SOCIO-ECONOMIC IMPACTS OF BIOGAS IN CHARPANE VDC OF JHAPA DISTRICT, NEPAL: A CASE STUDY

A Thesis

Submitted to the Central Department of Economics,

Faculty of Humanities and Social Sciences,

Tribhuvan University, Kirtipur, Kathmandu, Nepal,

in Partial Fulfillment of the Requirements

For the Degree of

MASTER OF ARTS

in

ECONOMICS

Submitted

Ву

SUMIT POUDYAL

Roll No: 255/066

T.U. Reg. No.:6-2-460-32-2004

Central Department of Economics

Tribhuvan University, Kirtipur

Kathmandu, Nepal

March, 2017

LETTER OF RECOMMENDATION

This thesis entitled "SOCIO-ECONOMIC IMPACTS OF BIOGAS IN CHARPANE VDC OF JHAPA DISTRICT, NEPAL: A CASE STUDY" has been prepared by Mr. Sumit Poudyal under my supervision. I hereby recommend this thesis for examination to the Thesis Committee as a partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS.

Mr. Babu Ram Karki

Thesis Supervisor

Date: 22nd March, 2017

11th Chaitra, 2073



TRIBHUVAN UNIVERSITY

CENTRAL DEPARTMENT OF ECONOMICS

Office of the Head of the Department

APPROVAL SHEET

We clarify that this thesis entitled "SOCIO ECONOMIC IMPACTS OF BIOGAS IN CHARPANE VDC OF JHAPA DISTRICT, NEPAL: A CASE STUDY" submitted by Mr. Sumit Poudyal to the Central Department of Economics, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfillment of the requirements for the Degree of Masters of Arts in Economics has been found satisfactory in scope and quality. Therefore, we accept this thesis as a part of the said degree.

Thesis Committee
Prof. Dr. Ram Prasad Gyanwaly
Head of Department
Prof. Dr. Sohan Kumar Karna
External Examiner
Mr. Babu Ram Karki
Thesis Supervisor

Date: 29th March, 2017

16th Chaitra, 2073

ACKNOWLEDGEMENTS

This thesis has been prepared to fulfill partial requirement for the degree of Master of Arts in Economics of Tribhuvan University. For this, I would like to acknowledge Central department of Economics for giving me such a valuable opportunity to use the theoretical knowledge in the practical field. I would like to express my gratitude to all those people who encouraged as well as helped me in completing this research work.

First of all, I am deeply indebted to my honorable teacher and thesis supervisor Mr. BabuRam Karki for all the inspiration, valuable suggestions and proper guidelines that I received from him during the course of my study in general and this thesis work in particular. I particularly appreciate his student-friendly and cooperative nature without which this piece of work would have never been completed.

I thank all the non-teaching staff of the Central department of Economics specially the library staffs, for all kinds of help and support they extended to me during the course of my study and research work. I heartily thank all staffs of the Charpane VDC, Jhapa, who provide me the valuable information's regarding to the research work and all the people who heartily participated in the process of the thesis work time and again despite of their hectic schedule.

I further acknowledge my gratitude to my respected parents (father Mr. Tilak Bahadur Poudyal and mother Mrs. Devika Poudyal), brother Gyan Bahadur Poudyal and other members of the family, whose care and continuous support during my study encouraged and strengthened me to complete this work.

Last but not least, I would like to express my sincere gratitude towards my friends Raju Mishra, Nikesh Adhikari, Madhav Ojha, Lyandra Neupane, Sushil Kharel, Parash Adhiakri, Hari Kafle, and Dipak Sitoula for their help and support of different kinds to complete this thesis.

I am alone responsible for any defects and errors in this study if any.

Sumit Poudyal

TABLE OF CONTNETS

Letter of Recommendation	i
Approval Letter	ii
List of Tables	iii
List of Figures	V
Abbreviations	vi
Acknowledgement	viii
	Pages
CHAPTER 1: INTRODUCTION	1-9
1.1 Background	1
1.2 Statement of the Problem	5
1.3 Objectives of the Study	7
1.4 Significance of the Study	7
1.5 Limitations of the Study	8
CHAPTER 2: LITERATURE REVIEW	10-25
2.1 Theoretical Framework	19
2.1.1 Benefits of Biogas	19
2.1.1.1 Benefits from Replacement of Firewood	19
2.1.1.2 Benefits of Biogas on Health and Sanitation	20
2.1.1.3 Time Saving and Workload Reduction	21
2.1.1.4 Benefits of Bio-slurry	21
2.1.1.5 Economic Benefit	22
2.1.2 GHG Reduction	22
2.1.3 CDM Approach	22
2.1.4 Investment Aspect and Payback Period	23
2.1.5 National Policies and Action Plan	23
2.1.6 Research Gap	25
CHAPTER 3: RESEARCH METHODOLOGY	26-29
3.1 Research Plan and Design	26

3.2 Description of the Sample	26
3.2.1 Sample Design	26
3.2.2 Sample Size	27
3.2.3 Sample and Population Distribution	27
3.3 Data Collection Procedure and Time Frame	27
3.3.1 Primary Data	27
3.3.1.1 Household Survey	28
3.3.1.2 Focus Group Discussion	28
3.3.2 Secondary Data	28
3.4 Analysis Plan	28
3.5 Validity and Reliability	29
CHAPTER 4: RESULTS AND DISCUSSION	30-61
4.1 Introduction of the Study Area	30
4.2 Socio-Economic Characteristics	31
4.2.1 Categorization of Ethnicity/Caste	31
4.2.2 Population Distribution of Household Heads by Ethnicity and Sex	31
4.2.3 Occupation of Household Heads by Ethnicity/Caste	33
4.2.4 Distribution of Households by Family Size	34
4.2.5 Educational Status of Sample Population	34
4.2.6 Total Income Distribution among Households by Ethnicity	35
4.2.7 Frequency Distribution of House Type by Ethnicity	36
4.2.8 Ownership of physical assets by ethnicity	38
4.2.9 Distribution of cattle among the sampled households	41
4.3 Landholding pattern	43
4.3.1 Landholding size by ethnicity	43
4.4 Uses and benefits of biogas plant	44
4.4.1 Reasons for Installing Biogas Plants	44
4.4.2 Motivating factors for the biogas plant installation	45
4.4.3 Size of the plant	46
4.4.4. Use of biogas	47
4.4.5 Saving of firewood	48
4.4.6 Saving of lp gas after biogas installation	52

4.4.7 Saving of kerosene after biogas plant installation		52
4.4.8 Cooking time		52
4.4.9 Cleaning of vessels		53
4.4.10 Saving of time in collection of firewood		55
4.4.11 Calculation of payback period		55
4.4.12 Perception of biogas household on biogas	55	
4.5 Discussion		56
4.5.1 Impact on Household Activities		56
4.5.2 Environmental Benefits		56
4.5.3 Social Benefits		57
4.5.4 Economic Benefits		58
4.5.5 Investment Aspect and Pay Back Period of Biogas Plant		58
4.5.6 Positive Impacts of Biogas		59
4.5.7 Negative Impacts of Biogas		60
4.5.8 Operation of Biogas Plant		61
CHAPTER 5: SUMARRY, CONCLUSIONS AND RECOMMENDA	TIONS	S 62-66
5.1 Summary		62
5.2 Conclusions		63
5.3 Recommendations		64

References

LIST OF TABLES

LIST OF TABLES	
Table No. Title Page N	0.
2.1 Substitution Effect of Biogas Produced from Various Plant Sizes	
3.1 Samples and Population Distribution of Households	
4.1 Composition of Sample Population by Ethnicity and Sex	
4.2 Sample Population Distributions of Household Heads by Ethnicity and Sex	
4.3 Occupations of Sampled Household Heads by Ethnicity	
4.4 Distributions of Households by Family Size	
4.5 Educational Status of Sample Population by Ethnicity	
4.6 Total Income Distributions Among Households by Ethnicity	
4.7 Frequency Distribution of House Type by Ethnicity	
4.8 Status of Separate Animal Shed in the Sampled Households	
4.9 Ownership of Agriculture Tools by Sampled Households	
4.10 Ownership of Vehicles by Sampled Households	
4.11 Ownership of Telecommunication Instruments by Sampled Households	
4.12 Distributions of Cattle Among the Sampled Households	
4.13 Classifications of Cattle	
4.14 Landholding Status of Sample Population by Ethnicity	
4.15 Reasons for Installation of Biogas Plant	
4.16 Motivating Factors for the Biogas Plant Installation	
4.17 Different Sizes of Plant	
4.18 Use Pattern of Biogas	
4.19 Consumption of Firewood Before and After Installation of Biogas Plant	
4.20 Impact of Biogas on Firewood Consumption	
4.21 Ethnicity-Wise Saving of Firewood After Installation of Biogas Plant	
4.22 Saving of Firewood After Installation of Biogas Plant According to Lan	nd
Holding	
4.23 Saving of Firewood According to Household Size	
4.24 Saving of Firewood After Installation of Biogas According to Number of	
Cattle	
4.25 Annual Saving of Lp Gas After Biogas Installation	
4.26 Required Time for Cooking Before And After Installation of Biogas Per	

Day

- 4.27 Required Time For Cleaning of Vessels Before And After Installation of BiogasPer Day per Family
- 4.28 Calculation of Payback Period
- 4.29 Perception of Biogas Household on Biogas

LIST OF TABLES

Table	No. Title Pag	ge No.
4.1	Sample Population Distributions of Household Heads by Ethnicity And	l Sex
4.2	Occupations of Sampled Household Heads by Ethnicity	
4.3	Distributions of Households by Family Size	
4.4	Educational Status of Sample Population by Ethnicity	
4.5	Total Income Distributions Among Households by Ethnicity	
4.6	Frequency Distribution of House Type by Ethnicity	
4.7	Status of Separate Animal Shed in the Sampled Households	
4.8	Ownership of Agriculture Tools by Sampled Households	
4.9	Ownership of Vehicles by Sampled Households	
4.10	Ownership of Telecommunication Instruments by Sampled Households	3
4.11	Distributions of Cattle Among the Sampled Households	
4.12	Classifications of Cattle	
4.13	Landholding Status of Sample Population by Ethnicity	
4.14	Reasons for Installation of Biogas Plant	
4.15	Motivating Factors for the Biogas Plant Installation	
4.16	Different Sizes of Plant	
4.17	Use Pattern of Biogas	
4.18	Consumption of Firewood Before and After Installation of Biogas Pla	nt
4.19	Required Time For Cleaning of Vessels Before And After Installation of	of
	Biogas Per Day Per Family	

ABBREVIATIONS AND ACRONYMS

AD Anno Domini

ADB/N Agriculture Development Bank of Nepal

AEPC Alternative Energy Promotion Centre

ARI Acute Respiratory Infection

Avg. Average

BDC Biogas Development Committee

BGC Biogas Companies

BSP Biogas Support Programme

CBOs Community Based Organization

CBS Central Bureau of Statistics

CDM Clean Development Mechanism

CDMA Code Division Multiple Access

CER Certified Emission Reduction

CES Centre for Energy Studies

CF Community Forest

CFC Chloro Floro Carbon

CFUG Community Forest User Group

CMS Consolidated Management Services Nepal

CO₂ Carbon di Oxide

cu. m. Cubic Meter

DCS Development and Consulting Services

DDC District Development Committee

Dev.Part. Development Partners Consultancy

EDR Eastern Development Region

e.g. Example Given

etc. Etcetera

ERPA Emission Reduction Purchase Agreement

ESAP Energy Sector Assistance Program

Exp. Expenditure/Expenses

FY Fiscal Year

g-C Gram Carbon

GDP Gross Domestic Product

GGC Gobar Gas Company

GHG Greenhouse Gas

GoN Government of Nepal

Ha Hectare

HDI Human Development Index

HMG His Majesty Government

IEIA Integrated Environment Impact Assessment

IoE Institute of Engineering

INGO International Non Governmental Organization

LDCs Least Developed Countries

LPG Liquefied Petroleum Gas

Ltd. Limited

MDG Millennium Development Goal

MoF Ministry of Finance

MoST Minstry of Science and Technology

m³ Cubic Metre

NGO Non-Government Organization

NHRC Nepal Health Research Council

NLSS Nepal Living Standard Survey

No. Number

NPC National Planning Commission

PAF Poverty Alleviation Fund

PRSP Poverty Reduction Strategy Paper

REDP Rural Energy Development Programme

REPPON Renewable Energy Perspective Plan of Nepal

RUDESA Rural Development Study Associates

RWEP Rural World Energy Programme

SOCIO-ECONOMIC IMPACTS OF BIOGAS IN CHARPANE VDC OF JHAPA DISTRICT, NEPAL: A CASE STUDY SUMIT POUDYAL 2017