MSc Theses Abstract

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TABLE OF CONTENTS

Graduation Year 2012

Graduation Year 2013

MSc Theses Abstract

Graduation Year 2012

Thesis Title: **INNOVATION IN PASSPORT ISSUE PROCESS OF NEPAL USING E-GOVERNMENT TECHNOLOGIES AND FORMULATION OF COST DIFFERENCE MODELS FOR THE CASE OF BAGLUNG DISTRICT**

Submitted by: **Krishna Kandel**

Supervisor: **Prof. Dr. Sudarshan Raj Tiwari**

ABSTRACT

Nepal is a mountainous, underdeveloped and remittance dependent country and a million of people go abroad for study and employment a year. For this purpose, getting MRP has become a resource consuming and exhausting step.

Many countries in the world have transformed their public service delivery from inline to online to reduce paper work, time, travel, corruption and poverty and to enhance transparency and efficiency in the service delivery. For the similar objective, GON has also decided to implement e-government systems. For this purpose, an IT department under MOEST has recently been

established, GIDC has been established and necessary acts, laws and policies have been formulated.

In this context, the main objective of this thesis is to explore and new model to deliver MRP which is less resource consuming and quick. After reviewing literature and experiences, an innovative process has been proposed to be implemented using the existing and potential e-government technologies in Nepal. Moreover, a holistic cost difference analysis has been done for the case of Baglung district to justify the efficiency of the proposed process.

In conclusion, if the proposed model is implemented, cost can be reduced from at least 17% to at most 95% and time can be reduced up to 91% in private domain of Baglung District of Nepal. In some cases, there will be no reduction in time. Moreover, transportation risk and other problems bearing factors can either be eliminated or reduced substantially.

Thesis Title: **PERFORMANCE ANALYSIS OF FIXED CHIMNEY BRICK KILN IN TERMS OF GENERATION OF TOTAL SUSPENDED PARTICULARS**

Submitted by: **Nitin Lakhe**

Supervisor: **Prof. Dr. Sudarshan Raj Tiwari**

ABSTRACT

Brick manufacturing factories are highly polluting in nature. Even from the test performed in different Fixed Chimney Brick Kilns (FCBK), it shows that the kilns eject higher Total Suspended Particulate (TSP) than ambient air standards set by National Ambient Air Quality Standards (NAAQS) for Nepal.

The main objective of this thesis is to do performance evaluation and to formulate mathematical model for fixed chimney brick kiln of Kathmandu Valley on the basis of Total suspended particulate.

For the study, different literature reviews are performed for the identification of factors affecting the generation of TSP. Then the field visits are done for collection of observed data, interviewed data and the measured data on the basis of identified factors for the generation of TSP. The TSP level of stations is measured

using Digital Dustmate LD-3 instrument. Every individual data are recorded after 5 minute and are converted into mass per volume by using K factor of instrument which is 2.04. After the measurement of TSP, the data are analyzed using descriptive statistical analysis and regression analysis for derivation of mathematical models for stations of sampled FCBKs. Using mathematical models the solution to the stated problem (effects on vegetation, Human Health, Physical property and visibility due to generate TSP in different stations of FCBKs) are analyzed.

The performance analysis is done for all the sampled FCBKs and the best performed sampled FCBK is selected. The performance analysis is done on the basis of TSP level as output and TSP generating factors as input factor. Lastly using CCR model, CCR efficient frontier is generated to check the efficiency of stations of different sampled FCBKs.

Thesis Title: **ELECTRICITY DEMAND SIDE MANAGEMENT OF RESIDENTIAL SECTOR IN KATHMANDU VALLEY**

Submitted by: **Sujan Adhikari**

Supervisor: **Prof. Amrit Man Nakarmi**

ABSTRACT

This study is an attempt to focus on current as well as future electricity consumption scenario and effective DSM options in urban Kathmandu households under different separate income growth scenario for each economic stratum. The study of current electricity consumption scenario is needed to study the future implications of the energy management steps we took in our households. Back casting method was employed to develop scenarios about the future of the society. The distinguishing attribute of back casting method is to evaluate how the future desired events can be attained and not what will be the possible future picture. It starts from the desirable future end point to the present to determine the feasibility of the features we are trying to adopt to get there and policy measures required.

From the survey, it was found that electricity consumption is most related to income and size of the households. The average electricity consumption was 47.90 KWh, 74.69KWh, 103.24KWh 132.00KWh and 250.00KWh for Poorest, Second,

Third, Fourth and Richest categories of households respectively in 2012. To achieve the research objective these figures were projected under different income growth rate scenarios for each income class of urban households of Kathmandu. The scenarios has been created as per the changes in household income growth rate, first as BAU scenario to represent the current household income growth rate of 5.4% ,second as MG scenario to represent national GDP growth rate of 5.5% and HG scenario to represent national GDP growth rate of 7%. The future growth rate of electricity was 9.5%, 10.7% and 11.6% for BAU, MG and HG scenario respectively.

According to the last objective of the research, the baseline forecast of electricity under MG scenario was compared with the DSM implementation scenario under same income growth. Three technological DSM options, DSM1 which is replacement of all existing fluorescent lights of except poorest households by efficient LED lights and replacement of existing incandescent bulbs of poorest households by CFL lights and DSM2 which is penetration of solar water heater to replace existing electrical water heater and DSM3 which is similar to DSM1 except all LED light will be solar powered, were identified and corresponding energy savings and financial benefits were presented.

Thesis Title: **A MODEL OF SOLID WASTE MANAGEMENT IN URBANIZATION VDC OF BHAKTAPUR DISTRICT: A CASE OF KATUNJE V.D.C.**

Submitted by: **Rajan Dhungel**

Supervisor: **Dr. Rajendra Shrestha**

ABSTRACT

Problem of solid waste is increasing in rural as well as urban areas but the study has basically been focused in municipalities and urban areas only. The research "Model of Solid Waste Management in Urbanizing V.D.C. of Bhaktapur District: A case of Katunje V.D.C." is conducted so as to access the status of solid waste in an urbanizing V.D.C. and propose suitable model for proper management of the wastes generated.

A total of 150 households (Around 5% of total household) were surveyed by using semi structured questionnaire and the quantity of waste generated for 8 days were collected, separated and weighted so as to obtain the waste generation rate at household level. The container size capacity for collection purposes is designed based on the practices and available standards for stationary container system since the generation rate is relatively low for the community. Among the total volume of waste generated, the share of organic waste was found highest

(81.16%) followed other wastes (11.22%), paper (2.5%), plastic (2.41%), Glass (1.08%) and metals (0.96%).

The highest generation of organic wastes can be managed by use of composting and gradually developing the organic village. The other inorganic wastes with recovery value can be managed by the concept of waste bank which is a sustainable way where the purchasing of waste and its resale takes place. The remaining volume of waste is needed to be disposed to landfill site at the rate of 0.405kg/capita per day for the year 2020 whereas by the year 2030 is found to be 0.505kg/ capita per day. The effective size of container was calculated as 8cum capacity for the collection of wastes from different stationary container location with the optimum travel distance of 13.8 kilometers. Although solid waste management is a social project; from net present value (NPV), it is found that the project is financially feasible and can sustain without any funds from other donor besides V.D.C. In this model matching fund invested initially by V.D.C can be paid back from waste management project within four years of the project starting date. By raising the monthly service charge on household basis, membership charge and revenue from scrap materials, the projects similar to this study can be feasible from sustainability point of view too. Moreover, the government policy and local governance act could enhance on the successful implementation of the project.

Thesis Title: **SCENARIO ANALYSIS OF BULK ELECTRICITY PRICING BASED ON LONG RUN MARGINAL COST: A CASE OF NEPAL**

Submitted by: **Krishna Prasad Nepal**

Supervisor: **Dr. Arbind Kumar Mishra, Prof Amrit Man Nakarmi**

ABSTRACT

Formulation and implementation of electricity pricing structure and strategies is complex process because it has enormous macroeconomic impacts and is extremely volatile. A study of electricity pricing based on long run marginal cost (LRMC) satisfies economic efficiency in setting tariffs, because, the calculation is based on future economic resource costs rather than historical costs.

Nepal has a huge potential of hydropower and currently Nepalese power system is dominant by ROR type hydro plants. The power generation from ROR type hydropower plants varies season to season due to variation of discharge in the river so power generation scenarios have been developed as wet season and dry season through the simulation. In this study it is found that, on average ROR plant of Nepal generate 52% of designed capacity

at dry season and 64% of designed capacity at wet season. The result of simulation shows that Range of time overrun for 95 % interval is 32% to 95% of estimated schedule and average time overrun is found to be 63%. However if we exclude time overrun of Middle Marsyangdi HPP average time overrun of Hydro project is found to be 52%. Time overrun scenarios have been developed as estimated time, 35% time overrun, 65 % time overrun and 90% time overrun based on the past experiences. Electricity pricing at substation level (Bulk Tariffs Structure) is calculated by considering all these scenarios.

In this study, the LRMC as the cost per unit of capacity required to meet the anticipated demand within the forecast period has been calculated based on the generation and transmission line planning from 2012 to 2020 along with the consideration of demand forecast at different economic growth scenarios. While calculating the LRMC different generation mix has been considered such as Hydropower from NEA, IPP, imported power and Diesel power plant.

The delay of new entrant not only affects the pricing but also increases the power deficit in the system which demands new costlier alternative power generation and makes the increase of generation cost significantly. In average, considering

hydropower only the LRMC of electricity ranges NRs. 5.5/KWh to NRs 9.70/KWh in case of estimated time whereas in case of 35%, 65%, and 90% time overrun price ranges from NRs. 4.00/KWh to 10.00/ KWh, NRs 6.00/KWh to NRs. 10.50/KWh and NRs 6.6/KWh to 14.00/KWh respectively.

At estimated time scenarios considering generation mix consisting imported power from India and diesel power plant as an alternative source to address the growing demand makes the peak hour price high approximately ranging from NRs. 14/KWh to NRs. 17 /KWh due to high generation cost of diesel power plant. In case of 35% time overrun price of electricity at peak hour approximately ranges from NRs 14/KWh to NRs 24 /KWh from year 2012 to 2018 if generation mix consist of imported power and diesel power plant as an alternative power sources to meet the growing demand. However for year 2019 and 2020 price will ranges from NRs 4.5/KWh to NRs 7.00/KWh. In case of 65% time overrun the pricing at peak hour will approximately ranges from NRs 19 /KWh to NRs 29 /KWh from year 2012 to 2020 whereas for 90% time overrun maximum price can reaches to 32/KWh.

Pricing structure and power balance status at different scenarios will be important insights for the power system planning and

management. It has been found that there is significant impact of the time overrun of the planned project on the pricing structure and power balance of the system. Time Overrun not only shifts away the completion of the project but also increases the power deficit in the system causing new entrant of thermal plant resulting the higher generation cost.

Thesis Title: **ENERGY RESOURCE FROM ANAEROBIC CO-DIGESTION OF TOBACCO WASTE, GARDEN WASTE AND CANTEEN WASTE**

Submitted by: **Anil Maharjan**

Supervisor: **Dr. Rajendra Shrestha**

ABSTRACT

The world today is seized with the problems of energy supply, shortage of cheap and efficient fuel resources, shortage of many other usable commodities and growing environmental pollution. The present energy crisis has adversely affected the socioeconomic development in the third world. The demand for energy is increasing day by day, and as a result of the hike in the prices of petroleum and other energies sources.

In context to Surya Nepal private Limited, large quantity of the tobacco waste has been dumped in the nearby factory premises creating space for the potential environmental and health impact due to different natural phenomenon. This is because the tobacco waste does not have any immediate use besides using them in the cultivation as the fertilizer. Since those substance being biomass and has potential of generating energy in the environmental friendly way, this research has been conducted. And to recover

the energy from such waste biogas technology was chosen as it is the proven technology for the solid waste management as well. The main focus of this study is to explore the potential to replace the existing LPG system in the cooking activities in the canteen of SNPL by using the biogas system.

Biogas production from composition in mesophilic temperature range and under the normal ambient temperature were measured and compared. The anaerobic co- digestion process was conducted with mini digester of 20lt capacity. As the feed material three different organic substances; tobacco waste, garden waste and canteen waste were fed in the mini digester under different proportion. From the experiment it was observed that the highest biogas yield under normal ambient temperature condition was 5,440 ml/kgTS that contain 51.48% methane from the sample SN4, the comingled mixture of tobacco waste, garden waste and the canteen waste taken in the proportion of 4:1:1.

Similarly, under the mesophilic system the highest biogas yield was recorded to be 7840 ml/kgTS that contain 50.9% of methane from the sample SM4 which is the comingled mixture of tobacco waste garden waste and canteen waste taken in the proportion of 4:1:1. To this regard, it can be conclude that the highest volume

of gas is released from the co-digestion of the all selected materials.

The average generation per day per kg TS for the highest yield system are 680 ml and 80ml operating under NAT and MT from the sample SN4 and SN4 respectively and the corresponding specific gas generation per day are 2.462 It kg^{-1}TS and 3.548 It kg^{-1}TS respectively. But from the calculation it shows that the specific gas generation of the sample SN3 is highest operating in NAT and is 2.826 It kg^{-1}TS while under MT system the highest specific gas generation is 4.251 It kg^{-1}TS from the sample SMI. Thus, from the analysis of the data recorded during the experiment shows that the biogas yield from the sample SMI is better compare to other samples taken.

On the basis of calculation taking highest specific gas generation values it was found that, for the complete replacement of the LPG system, the required daily tobacco waste and other organic wastes are significant high. But the company is generating approximately two tones of waste which is capable to cover about 10.11% of energy demand.

And to harness the possible 10.11% energy the company needs to install minimum of 20 m capacity the biogas plant whose cost

would be approximately NRs. 334,180.00. The NPV calculation shows the project is feasible to implement and has huge monetary benefits. In addition, regarding the environment conservation it has significant benefits. Moreover, it would polish the reputation of the company having the EMS 14001 certification.

Thesis Title: **STATICAL ANALYSIS OF ROAD TRAFFIC ACCIDENT IN KATHMANDU VALLEY**

Submitted by: **Prasanta Malla**

Supervisor: **Prof. Dr. Bhakta bahadur Ale**

ABSTRACT

Nepal is a country with a largest number of traffic road accidents and fatality rate, and the share of the Kathmandu Valley is quite big. Pedestrians and the disabled, children and the aged in particular, are the major victims of these accidents.

This study attempts to identify the major factors that cause the road traffic accident in Kathmandu Valley. For the purpose of study secondary data of accidents detail were collected from Metropolitan Traffic Division, Kathmandu Nepal. The data are also available on website www.traffic.nepalpolice.gov.np. Details of accidents like driver details, vehicle details, time of accidents, location details, and reason of accidents, injury details and crash details were analyzed statistically. The unit of analysis was number of accident per day. The sample includes data of 36 days, between time periods Shrawan, 2068 to Poush, 2068. The numbers of traffic road accidents analyzed were 567.

Findings of the study have shown that incase of driver, males were highly responsible for causing an accident than female and the age group of 18-25 were mostly involve in accident in Kathmandu Valley. During the time of 6 pm to 9 pm maximum numbers of accidents occur. Among the type of vehicles, motorcycles were causing more accident. Drivers fault were the major cause of road traffic accident. And maximum number of accident occurs due to collision between 2 wheelers and 4 wheelers. Among 2 wheelers and 4 wheelers collision, head-tail collision is the major cause of accident. On the basis of frequency of accidents, Koteshwor, Gausala, Satdobato, Jawalakhel, Darbarmarg, Kalimati, and Nayabuspark were found to be top 3 accident prone locations in Kathmandu Valley. The major injury caused by road traffic accident in Kathmandu valley was found to be light injury followed by heavy injury and death.

The results of hypothesis have shown that occurrence of road traffic accident in Kathmandu Valley is dependent on age of driver, sex of driver, time of day and type of vehicles. The number of fatality due to RTA in Kathmandu Valley is found to have linear correlation with the number of population and number of registered vehicle in Kathmandu Valley.

Graduation Year 2013

Thesis Title: **PERFORMANCE EVALUATION OF COMMERCIAL BANKS IN NEPAL**

Submitted by: **Ashish Bhandari**

Supervisor: **Prof. Amrit Man Nakarmi**

ABSTRACT

A sound financial system is indispensable for a healthy and vibrant economy. The banking sector constitutes a predominant component of the financial services industry. The performance of any economy to a large extent is dependent on the performance of the banking sector. The objective of this research was to explore and evaluate the financial performance of commercial banks in Nepal through Multi Criteria Decision Analysis approach based on their financial characteristics and identify the determinants of performance exposed by the financial ratios. The financial parameters were derived by segregating 5 major criteria which were Liquidity, Efficiency, Profitability, Capital Adequacy and Assets Quality. These criteria were further classified into 21 hierarchical sub-criteria. The performance evaluation was done for 13 commercial banks for financial data from year 2008/09 to 2011/12. The performance evaluation was

done using Multi Criteria Decision Analysis tool called Analytical Hierarchy Process (AHP).

The main focus of this research was to prioritize the financial parameters based on the methodology adopted. 13 Experts from Banking Financial Sector were distributed Questionnaire based on AHP. The evaluation modeled was based on rigorous literature analysis and Delphi Method. It was seen that Liquidity was the most important criteria in determining the soundness of Banks (31.1%), Capital Adequacy, Asset Quality, Efficiency and Profitability were (21.6%, 18.5%, 14.9% and 13.9%) respectively. The ranking of commercial banks was done after prioritization of the financial criteria's. It was evident that Standard Chartered Bank was the most efficient and profitable banks with Normalized Efficiency and Profitability score of 100%. Two Public sector banks Nepal Bank Limited and Rastriya Banijya Bank were ranked in the bottom two in the ranking list (Overall Normalized Performance Score of 64.9% and 56.3% respectively). This was particularly due to Negative Capital Adequacy Ratios which is 21.1% (Second) prioritized financial component as per the analysis. The average Total Capital Adequacy Fund for these banks was -14.87%. which is below the 10% minimum Capital Adequacy Requirement (CAR) prescribed by Nepal Rastra Bank (NRB).

Furthermore KIST bank's Average Non Performing Loan to Total Loan ratio of (1.723%) is an alarming condition. NABIL Banks has maintained their Cash Reserve Ratios above 5% specified for Commercial Banks which was 3.02% and 4.9% in 2009/10 and 2010/11. According to the developed model banks are required to maintain their Total Capital Fund (Rastriya Banijya Bank and Nepal Bank Limited particularly) and banks like Agriculture Development Bank has to maintain liquidity by managing Total Credit to Total Deposit ratios below 1 which for ADBL is 1.07. The average Return on Equity for all the commercial banks is 14% which again for Public Sector banks is on a downside.

A statistical method Man Whitney test was performed to test the hypotheses developed for selected financial criteria's showing that the performance of Public Banks (Nepal Bank Limited, Rastriya Banijya Bank and Agriculture Development Bank) is significantly different from other Private Commercial Banks. Further a sensitivity analysis shows that the performance of Public Sector Banks can be significantly improved by strengthening their Capital Adequacy Position.

The research has developed and proposed Multi Criteria Method which emphasizes Financial decision problems to have strong multicriteria character. The results of this study show that Multi

Criteria Decision based approach such as Analytical Hierarchy can be used as a supplementary decision support tool to the CAMELS rating system in bank examination process. The Multi Criteria Decision Analysis based systems approach explicitly explore the financial characteristics of the banking system and compare the banks with respect to these characteristics, thus, determining differences in the financial structures of the banks.