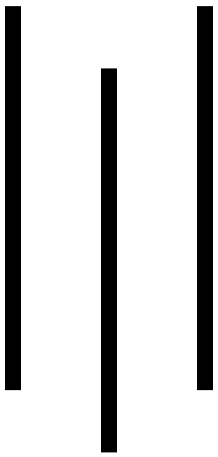
A STUDY ON COST VOLUME PROFIT ANALYSIS
(WITH REFERENCE TO SUJITA PAINT INDUSTRY PVT. LTD.)



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ABBREVIATIONS

ADB/N:	Agricultural Development Bank/Nepal.
AEPC:	Alternate Energy Promotion Center.
BEL:	Bionic Energy Limited.
CRE:	Center for Renewable Energy.
ESAP:	Energy Sector Assistance Program
HLF:	Himalayan Light Foundation.
IREF:	Interim Rural Energy Fund.
LE:	Lotus Energy Pvt. Ltd.
LSN:	Laser Sun.
RBB:	Rastriya Banijya Bank.
SEMAN:	Solar Energy Manufacturers Association of Nepal.
SHS:	Solar Home System.
WLG:	Wisdom Light Group.
MOST:	Ministry of Science and Technology

CHAPTER I

INTRODUCTION

BACKGROUND OF THE STUDY:-

Before starting what a Solar business really is, it would be better to start up with the present scenario of Nepalese living in the remote and the far remote places and especially those people who are devoid of the power supply from the national grid. In fact, the people living in the urban areas and especially in the big cities like Kathmandu, Biratnagar, Pokhara etc. cannot even imagine the real situation of those people. They are really having hard times with their lives though they seem to like it in an absolute normal way, just as we are living here in the cities.

According to the data provided by Nepal Electricity Authority (NEA), only 17 percent[1] of Nepalese have been able to enjoy the power from the grid, and the rest 83 percent are devoid of the facility. Though we Nepalese keep boasting that Nepal is quite rich in terms of hydro electricity sources, but those talks are based on no firm base. In fact there exists the words like 'technical feasibility' and the 'economic feasibility'. Yes! Nepal is rich in hydro electricity (potential), but the economic situation has suppressed it to that extent that it cannot even imagine of supplying its entire citizen with electricity. Nepal is not capable of converting its resources to facilities that is usable to the end users.

In the above context, it is quite obvious that major portion of the population must be using kerosene lantern and kerosene tukis for lighting, woods for cooking and which means they are not been able to make god use of the kerosene or the woods and moreover they are also polluting the environment and are destroying the forests. All of the above will in course of time result in the natural disasters.

Looking into the above realities, some of the Non Government Offices (NGOs) and International NGOs (INGOs) got slowly interested in this sector and started running programs which would in one way or other try to protect and converse the environment. Out of their many programs 'Solar Program' became quite popular. This is because the People living with the tukis and the lantern felt very comfortable with the electrical bulbs and

[1] Minendra Rijal. "*Solar Power in Nepal*". A discussion paper. 6th August. 2002. Kathmandu.

lights. So they also started showing interest on their own in this sector. It was not all possible for the NGOs/INGOs to provide everyone with the free solar home System (SHS).

SHS is a set of electrical component of one solar PV module, one battery, one charge, few (at least three or four) small tube lights, and the power enough to run a 14" black and white television, and which is very useful for the domestic household lighting of the village people"[2]

Seeing the awareness on the village people, some of the claver citizens thought of capitalizing this opportunity and started assessing the affordable of the consumers to the SHSs and also worked out some of the details of the cost estimate of importing and selling them in the country. In fact, this was mostly done by the people of entrepreneurial mind and which, really "clicked". They started making the work teams, started contacting the NGOs/INGOs, made the market surveys and really felt that the orders were flowing everywhere. All they had to do was import the components from outside, assemble it here and then sell it to the interested buyers. In this way the solar business got initiated and slowly started growing.

Brief Background of Nepalese Economy

Nepal is a land locked country between and India. Hills and Mountains are Nepal's main topographical characteristics and occupy about 75 percent of the total land. Ecologically, the country is divided into three major regions – the Mountains, the Hills and the Terrain plane, with altitude varying between 70 meters (m) and 8848 meters (m) above the sea level. The former two regions are sparsely populated, rural in nature with very limited development infrastructures as compared to the southern low-lying plains.

Like many other developing countries, agriculture dominates the economy contributing to about 40 percent in the overall Gross Domestic Product (GDP) of Nepal and providing employment to more than 80 percent of the economically active population. Other major economic activities include small-scale industries and tourism.[3]

P[2] *Saurya Gharelu P ranali*. Lotus Energy Private Limited
[3] HMG/N. *Economic Survey.* 1997/98. p. 23

Whenever we talk about the economy of Nepal, we always have to start with the fact that "Nepal is a Landlocked Country" and due to which we have not been able to use many facilities of the sea route and we all know that the businesses are all dependent on the sea routes and/or sea transports.

Nepal from the beginning is a sovereign and independent country. As mentioned before, it is geographically landlocked between India (on the three sides) and China (on one side). Religiously, it is a non-aligned Hindu Kingdom that lies on the lap of the highest peak of the world-renowned as "Mount Everest".

Its nearest seaport is Calcutta of India, which is 1120 km away from Kathmandu, the capital city of Nepal. Squeezed between two Asian giants: India and China, Nepal lies on the Southern Lap of Great Himalayan range where one can observe the majestic Himalayan peaks, scenic beauty and tremendous Shangri-La. In the country, the modes of transportation are either road or air. Out of 14 zones, all are linked with road transportation.

Nepal is an agricultural based country where more than 90 percent of the total working population are engaged in agricultural occupation and m ore than 42 percent of the total share of G.D.P. is automatically covered by this sector. Two third of the national production comes from agriculture although only 18 percent of the total land are is under cultivation. The major crops are rice, maize, wheat, and millet in hilly areas, livestock is carried out, while horticulture is slowly getting popular in the mountainous areas. Though more than 90 percent of the labour force and 75 percent of the total export is occupied by this sector, the trend of the share of the agriculture in G.D.P is gradually decreasing[4]. It is due to the lack of scientific means of production as farming is done in the traditional ways, which is still in primitive stage. Though the industrial sector has not flourished but the percentage of total G.D.P which indicates that the productivity of industrial sector is much more higher than the agriculture one.

Nepal is always backward on agricultural products because it is still in primitive stage. Lack of irrigation, topographical constraints, agriculture markets and other infrastructures are main responsible factors to make this sector backward. Disguised unemployment and under employment involved in the agricultural sector are crucial factors which compelled to the low

[4] HMG/N, *Economic Survey*, 1997/98.

productivity of this sector. To solve these problems it is necessary to transfer most of the labors from this subsistence sector to modern one. Now we can just figure out how the situation of the Nepalese economy is. But one this is noticeable and that is in our statistics, we hardly account the earning of the villagers in terms of the crops as we still see that 'Barter' system still exists in many of the villages and which covers a major portion of their earning. This is also one of the reasons why the per capital income shown is much less than what really is.

In other words, exploring into the market and observing the potentialities of the remote customers to buy anything, any entrepreneur would succeed if they give them the right value of money they are ready to spend. The entrepreneurs who had decided to enter in the solar business took the same concept in their mind and started the solar business about a decade ago. The data assessed concluded that a household would be ready to spend 15000 Nrs (the rest half out of 30000 Nrs (the system's price) being given as subsidy to the end users). [In this discussion we are trying to focus on the 36W SHS as the standard one and the pricing is also assumed accordingly, i.e. on average.] In short, our Nepalese citizens living in the remote places, despite the poverty proved that they were capable of buying the SHS if facilitated in one way or the other (like the subsidy from the government).

Overview of Energy Scenario

Hydropower, biomass and other renewable resources constitute as major sources of energy of Nepal. Although the country has a large hydro potential of about 83,000 Mega Watt (MW) (25 percent of it is considered technically feasible), only about 250 MW is presently utilized meeting only 1 percent of the total energy requirements.

Nepal has no proven significant deposit of fossil fuels such as oil and coal; therefore it relies heavily on traditional energy sources such as fuel wood (80 percent), agricultural residues/animal waste (11 percent). Excessive fuel wood consumption has led to forest depletion and environmental degradation. About 8 percent of the commercial energy requirements are met from the imported fossil fuels spending about 40 percent of the foreign exchange earnings. Only 1 percent of the total energy is met by electricity

supply, which is limited to about 14 percent of the total population. At present, only 4 percent of the rural population has access to electricity[5].

The above figure shows the share of different forms of energy in total supply as well as the sectoral distribution of the consumption. Nepal with the huge hydropower potential has one of the least per capital energy consumption.

Over the years, Nepal has experienced a growing demand for both modern and traditional energy owing to the increasing population and diversification of economic activities. As a result of this scenario coupled with the high cost of fuels, both domestic and imported, there has been increased interest and initiatives in the development of alternative sources of energy with focus on micro-hydro and solar. Emphasis has also been given for wide spread dissemination of biomass technology such as improved cooking stove for reducing fuel wood consumption, improving health through reducing smoke emission.

In view of the above context, renewable form of energy such as solar will play a major role in the overall energy scene as – Potential Energy of Tomorrow.

Past and Current Status – Some Experiences on Solar Photovoltaic (PV) System

Nepal has a high potential for harnessing solar energy. The average insolation (this is a unit of "incident, solar and radiation" i.e. illumination of sun ray, hence combined as the word "insolation") is around 4.5 kWh/m^2/day and the sunshine for about 300 days per year are sufficient for most small-scale application.

While solar energy has been used traditionally in various ways in Nepal, this paper will only focus on the solar PV system for rural application and reflect some experiences and main barriers relating to the dissemination of solar PV system in Nepal.

Several past reports document the status of PV-efforts in Nepal. These reports and other information (Lotus Energy) indicate a range of efforts

[5] V.B. Amatya, G.R. Shrestha. R.N. Gangol, S. Shrestha, and K. Bajracharya. *A Study on Implications of National Policies on Renewable Energy Technologies and Energy Efficient Devices in Nepal. Vol. 1 and 2. ICIMOD,* Center for Rural Technology, Kathmandu, 1997, p.35.

towards the application of solar PV systems generating energy to the tune of 1093.1kW peak. A brief status of the solar PV systems in Nepal up to the year 1998 is presented below:

Nepal Status of Solar PV System
Telecommunication – 795 kW peak
Solar Home System (SHS) - 36 kW peak
Centralized System (electricity by private sector) - 76 kW peak
Centralized System (electricity by Nepal Electricity Authority) - 130 kW peak
Water Pumping - 56 kW peak
Total Solar PV installation – 1093.1 kW peak[6]
The household levels are still dominated by three solar electrification demonstration efforts in 1980's undertaken as a joint Nepali-French co-operation in four rural towns for Centralized PV-systems. These efforts however, suffered a large variety of technical and operational problems.[7]

The subsidy policy for solar energy by ADB/N and government

Product	WP (watt peaks)	NRS
1. Solar home system (SHS)	10wp, 20wp, 30wp	8000per system
2. Solar cooker	-	will not exceed 3750 (50% of market value)
3. Solar dryer	-	50% of its cost for town 70% of its cost for rural
4. Solar water pump	500wp	75% of its cost

[6] www.solarbuzz.com
[7] DeLucia and CRT, *Institutional Strengthening of the Rural Energy Planning and Implementation. Nepal.* DeLucia and Associates Inc. Cambridge. USA and Center for Rural technology (CRT). Kathmandu. 1997. p.46.

Some Experiences on Solar PV Systems

Following cases indicated the good performance of these systems and the households who own these systems appears to be satisfied.[8]

A pilot project was initiated in Pulimarang village of Tanahu district where 67 systems were installed in December 1993 through January 1994. There were 35 w-peak systems with 3 lights of 8 w bulbs and there were 5 systems with black and white televisions. At that time the system cost about Rs.23000 and were sold to the households at Rs.12, 500 each {50 percent subsidy under support from and INGO, SELF working with the Centre for Renewable Energy (CRE) or Rs.17500 if financed over two years}. These systems were sold and installed by Solar Electricity Company in Co-operation with CRE. Survey undertaken in this area indicate the main benefit perceived by the households were related to improved health and sanitation as well as increased hours of study for child's (WLG, 1995). Users seem satisfied; there has been no problem of loan repayment. The village has particularly high incomes as many families receive army pensions, and it appears that primarily the higher income households were the vast majority of system purchasers.

In the later half of 1995, another INGO (Plan International) provided 68 systems to the few villages' outlying areas of the Kathmandu valley. These 32 w-peak systems were purchased from a local company (Wisdom Light Group) for Rs.32000 per system and provided 100 percent subsidy to the households.

During May-June 1995, another company (Lotus Energy) has installed about 40 systems (SHS) to a group of artist supplying handicrafts to Kathmandu tourist trade from Timaldanda Peripheri of Kavre-Palanchowk district. These installations have been supported with 50 percent government subsidy through the Agricultural Development Bank (ADB/N).

Solar Technology Demonstration

With regard to the experience on awareness creation and demonstration on solar PV system, a number of such efforts have been advanced mainly by the private companies in the potential rural areas, which has helped enhance the

[8] www.lotusenergy.com

demand for SHS. The latest effort of such demonstration was in Kathmandu during February 1998 organized jointly by CRT, AEPC and the Liver Foundation on the range of solar energy technologies such as solar cookers, dryers and solar PV systems for home lights and water pumping.[9]

Energy Sector Assistance Program (ESAP) for Solar PV System

ESAP/DANIDA program is expected to provide support to Nepal for the capacity building and stimulate deployment of about 27000 SHS over the next 4 years. This program component envisaged to establish a sound technical and institutional base for launching a sustainable Solar PV-Program and provide rural home lights to the rural households in the hills and the mountain areas.[10]

Government Policy and Financing Mechanism of Solar PV System

With regard to the government policy, promotion and deployment of solar technologies has been high priority in the current plan. Its policy is mainly articulated through the lending policies of the ADB/N as main financing agency and through the Alternative Energy Promotion Centre (AEPC) as coordinating agency for the promotion of alternative energy technologies including solar energy in Nepal.

The ADBN used to act as the financial intermediary (FI) for solar PV system and providing the government subsidy channel through it 1995/96 to 1998/99. The government used to provide 50 percent capital subsidy on solar PV home system (SHS) up to a maximum of Rs.15,000 via ADBN and the remaining Rs.15,000 was paid by Rs.5,000 in cash as equity participation for household use and Rs.10000 as loan at 16 percent interest rate to be paid within 3 years on monthly repayment period (earlier the loan term was for 7-10 years). Normally, the bank and the solar company makes promotional activities at the district level; company help to identify the potential household, obtain loan application and registers with the ADBN district branch, makes on-site inspection, evaluate the loan and sanction the loan after taking the collateral which will cover the entire cost of SHS (Rs.30,000). This loan procedure normally takes about a month or more.

[9] Ibid.
[10] Mandan Basnet, "*Solar Power in Nepal*", A discussion paper, 6th August, 2002, Kathmandu Nepal.

Lately, Rastriy Banijya Bank (RBB) has started the same.

But now the case is bit different than what is mentioned above. Now what happens is the subsidy is given in the flat rate and that is Nrs.8000/-, 10000/- and 12000/- depending on how remote the place is. But after the fiscal year i.e. starting from the fiscal year 2059/60 B.S. the subsidy is going to be reduced by 10 percent each year. But the financing is still done by the ADB/N. For example for the fiscal year 2058/59 ADB/N had 2000 quotas for financing SHS[11]. The loan provided to the customers is the system's price minus the subsidy price. For example the system's price is Nrs.30000 and the subsidy amount for that VDC is Nrs.10000. Now the remaining Nrs.20000/- is provided as a loan by ADB/N out of which the customers have to pay Nrs.5000/- in the first installment and the rest amount has to be paid in three years time at nominal rate of interest.

In this case also there are practical difficulties like the customer cannot pay Nrs.5000/- in one go. So this case has also been considered by ADB/N and practically they grant the loan even in the case where the villagers pay less than Nrs.5000/- in the first installment.

Some Issues

A number of issues have been identified during the implementation of the solar PV system particularly at the household level for electric lights. They are as follows:

> ADBN indicated no problem on the solar PV repayments, because of the fact that majority of the SHS users are well to do families in the village communities who can afford to make loan payments. So far, very few low-income households have SHS (ADBN). This is an issue, which need to be addressed and need to design a special subsidy scheme for poor households to have access to the SHSs.
>
> For rural PV-SHS applications end users will need to be aware of competition with other energy options for electricity supply such as in the hills competing with electricity from micro-hydro or grid. Therefore, while selecting areas for PV-SHS installation, attention should be given to select these areas where electricity supply from

[11] Agricultural Development Bank, Circular to the Branches, 2001

micro-hydro are not planned in near future or other options is not feasible.

SHS users have complained about the difficulties of loan repayment (from 7 to 3 years) to ADBN because of the recent changes in loan policy.

Data and case studies on current solar PV-activities (success as well as failure or partial success) are mostly lacking. It will be particularly important and useful to prepare such cases and also to document the implementation approach and the financing strategies used including instances of heavily or totally subsidized (INGO) efforts.

Relative to rural incomes, SHS are affordable only to higher income households where there is income generation based on outside-related activities (such as tourism, rural market centers etc). Efforts must be made to integrate solar PV systems for other income and community services related end-uses such as running refrigerator, battery charging, linkage with health services, etc.

Dissemination of low-cost solar lanterns will have significant scope as well. However, there is little experience with the above end-use options.

Monitoring and evaluation (M&E) is a critical component, which should be enforced as part of the package of Govt./development agency/NGO incentives. It should be persue periodically and supervised by AEPC.

Due to high investment cost, SHS adaptation is beyond the capacity of most households in the rural villages, even with current government subsidy, policy review be made on the provision of subsidy and incentives which should primarily be based on economic and social equity analysis.

Solar Home System

The photovoltaic modules on the solar panel capture energy from the sun and convert it into electricity. India and Nepal fall in the tropic al and sub-tropical zone, so there is no doubt about the availability of abundant sunshine in both the countries. Even in the Himalayas to the far north, sunshine is found in plenty.

In Nepal, foreign NGOs have installed solar electric systems for various community development projects, but a comprehensive record or count of these installations is not available. The countries involved in the community

development projects through renewable energy assistance are USA, UK, Australia, France, Denmark, India, Switzerland, etc. The solar electrification has encouraged the establishment of local companies to install solar systems in the village household. Currently there are 14 main solar electric companies[12] and three pioneers are: Wisdom light Group, Solar Electricity Company, and Lotus Energy. Over 17000[13] Solar Home Systems manufacture din Nepal have been installed across Nepal. The typical system consists of a 20 to 40 watt solar panel, lead acid battery, and charge controller, energy-efficient lights.

In both India and Nepal, public welfare programs have been greatly benefited by solar power. Solar panels have been used to electrify the NGO offices, libraries, local clinics, weaving and paper making factories and training centres in the remote areas. The solar systems permit the users of these facilities to continue activities after sunset without relying on expensive, polluting kerosene. For the factory workers, this means they can work more flexible hours and generate more income. Training programs can be conducted in the evenings when more people are available after their framing work. Women's livelihoods have improved because they have more time to engage in other activities like adult education, handicraft production, and community meetings. Young children now get to study under brighter and safer light. The rapidly advancing solar technology has enabled some communities to have a direct access to the internet via satellite thus enabling them to keep them abreast of the rest of the world.

Less than 10 percent of Nepal's rural population has access to electricity, and centralized distribution is not expected to reach many areas of the mountainous country for the next few decades. The Solar Sisters program operated by the Himalayan Light Foundation (HLF), an NGO based in Kathmandu, is directed toward bringing power to Nepali villages. HLF facilitates the establishment of village communities responsible for system maintenance. Systems are installed in places, which benefit communities and help local development. HLF has provided solar lighting systems to monasteries in the remote Himalayas. Since monasteries are like community centres, this is expected to greatly enhance the environment for the religious, educational, and social activities for the local villagers.

[12] www.aepcnepal.org
[13] idem

In Nepal solar power is used mainly to light the rural households, whereas in India it has found a wider application such as solar heating, cooking, solar fridges, solar radios, solar hearing acids, power generation, industrial applications, and so forth. Lot of other ideas has come forth as a result of enhancement of the technology. The far cheaper Solar Photovoltaic (SPV) water pumping system has amazed farmers from Tamil Nadu, South India, who had been using diesel pump set for a long time. There have been ongoing projects to promote solar thermal power in India. The government has set up Solar Power plants at various places. One is in Mathiana in Jodhpur district of Rajasthan. India has gone as far as commercializing the Solar Power whereas in Nepal it is not the case.

Solar power is a cost-effective solution to the lighting problem in the households of rural Nepal. It is convenient to install, and the use of efficient appliances and solar electricity's low maintenance requirements make the price of electricity comparable to that obtained from small hydro.

Before starting with the rest of the details and the facts, it is better if we describe what a Solar Home System (SHS) is.

"A Solar Home System (SHS) is nothing but an assembly of the components like solar PV module, battery, charge controller and few energy efficient lights which is enough to give sufficient illumination to the villagers surviving with the kerosene lantern and the kerosene tukis".

In fact, when we talk about the SHS, we find it in different wattages. It all depends on the capacity of the customer to pay and also his requirement.

Several wattages of the SHS are 10W, 20W, 36W, 40W, 50W, 60W, 75W and 100W mostly.

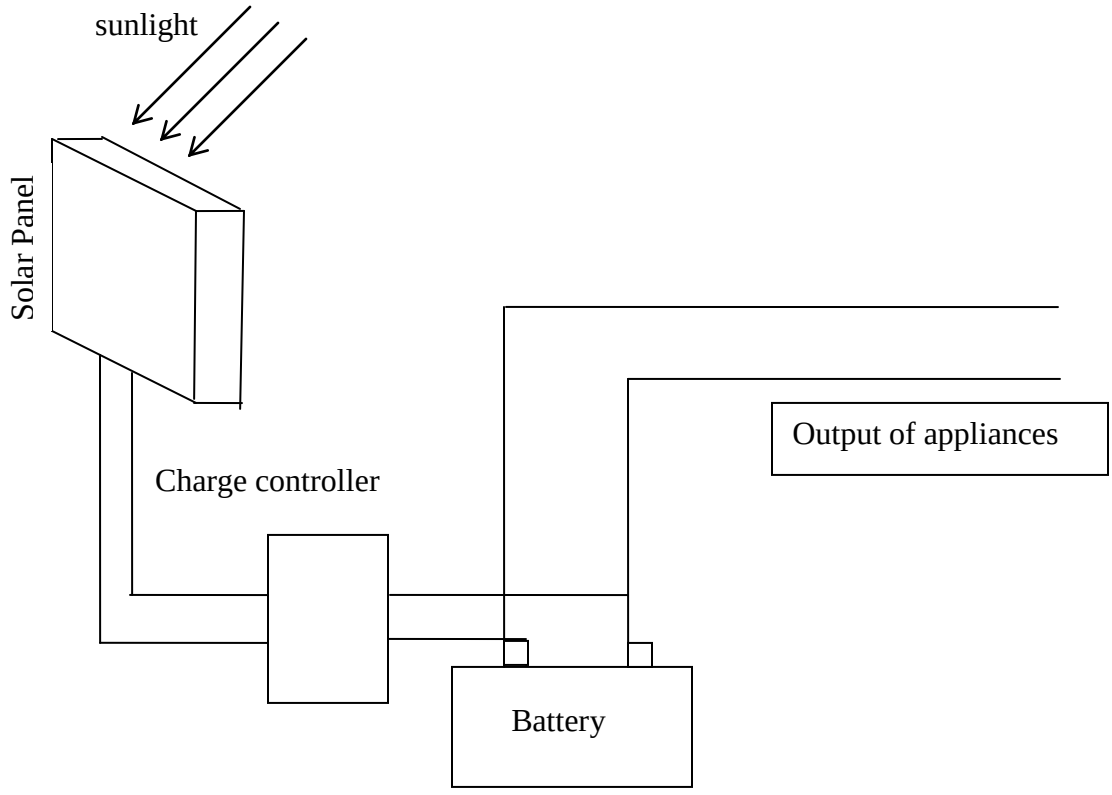
Now if we take the 36W or 40W SHS as an example (which have almost the same performance), the study will give the best out put and the best information as these occupy the major market segment according to our rural electrification data.

Now what is a 36W SHS?
A 36W SHS comprises of a 36W panel (Solar PV module), with a current rating of 2.2 ampere, and which is used to charge the battery through the charge controller during the daytime, so that the charge stored in the battery

during the daytime can be used to light the energy efficient lights during nighttime[14].

The process goes somewhat like this, when the sunlight falls on the surface of the panels (modules), the electrons get excited and start moving in the metal strips of the panels. When the flow is high (i.e. in the peak sun or more than average sun), the potential is built up, and then since the two terminals of the panel is connected to the two terminals of the battery (negative and positive) via charge controller, the electrons or the charge get stored in the battery, which is turn can be used in the night time or when there is no sun light.

Below is the basic diagram of the Solar Home System (SHS), in which it is tried to explain to the readers who are not aware about the system, an overview of the SHS. The main components of the SHS are shown in the figure[15].



[14] Lotus Energy Pvt, Ltd, *Lotus Energy EK Chinari*
[15] Lotus op.cit.

Solar suppliers and their history.

Wisdom Light Group (WLG) and the Lotus Energy Pvt. Ltd. (LE) are considered to be the pioneer on solar sector in our country. Talking about Lotus Energy, Its current directors Mr. James Ronald Goff and Mr. Adam Friedensohn started business on their own in 1992 A.D. They used to purchase the components from the foreign countries and started assembling the components into systems themselves. Very few Nepalese accompanied them on this business. They were the one who have prominent role in the introduction of subsidy scheme in Nepal. They have contributed a lot in the uplifting the solar power in the country. Then gradually came up other companies like Wisdom Light Group, Suryodaya Urja Pvt. Ltd. Kathmandu Power Company Pvt. Ltd., Laser sun Energy Pvt. Ltd., Alternative Energy Resources Nepal and so on which later got "Qualified" from AEPC and started doing business in a full fledged manner. There are several other new comers in this sector like Swogun Nepal, Rural and Alternative Energy Service Center (RAESC), Nabajyoti Urja Pvt. Ltd. Who have recently started doing business in the sector with an aim to get qualified from AEPC. Till they qualified, they are not allowed to claim subsidy on their own and so they have to work under the banner of qualified companies. Like for example Swogun Nepal is working under Lotus Energy Pvt. Ltd. Similarly RAESC is working under several companies like Bionic, Suryodaya and so on. Nabajyoti is working under Suryodaya etc.

But still those upcoming new companies are trying diehard to get qualified in order to put their signature in the history of Solar Power.

This was how the solar industries got into business by qualifying themselves and still some new companies are struggling with it. So the history of solar industries is quite a bit interesting and is on going too. May be today's history will be different from the future's history. It would be quite nice to see several companies growing in this sector, as our Nepalese citizens would be benefited ultimately.

Solar Business and the need for capital investment.

As it is already mentioned several times before, there are several companies working in solar business at present days. This does not mean that there is a very easy access to solar entrepreneurship and does not require much of

investment. In fact, this business also requires lot of investment and involves several risk factors in it.

For example to make business of SHS (Solar Home System), one has to import solar modules (panels), batteries, charge controllers, lights and several other installation materials which does not come from the same supplier are all of which have to be imported and that too from several countries. Like for example Lotus Energy purchases modules from "Siemens and Shell" (USA), batteries (Trojan, USA and Sundaya, Indonesia), charge controller (Steca, Germany) and Lights (Sundaya, Indonesia) and several other local suppliers[16]. Now the market is such that only for the ready-made systems, the customers pay cash and no such events like advance payment to bulk sales, occur. This is due to the intense competition and the existence of several competitors in the market.

This provokes the requirement of large capital because the companies have to be ready with the systems way in advance so that whenever there is the demand, they should be able to fulfill it.

Apart from the above, the need for the importing procedures and formalities such as the advance payment, deposits to the suppliers (being the sole distributor in the country), payment to the clearing agents, payment to the transport company, cash required for opening of L/C (Letter of credit), payment to the insurance company, the cash requirement for the infrastructure (like branches in several parts of the country, production set up, administrative set up, manpower fulfillment, commissions to be respective agents, emoluments and the salaries to the staffs) and so on are they typical faculties which necessitates and the capital requirement.

Production aspects.

Actually there is not much to discuss on the production aspects of the solar industries. They operate on a very simple manner. What they do is each solar company has taken the exclusive agency (sole distributorship) of one or another solar components' manufacturers (abroad) and they work under the license of those manufacturers.

[16] ibid

Lets take for example Lotus Energy Private Limited (here after abbreviated as LE) note: LE is one of the leading and pioneer company working on the manufacturing and distribution of solar power all over the country. And here in this dissertation, we have taken LE as the example for the case study and comparisons though we also see the marketing and production aspects of other companies like Laser sun, Bionic, SEC, Suryodaya and so many of them.

Before discussing the production aspects of the SHS (Solar Home System), it would be better to see in details each component of the SHS. As mentioned earlier, each SHS comprises of one PV module, one charge controller, one battery and few (four or five) tube lights of 10W each.

In most of the cases each solar supplier purchases panels (modules) from one manufacturer abroad, similarly they buy batteries from the other manufacturer and similarly the tube lights and the charge controllers from some other manufacturers. But each company has each manufacturer abroad for each component of which they are agents.

The components are almost finished products. All they (suppliers) do is design those components as per the requirement of the consumers into different sized SHS. This is because sometimes the customer may be demanding for larger systems (or the higher power demand). In such cases, one module or one battery will not be enough to meet their power demand and so two or more modules or two or more batteries might have to be used in order to meet their demand. So we can say that the major job in the production line is designing the available components as per the requirement.

The other aspects of production unit are quality control of those components. For example quality control of solar panels (module) is done, by checking the current it generates in the peak sun hours. Similarly the quality check of the battery is done, by measuring the potential difference across the terminal of the battery. And similarly there are other methods of quality check for the other components.

STATEMENT OF THE PROBLEM

In course of making business, there are many problems that come across and which are really very difficult to solve from the central office. This has

hindered the business a lot and hence the marketing department is also facing a lot of problem in selling and making the business all over the country. Some of the problems have been stated as under which is being studied in this dissertation and the necessary recommendations have been suggested in the later part of the study. For every solar entrepreneur, it has become a problem to carry on with the business or even survive at so-called "breakeven", and this is a real misery for them. There used to be a time when this business was flourishing like anything. The situation of the country and the problem of unhealthy competition and the problem of the marketing mix have seriously infected it. Villagers have started being more aware and have started making more queries. So solar suppliers have not been able to sell the systems based on false promises.

The market of solar power has not been explored properly and which has caused a lot of inconvenience in selling the SHS all over the country.

Solar Companies have been facing lot of problems with the marketing mix. Before dealing with the problems with the marketing mix, it is better, if we become clear with what a marketing mix is.

Marketing mix is the set of marketing tools that the firm uses to pursue its marketing objectives in the target market.[17]
Mc Carthy classified these tools into four broad groups that he called the four Ps of marketing: product, price, place, and promotion. The particular marketing variables under each P are shown in figure 1.5. Marketing-mix decisions must be made for influencing the trade channels as well as the final consumers.

It is to be noted that the four Ps represent the sellers' view of the marketing tools available for influencing buyers. From a buyers point of view, each marketing tool is designed to deliver a customer benefit. Robert Lauterborn suggested that the sellers' four Ps correspond to the customer' four Cs.

Four Ps	**Four Cs**
Product	Customer solution.
Price	Customer cost.
Place	Convenience.
Promotion	Communication.

[17] Philip Kotler, *Marketing Management, The Mellennium Addition,* Prentice Hall of India, 2000, P15.

Winning companies will be those who can meet customer needs economically and conveniently and with effective communication.

There are so much prospects of Solar power but still it remains uninvestigated which is due to the lack of the researches d one till now and also the lack of the field work experience.

The solar companies have designed a market survey form, which is used to find out the demand of the solar home systems in the villages. This survey form along with the its findings will be shown in the later part of this paper, where a sample size has been studied and certain conclusions are drawn out of the research carried out. This survey is very necessary to know what exactly is the situation of any particular area on the scope of the solar before penetrating in that area.

The nature and kind of this business is so messy that it is very difficult to manage it completely and moreover since this business is entirely left on the field works, the practical difficulties that comes on the way remain unanswered at times and this happens very frequently.

OBJECTIVES OF THE STUDY.

Among several objectives the major one being, studying the difficulties faced by the solar power suppliers in Nepal along with the recommendations is main.

But still there would be a more objectives as followed by details below:-

To explore the solar power market in Nepal.

Problems regarding the marketing mix of solar companies and to examine it.

To know the several other reasons along with the recommendations that could improve solar marketing.

To elaborate the major problems due to mismanagement and lack of coordination and solar energy industry prospects in Nepal.

All the above-mentioned objectives will be elaborated the "conclusions and recommendations" in the later part of the study.

LIMITATIONS OF THE STUDY.

There could be several limitations to this study. For example, the present scenario of this country due to the "state of emergency" announced few

months back could impose limitations to the data availability, field survey etc.
In addition to that, the papers and the documents availability in the organizations are not sufficient enough to search the history of this business. This is because the subsidy used to be granted by ADB/N, REDP and some organizations as well in the past, where as AEPC has just started to grant the subsidy. Due to this reason, the data are scattered in different organizations and also they have not properly filed the details once their job was over. So for the research study like this one, data availability could be a problem.

Also some of others can be noted as follows:-

18.1 Study is limited to solar power, although there are alternatives of power.

18.2 Study is based on a limited districts of Nepal, mostly urban.

18.3 Findings are presented on the basis of the respondents only.

18.4 Data analysis is based on simple statistical techniques like percentage, graphs and tables

18.5 The papers and the documents are not sufficient according to its availability. So its not enough to search the history of this business.

Thus, for the research study like this one data availability could be a major problem.

CHAPTER II

REVIEW OF LITERATURE

18.6 EMERGENCE AND EXPANSION OF SOLAR BUSINESS IN NEPAL-CASE STUDY (LOTUS ENERGY PRIVATE LIMITED).

Lotus Energy Private Limited (the case study) (Company overview)

Lotus Energy is one of the pioneers of solar power in Nepal. Its role in introducing the concept of solar in the rural areas is quite appreciable. The company is based in Kathmandu and mainly manufactures solar photovoltaic systems to support solar and alternate energy.

Complete turnkey solar electrification project even in the remote rugged areas of the Himalayas is one of the major characteristics/specialties of Lotus Energy Private Limited. The company also provides wide range of services from preliminary site assessment and system design up to manufacture, installation, maintenance, and warranty service.

The ability of this company to handle complete project implementation in the most difficult and demanding situations of the Himalayan region in conjunction with the government of Nepal, NGO's and private sector organizations, have been proven several times.

Major Projects include:

"*Lotus Energy* Village Electrification and Lighting Utility Project" (LEVEL-UP) partially sponsored by the US Oceans and Environmental Sciences Organization (OES): This project is supplying village homes throughout Nepal with solar electric lighting systems which can also power a small TV and radio.

"Solar Technician Training Program" for field technicians funded by United Nations Educational and Scientific Cultural Organization (UNESCO).

"Terai Solar Powered Drinking Water Pumping Project" supplying the daily needs of a village of 1000 people in South Nepal funded by Canadian Cooperative Office (CCO) and British Water Aid.

Distinguished Clients

World Bank, Nepal Telecommunications Corporation, Agricultural Development Bank of Nepal, Nepal Central Bureau of Statistics (Population Studies), CARE Nepal, Save The Children U.S., Netherlands Development Organization (SNV), Action AID, Lutheran World Services, King Mahendra Trust for Nature Conservation, Tiger Tops Jungle Lodges, Japanese International Coorporation Agency (JICA) and hundreds of individual private home owners and business throughout remote and urban areas of Nepal.

Future Prospects

Lotus Energy anticipates a fast expansion in the next few years as a result of the very successful LEVEL-UP Program in which the Agricultural Development Bank of Nepal (ADB/N) has joined hands with this company to flow the loan to the remote villagers' purchases of solar home lighting system. Lotus Energy expects to reach a production throughout of 2,000 systems per annum of typical village home sized systems alone, along with the necessary field infrastructure, remote service depots, etc., to support these remote market areas.

Lotus Energy Products

Lotus Energy produces and supplies a large range of products available for many remote and urban power supply purposes. In addition to the regularly produced products, specialized products and systems can be custom designed by Lotus Energy engineers and manufactured to suit the client's requirements.

The company manufactures both DC (direct current, generally 12 volt) and AC (alternating current, generally 220V) types solar electric power systems. These systems are of the highest quality available in Nepal.

A. Small multiple voltage regulator

One of the component of the SHS. These small multiple voltage regulators(SMVR1A) are specially designed for converting 12 volt DC from a solar battery in to a lower voltage required to operate systems such as a radio or cassette, one of the major benefits of this component is that users no longer need to buy small batteries to power their equipment.

B. photo voltaic modules

This is the main source of power in all solar energy systems. Made of pure silicon crystals extracted from sand, solar panels are wired to give the current and voltage needed to change the batteries which power electrical needs. It generate electricity directly from sunlight and their operation is completely silent and pollution free.

C. solar power converters from trace

Lotus energy is the distributor for trace engineering companies and the only Authorized warranty service center for their products.

D. solar changer controller/sine wave inverter from fronius

The innovation for photovoltaic stand alone systems, a sine wave inverter and a solar charge controller combined into one device with innovative features, of course the inverter is also available as stand-alone-device.

E. solar lights- tube light

This high efficiency solar lamb uses only 10 watt tubes but provides the same light as a standard 40-75 watt filament type bulb. This special 12V model is designed especially for solar power applications. The rated life time

of a bulb is 8000 hrs. the fixture is designed in such a way that it can be mounted on the wall or ceiling.

F. Dankoff solar force piston water pump

They are (surface pumps) designed for drawing water from a shallow well, springs, river or tank. It can pump water uphill and over long distances for home , village, irrigation or livestock uses. It can use power directly from a photovoltaic array or from storage batteries to fill a storage tank or to pressurize water.

G. Ozone water purifier

The ozone water purifier is lightweight and easy to move. It is designed especially to purify water is holding tanks and emergency storage water tanks. It can also be used to purify drinking water from well sources or city water suppliers by removing undesirable tastes, odors and colors.

Advantages (water treatment systems)

1. improved health standards and improve the taste and odor of potable water,

2. Very effective disinfectant and can kill or disable pathogens resistant to other treatment methods,

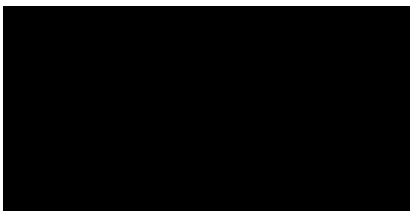
3. Simple to use and can be easily powered with any renewable energy system such as solar.

4. Can be used with water that is clouds or discolored without pre-filtration.

H. solar power converters (outback power systems)

The outback fx2000 is a 2kw continuous rated modular "building" block sine wave inverter/charger which can be used both for small and large power systems. Each system DC to AC inverter, battery, charger and AC transfer switch. Additional inverter/chargers can be connected at any time in either parallel or three phase configurations, allowing the system to be customized to the specific power conversion requirements of the application, both at the time of the installation and in the future. Up to eight fx2000s can be connected together to provide up to 16kw of continuous power conversion capacity.

solar deep cycle batteries



Lotus energy provides deep cycle batteries which are especially mfg, for deep discharging. These batteries have longer life and better performance than other ordinary automotive batteries.
These batteries have thicker, heavier plates and are more solidly built to with stand many years of charge and discharge. 2volt cells have clear industrial containers for easy electrolyte viewing.

Despite this:-
An important area of solar energy use has been electricity generation from solar photovoltaic (SPV) system. It provides a required amount of electric power effectively and safely. A typical system may include (i) solar cell modules (ii) array structure and foundations (iii) voltage regulator and other controls (iv) storage batteries and enclosures (v) instruments (vi) power cables, buses and switchgears (vii) and electrical grounding network. The module, the basic building block of the systems, consists of a number of solar cells electrically interconnected and encapsulated within a supporting structure. Solar cells, usually in the form of thin films or wafers are semiconductors device that convert 3-25 percent of the incident solar energy into DC electricity, with efficiencies depending on illumination-spectrum intensity, solar cell design, material and temperatures.

It converts light directly into electricity by a process called the photovoltaic effect and it is most commonly made from silicon. The modules are available in sizes ranging from 2 to 50 watts.

Large power outputs from a single source can be obtained by combining modules. At present, two types of systems are commercially available in the mountain areas of HKH. These are: a) Centralized SPV Power Station (20-150kW), and b) Stand-alone SPV System, or commonly known as "Solar Home Systems" (10-120Watt). Centralized SPV Power Station can provide grid-quality electricity by converting DC power generated from solar cells to AC. This system can provide lighting and other small-scale motive power applications for the remote and isolated mountain areas. A small Solar Home System (40W) provides DC electricity to power 3 or 4 lights and a radio or television for 3-4 hours per day. In most of the mountain areas. SHS are popular than the Centralized SPV power plant, as most of the centralized systems installed during late 80's did not function properly due to the operation, repair and maintenance problems primarily relating to DC-AC inverter (Box 1).

Box 1: Suitability of Solar Home System (Standalone SPV systems) in Nepal

Through the experiences of concentrated SPV system at Mugu and Humla and Standalone solar PV system in Kavre and Pulimarang, it can be concluded that stand-alone system is more appropriate than the concentrated

system in the rural area of Nepal due to transmission difficulty and managerial constraints. It is found to be cheaper than grid electricity when grid point is located more than 40 kilometers from the load center. It is also found that if the demand is very low, less than 300 W, solar PV is cheaper than diesel generator and micro hydro plants example demand for telecommunication services. It is also preferred at the locations where diesel engine does not start due to low temperatures at high altitudes.

The attractions of photovoltaic arrays include the absence of moving parts, very slow degradation of properly sealed cells, possibility for modular systems at sizes from a few watts to kilowatts, and extreme simplicity in use. Even today, the cost of SPV system is still five-times more than the conventional source of energy production. However, SPV can have a 'niche' market for isolated and remote mountain areas where there is no feasible options available to provide illumination (Box 2), to support communication infrastructure and to power computer operation. It has been observed that the provision of these facilities will not only improve quality of life of poor mountain people (Box 2) but also provide opportunity for them to diversity their economics and to reduce health hazards.

Box 2: Impact of Solar Home Systems in the lives of Mountain People—Case of Pulimarang and Rampur Village, Nepal.

The survey of altogether 52 Solar Home Systems in Pulimarang and Rampur village of Nepal showed that it could be practical way of providing electricity to remote mountain households. With few exceptions, everyone was happy with the technical performance of their systems. In Rampur, most households enjoyed 3 and 6 hours of light per day, while in Pulimarang most said 3-4 hours. However, this does not necessarily reflect the capacity of the systems since everyone seemed very economic in the way they used their lights, only having lights turned on when they needed it and always turning the light off when they left a room. None of the interviews felt that reduced hours of light due to bad weather was a big problem. Although about half of the respondent did say that there was noticeable difference after many days without sunshine. The number positive things has happened in the villages due to the installation of SHS as per the villagers. These are:

Noticeable reduction in kerosene used and dry-cell batteries was reported in villages, 75 percent in Pulimarang and 88 percent in Rampur.

Nominal increase in income generating activities (bag making Pulimarang due to the fact that most of them were comparatively rich and they did not utilize the extra time available at night.

Influence on children's study time and education is remarkably improved due to light in both the villages.

Many villagers pointed out how important it is for them to have the opportunity to watch television. The people were very interested in learning more about activities that can help them improve their lives. Such as information on forestry, agriculture, child-care, etc. Television (TV) program can be geared towards providing information on these aspects, which may play an important role to improve the living conditions in villages. In 1995, the interviewees commented on the increase in their living standard due to the opportunity to watch television. Now, television is no longer a novelty and it is considered as a part of their lives today.

The installation of SHS has a big positive impact on the indoor environment. Around eighty percent in Pulimarang and forty percent in Rampur stated that there has been a significant change in indoor environment because kerosene lamps are no longer used.

> Some women in Pulimarnag reported that light provided them opportunities to diversify their income generating activities (shawl and bag making) instead of continuing with drudgery-ridden buffalo raising that reduced 3-4 hours hard labor per day.

19.1 REGISTRATION OF SOLAR COMPANIES IN NEPAL

Although there are number of companies interested to work in solar power, but it is no use until they get a "qualified" title from Alternate Energy Promotion Center (AEPC), otherwise they will not be entitled to the subsidy scheme. So those companies, which are registered, and "qualified" from AEPC are called the manufacturers or supplies of solar power in Nepal. There are also other companies, which work under one of the registered companies and sell the Solar Home Systems (SHS), and are trying for the "qualification" on their own. But presently there are only fourteen (14) companies "qualified" or "registered" in AEPC and they are as follows:

> Solar Electric Company.
> Lotus Energy Pvt. Ltd.

Wisdom Light Group.
Suryodaya Urja Pvt. Ltd.
Kathmandu Power Company Pvt. Ltd.
Laser sun Energy Pvt. Ltd.
Alternative Energy Resources Nepal Pvt. Ltd.
Krishna Grill and Engineering Pvt. Ltd.
Rural and Alternative Energy Service Center.
Nepal Energy Development Company
Scientific Technology Pvt. Ltd.
Everest Solar Energy Pvt. Ltd.
Suryo Jyoti Company Pvt. Ltd.
Bionic Energy Pvt. Ltd.

The above mentioned are the companies which are entitled to "subsidy scheme" and they can only sell the Solar Home Systems and claim for the subsidy amount. The companies are "registered or "qualified" on the basis of the business volume they have made and also the infrastructure of the organization. Their performance, sales volume and the after sales service are all observed and examined so that the customers are well taken care of. In this way the AEPC monitors the service and the quality of the systems sold to the remote villagers.

There are several companies working in solar sector. Counting all the "qualified and unqualified" companies. It totals to more than twenty companies working as the solar supplier in Nepal. Those who are "qualified" from AEPC can claim subsidy in their own name and hence can import the raw materials with the exemption of tax. For those who are not "qualified" cannot claim the subsidy on their own and hence have to work under some qualified companies and also cannot import the components on their own. The list of the qualified companies provided by AEPC as per June 11, 2002 has already been discussed and those, which are struggling for the qualification, are as follows:

NabaJyoti Urja Pvt. Ltd.
Swogun Nepal Pvt. Ltd.
Sunpower Pvt. Ltd.
etc.

There are also other companies that are not mentioned in the above list bust still working as solar suppliers.

2.3 AFFORDABILITY BY THE NEPALESE CONSUMERS.

As mentioned earlier, our Nepalese citizens living in the far remote places find it hard to afford such expensive systems in one go. For example the typical SHS (i.e. of 36 W) will cost them Nrs.30, 000/- out of which Nrs.8, 000/-, 10,000/- or 12,000/- will be granted as the subsidy depending on how remote the place is. For very remote place, it is 12,000 and for the least remote place, it is 8,000/- and 10,000/- is for the place in between.

[note: from this fiscal year the subsidy amount of Nrs.8,000/- has been reduced to Nrs.7,200/- and the other two remains unchanged]
Now let us take for example the customer belonging to the 10,000/- subsidy category is buying the above-mentioned system. He will have to pay only the system's amount (i.e. Nrs.30,000/-) minus the subsidy amount (Nrs.10,000/-) which means he has to pay Nrs.20,000/- only.
Now this amount (Nrs.20,000/-) is also a big sum for the village people. Well in fact no body knows the real status of the village people as their source of income is mostly hidden. Anyway, they would always prefer to buy systems in installments basis. To make this purchase easier, many companies have also started giving them the SHS on installments basis. On top of all those, Agricultural Development Bank (ADB/N) also flows the loan all over the country to promote the Solar Home System (SHS).
The process of loan flow is that the ADB/N head office from kathmandu sends the quotas all over the country depending on the demand made by their offices in the respective areas. The ADB/N branch office in the respective areas takes care of the customers. The bank keeps the ownership papers of the customers land and house as a form of mortgage and pay to the solar companies of behalf of the customers and the customers are liable to pay the loan amount at a normal rate of interest in a period of three years which is considerable duration of time.

The over all above mentioned procedures have made it easy for the below average end users to afford to busy the SHS set. Otherwise it would have been difficult for all the customers to make the down payment of the full amount before buying the systems especially for the ones who are struggling for 'hand to mount' (and which is the most often case).

Installing an SHS set is ones house has become a kind of fashion in the villages.

CHAPTER III

RESEARCH METHODOLOGY

This chapter includes the research design, population and sample, sources of data and analysis of data.

19.2 RESEARCH DESIGN

This research attempts to analyze the opinions of the respondents. Hence a descriptive and analytic research design has been used.

19.3 POPULATION AND SAMPLE/ SAMPLING PLAN

The total number of districts in Nepal and the population of the sampled districts are the population of the study and the customers of SHS(solar home system) are consider as the population of this study, which the area would be urban. It consists of all the customers within in villages of Nepal.
The respondents represent the resident of districts of Nepal. From the population a sample of near about 150 to 250 homes are selected for. To collect the primary data many process of personal interviews are taken.
Companies, retailers are also taken for the study process.

Companies, retailers, are also taken for the study process. However, this study had taken the age group of 18 to 58 years age of rational peoples, exposed to different ideas and aspects to solar system.

So, for the requirement of this thesis survey study and to conduct the further population and sampling process, some of the urban districts of Nepal have been taken for.

The selected districts are as follows:-

Kavre
Saptari
Sunsari
Morang
Ilam

19.4 SAMPLING PROCEDURE

On the basis of the feasibility of study random sampling procedure has been used to select the sample districts and respondents for the study. The respondents are selected from the place of such type of urban districts for their suitability and to easy survey.

19.5 SOURCES OF DATA

To fulfill the objectives of the study primary as well as secondary data has been sued. Data collected by the government and non-government offices in their different studies and serve as secondary data in this research. The unpublished record of AEPC, ADB/N, REDP and RBB are main source of secondary data and published in different journals, magazines, newspaper also serve as partial secondary source of data.

19.6 COLLECTIONS AND ANALYSIS OF DATA

To collect the primary data interview as well as questionnaire method has been used. Collective data are analyzed by using percentage and different diagrams and graphs. Plus the data are checked, complied and present in appropriate table to facilitate analysis and for interpretation. Different tools used to make the information easy and understandable. And other relevant data are collect from the different solar companies, news paper, magazine, journals and some of other published and unpublished materials e.t.c.

19.7 LIMITATION OF METHODOLOGY

Data collection especially for a topic like this is quite a tedious job. This is such a business, which is scattered all over the country and not so uniformly which has made the statistics analysis even more cumbersome. Since the distribution is skewed, it has made it difficult to make the proper samples and carryout the study. Selecting the market segment and making the analysis accordingly is the biggest job and which has consumed the maximum time and effort of the research.

CHAPTER IV

DATA PRESENTATION AND ANALYSIS

This chapter explains the data presentation and analysis. The first part of this chapter includes the analysis of the responses collected from the respondents of the different sample districts and the latter part explains the linkage among the end users, solar industry and the subsidy giving organization and the additional support giving organizations like ADB/N which flows loan to the villagers and encourage them to buy the solar home systems.

ANALYSIS OF RESPONSES

Different parameters are chosen to study the possibility of selling the solar technology in the rural most areas of the country. The parameters, which are mainly focused, are
Awareness about the Solar Power.
Interest in buying the Solar Power.
Ability to buy them on cash vs. credit.

While these five districts were studied, fifty sample households from each district were considered. Out of those fifty households, it was tried to find the awareness and interest of the people in solar power or SHS. And out of the ones who were aware and interviewed to know their interest in buying the systems in cash or credit and under what terms and conditions. All these analyses are very well tabulated in the tables and the bar chart shown below. The conclusions of the particular survey follow after the tabulated presentation.

Awareness about Solar Power:

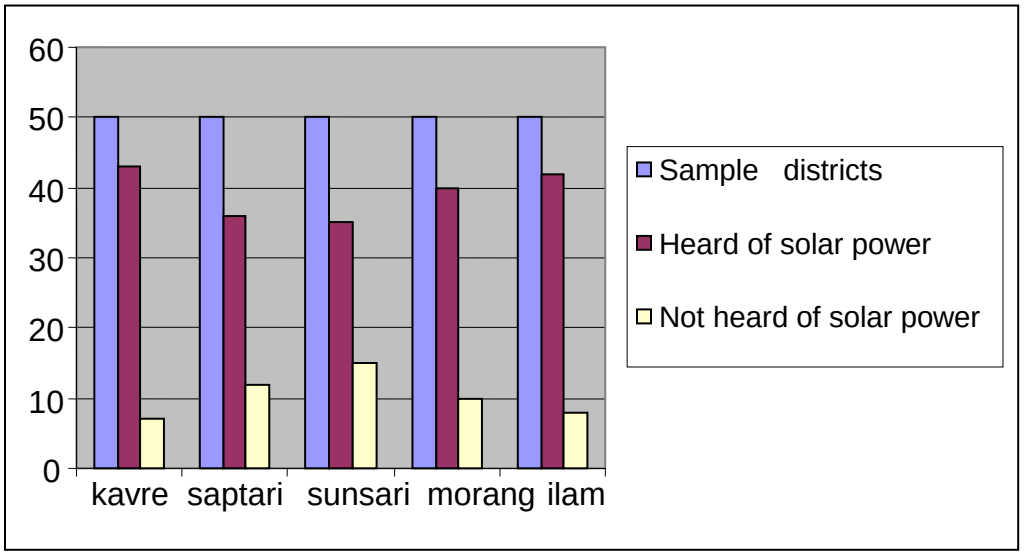
The under shown is the survey which shows the awareness of the villagers about solar power.

Table 1
Consumer's awareness about solar power

Sample districts	Heard of Solar Power	Not heard of Solar Power	Total
kavre	43 (86%)	7 (14%)	50 (100%)
saptari	36 (76%)	12 (24%)	50 (100%)
sunsari	35 (70%)	15 (30%)	50 (100%)
morang	40 (80%)	10 (20%)	50 (100%)
Ilam	42 (84%)	8 (16%)	50 (100%)
Total	198 (79.2%)	52 (20.8%)	250 (100%)

Source: - conclusions from particular survey report of SHS from dealers.(2010)

Figure 1



From the above table and the graph, it is very clear that the people of kavre district are quite aware about the Solar Home Systems (86%) as compared to other districts taken in the sample. It can also be very clearly seen that among the five districts, the people of sunsari are least aware (70%) about the technology. But this doesn't mean that kavre is the only place where the solar companies should focus on. Similarly, it can't be concluded that sunsari is not the place for solar companies to invade. Sometimes the cases are very typical. In this context, we could also say that kavre is quite saturated as compared to other districts and sunsari could be the district where the demand is creeping up. On average (as per the data in the table above), we can seen that out of the total surveyed sample, 79.2% of the individuals interviewed were aware about the solar technology and the remaining 20.8% are not aware about the technology.

Interest in buying the solar power:

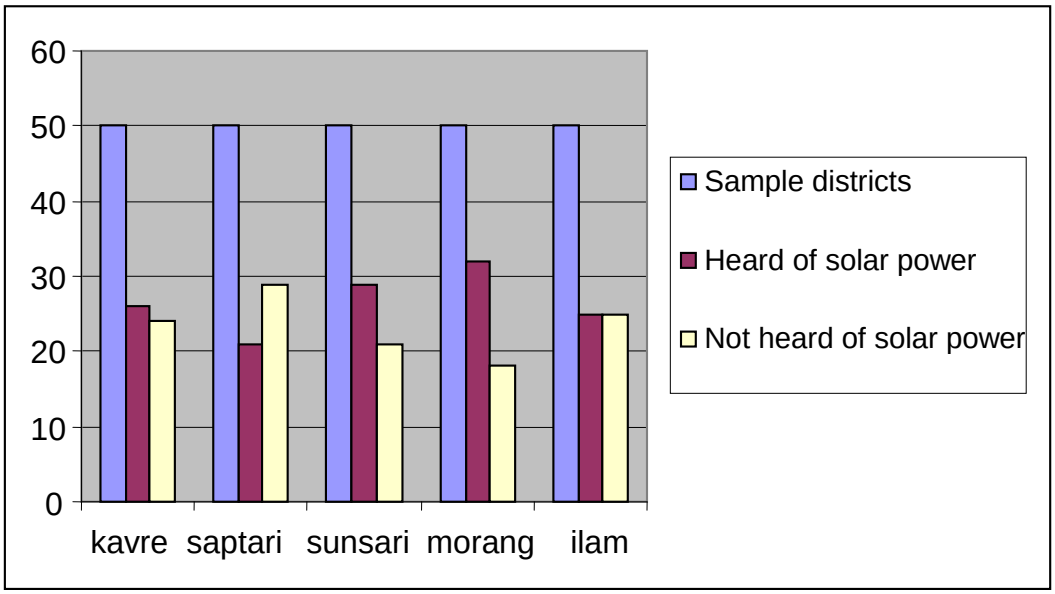
Table 2

Consumer's interest in buying solar power

Sample districts	Heard of Solar Power	Not heard of Solar Power	Total
kavre	26 (52%)	24 (48%)	50 (100%)
saptari	21 (42%)	29 (58%)	50 (100%)
sunsari	29 (58%)	21 (42%)	50 (100%)
morang	32 (64%)	18 (36%)	50 (100%)
Ilam	25 (50%)	25 (50%)	50 (100%)
Total	133 (53.2%)	117 (46.8%)	250 (100%)

Source: - conclusions from particular survey report of SHS from dealers.(2010)

Figure 2



From the above figures, we can get an estimate of what proportion of the villagers are interested to buy the solar technology. This refers back to the questionnaire form where the real interests of the people are calculated. The people morang seem to be utmost interested (64%) where as the people of saptari seem to be least interested (42%). But this is again a relative figure and nothing can be taken in conclusion as a tested hypothesis. This is all about exploring the market and trying to figure out where the real potential is. This kind of research work always helps the people of the related field to attain invaluable data.

It is also seen that more than 50% (53.2%) of the people who are aware about solar technology are interested to buy them. Now this could be big

news for the solar companies. One sale on every two approaches is enough for any companies to flourish.

Ability to buy them on cash vs. credit.

Proportion of households ready to buy in cash vs. credit

Table 3

Consumer's ability to buy in cash/credit

Sample districts	Heard of Solar Power	Not heard of Solar Power	Total
kavre	26 (52%)	24 (48%)	50 (100%)
saptari	21 (42%)	29 (58%)	50 (100%)
sunsari	29 (58%)	21 (42%)	50 (100%)
morang	32 (64%)	18 (36%)	50 (100%)
Ilam	25 (50%)	25 (50%)	50 (100%)
Total	133 (53.2%)	117 (46.8%)	250 (100%)

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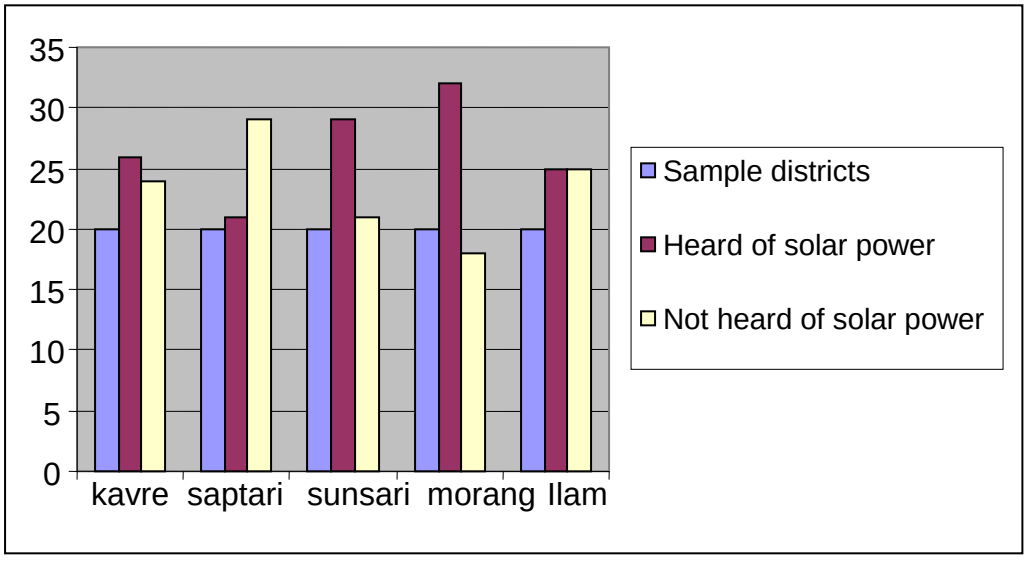
Figure 3



In spite of the desire to possess a solar technology, people have to suffer lot of constraints and cash position is one of the major constraints. It can be clearly seen from the above analysis that the people of Ilam district are ready to buy in cash. This also depends on the time of the year when the interviews are taken. It may be that the readings have appeared to show that the llamese are well off. But contrarily, it could be that the interviews to those people are made during the time when they were high (just after reaping their cash crops). But if we ignore those contingencies, it can be considered that the

economy of the people of Ilam is quite good as compared to other districts and that the solar companies could think of putting some more marketing effort in the district. The people of saptari and sunsari are least interested (30%) to buy in the cash. This means that they are either short of cash normally or they are very well aware of the procedure to get loan from ADB/N. The aggregate analysis showed that only 39% of the people are interested to buy in cash. As long as organizations like ADB/N keep providing loan support in this sector, the villagers can easily afford Solar Home Systems.

From the above analysis, we can say that, the villagers are quite eager to keep the systems for themselves. The solar companies have reached many remote places, which have of course helped them a lot to achieve a big market. The awareness of the villagers about the solar home systems is also appreciable. In addition to their awareness, their keenness to buy the systems (in a reasonable proportion) is another important factor.

It can be noticed that sunsari and saptari are the most potential area among the chosen ones. Especially in saptari, the solar home systems movement has created new these days.

SUBSIDY PROGRAMS

His Majesty's Government of Nepal established Alternative Energy Promotion Center (AEPC) in 1996 under the control of the board Alternative Energy Promotion Development Board. At present AEPC is under Ministry of Science and Technology. This institution has been established with the following objectives:

To assist and advice HMG/N in formulating the implementing the renewable energy policy for enabling the people to plan, implement and manage the rural energy for the sustainable development.
To collect, compile and provide all renewable energy technology related information.
To standardize and set the quality control of the renewable energy technology (RET) appliances and equipment.
To set up the RET funding and ensure access to finance by poor people for adoption of RET.

To promote and disseminate RET to cater energy needs to household economic activities by involving the private sector and NGO and INGOs.

To create the appropriate environment to involve the Research and Development institution to sustain themselves for R & D of RET which will contribute for technically and financially sustainable RET whining the reach of the rural poor people.

To establish a forum (Network) to integrate energy programs and stakeholders (Users, private sector, NGOs and financing institutions) for effective utilization of RET.

To demonstrate Re resource development through enabling local institutions to plan, acquire and manage rural energy resources to uplift the rural economy and living standard of the people.

To develop the institutional capacity for promoting large scale use of renewable sustain ably.

Financial support or the financial backing of any kind is known as subsidy. As mentioned earlier, our Nepalese citizens living in the far remote places and who are very poor would find it hard to invest such a large amount to get something whose value was not yet known to them. In fact this was the case at the very beginning. After that, the government made the policy of granting the subsidy in all the sectors of renewable energy as per its own rules and regulations. That subsidy program encompassed several sectors like micro hydro, Pico-hydro, Solar power (of any kind) etc.

For micro hydro, Pico hydro and solar power (especially the water pumping system), the government is still providing the subsidy of worth 75 percent of the expended amount as long as the total budget remains within the fixed limit (the limit laid down by AEPC is Nrs.500000/-), which means if the installation cost is within Nrs.5 lakhs, government provides the subsidy of 75 percent of the amount.

Shortfalls of subsidy programs

Nothing in this world is 100%. One-way or other we keep finding the problems attached with or inbuilt in the system. Subsidy programs recently in operation also have some shortfalls.

As mentioned several times before, there is no major tracking of who is actually entitled to the subsidy. It was checked during the study what

actually is needed to the solar companies to actually claim and subsidy. It was found that only the photocopies of the citizenship of the poor villagers would be enough to claim the subsidy. Now for the companies that doesn't have infrastructure, it is very easy to claim hundreds of fake subsidies and then stay home even after they are caught and sacked. AEPC/ESAP also doesn't seemed to be concerned very much towards giving limited registration to companies which have polluted the environment of subsidy mechanism.

Their subsidy providing mechanism is very inefficient. They take long time to release the subsidy amount to the solar companies, which have already given that amount as a quite a long time (may be a month or two) and so they are at times in problem

The overall process of subsidy releasing mechanism is cumbersome and expensive as well. The documentation part is even more difficult. If AEPC/ESAP could maintain a cooperative environment among the solar companies and themselves, this whole team could have given a better result.

CONSUMERS AND THEIR NEED REGARDING SOLAR HOME SYSTEMS

There are several factors that prompted the adoption of Solar PV technologies in the hills and mountains of HKH Region. Some of these factors, which may be instrumental in promoting the SPV, are briefly discussed and hence due consideration need to be given while formulating policies and actions for particular mountain areas and countries.

Standardization, Safety, Warranty, and Insurance: There are no formal guidelines or mandatory safety provisions for the construction and operation of SPV systems in most of the mountains areas. Often equipments supplied by manufacturers are not based on proper design consideration. Strict enforcement of standards may result in the successful implementation of the program. For example, warranty is an important factor to ensure quality output from manufacturers as it ensures that suppliers of services are made responsible for what they promise to deliver. It is observed that in the absence of warranty, manufacturers will get away with inferior equipments, parts and after sales services. At the same time, some risks can be covered through insurance schemes. In the resent past, an insurance company in Nepal has agreed to provide insurance scheme for solar home systems.

Subsidy and Incentives: In many a case subsidies and incentives have played a critical role in terms of popularizing SHS in the HKH Region. The provision of subsidy and incentives should primarily be based on economic and social equity analysis. Contrary to this, it was observed from case studies that most households who own solar home systems belonged to high-income group of the village.

Role of Financial Intermediaries: The role of financial intermediaries is critical for the successful implementation of SPV program, as this would mean creating access to financial services by ensuring sustainability of the services in the long run. Properly designed subsidy program along with full-cost recovery based financial operation of SPV program is a minimum prerequisite to attain financial sustainability. In this context, access to financial resources need to be improved so it becomes transparent and flexible enough to facilitate the poor and marginalized people.

Integrating Gender Concerns in Program Development: More emphasis should be given to ensure the active participation of women in the design and implementation of SPV programs as they play key roles in using them at household level. The promotional activities do not recognize the socio-cultural implications of technology adaptation, as these programs, in most of the cases, are gender-blind.

Develop Commercialization Plan for SPV Promotion: There is a need to develop a commercialization plan for SPV programs. The efforts required may differ depending on the level of development that is in place in specific country. In this context, the role of the government is to create the right kind of policy atmosphere whereby shy entrepreneurs are attached to make investments in SPV Program.

Guidelines for Donor Agencies: In many instances donor agencies are engaged in promoting, disseminating and implementing SPV technologies in remote mountain locations, but there is no coordination between various donor agencies and government institutions. Broad guidelines should be made available to various donor agencies in terms of avoiding the duplication of their efforts. Some donors may be interested in capacity building, some in marketing technologies, others in research and development. While yet others may be interested in promoting SPV technologies in specific areas or to specific ethnic groups. Each of them

should be allowed to function with clear mandates and objectives. The lessons learned and successful strategies in disseminating SPV systems must be taken into consideration while designing future programs for interventions. The role of donor agencies have been found effective in terms of capacity building and research activities instead of implementation of the SPV program.

LOAN FLOW IN THE SOLAR SECTOR.

We can see several organizations providing loan in this sector. But the most consistent one involved in the uplifting is the Agricultural Development Bank/Nepal (ADB/N). ADB/N has a fixed allocated budget for the Solar Home Systems not in terms of Rupees but in terms of quantity of Solar Home System (SHS). Like for example for the fiscal year 2058/59, ADB/N had allocated 3000 quotas to the branch offices all over the country.

The process is the head office sends the fixed number of quotas to all the Su, Ni, Ka, all over the country, and from there the quotas are distributed to the banks of the concerned offices. Say for example each bank has authority of providing loan to 30 customers or for 30 Solar Home Systems (SHS), and then the solar supplies have to look for the customers of that area for which the bank has the quotas. So when the solar suppliers bring the customers there to the bank and the customer says that he/she is interested to buy the SHS from the particular supplier, the bank has to make "coupons" in the name of that supplier for that customer. Now that supplier has to install the SHS in the customer's house in a limited period of time (mostly 35 days) and has to make the expense claim ("Kharcha patra") from the local branch office (ADB/N). The ADB/N branch office after inspecting and finding out whether the installation has been done in the right place and in the right manner approves the installation and hence makes the "kharchapatra" in the name of the solar company. All the process of SHS installation should be reliable and having no doubts for the further future circumstances. If the problem occurs, that should be removed at the exact time of seller and costumers conversation time, which is very much the proper time of this period is installation process. The solar power company then submits the "kharchapatra" to the ADB/N head office in Kathmandu and the amount is received. Now the concerned branch office of the sector collects the collection of the loan amount provided to the consumer.

There is not much risk in this because the villagers put their land and/or properties as a form of mortgage for buying the systems. In short ADB/N pays the solar companies on behalf of the customers and customers pay back the loan to ADB/N in installments basis, which is quite comfortable to the users.
Apart from ADB/N Rastriya Banijya Bank (here after abbreviated as RBB) is also providing loan for the solar home systems. They directly don't flow the Loan to the villages in the form of quota like ADB/N does, but simply approves the loan taken by the farmers to install the Solar Home Systems (SHS)**.** RBB is right now in a transition phase and has got their own problem within the organization as it is going to be reshuffled entirely, so these days it is not playing the remarkable role in solar promotion or in the other sectors too.

The villagers are always looking for the SHS to buy but in the installments basis. But the companies cannot give them the systems in installments and the villagers cannot afford to put in such a large amount at once. For companies it is difficult to do so because they cannot go to every household every month or after two months to collect the installments. So for the villagers and the companies to reach to a point of convergence, ADB/N plays a significant role. What they do and have been doing is acting as a bridge between the solar companies and the consumers. ADB/N plays the companies and collects from the villagers on a long-term basis (i.e. on installments). This is the basic idea.

Some of the cooperatives and the finance companies also do the same as ADB/N does. They also keep the papers of land and building of the villagers as a form of 'mortgage' and finance on behalf of the consumers and later charge the villagers in the form of interest and sometimes they also gobble up the margin from the companies.

AFTER SALES SERVICE PROVIDED BY THE SOLAR COMPANIES.

After sales service is another important issue which has to draw the attention of all the solar companies. This is a must because the poor people from far away places invest their lifetime earning just with a hope of living in white light from electricity forever. With this hope they agree to the marketing staffs of the solar power companies. They are also told about the after sales

service facilities. Some do it verbally and most of them do it in written form. But the problem is that even the ones who do it in written form are marketing in the unexplored areas. They take it as wasting time. The solar companies not at all perceive the seriousness of this matter. On the other hand Lotus Energy (and few other companies) as discussed before, is very conscious about the quality of the goods it supplies to the market and in addition to that it also looks after its customer even after the sales is made. According to Managing Director of Lotus Energy (Mr. James Ronald Goff), the company has made up a policy in which the SHS sold to any of the customer in any part of the country will have to be taken care by the branch of that respective area and if possible, by the concerned field staff who has made the sale. The policy laid down there is that the customer will be taken care of till two years (four half yearly visits) and that too free of cost. This not only motivates the other customers but also gives the field staffs the opportunity to make other sales in that area. This is because that are which is well taken care of can easily build up the customers in future. This was the basic idea of the 'after sales visit' or the 'warranty visit'. The compulsion was in fact laid down the Alternate Energy Promotion Center too. And that was, AEPC used to hold up the 10 percent of the subsidy amount for up to one year time and which would be released only after two service visits (i.e. half yearly).

To make the after sales service more effective APEC has played number of important roles and has taken number of practical steps. On of them is already mentioned above (i.e. holding of the 10 percent of the subsidy amount). Another important one is that AEPC does not provide the subsidy to the systems until and unless there are at least 10 systems per VDC or a cluster of 10 systems including the adjacent VDCs. Its main focus is that any marketing personnel would feel like going to make after sales service of number of systems concentrated in one area rather than going for only one system at the top of the mountain or some remote places.

Talking about the warranty terms and conditions, the period of warranty differs from component to component and company to company. Like for example the warranty given for modules are different in different companies. Lotus Energy uses Siemens modules and the warranty given in 10 years where as the warranty for modules is 15 years given by Lasersun and they use Kyocera modules. Similarly for the batteries the warranty given in mostly 2 years where as the life of the batteries are five to seven years if

handled carefully. Similarly the warranty differs from component to component and company to company.

RISK FACTORS OF THE BUSINESS.

At the percent scenario, the emergency situation is the most important factor that has caused a slack in the solar business. Science last so many months, the marketing personal are facing difficulties from both the sides of this civil war. It has become almost impossible to carry such equipment likes batteries, charge controllers, panels, lights and especially the wires and the pipes all the way to the villages. In addition to that is has also become very difficult to collect the cash from the filed and walk all the way to the urban areas/cities, which almost take them more than two or three or even more days sometimes. The chances that the filed staff be looted cannot be ignored and if it really happens, the trend to pick up is quite probable. This particular issue us not only related to the emergency situation but also in any kind of situation. Recently three SHS (solar home system) of lotus Energy Pvt. Ltd., were captured by the Maoists. Now this is a real problem, which needs addressing. It is not only with lotus energy but also with other companies that such problems exist.

As mentioned earlier, AEPC has made a rule that a company can claim for subsidy only when it has installed ten or more systems in one VDC and which is quite a small area. This puts them in dilemma of weather to provide the system there is a fear of losing the sales, to any VDC if they get order of five or six systems. Now if they don't do this, there is a fear of losing the sales, which is on hand right at the moment, and if they make the sale, there is fear of not getting the subsidy in case they cannot make ten sales there. This problem has occupied a major position in the minds the solar power company. This issue does not stand alone in creating problems to the solar power company. This in fact gets tied up with the govt. polices, which jointly creates problem to the solar power companies. Like for example many solar companies have sold systems in the past to several VDCs in the past with a hope of making ten systems in those VDCs. As a result, there are so many scattered systems in the different parts of the country. Lotus Energy alone has more than 350 systems for which the subsidies have to be claimed just because the systems are scattered in different VDCs and none of those VDCs have ten or more systems. But now the policy has changed a little bit. According to the new policy, from the fiscal year (2059/60 B.S.), the subsidy has been reduced by 10 percent (as mentioned earlier but only for those VDCs which was entitled to Nrs.8000/- subsidy). Now this is going to

make a big loss for all those companies, which have sold the systems in scattered form (a big mistake perhaps).

Another important and considerable issue is the cash collection.
Since the nature of this business is quite awkward, it involves unnecessary complicacies, which troubles the field staffs as well as the owners. This business involves several field and the agents without the help of which, it is not at all possible to make business. It is very difficult that companies make business without letting systems on credit and on the other hand, it is very difficult to collect the money which are on credit. No matter how strict the companies are, to stand firm in front of the competitors (which provide different kinds of installment schemes), it has to bear some kind of risk as far as the credit limit is concerned. The company also cannot stand if it sees a good party like agent, which acts as a bridge between the bit NGO/INGOs and the company. Such are the cases when the company though unwillingly has to increase the credit limit and finally might be cheated by the agent or even the staff against whom nothing can be done.

Competition is also another factor that improves the performance of the company and at the same time can be a reason for the degradation of the company. It should be taken very seriously for this kind of business and for the future stability for long period to to run .If taken healthy or with positive attitude, competition is a boon and if taken negatively, it is a curse. One cannot afford running after each competitors and watching what they have been doing since last so and so period. They have to make the strategies of their own and at times just keep bird's view over them. For example a solar company cannot start giving away systems on installment basis simply by seeing the competitors doing that especially at times when the manpower in the field is not so strong enough to collect the credit amount. May be that area where the competitor is selling on credit is its local area or may be the staff allocated for that area is a well-reputed citizen of that area who could collect all the credits. So one should not imitate especially in the business like this.

This is also a kind of business where the sales projection cannot be made with certainly. The demand is very unlikely to be predicted. This is one of the reasons why most of the solar companies are not being able to supply the villagers with goods on time. Sometimes the demand shoots up and sometimes the demand is quite static. This makes the maintenance of the

inventory or even cash cycle very uneven and unpredictable and which again is troublesome.

The companies also have to go through several logistics procedure, which sometimes cause the delay in the arrival of goods. The process of getting the tax free letters which already is a facility given by the government also creates lot of problems and which sometimes creates a threat of delay of the goods of very important customers who could in turn switch over to other companies. This could be another important and considerable issue, which could mean quite a much to a much to the solar companies if not handled carefully.

The most important risk factor that has crept up in the recent days is the subsidy claim's duplication. Subsidy provided by AEPC to the solar power companies is simply based on the faith on those qualified companies. All they need is the citizenship photocopies of the customer to whom the system is sold and the serial numbers of the equipment sold. Now this is never a big deal. Any agent could do anything with the citizenship certificates. Like for example sometimes the subsidy claims made by one of the company has been already claimed by another one in the past, which means in the name of same citizen, the subsidy has been claimed previously. As mentioned before, subsidy is only a matter of the citizenship photocopies and so it is quite understandable that one of the two companies has done some kind of mischief. Or sometimes it is the agent who does it. In either case, the company has to bear the responsibility because if found guilty, the company has to answer the AEPC or even might get disqualified if the case is very serious. This is one of the big risk factor to which the companies have to be careful about.

MARKETING MIX

Before implementing this concept with the solar business, lets first be clear on our own this really means.

As already discussed in chapter one, McCarthy classified these tools into four broad groups that he called the four Ps of marketing: product, price, place and promotion. The particular marketing variables under each P can be defined as follows:

Product: Product variety, quality, features, brand name, packaging, sizes, services, warranties, returns.

Price: List price, discounts, allowances, payment period, credit terms.

Promotion: Sales promotion, advertising, sales force, public relations, direct marketing.

Place: Channels, Coverage, Assortments, Locations, Inventory, Locations, Transport. Marketing mix decisions must be made for influencing the trade channels as well as the final consumers.

Typically, the firm can change its price, sales force size, and advertising expenditure in the short run. It can develop new products and modify its distribution channels only in the long run. Thus the firm typically makes fewer period-to-period marketing-mix changes in the short run than the number of marketing mix decision variables might suggest.

Not that the four Ps represent the sellers' view of the marketing tools available for influencing buyers. From the Robert Lauterborn suggested that the sellers' four Ps correspond to the customers' four Cs which has already been briefed in the early part of this paper work in detail.

But still, Product is related to customer solution, price is related to customer cost, place is related to customer convenience and promotion is related to the communication. Winning companies will be those who can meet customer needs economically and conveniently and with effective communication.

Now relating all the above concepts with the solar power marketing in Nepal, we can include several things here as there are so many competitors very close to each other and it will be worth watching to see each others strategy.

As far as the product is concerned, which is related to the customer solution from customer's side, this applies very well to the solar business. This is because most of the solar companies and especially Lotus Energy keeps telling, "We don't sell any products, but instead we sell the solution to the problem of any kind which occurs in the remote areas, provided the problem is related to the electrical power system". In fact that is true. This is because this is such a kind of business where the customer might come up with any

kind of demands. For example sometimes he/she needs then computers to operate in the remote place where there is no grid to run the computer classes. So the requirement of the customer has to be estimated and then only the real solution can be suggested. In short, we can say that the solution along with the product is sold and not the product along. In fact, the assembly of the products/ items is combined together to form the system, which is then sold to the customers. Sometimes it so happens that the customer wants more illumination out of the already existing system. In that case what a supplier can do is provide him/her or suggest him/her to increase the number of light fixtures and also the size of the battery if needed.

Similarly when price is concerned, this relates to the customer cost at the other end. In solar business things can be twisted as one likes. This can be applied to the customer's end as well as the suppliers' end. Several factors can affect the price and hence costing for the customers. Quality is a major factor which affects the pricing and hence the costing for the customer. Each solar company has different quality products to serve the same purpose, which directly affects the pricing. Sometimes it is also possible to redesign the engineering and make the systems cheaper. The nature of the business is typical and above that the business has to be run in remote places, which puts in or adds in several contingencies, which will also affect the pricing.

When we talk about place and which relates to the convenience to the customers, solar companies take care of the customer on this regard very well. Most of the solar companies have their agents or field staffs or even the branches in several parts of the country. In fact this has become a kind of home delivery system. No customer needs to come to the capital city to buy the system (the chance is very remote). This is all because of the competition, as all of the solar companies need to survive and so they have to serve at the field level (door to door).

For promotion, which relates to communication, the solar companies have always taken major steps in this issues. Most of the companies are sending out the brochures to the field. Marketing materials, promotional materials, and information about the company, and every kind of information is provided to the villagers from the brochures and the field staffs as well. Apart from the advertisements in the radio, television and the newspapers provide them with lot of information.

PROBLEMS FACED BY SOLAR COMPANIES IN NEPAL

Dissemination of solar PV in Nepal is still in the initial phase although solar PV market is gradually expanding. A number of barriers exist that are related to the dissemination and market expansion of solar PV system. Some are technical and institutional while others are financial. The high initial capital cost and poor promotional strategies act as major constraints to its development. In brief, the main barriers are as follows:

Technical:

High initial investment requirement to own PV system.

Failure of lights and change controllers is common problems.

Inadequate network of technical back up services for timely repair and maintenance/replacement of components.

Technical limitations (low power conversion efficiency, climate uncertainty, difficulty for transfer in remote location)

Lack of "trained" technicians and promoters specially in the potential districts

Institutional/Policy

Inadequate promotion, demonstration and M&E services.

Current government subsidy policy is more favorable to high-income households who can afford cash equity participation and offer collateral thereby limiting its adaptation by poor/disadvantaged households.

Disparity between the government subsidy (about 25 percent) and I(NGO) subsidy policy of 100 percent subsidy resulting to confusion to end users.

Financing

Commercial and private banks have not yet participated in the solar PV credit scheme. At present, ADBN is the only active financial intermediary.

Complain exists on the long and cumbersome loan approval procedure of ADBN on solar PV and on the "ad-hoc" collateral assessment thus taking even months in some cases.

Lack of adequate investment as well as subsidy fund thereby limiting the potential market expansion and dissemination of solar PV systems.

Labor

Nepal lacks a skilled and educated labor force. The overall literacy rate is only 41 percent and only 21 percent for females. Vocational and technical training is poorly developed and the national system of higher education is severely taxed by the large number of students enrolled. Many secondary and college graduates are unable to find employment in positions commensurate with their education. The employment of foreigners is also severely restricted. Under current law, the Department of Immigration must approve the employment of foreigners for all positions except those at the very top of a company or project.

In this situation it is quite obvious that it is hard to find the skilled manpower of this sector. The available work forces that have been used to market and install the products have learnt only with the experience and nothing else. Today's field technicians have no idea of what they are doing but still the installations go percent. They sometimes fail to explain the pros and cons aspect of the technical stuffs they are supplying to the villages. This also has affected a lot in exploring and expanding the market in our country.

Raw materials.

As it is already discussed before that the solar home system (SHS) comprises of several components, which are only assembled in the production units. For examples modules, batteries, charge controllers, lights and other installation materials like pipes, wires and several other materials, which are locally supplied or purchased. The local material are not much of a problem but when it comes to importing panels (modules), batteries, charge controllers and other things ,there are too many difficulties and the problems of logistics to be handled. The airport procedures, the raw material verification etc. is also a part of the job that has to be carried out.

It is not only while importing the materials but also after the sales that it has to be taken care of. Like for example the distilled water has to be added in the battery as soon as the level of the water reduces from a certain level. Now a customer living in the very remote place has to come a long way just to fetch few bottles of distilled water. Similarly, sometimes there are the problems in the tube lights and sometimes the problem is in the ballast of the tune light. Any kind of defect in any of the component will lead to failure of the system and so it is difficult for the people of the remote places to cope with the problem.

The price of the raw materials also plays a great role in determining the price of the overall system and which ultimately affects the demand. Modules, batteries, charge controllers and even lights imported by Lotus Energy Pvt. Ltd. is more expensive than those imported by the competitors. For example Lasersun imports cheap modules from Kyocera. Similarly, some of the companies do it from CELL India, the cheapest ones. This fact has affected a lot in causing the price disparity among the competitors. The disparity in the price may also sometimes put wrong impression about solar companies in the minds of the villagers. So the raw material requirement and raw material import has quite a bit to do right from the customer satisfaction to the market uniformity and hence plays a big role.

Transportation

Transportation is another big and one of the most important issue which has to be given a due priority.

The solar business in Nepal is by nature is quite complicated. One very interesting fact can be recalled. Nepal is the country with so many places which does not have access road and hence no electricity to them. Where there is no access road, normally there is no electricity, and those are the places where marketing of solar power has to be done. So solar business mostly occurs in those places where there is no access road mostly. This means transportation of the Solar Home Systems (SHSs) is quite a big problem to the solar suppliers.

Right from importing those goods from the manufactures up to the supply to the end users, the chances of goods being mishandled keeps pricking the minds of the owners of the company. Especially while disseminating those systems to the end users, there is a problem. This is because the transport company can carry the goods only up to the nearest road head and from there it is the joint responsibility of the field staff of the company and the customers to carry them all the way to the customers house which might be a few hours to few days walk (quite unpredictable). Anything can happen to the goods, which is carried with the help of the porter for such a long distance. The Managing Director Mr. James Ronald Goff of Lotus Energy Private Limited gave one good example about the transportation of the SHS to the remote place and this example was about the transport goods to Mustang. The problem is that the acid, which is used in the batteries, is not

allowed to fly in the aeroplane where as the rest of the components are allowed. Now to carry the acids all the way from Pokhara to Mustang is quite a big deal. The acid has to be put in drum and has to be carried by 'mule' (Khuachhad). According to Mr. Goff what happened in their last consignment was that the drum leaked (very very small leakage). The leakage slowly started ripping off the rope that kept the drum tied up to the body of the mule. Finally the rope ripped off and the drum fell off cliff and not even a drop of acid could be recovered.

Due to this incident, there was shortage of acid in that consignment and due to the shortage of the acid in the batteries, some of the systems didn't work and since the systems didn't work, the cash collection was not possible. This is because the villagers don't give away full cash till they get the installations completed and which is quite obvious.

Even the insurance companies are not giving the insurance beyond the road head and it is not possible to either. Now the road head is only 50 percent of the total distance normally. Duration wise reaching the road head takes les than 20 percent of the total time taken. So more than 80 percent of the transportation time is very risky.

Due to such inconvenience in transportation, it is quite obvious that the price of the same goods vary within the company at different parts of the country, i.e. the same goods are charged differently in different parts of the country in its own different branches. Talking about this to the Managing Director of Lotus Energy Mr. Goff says that Lotus Energy is service-oriented company and its main objective is to provide solar power in the remote part of the country. With this objective is to provide solar power in the most remote part of the country. With this objective he had started the business and hence has maintained the uniformity in the price of the systems through out all the branches all over the country. His statement was very true as the price comparisons in one SHS sold by them in Lotus Energy head office and at their branch in Humla was compared and was found to be the same. So despite the inconvience in transportation, if all the companies start operating like Lotus Energy has been doing, the village people will find themselves blessed and will start having nice feeling and faith towards solar companies.
There are also some other problems that occurs while transportation of the goods from the sources to the end users. Sometimes the terminals of the battery get 'shorted' and the battery blasts or gets damaged and the staff has

to come back to fetch another battery. This is the wastage of time, energy and an additional unnecessary inconvenience.
Sometimes the seal of the distilled water (used for the batteries) bottles gets brokern and the customers are conscious about it and one should be. They start asking several questions on how the seal was broken, and whether that is actually the pure distilled water. The customer will start having doubt on the company's staff.

Similarly, the modules which are though resistant to the small accidents, sometimes break off when hit by big stones or with the small stones by force. It also gets damaged if it falls off from a height of five to ten feet approx on a hard floor (though it is tested upon in the factory). Module is the most important and the most expensive component (about sixty percent of the total cost is occupied by the module), so this has to be handled with care.

Promotion

By now it should have been clear that the solar business is of typical nature. It can never be predicted on how and what impresses the end users of this business. The remote village people are never conscious about the quality of the products. So it is really difficult to predict what really impresses them. They sort of follow the whims. There are certain typical magazines, which are popular among the villagers. Sometimes putting an advert could be one of the means of promoting the business in those areas. So, solar companies are often found placing advertisements in such magazines which entertains the village people.

Listening to radios is also what the village people are fond of. These days we can see that the FM stations are being transmitted in the eastern part of the country. Kantipur FM is one of the examples, which is quite famous in the east Nepal especially in the areas of Taplejung, Panchthar, Sankhuwasava, Dhankuta, Okhaldhunga and some other districts of the east. This FM station is quite famous in the eastern part of the country. Some solar companies are also found placing advert in the FM. This has proved to be the effective means of promoting the solar business or even other businesses whose end users are the remote village people.

Most of the companies have got lot of promotional materials either published or obtained along with the imported components. Like for example in solar business, the modules supplier sends the brochures and the

performances of the modules along with other promotional materials like the introduction and importance of solar power on earth and several drawings which show the outstanding importance of solar power as compared to the diesel power (i.e. used to run the generators). Such promotional materials are also quite impressive ones as they really attract the readers or the viewers of the display.

Another way of the pro motion is the free distribution of the brochure, which displays the introduction, importance, operating procedure, maintenance procedures and number of other valuable information about the solar power and the solar home systems. Like for example Lotus Energy Private Limited always sends one free booklet with each sale in the rural areas which explains all the above mentioned details along with the proper contact addresses of all the concerned branches and the necessary information of the company.

On top of all the above, the trend was found that the solar companies are also publishing the annual calendars and distributing them to the remote areas for free. The calendars also contain the contact addresses of all the branches and the regional offices along with the contact addresses and the contact numbers.

Among the solar companies, there is always the competition on attracting the new customers and maintaining the new ones. They always keep striving for success for which they have to win the customers. Business promotion is one of the major tool they have adopted to do that and have become quite a bit successful in the implementation.

THE CHALLENGES OF THE SOLAR INDUSTRIES

Most of the solar companies have participated in the sector just to make money and make their living better. But this is not the basic idea. Government would never entertain such companies, which have come down to the filed of solar business just to make money. What most of the companies do is fulfill just enough formalities so as to maintain their existence in the list of "qualified" companies. Some of the solar companies are very loyal to this business and stick to the bindings of the set rules emotionally and practically. This was the idea behind promoting the solar business in Nepal. It is never good to make easy money at the cost of poor people living in hardships. For example if any solar company sells anything

in the remote place and never turns up in that area, it would be unfair to the customer of that area. May be the company des that simply to avoid the inconvenience, but it matters the life of the poor people. They will have to live in the darkness forever that too after tasting the glamour of white light from tube lights. The would really be cheating them.

Another important factor is the uniformity of price of the systems all over the country. Country for the same system. But this is not fair either. This is because it is not the fault of the end user to have their house far away from the company's branch. One very good example is that, Lasersun (one solar company) has its price more than three percent more in kailali then what it is here in the head office (kathmandu). On the other hand companies like Lotus Energy Pvt. Ltd. provides the goods at the same rate even in the places like Humla. When asked about this fact to the Managing Director Mr. James Ronald Goff (Lotus Energy Pvt. Ltd.), he says that Lotus in not an entirely profit based organization but it has some liabilities to the poor and left out people of this nation. According to him his major aim is to provide service to every part of this country and especially to those people who are living in the far remote places and are devoid of electricity.

Every solar company has presented themselves as the service oriented companies, So it has become a sort of challenge to them that they keep this image of theirs in front of the villagers and the government as well.

Service to the villagers

Different companies struggling right now are selling Solar Home Systems to different parts of the country and to the people living in different kind of geographical set up. The customers could be from nearby districts like kavre, Dhading, etc to the remote districts like Humla, Jumla, Dadeldhura, Darchula, Sakhuwasawa etc. So this is a big challenge for the solar companies to provide service to all the customers door to door. But AEPC has set down the rule to make the after sales visits of those customers and the systems they've sold. For the same objectives, AEPC also holds up certain (10 percent) of the subsidy amount so that the solar companies make six monthly visits for at least two times in the first year. Once the companies apply for the remaining amount (subsidy) with the proof to AEPC, they will release the rest of the amount.

AEPC is always smart enough to go to the field and make the assessment which is considered to be the check against the solar companies which claim for the subsidies. It is bit easy to make the after sales visits if the systems are sold in a clustered form in one of the VDCs or the near by VDCs to make the after sales service. But they have to do it anyhow. This is one typical challenge that the solar companies are facing regarding the service to the villagers.
It is hard for the solar companies to keep up with the promises they have made with the villagers, but still they have to try their best to do it as it as its qualification from AEPC is a result of the challenges it has been facing successfully till now.

Field Difficulties

This is another big challenge to the solar companies. i.e. the field difficulties. Field difficulties are one of the challenges, which exist from decades in our country. Even before Maoists stepped in, we had difficulties at times and at places and they are due to the geography, topography and so many other things. In addition to those, we started having several other problems like Maoists problem. Emergency situation, increasing number of loots and murders and what not. This increased the field difficulties tremendously.

In such a scenario of the country, it is difficult for the field staffs not only to go to the field but also to collect the demands, to fulfill their orders, to carry the systems up to their place, to install them, to collect the cash and to come back all the way on foot (two or three days walk). Sometimes they are not even allowed to carry the pipes and wires in the villages for the security reasons. The acid, which is used in the batteries, is not allowed by air. Like for example if the system has been sold to Humla and the field staff would rather not travel except on the airplane.

The major field difficulties are as follows:
The places are too remote.
Collection is sometimes difficult.
Difficult to make the warranty visits.
Villagers' unawareness about the systems and its quality makes things even worse. There are other uncountable difficulties in the field that are faced by the field staffs and which are not yet recorded anywhere. Such difficulties might come along the course of time.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

39.1 SUMMARY

Summarizing this whole topic would be very confusing as this topic "solar power in Nepal" occupies number of issues and many of them are solved where as many of the issues still stand firmly in front of the solar promoters and the solar power companies. Anyway the conscience that has slowly started building up in the minds of the people should be appreciated as this is the outcome of the role played by the major organizations like Agricultural Development Bank/Nepal (ADB/N), Alternative Energy Promotion Center (AEPC), Energy Sector Assistance Program (ESAP) etc. These organizations are also thinking of coming up differently in future to make the solar promotion even more effective in days to come. The organizations, which are engaged mostly in promoting the solar business in Nepal usually, get the feedback from its own field staffs; the solar companies and the problems they state; the end users and so on. With the feedback they get from the field, they are able to make new and better policies so that the distribution of solar power becomes more and more effective in future and maximum people will be able to enjoy the solar power.

A Solar Home System which companies of a solar panel (for charging the batteries), a battery (for storing the charges), a charge (to control the level of charge in the battery), a set of installation material and few tube lights is a very simple mechanism, which can be easily copied by any one. The essence is that there used to be so few solar companies initially which multiplied later to number of solar companies.

Nepal is a country with complicated topography and hence only 18 percent of the population is able to enjoy the power from the national grid, the rest are devoid of this. In spite of such a large potential of hydropower, Nepal has to take help and aid from several foreign donors and commercial companies to generate power from the available resources. The problem is not only with the complexity in the topography but also with the poor economy of the country. Poor economy and poor technology topped with complex geography has really cursed our country and due to which the poor

remote villagers are suffering. Despite the poverty, it has been found (from the study) that the villagers are able to buy the solar home systems. They are ready to invest their life time earning just to live in bright light.

The beginners of solar business realized the above facts and they thought of capitalizing the opportunity. SEC (Solar Electric Company) and LE (Lotus Energy) the pioneers immediately started pilot projects with certain help to make the people aware about solar power. This succeeded to a great extent and people slowly started being ready to make the purchase on their own. Above that, the government also took the initiative and started funding by itself and by getting the donors in the form of subsidy, one way or the other. This boosted the morale of the villagers and the business took the rapid pace.

The shareholders and the staffs of the pioneer solar companies thought that this business could be started independently and so they did. They split from the mother companies and started doing business on their own. They already had lot of contacts while they were on business and so it was not so difficult for them to succeed. Moreover in this business the capital investment is never a problem. Anyone can start a companies couldn't deny them with a fear that they would lose the business.

It is only few large companies that manufacture goods on their own, the rest are kid of trading companies. They don't normally manufacture any goods on their own. This is because of the risk of increase in the overhead costs. They cannot afford to bear the salaries and the research and development activities like bigger companies. As far as most of the process is 'assembly' and not 'manufacture'. They mostly do the sourcing of individual items and assemble them here apart from few chips, which are fabricated here locally.

As far as the problems of the faced by the solar power is concerned, few major ones are as follows:

Lack of exploring the market.
Problems with the marketing mix.
Lack of research works in this particular field.
Practical difficulties in the field.

So the objective of the study has been focused on the above problems faced by the solar companies. To overcome all the above problems and to provide necessary recommendations for them is the basic objective of this study.

Even in this research work there are so many limitations, which have hindered the complete research work. The major limitation of this study is the current unstable political situation and the emergency state of the country. In addition to the above, the nature of this business and the importance of the information about the market is a vital thing due to which the companies were very reluctant to provide the researcher with the market information. This was a big limitation to the study carried out.

The data collected in this research work are mostly secondary. The researcher has also put forth his best effort to collect the primary data on his own by traveling few parts of the country like Kavrepalanchownk, Kailali, Dhading etc.

At present the solar business is at its peak and this rapid pick up has lured many entrepreneurs to commerce this business. This is because the awareness among the villagers are rapidly increasing and they are motivated enough to buy the solar system even without the subsidy provided by the government. The case study of Lotus Energy Pvt. Ltd. has really made this research work quite fruitful. Lotus Energy is the only solar company, which is very professional in this business. It has already carried out many outstanding projects. The expansion of LE's business also gives an example of the expansion of solar business in Nepal. Lotus Energy has many outstanding professionals. The directors are highly skilled professionals (Americans) who have put their entire life in solar research and development. Highly qualified General Manager (Nepalese), Sales Manager (German), many engineers (qualified solar engineers) and number of CTEVT certified field staffs are the biggest asset of the company.

By now there are more than twenty solar companies, which have been registered in the ministry of industries. The ones qualified/certified by AEPC/ESAP are fourteen. Out of them only eleven companies are members of solar association named SEMAN (Solar Energy Manufacturers Association of Nepal). The tax (import tax) free facility and the subsidy facility is obtained by the companies only when they are qualified by the AEPC/ESAP. By registering in ministry of industry of SEMAN don't help them much. It is also to be noted that all the members of SEMAN are pre-qualified where as all the registered companies are not.

When we talk about the subsidy, the affordability by the consumers is automatically confronted. We are quite aware of the economy and the per

capita status of Nepalese. Through the need of installing solar power in their home is quite high, but still they might be set back when they think of the investment to be made. Keeping all these in view, government took a wise step and started seeking for the donors to provide the subsidy to the poor villagers.

Initially the subsidy used to be provided by ADB/N (Agricultural Development Bank/Nepal). The Subsidy amount used to be 50 percent of the quoted price. Later on, the budget was all used and then later entered DANIDA. They started giving subsidies in SHS purchase but in a flat slab basis. The subsidy amount was set to be Nrs.12000, 10000, and 8000 respectively depending on how remote the place is. The donors through AEPC/ESAP give this subsidy amount. It is not that the donors give 100 percent of the subsidy amount but they have made our government to contribute the 10 percent amount and bears the 90 percent amount on its own and has been managing the project on its own. We are almost nearing the end of the program and AEPC/ESAP is also looking for some other donors so that we don't run out of the subsidies for the villagers.

The subsidy program has really made the solar companies easy to make the product and also to convince the customers. The solar companies always look for what exactly the end users expect from the solar home system. Or how does he/she expect to bring changes in his life after having solar home system. In fact it is more like marketing the concept and not the product. Mr.Sven Thomas (Sale Manager, Lotus Energy Pvt. Ltd.) says, "We sell solution to the power problems of the clients and not the different sized solar home systems" and which is very true. One can never impose or force anyone to have a particular size of the system. It all depends on the requirement of the user.

When we talk about the marketing of solar power in different parts of the country, the role of the loan giving organizations cannot be ignored. In fact they have to be given a big consideration. Agricultural Development Bank (ADB/N), which has been supporting on his particular aspect of solar marketing, has contributed a lot in the solar promotion in the country since years. Apart from ADB/N, RBB (Rastriya Banijya Bank) has also started flowing loan in the solar sector from this fiscal year (i.e. 2059/60). The coverage of ADB/N is wide but the coverage of RBB seems to be bit narrow as compared to ADB/N. But still the loan flow, which is carried out by these

two organizations, has lot to do with the marketing of solar power in the remote areas of the country.

Up to now we discussed about the efforts put in by the stakeholders to promote the solar market all over the country. It is good that the coverage is wide and the market expands. But at the same time it is the duty/responsibility of the solar companies to take care of the customers and the systems, which they have sold in the remote areas. Even a small error in the system sold can put the entire house in dark for another so many months. And it is possible for those poor villagers to carry the system all the way from the village to Kathmandu for repair. So AEPC/ESAP has put this as a compulsion to the solar companies to make the warranty visits after every six months for at least one year. This is because the systems are well taken care of and the villagers will be least bothered about the malfunctioning of the system.

Apart from the risk/problem at the consumers' side, there is also big problem/risk at the suppliers' end. The problem includes the availability of trained manpower at every remote branches of the country. Moreover the availability of the solar specialized technician is also another problem. Raw material availability, transportation of goods to different parts of the country is another big issue especially at this stage when anything is not certain including the political situation of the country. Since the remote villages lack communication from rest of the country, so promotion of the product without reaching that particular place is most impossible. Above all, the field difficulties, carrying of cash (on couple of days walk), relying on the agents (with out which business is impossible) etc have really created havoc to the solar businessman. There are several recommended solutions to all above, which will be discussed in the later part of this study.

43.1 CONCLUSIONS

Here in the conclusion part we mostly deal with the problems in a more elaborated form which is stated before and which was formulated to objectives. This is kind of explaining what the present situation of those problems is.

As far as the situation of market exploration is concerned, due to several reasons the solar companies are not too encouraged to invade the rural most areas of the country. The companies are completely unaware about the

financial status of those people. Most of the companies carry a generalized concept that "people of remote areas are poor and that they cannot afford to have solar technology at their houses", which is not true. To know the real situation this kind of research work is necessary which our solar industry lacks to a great extent.

About the problems faced by the solar companies regarding the marketing mix, there are several issues. The most important one is that the concept the solar companies are carrying with them regarding the marketing mix is very poor. In fact, it can be observed that they don't have an idea at all. Most of the companies try to "push sale" the product they have rather than try to find out what the customers' need is (they seem to lack interest in knowing what product they have got to offer for particular customer's problem). This might give them good turnover for the time being but for the later years of the business, it can result to terrible situations. This was the lack of synchronization between first p (product) of the seller and the first c (customer solution) of the buyer. Similarly, talking about the second p (price) and second c (customer cost), the suppliers or the sellers are not able to diagnose the correct price the customer will be able to afford for the particular type of technology. It is not necessary that the poor villager will only look forward to have a high quality product at a higher rate or that he will only look forward to have the cheapest product no matter what the quality is. There should be a kind of optimization point, which has to be researched by the seller. That optimization point is the point where the business booms. The third p (place) of the seller and the third c(convenience) of the customer relates very much to the complex geography of the country, which is aggravated by the present insurgency spread all over the country. It has been difficult for either party to send/carry goods to different remote locations of the country. The last and the final p (promotion) of the seller and the last c (communication) of the customer/buyer are very tactful to explain. What the present situation shows are that the promotional efforts put in by the suppliers doesn't match (to a very high degree) to what the poor villagers anticipate/understand. The communication has to be down at the level i.e. in the language, which the villagers understand. It has been found that few companies have done quite good in this aspect but still that is one of the problems with most of the solar companies. So this is the present situation of the solar companies and hence the solar business in context to marketing mix.

Now about the overall prospects solar energy industry has in Nepal, we can very well say that this statement is very huge to be explained in few lines. From the research study, it was found out that the political instability, government policy, subsidy mechanism and the loop holes found everywhere in the whole ecosystem added up by lack of field information and the lack of technical knowledge has put the solar business under a big question mark.

Lastly about the problems due to mismanagement and lack of coordination, this is the business full of complications. At the same time this business requires full faith and reliance on the field level. On the contrary, how can an owner rely on the staffs completely? The decentralized structure could put the whole business in risk and at the same time the centralized control could mesh up things. This is exactly what is happening here with the solar business. In addition, the solar companies lack skilled management staffs (professional) due to which the traditional way of carrying out the business prevails.

Prospects for the solar industry:

As discussed several times before, the solar companies should be wise enough to carry out a research like this (with a minimum cost), so that they can easily pin point the potential market. All they have to do is remain little bid conscious while choosing the samples like the ones the researchers have done in the study. All this business need is information. From one angle, it might be looking like this market is nearing the saturation, but this is not true, there are so many unexplored areas. People of so many potential areas are still not aware about the subsidy scheme and about the solar power. The knowledge of solar power is another important factor. Wider the knowledge is spread, more potential the market is so the most important factor is the exploration of the market. As this study has found out that the places like kailali and Baglung are turning out to be more and more potential, similarly there could be other places, which might have slipped off the eyes of the researcher, which could be a potential market for solar power.

43.2 RECOMMENDATIONS

When we think of recommending something, it should always be focused in what direction the problem exists. We can enumerate the list of problems first, and then determine the necessary objectives to achieve which we have

to have recommended solutions to the stated problems. So the recommendations to the ones involved in solar business are stated below:

43眩2.1 To explore the market for solar power in Nepal.

Being such a potential area, our remote places are still not explored by the solar companies. Every company is just roaming around the available road heads and never dare to enter into the potential area, which is very far off from the available access road or the road head. Government has given more subsidies to the areas, which is very far off from the access road. So the solar companies should capitalize this opportunity and start exploring in far remote areas like Humla, Jumla, and Mustang etc. here in the study it is very clearly found that the districts like Dhading, Ilam and Kavre are quite potential areas. And the proximity effects also exists due to which the near by districts could turn out to be potential again. So the solar companies should keep on trying their luck but in a more organized and sensible way. This is true that the people of far remote places might not be able to afford even for the smallest sized SHS. The case is always not the same. For example the people of Mustang and Humla are rich enough to buy the systems even without the subsidies grant from the government. Till now solar companies have gone to far remote places only when they got any lump sum contract from any NGO/INGO. For example Lotus Energy Pvt. Ltd. has installed about fifty systems in Dolpa and is going to install another fifty systems by March, 2003. This is the contract LE is having with WWF (World Wildlife Fund). The people from Dolpa are quite poor and might not be able to make the purchase on their own. The programs like WWF look upon such areas. Besides, there are so many places even in non-remote districts, which have not been explored yet. Whichever company first approaches them, can grab the sale.

All, the solar companies need is the "information". The companies can even hire people to get the information about the places and the market for solar. The companies can even go for "head hunting" to look for the people who are active locally and then make them work in the commission basis. As this business is entirely dependent on the "influence" which one can exert locally, so this step should be a must. It is not that the companies are not doing this, but not to a sufficient extent. Exploration of market and the according follow up is a must to survive at this age of competition.

43眩2.2 To examine the problems faced by the solar companies regarding the marketing mix.

Marketing mix relates four Ps of the spillers with the four Cs of the consumer (which is already explained in the former part of the study). The main issue would be to relate those inter relationship of four Ps and four Cs to the context of marketing of solar power. Those four Ps and the corresponding Cs are as follows:

Four Ps	***four Cs***
Product	*Customer solution*
Price	*Customer cost*
Place	*Convenience*
Promotion	*Communication*

First P of seller and first C of customer in solar market:

As mentioned before, the solar companies don't sell the specific product like A or B. It is the solution to the power problem, which they sell. Even the companies with any product boast that they sell the solution to the problems customers are having (may be even tea of biscuit sellers). In fact this is true to some extent, but still this should imply much more the solar product. This is because there is on definition of any particular product in solar sector. It all depends on how much electricity a customer wants and not on hoe big system they want. They are not the one to know the solution themselves. It is the responsibility of the company to identify their problem and recommend them with the appropriate solution. The customers should be encouraged to use a particular type and size of the system. But to fulfill ones own greed, the customers should never be misguided. It is not only a matter of one customer; it is the matter of the whole market. Customers are so powerful that they can make the life of the supplier very miserable. So a grate care has to be given in suggesting and providing the customer with the product launch should also as per the taste of the local people and their needs.

Seconds P of seller and the seconds C of customer in the solar market:

The other major issue is the price of the product and the affordability by the customers. Price does not stand-alone. For example lotus Energy never compromise with the quality and hence have a high cost system. But still, the return villagers get out of the systems supplied by LE is of great worth.

Similarly there are some companies, which sell very cheap quality products. These products are so cheap that anybody would be attracted to by it. On the other hand, there is on guarantee on how long the systems will remain in operation without malfunctioning. The basic essence is, neither the customers can afford too high price only for quality nor it is good for them to by the systems, which are too cheap but poor quality. An optimization point should be determined where there is a compromise of the quality and the price. This helps villagers to afford the purchase and still get the considerable quality.

Third P of seller and third C of customer in the solar market:

In this context, the product should be made available in a place, which is very convenient to the customer. Every customer wants the product be available at his or her doors. It applies to the customers of the urban areas too. So it is quite obvious that is solar market, the customers wouldn't prefer to come all the way from their place to Kathmandu just to ensure whether they are getting the quality products and at products locally available either by permanently placing or assigning staffs district wise or by opening up branch offices in as remote areas as possible. This will increase the overhead costs though. The best solution to this problem would be to make someone from that area an agent and make the provision of home delivery. As for now, Lotus Energy Pvt. Ltd. looks after the transportation only up to the road head and not beyond that, which will not be favorable to the villagers in any case.

Forth P of the seller and fourth C of the customer in the solar market:

The forth P of the seller is the Promotion and the forth C of the customer is the communication. The P of the seller should vibe with the C of the customer, or in other words the P of the seller should be related to the C of the customer. In this case, the consumers might not be aware of the product or the benefits of using the products because they have never heard of it. This again might be due to the lack of the promotion of the product by seller. In the context of solar market, the remote villages are devoid of all kinds of communication (except Radio Nepal and NTV) medias except for some districts in the east where they can listen to Kantipur FM apart from Radio Nepal and NTV. So in the areas where the radio and TV service is available, a proper advertisement would be an appropriate and where possible the

pamphlet, brochures, calendars, education on solar power, etc would create a lot of market for solar power.

A short recommendation could be "Winning companies will be those who can meet customer needs economically and conveniently and with effective communication."

43眩2.3 To investigate the overall prospects solar energy industry has in Nepal.

When we talk about the investigation of the prospects that solar energy has in Nepal, two major issues are confronted and they are technical aspects' investigation and the field information investigation and most of the solar companies are weak in both. At this point of time, since the individual subsidy program is going to end, the companies also should start thinking about exploring the new possibilities. They should find out the ways of marketing the products even without the subsidy. At the same time government will provide the subsidy on the Institutional Systems though not on the private systems. So the companies should start targeting for the larger systems where the provision of the subsidy will be up to 75 percent of the project cost provided the size of the system in terms of array of Solar Panels is less than 1000W.

The most worrying issue is the solar companies are growing (not matured yet) and the environment is very dynamic. The policy of the government, situation of the country, subsidy policy etc keeps changing and so they are the major reason for the retarded growth of the solar business.

So it is a must that the companies not only pick up the pace to meet the pace of the surrounding environment but also enough pace to fight back of them and still survive.

Newer products, newer areas, newer customers, newer ideas and dynamic promotion of the products will definitely make the business successful.

43眩2.4 To elaborate the major problems due to mismanagement and lack of coordination and several other reasons along with the recommendations that could improvise them.

First of all, before knowing what to improvise, a company should know what the flaws or the problems are. Problems existing could be due to several reasons, the major ones being lack of coordination and due to lack of mismanagement. This can be easily overcome. The management should have a 'bird's eye view' over the entire business so that it can locate or at least identify where and how things are not going right. It can be easily seen whether the lower level management is doing its best or whether there are any loopholes in the business, which still has a room for betterment. This is a kind of business where the activities should be carried out in a decentralized pattern. If the lowest level in charges always has to wait for the management approval for every small decision, things will get late and the business is down. This business is very typical. On the contrary, there are so many things, which cannot be left at the discretion of the lowest level in charges. The management has to interfere in that. This is very contradictory to the above statement, but still is very true. What a highest-level management can do is find out the optimum value or level, which demarcates whether the decision can be made at the branch level or whether the top-level management has to interfere in that. After that everything has to be channelized.

So many times the practical field difficulties, which cannot be answered, creep up. The management at the central cannot do anything on that apart from watching it. In that case, the tool of decentralization can be used. This can also be considered as the opportunity to locate the best resources of the company by judging how that local branch in charge acts on the situation.

If all the above-mentioned tools are used in an effective way, the solar companies could achieve a considerable benefit out of this.

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