
6	Model of Entrepreneurial Process	Hisrich & Peters (2002)	Innovation, Opportunity, Personal motivation and Management Skills	Business Planning Organization, Environment, and Resources
7	The Integrative Model of Entrepreneurship	Morris et al. (2005)	Entrepreneur, Concept	Organization, Environment and resources, and The process

8	The Conceptual Model of Entrepreneurial Success	Kumar (2007)	Willingness to start enterprise and Opportunity identification	Success of enterprise
9	Rajput Model of Entrepreneurial Success	Rajput (2011)	Entrepreneur, Innovation and Network	Culture & environment, Opportunity and Resources

On the other hand, it would be worthwhile to see the factors employed in the models fall in which category of capital among social, financial and human capitals as well as its focus in construction of model of entrepreneurial success. Table 2 shows the classification of factors of entrepreneurial success into social, financial and human capital.

Based on the review and discussion on the models of entrepreneurial success, the models show that all three types of social, financial and human capital along with some other external factors are necessary to build a comprehensive model. Viewed in this perspective, it can be argued that combination of these capitals in a model can explain entrepreneurial success. Hence, the actual root cause of success may lie in the combination of different factors.

Table 2: Classification of Factors of Entrepreneurial Success into Social, Financial and Human Capital

S N	Model	Author(s)	Social Capital	Financial Capital	Human Capital	Others
1	Indian Model of Entrepreneurship	Zafar (1983)	Entrepreneurship development and Environment	Finance, Infrastructure	Entrepreneurial traits, Skills and project report	Opportunity
2	Timmons Model of the Entrepreneurial Process	Timmons (1989)		Resources	The team	Opportunity
3	General Model of Entrepreneurial Success	Rauch and Frese (2000)	Environment		Human Capital, Personality and Goals	Strategies
4	Wickham Model of Entrepreneurial	Wickham (2001)			Personal motivation, Management	

	al Performance				skills and People skills, Industry knowledge	
5	The Entrepreneuri al Capital Model	Erikoson (2002)			Ability and Motivation	Opportunity
6	Model of Entrepreneuri al Process	Hisrich & Peters (2002)	Environment	Resources	Personal motivation and Management Skills, Innovation, Business Planning	Opportunity, Organization
7	The Integrative Model of Entrepreneurs hip	Morris et al. (2005)	Environment	Resources	Entrepreneur, Concept	Organization and The process
8	The Conceptual Model of Entrepreneuri al Success	Kumar (2007)			Willingness to start enterprise, Opportunity identification	Success of enterprise
9	Rajput Model of Entrepreneuri al Success	Rajput (2011)	Network, Culture, environment,	Resources	Entrepreneur, Innovation	Opportunity

Likewise, it is very much sensible to identify most common factors of entrepreneurial success. Based on the review of acclaimed nine models of entrepreneurial success, the most widespread factors of entrepreneurial success are given in Table 3. The widespread factors of entrepreneurial success were identified through frequency distribution of the uses of the factors of these models.

Table 3: Most Widespread Factors of Entrepreneurial Success

SN	Factors of Entrepreneurial Success	Total Frequency	Percentage
1	Opportunity	6	66.67
2	Environment	5	55.56

3	Resources	4	44.44
4	Entrepreneur	2	22.22
5	Innovation	2	22.22
6	Management Skills	2	22.22
7	Organization	2	22.22
8	Personal motivation	2	22.22
9	Ability and Motivation	1	11.11
10	Business Planning	1	11.11
11	Concept	1	11.11
12	Culture	1	11.11
13	Entrepreneurial traits	1	11.11
14	Entrepreneurship development	1	11.11
15	Finance	1	11.11
16	Goals	1	11.11
17	Human Capital	1	11.11
18	Industry knowledge	1	11.11
19	Infrastructure	1	11.11
20	Network	1	11.11
21	People skills	1	11.11
22	Personality	1	11.11
23	Skills and Project report	1	11.11
24	Strategies	1	11.11
25	Success of enterprise	1	11.11
26	The process	1	11.11
27	The team	1	11.11
28	Willingness to start enterprise	1	11.11

The frequency table shows that a most repeated (mode) factor of entrepreneurial success is opportunity. Six out of nine (66.67 percent) models are highlighted its prominent role for entrepreneurial success. Likewise, environment and resource are also important factors of entrepreneurial success. There are 55.56 percent and 44.44 percent of models revealed that environment and resource as vital factors respectively. On the other hand, entrepreneur, innovation, management skills, organization, and personal motivation are moderately important factors of entrepreneurial success. Two out of nine models included these factors as the vital one. The rest 20 factors are less important factors of entrepreneurial success as only 11.11 percent models have included these factors. Thus, the review suggests that the strong role-played by opportunity, environment and resource as well as moderate-role played by entrepreneur, innovation, management skills, organization, and personal motivation while weak role-played by the other factors as a whole.

Furthermore, there are few studies conducted on the area of entrepreneurship and biogas in Nepal. K.C. (2003) concluded that economic development cannot be initiated without the pioneering efforts of entrepreneurs and entrepreneurs in Nepal are very shy to invest capital in industrial sector. Likewise, Yadav (2012a) revealed the significant role of biogas for sustainable development in Nepal. Moreover, a study by Karki, Shrestha, Bajgain, & Sharma (2009) revealed that the role biogas for national development along with the role of loan and subsidy in biogas development in Nepal. The study showed that the subsidy scheme encouraged farmers to install biogas plants. Similarly, financing of the biogas plants is the most important part, since the decisions to invest in a new project necessitates its financing. Affordable financing is a key element in the promotion of biogas plants that led to enterprise development in the sector. There are two approaches for financing biogas plants-one with provision of direct financing in cash and the other through loans from banks or micro financing institutions (MFIs).

Though the abovementioned studies are good in their own right, with the exception of few issues, many of the issues on entrepreneurship development in Nepal are still remain unresolved. Some of aforementioned empirical studies are devoted to the entrepreneurship of Micro, Small and Medium Enterprises (MSMEs). Nevertheless, the bulk of such research tends to concentrate on MSMEs in developed countries; very limited studies have provided such research on MSMEs in developing country like Nepal. This is an important research gap in the literature. Likewise, the study on opportunity and financial capital for entrepreneurial development in the context of Nepal, taking opportunity-based entrepreneurship theory and resource-based entrepreneurship theory into account, is not available. This is another prime research gap in the literature. Likewise, the empirical studies on entrepreneurship for Nepalese perspective are very few that are not covered Nepal's renewable energy sector. This is another important research gap in the literature. This study aims to fill these gaps. Viewed in this perspective, the study on key factors of enterprise development in biogas sector of Nepal may be very rewarding.

Based on reviewed literature, it shows that enterprise development is influenced by opportunity and financial capital. The pertinent question arise that what extent these factors plays role in enterprise development in the context of biogas sector of Nepal. Despite all these empirical evidences of the biogas sector, no such study on key factors for enterprise development in biogas sector has yet been conducted in Nepal. With the above backcloth, this study aims at determining key factors for enterprise development in the context of biogas sector in Nepal. In this circumstance, the study deals with: Does the financial capital in the form of loan and subsidy play vital role for enterprise development in biogas sector of Nepal? Does the opportunity in the form of market size of biogas sector i.e., number of biogas plants play significant role for enterprise development in biogas sector of Nepal?

Theoretical Background

Several theories have been put forward by scholars to explain the field of entrepreneurship. These theories have their roots in economics, psychology, sociology, anthropology, and management. There are six entrepreneurship theories (Simpeh, 2011, p. 1). These are: economic entrepreneurship theory, psychological entrepreneurship theory, sociological entrepreneurship theory, anthropological entrepreneurship theory, opportunity-based entrepreneurship theory, and resource-based entrepreneurship theory. However, this study takes opportunity-based entrepreneurship theory and financial capital/liquidity theory of resource-based entrepreneurship into account for the theoretical base and mentioned in the following pages.

The Opportunity-Based Theory: The opportunity-based theory focuses on opportunity. Peter Drucker and Howard Stevenson presents the opportunity-based theory. This theory provides a wide-ranging conceptual framework for research in entrepreneurship. Entrepreneurs do not cause change but exploit the opportunities that change creates (Drucker, 1985). Drucker also adds, “The entrepreneur always searches for change, responds to it, and exploits it as an opportunity”. Drucker’s opportunity construct comprises that entrepreneurs have an eye more for possibilities created by change than problems. Stevenson (1990) extends Drucker’s construct to include resourcefulness. He concludes that hub of entrepreneurial management is the “pursuit of opportunity without regard to resources currently controlled.”

The financial capital/liquidity theory of resource-based entrepreneurship: The resource-based theory of entrepreneurship claims that to access by founders is an important predictor of opportunity-based entrepreneurship and new venture growth (Aldrich & Martinez, 2001). This theory comprises the importance of financial, social and human capital that enhances the founder’s capability to detect and act upon discovered opportunities. Financial, social and human capital represents three theories under the resource-based entrepreneurship theory. Among them, financial capital is basic requirement of enterprise development. The new venture creation is very common when people have access to financial capital. This theory suggests that people with financial capital are more able to acquire resources to effectively exploit entrepreneurial opportunities and start up an enterprise to do so. However, Aldrich (1999); Kim, Aldrich & Keister (2003); Hurst & Lusardi(2004); and Davidson & Honing (2003) studies’ findings contradict with this theory and argues most entrepreneurs start new business without much capital that financial capital is not significantly related to the possibility of being promising entrepreneurs (Simpeh, 2011). Viewed in this perspective, this does not necessarily rule out the possibility of starting an enterprise with much capital.

With above-mentioned backdrop, this study aims at determining key factors of enterprise development through analysing the impact of financial capital in the form of loan and subsidy as well as opportunity in the form of market size of biogas sector on enterprise development in biogas sector of Nepal.

Conceptual Framework

Based on the review of entrepreneurship theories and literature, a conceptual framework of the study is presented in Figure 1. This table displays the conceptual framework by showing the relationship of enterprise development with its variables. The intuition is that the study consists of financial resources and opportunity related variables as independent variables to identify its relation with enterprise development.

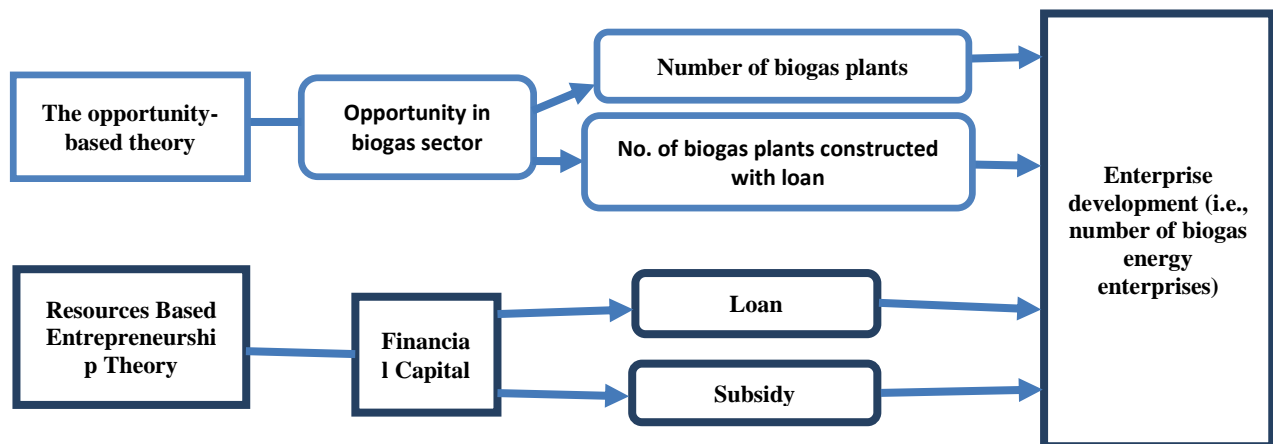


Figure 1: A Conceptual framework

Source: Authors' designed.

The study consists of opportunity in the biogas sector i.e., market size of the biogas sector that indicated by total number of biogas plants constructed and number of biogas plants constructed with loan over the year. Likewise, access to finance or financial capital in the form of loan and subsidy provided in the sector is also included as independent variables in this study. These factors are considered as the independent variables while enterprise development i.e., number of biogas enterprises working in the sector. Thus, the point of start of the study is opportunity-based entrepreneurship theory and financial capital/liquidity theory of resources-based entrepreneurship while the point of departure of this study is to determine the key factors for enterprise development in the context of biogas sector of Nepal.

Research Objectives

The main aim of this study is to determine key factors for enterprise development of biogas sector in Nepal. The specific objectives are:

- 1) To analyze the impact of opportunity in the form of market size of biogas sector on enterprise development in biogas sector of Nepal.
- 2) To assess the impact of financial capital in the form of loan and subsidy on enterprise development in biogas sector of Nepal.

METHODS AND MODEL

This paper is based on secondary data covering a period of 22 years from fiscal year 1992/93 to 2013/14. The secondary data is collected from Alternative Energy Promotion Centre (AEPC). The collected data are related with the enterprise development such as, number of biogas companies (BC), total number of biogas plants (P), number of plants constructed with loan (PL), micro credit, i.e., loan (L), and subsidy (S).

This study attempts to assess the role of key factors in enterprise development by estimating various models. The theoretical statement of the models is that the enterprise development (number of biogas companies, BC) is regarded as subject to the constraints of opportunity (total number of biogas plants, P and number of plants constructed with loan, PL) and financial capital (micro credit, i.e., loan, L and subsidy, S). The theoretical statement is framed as,

$$BC = f(P, PL, L, S) \quad \dots (1)$$

The equation to be estimated is therefore specified as,

$$BC = a + b_1P + b_2 PL + b_3L + b_4S + U_i \quad \dots (2)$$

Where, U_i = Error term or disturbance

Although the lag models are extensively used in econometric analysis, all economic problems may not correspond to the assumption of monotonically decreasing lag pattern. There are some situations where the effect of the lagged independent variable may follow cyclical pattern, the coefficient increases gradually before reaching a peak and then decreases. This type of lag pattern can be taken care of by using the Almon (1965) Polynomial Lag Model. The Almon Lag Scheme is expressed as a linear function of the current and the K previous values of X:

$$Y_t = a + b_0 X_t + b_1 X_{t-1} + b_2 X_{t-2} + \dots + b_t X_{t-k} + U_i \quad \dots (3)$$

Whereas the coefficient b_0 is known as the short run or impact multiplier because it measures the change in the mean value of Y following a unit change in X in the same period, $b_1, b_2 \dots b_t$ are called delay or interim multipliers because they measure the impact on mean Y of a unit changes in X in various time periods.

The relationship of number of biogas companies with total number of biogas plants, number of plants constructed with loan, micro credit, i.e., loan and subsidy is analysed within the framework of Almon Polynomial Lag Scheme, as these relations are expected to follow an inverted V-type lag pattern. Five-year length of lag is taken for applying the Almon Log Scheme between the specified variables. The reason for this choice of lag length is periodic plans (except the second and interim) in Nepal are worked out for time horizon of 5 years.

Research Hypothesis

The main aim of this study is to determine key factors for enterprise development of biogas sector in Nepal. After theoretical and literature review, the study considered two objectives and each objective has distinct hypothesis.

Hypothesis for Objective 1:

Hypothesis 1.1: The opportunity in the form of market size of biogas sector i.e., number of biogas plants play significant role for enterprise development in biogas sector of Nepal.

Hypothesis 1.2: The opportunity in the form of market size of biogas sector i.e., number of biogas plants constructed with loan play significant role for enterprise development in biogas sector of Nepal.

Hypothesis for Objective 2:

Hypothesis 2.1: The financial capital in the form of loan play vital role for enterprise development in biogas sector of Nepal.

Hypothesis 2.2: The financial capital in the form of subsidy play vital role for enterprise development in biogas sector of Nepal.

EMPIRICAL RESULTS

In this section, an attempt is made to determine the role of key factors for enterprise development in the biogas sector of Nepal. One of the important indicators of enterprise development is the number of biogas companies in the sector. Although there are some other indicators of enterprise development, the overall effect of sector efforts is examined in terms of growth in number of biogas companies. It is used as a measure of enterprise development. First of all, the time series linear regression of the model show the impact of number of biogas plants, plants constructed with loan, micro credit, i.e., loan and subsidy as presented in Table 4.

Table 4: Regression of enterprise development on key factors for 1992/93 to 2013/14

Regression of number of biogas companies (BC) on total number of biogas plants (P), number of plants constructed with loan (PL), loan (L), subsidy (S) for the Period of 1992/93 to 2013/14

Regression Equation: $BC = a + b_1P + b_2 PL + b_3L + b_4S$... (4)

Dependent Variable	Intercept	Regression Coefficient of				Adjusted R ²	SE E	F	Eq. No.
		P	PL	L	S				
BC	5.32 (0.43)	0.86 (8.30)*	-0.12 (1.16)			0.81	13.54	45.59	I
BC	29.01 (2.37)**			0.04 (0.26)	0.80 (5.13) *	0.58	20.22	15.21	II
BC	-1.35 (0.13)	0.78 (4.61)*		-0.02 (0.16)	0.14 (0.81)	0.79	14.07	28.04	III
BC	86.59 (5.61)*		-0.45 (2.25) **			0.16	28.40	5.05	IV
BC	31.74 (5.42)*				0.78 (5.64) *	0.59	19.74	31.83	V

Source: Alternative Energy Promotion Centre (AEPC), Government of Nepal.

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

(2) *, ** and *** indicate that the results are significant at 1 percent, 5 percent and 10 percent level of significance respectively.

The overall results presented in equations I to V in Table 4 are encouraging. The signs of all the coefficients are as expected except the sign of plants constructed with loan in equations I and IV and the sign of loan in equation III. It presents the usual simple linear relationship of number of biogas companies (BC) with total number of plants (P), number of plants constructed with loan (PL), micro credit, i.e., loan (L), and subsidy (S).

Moreover, one plant increase in total plants leads to about 0.86 number of biogas companies increase holding other variables constant in equation I while the same is noticed to be 0.78 numbers in equation III. All the coefficients of total plants are statistically significant. The influence of plants constructed with loan (PL) is negative in equations I and IV. On the other side, one rupee increase in loan is resulted 0.04 number of biogas companies in equation II holding other variables constant while the influence of loan is negative in equations III. Similarly, one rupee increase in subsidy leads to about 0.80 numbers increase in biogas companies holding all other independent variables constant in equation II. The same is noticed to be 0.14 and 0.78 numbers in equations III and V respectively. The coefficients of subsidy are statistically significant in equations II and V. The goodness of all the models is also satisfactory.

The regression equations presented in Table 4 show the strong role-played by total plants and subsidy while weak role-played by plants constructed with loan and loan in determining enterprise development. It may now be interesting to see the results when entire-period of the study is divided into four sub-periods. Table 5 presents the regression results of number of biogas companies (BC) on total number of plants (P), number of plants constructed with loan (PL), micro credit, i.e., loan (L), and subsidy (S) for various time-periods.

The results presented in Table 5 indicate that the estimated coefficients have expected signs of loan for all the periods. The same is the case with total plants for all the periods except 1992/93 to 1999/00 in equation ii. On the other hand, the same is the case of subsidy for the periods of 1992/93 to 1999/00 in equation ii. The estimated coefficients of the rest of the periods for subsidy and all the periods for loan are not as expected. The goodness of all the models is satisfactory. The regression equations presented in Table 5 also show the usual simple linear relationship of number of biogas companies (BC) with total number of plants (P), number of plants constructed with loan (PL), micro credit, i.e., loan (L), and subsidy (S).

Table 5: Regression of enterprise development on key factors for various time periods

Regression of number of biogas companies (BC) on total number of biogas plants (P), number of plants constructed with loan (PL), loan (L), subsidy (S) for various time periods

$$\text{Regression Equation: } BC = a + b_1P + b_2 PL + b_3L + b_4S \quad \dots (5)$$

Time Periods	Intercept	Regression Coefficient of				Adjusted R ²	SEE	F	Eq. No.
		P	PL	L	S				
1992/93-2013/14	16.11 (1.19)	0.86 (5.27)*	-0.66 (1.92)** *	0.52 (1.75)** *	-0.08 (0.04)	0.82	13.1 2	25.1 1	i
1992/93-1999/00	1.39 (0.19)	-9.50 (3.09)** *	-0.98 (2.73)** *	0.70 (2.73)** *	10.82 (3.44)* *	0.97	2.60	77.7 8	ii
2001/02-2008/09	40.51 (2.47)** *	1.34 (3.26)**	-1.64 (2.96)**	4.12 (4.57)*	-3.39 (3.95)* *	0.69	5.76	5.42	iii
1992/93-2010/1	2.88 (0.27)	1.36 (4.44)*	-0.68 (2.22)**	0.86 (2.42)**	-0.53 (1.60)	0.83	9.22	21.2 3	iv

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Source: Alternative Energy Promotion Centre (AEPC), Government of Nepal.

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

(2) *, ** and *** indicate that the results are significant at 1 percent, 5 percent and 10 percent level of significance respectively.

Similarly, it may be interesting to see the results obtained by applying the Almon Lag Scheme. Total number of plants (P), number of plants constructed with loan (PL), micro credit, i.e., loan (L), and subsidy (S) contribute enterprise development i.e., number of biogas companies (BC) in a lagged pattern. The Almon Lag Scheme is employed to test the lag structure of the effects of total number of plants (P), number of plants constructed with loan (PL), micro credit, i.e., loan (L), and subsidy (S) on number of biogas companies (BC). The results are presented in Table 6.

Table 6: Regression of enterprise development on key factors and its one to five year lag values

Regression of number of biogas companies (BC) on total number of biogas plants (P) and its one to five year lag values; the number of biogas companies (BC) on number of plants constructed with loan (PL) and its one to five year lag values; the number of biogas companies (BC) on loan and its one to five year lag values; the number of biogas companies (BC) subsidy and its one to five year lag values for the period of 1992/93 to 2013/1

Regression Equations:

$$BC = a + b_0P_1 + b_1P_{t-1} + b_2P_{t-2} + b_3P_{t-3} + b_4P_{t-4} + b_5P_{t-5} \quad \dots (6)$$

$$BC = a + b_0PL_1 + b_1PL_{t-1} + b_2PL_{t-2} + b_3PL_{t-3} + b_4PL_{t-4} + b_5PL_{t-5} \quad \dots (7)$$

$$BC = a + b_0L_1 + b_1L_{t-1} + b_2L_{t-2} + b_3L_{t-3} + b_4L_{t-4} + b_5L_{t-5} \quad \dots (8)$$

$$BC = a + b_0S_1 + b_1S_{t-1} + b_2S_{t-2} + b_3S_{t-3} + b_4S_{t-4} + b_5S_{t-5} \quad \dots (9)$$

A	b ₀	b ₁	b ₂	b ₃	b ₄	b ₅	Adj. R ²	SEE	F	Eq. No.
-30.52 (4.13) *	0.05 (0.27)	0.18 (0.88))	0.27 (1.69)	0.27 (1.91)* **	0.22 (1.36)	0.08 (0.58)	0.92	5.89	30.91	6
132.42 (5.51) *	-0.67 (2.08) ***	-0.06 (0.16))	0.07 (0.18)	-0.01 (0.02)	-0.04 (0.11)	-1.09 (3.15) *	0.50	14.50	3.71	7
101.39 (3.74) **	-0.58 (1.44)	0.04 (0.09))	0.17 (0.38)	0.05 (0.11)	0.06 (0.12)	-0.95 (2.04) ***	0.07	19.85	1.20	8
-5.03 (0.65)	0.77 (2.02) ***	-0.10 (0.21))	-0.05 (0.15)	0.67 (2.56)* *	-0.50 (1.21)	0.21 (0.41)	0.73	10.72	8.18	9

Source: Alternative Energy Promotion Centre (AEPC), Government of Nepal.

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

(2) *, ** and *** indicate that the results are significant at 1 percent, 5 percent and 10 percent level of significance respectively.

All the coefficients of total plants (P) are positive for one to five year lag in equation 6 while the coefficient of number of plants constructed with loan (PL) for two year lag value only is positive in equation 7. All the coefficients of loan (L) are positive except five year lag value in equation 8. The coefficients of subsidy (S) are positive for three and five years lag values in equation 9. The goodness of all the models is satisfactory except equation 8. The results show enterprise development is influenced not only by the current values of the key factors but also by the past values in the biogas sector of Nepal.

Hypothesis Testing and Discussion

Hypothesis 1.1: The opportunity in the form of market size of biogas sector i.e., number of biogas plants play significant role for enterprise development in biogas sector of Nepal.

Hypothesis 1.1 is accepted. The results of this study suggests that the strong role is played by opportunity i.e., market size of biogas sector in the form of number of biogas plants. This finding is similar with the results of the study by Zafar (1983), Timmons (1989), Erikoson (2002), Hisrich & Peters (2002), and Kumar (2007) that supports to the opportunity-based entrepreneurship theory. However, this results contradicts with the findings of the study by Aldrich (1999), Kim, Aldrich & Keister (2003), Hurst & Lusardi, (2004), Davidson & Honing, (2003).

Hypothesis 1.2: The opportunity in the form of market size of biogas sector i.e., number of biogas plants constructed with loan play significant role for enterprise development in biogas sector of Nepal.

Hypothesis 1.2 is not accepted. The statistical test shows that biogas plants constructed with loan does not play significant role for enterprise development in the context of biogas sector in Nepal. The results in case of number of plants constructed with loan is similar with the findings of the study by Aldrich (1999), Kim, Aldrich & Keister (2003), Hurst & Lusardi, (2004), Davidson & Honing, (2003). However, this results contrary with the results of the study by Zafar (1983), Timmons (1989), Erikoson (2002), Hisrich & Peters (2002), and Kumar (2007) that do not support to the opportunity-based entrepreneurship theory.

Hypothesis 2.1: The financial capital in the form of loan play vital role for enterprise development in biogas sector of Nepal.

Hypothesis 2.1 is not accepted. The statistical test does not show an association between loan and enterprise development in biogas sector of Nepal. The result reveals that the micro credit, i.e., loan play a weak role for enterprise development in Nepal. This results contradict with the findings of Zafar (1983), Timmons (1989), Hisrich & Peters (2002), Morris et al. (2005), Karki, Shrestha, Bajgain, & Sharma (2009), and Rajput (2011).

Hypothesis 2.2: The financial capital in the form of subsidy play vital role for enterprise development in biogas sector of Nepal.

Hypothesis 2.2 is accepted. The statistical test shows an association between subsidy and enterprise development in biogas sector of Nepal. This study suggests that the strong role-played by financial capital in the form of subsidy. This result is similar with the findings of the study conducted by Zafar (1983), Timmons (1989), Hisrich & Peters (2002), Morris et al. (2005), Karki, Shrestha, Bajgain, & Sharma (2009), and Rajput (2011) that supports to the resource-based entrepreneurship theory.

In conclusion, the market size and subsidy are the very important while loan and biogas plants constructed with the loan are not vital for enterprise development in the context of biogas sector in Nepal.

Implications and Future Research Directions

The findings of this study can have significant implications for *academia*, *renewable energy enterprises (REEs)*, *development actors* in the sector, and *policy makers*. This research is first of its kind in Nepal. This study is a new undertaking for the biogas sector of Nepal. It is most likely to be useful for the researchers because such information on this sector is being made available for the first time. This finding can have significant implications as the scholars interested in conducting research in entrepreneurship and biogas sector of Nepal. Likewise, this study is constructive for academia by acquiring new knowledge in the literature of entrepreneurship and recommendation for future research. The study is valuable for REEs particularly, biogas companies to grow their own business through focusing on the important factors of enterprise development. It is also useful for development actors of the biogas sector for more commercialization of the sector. Finally, the study is also useful for policy makers. It is guide map to formulate entrepreneur-friendly policies to facilitate the existing and potential REEs.

This paper can be extended by conducting a case study of renewable energy enterprises (REEs) to get possibly more concrete results. A second research avenue is to make the study more fruitful by adding additional variables that are related with enterprise development to get a greater understanding into the results. The paper can also be extended by investigating characteristics of renewable energy enterprises and renewable energy entrepreneurs to get a greater insight into the results.

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