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LACK OF INFRASTRUCTURE, ENERGY MARKETS AS AN OBSTACLE IN THE PROMOTION OF CLEAN ENERGY

Dr. Anshu Mali* & Maliha Maliha Batool*

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Abstract

Purpose: *In the rural areas of developing countries most of the people have less access to renewable sources of energy due to less developed transport, markets, less infrastructural development. In these areas maximum people are dependent on traditional sources of energy which is less sustainable, even if some households have some solar equipment brought by them from urban areas, yet they face repairing problem. The aim of this paper is to analyse that a development in the proper supply facilities and more progress in rural markets can be solution to increasing the use of renewable and clean sources of energy which are more sustainable.*

Design/Methodology/Approach: *Multi stage purposive random sampling techniques have been used in order to select the respondents from the two blocks of particular selected district. The final sample size for the collection of primary data is 180 households 30 from each village. After data collection from the field, edition, tabulation and finally analysis was done by using simple statistical tools like percentages, averages etc.*

Findings: *The main findings from the field survey is that people of the rural areas have lack of marketing facilities, lack of supply chain for the renewable sources of energy and even lack of repairing facilities. Even among the rural areas there is much disparity as the rural areas near to the urban areas have more access to clean sources of energy in comparison to the distant rural areas.*

Practical Implication: *There is need for development of supply chain so that people have easily access to clean renewable sources of energy, developed market and easy repairing facilities. By easy repairing facilities the already installed solar equipment's fixed cost will be covered.*

Keywords: *Renewable energy, Supply chain, rural markets, Development*.

* Research Scholar, Department of Economics, University of Jammu.

**Lecturer GDC Nagrota, Jammu

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Introduction

In India nearly 70% of the country's population lives in rural areas. According to Census of India's 2011, Of the 121 crore Indians, 83.3 crore live in rural areas while 37.7 crore live in urban areas. The living condition of the rural India is not satisfactory. The rural people are living a life of immense poverty with cultivation as only source of their livelihood and with less employment opportunities. These don't have availability of good roads, proper educational facilities, well managed banking facilities and proper clean sources of fuel, also lacking health facilities like availability of few good doctors and lack of hospitals. The bulk of the people in Indian rural households are illiterate and ignorant. They are indulged in non-economic activities and other wasteful habits. They have a habit of wasting time by quarrelling over petty matters and spending a large sum over litigation. Many rural households do not have even knowledge of the importance of cleanliness due to lack of literacy and education as the result dirt has been observed all over in the villages. Due to lack of cleanliness most of the people fall an easy prey to diseases.

Talking about the heating and cooking aspect in major instances people of these areas are dependent on firewood. In rural energy maximum share of energy comes from firewood which is not sustainable as burning of it releases a lot of smoke, dirt and results deforestation etc. In the recent times there has been seen a continuous shift towards modern sources of energy as development is taking place but the pace of switching is more rapid in the urban areas and even the rural areas much shift has been seen in the areas where there is ample supply of modern fuel and highly developed market. So, there is need for development of proper market facilities and increase in supply of renewable sources of energy chain in these rural areas.

RURAL MARKETING

Rural marketing involves a process of developing, promoting, pricing and distributing rural specific goods and services leading to desired and need Base Exchange with rural customers that satisfy their needs and wants, and also to achieve organizational objectives in view.

Need

Rural Marketing in India Economy is very significant as it plays an influential role in the lives of people. In India if we try to leave out a few metropolitan cities, all the districts and town are connected with rural markets. These rural areas generates biggest source of revenues in the country as in these rural regions maximum consumers belong to in this country. There is need to address needs of 70 percent of rural population which is highly scattered and holds a big promise for the marketers as the purchasing power of these rural people is on rise day by day. Traditional outlook of these rural people is changing day by day as with time the rural population is changing its demand pattern, and there is demand for more branded items and clean renewable sources like LPG in villages. The universality of rural markets in India assure the proper and timely facilities of clean sources of energy and people belonging to the rural areas with proper channels of these sources will develop a habit of using the same and once people switch to modern sources of energy they hardly think of returning back to the traditional source of energy.

In India about 68% of the market is untouched due to inaccessibility of sustainable development such as infrastructure, transportation, electrification etc. India's rural market offers a great potential for the marketers and seems to be the replacement of urban market in future. The rural market is very attractive with its increasing demand and offering the opportunities like increase in

population with an increase in demand, an increase in the rural income due to agrarian prosperity and with huge inflow of investment for rural development programmes from government and other sources.

At present there is rapid development in infrastructure all these opportunities attract companies to target rural market. With some technological advancement breakthrough has been in distribution and marketing of products in rural India, companies in rural market can earn more profits, income, greater market share, etc. The Rural market has a greater future prospect for the marketers and there are many more opportunities available for them in rural markets. The development of rural markets will make both the retailers and the customers to reap all round benefits involving profit to the retailers and proper availability of good and services to the customers at the grass root level. (Talwar, 2014)

Need of proper Supply of renewable sources

In rural area of India most of the people have no access to clean sources of energy because of lack of transportation facilities and lack of proper road connectivity as a result they find no alternative but to use traditional sources of energy. Proper supply chain involve a system of organizations, information, activities, people, and resources involved in moving the goods or service to customers who are in need from supplier.

Rural supply chain system involves goods or items that flow through various levels of hierarchies of suppliers, distributors and customers. We need a mechanism to track the goods at every level of the supply chain system. Supply chain systems in rural developing regions are extremely fragile and are vulnerable to a wide range of security threats. (Varun Gautam, 2015)

Rural supply chain networks involving the use of huge technologies, keeping in mind the

Inefficiencies and supply constraints imposed by the infrastructure like lack of roads, transport etc. and economic environment. (Viswanadham, 2007)

While talking about the importance of physical distribution in rural marketing, the researchers always highlight the importance of the proper supply channels and it has been stressed that there is need to take into account of customers' needs to improve service and save on costs in such physical distribution so that needs of the customers is met properly.

Why there is need of rural markets

Sixty thousand villages in India have no form of retail outlet, making it very difficult for products to reach potential customers there. But, three million retail outlets are existing in the remaining villages. The challenge is how the people in these areas get products which are needed and those outlets and replenish them consistently and reliably. There is need to explore the needed factors that will enhance the efficiency of rural supply chains. Need is of improved data collection, infrastructural linkages, Training of local talent, and information on rural markets, etc

Rural Marketing can play an important role in the overall economic development of the country. There will be growth and development of rural industries which can facilitate local villagers by providing them self-employment, resulting in wider dispersal of industrial and economic activities and can and helps in the maximum utilization of locally available raw materials and labour. Rural industries will be beneficial as these will play an important role in the socio-economic conditions i.e increases living standards. (Gosavi, 2016)

The study shows that awareness about renewable energy technologies and willingness to pay for electricity access has

increased considerably. However, there is a huge financial gap between the cost of electrification and affordability among the poor. The distribution analysis shows there is significant increment in the extensive growth but decrease in the intensive growth rate of rural electrification thus indicating market expansion with uneven penetration among the rural people. Solar PV technology is still not in the reach of the economic poor. Access to credit and cumbersome subsidy delivery mechanisms have been perceived as the major factors affecting the expansion of rural electrification by the stakeholders, requiring innovation in the credit and subsidy delivery system so that a larger rural population can be given access to electrification

Review of Literature

Review of literature deeply summarizes, properly evaluates, provides the theoretical basis and determines what the nature of a researcher's work is. It provides a context for the researcher's research, ensuring that the research is not a replication of facts done before but it shows the place where the research fits into existing body of knowledge, throws light on previous research flaws and research gaps that exist in past studies.

Peng et. al (2008) They described the view point that maximum rural population are using traditional fuels and the inter fuel switching is at an early stage, the reason behind being at an early stage is- not actual absolute rise in income. Coals burning being a source of air pollution, so people prefer natural gas and electricity as an important source. Improved clean and modern sources of energy have increased chances of being used in future.

Talwar et al There are many opportunities available for the marketer in rural markets as it is much population lives in these areas. With the rapid development in infrastructure in these rural area all these opportunities attract companies to target rural market.

Umair Shahzad 2012 The governments need to revise the power policies to cope to make full use of renewable energy sources in both rural and urban areas and with the energy crisis and Innovative solutions must be put forward by experts in the field to solve the increasing energy. Technological exchange programs to help the developing countries to establish, build and reinforce the renewable energy sector need to be initiated by developed countries. For the promotion of renewable sources of energy there is need of making renewable sources of energy more availability at rural areas.

Moll E 2015 The burning of non-renewable sources of energy pollutants result respiratory illnesses produce acid rain that devastates buildings and destroys fragile ecosystems even the death in humans, and deplete the ozone layer through global warming. On the other hand are free from such hazards so there is need to make renewable sources available via development of infrastructure and make them easily available through markets.

Qureshi et al (2015) Hussain et al (1987) In rural areas large quantities of energy is required as fuel for cooking food as well as for keeping houses warm during severe winters. To meet the demands for fuel wood for household purpose, the households usually depend on local forests or other community lands whereas less is obtained from markets. In high altitude fuel wood and kerosene are the two main sources of energy.

Moore *et. al* (2011), analyzed that in Brazilian state of Minas, Gerais, and observed that in the area of being endangered Atlantic forests, rural households use wood as a source of domestic energy. They conducted a survey of 48 households in four small rural communities and came with the conclusion that fuel wood is the main source of

domestic energy. Illegal felling of trees without permit is done by many rural residents for domestic use. Household energy use is much influenced by socio economic status proving same as explained by energy ladder model. Governmental policies of imposing severe restrictions on firewood may be able to make a number of households to switch to the modern who at present are at an impossible position to cut fire wood consumption and not able to afford LPG..

Study Area

Doda is situated between 32° 53´ and 34°21´ N latitude and 75°1´ and 76° 47´ E longitude E and is an eastern district of Jammu region. It is 175 km away from Jammu. There are two national highways NH- 1A and NH- 1 B connecting the district. Doda was a part of erstwhile Udhampur district till 1948 when it was partitioned into Udhampur distric and Doda district. In 2006 state trifurcated the district into Doda, Kistwar and Ramban. Doda occupies 556th rank out of 600 total districts in India. Doda district is a part of Jammu division and has an area of 4500 Sq. km. In the west it shares boundaries with Ramban, Kistawar on its east and Anantnag on its north. Doda district has two sub divisions Doda and Bhaderwah. Itcomprises of 4 tehsils - Doda, Thatri, Bhalessa and Bhaderwah. Of the four tehsils Doda is the largest. These tehsils are further divided into 8 community development blocks- Bhaderwah, Thatri, Gandoh, Marmat, Ghat, Assar, Bhagwah and Gundana

Research Methodology

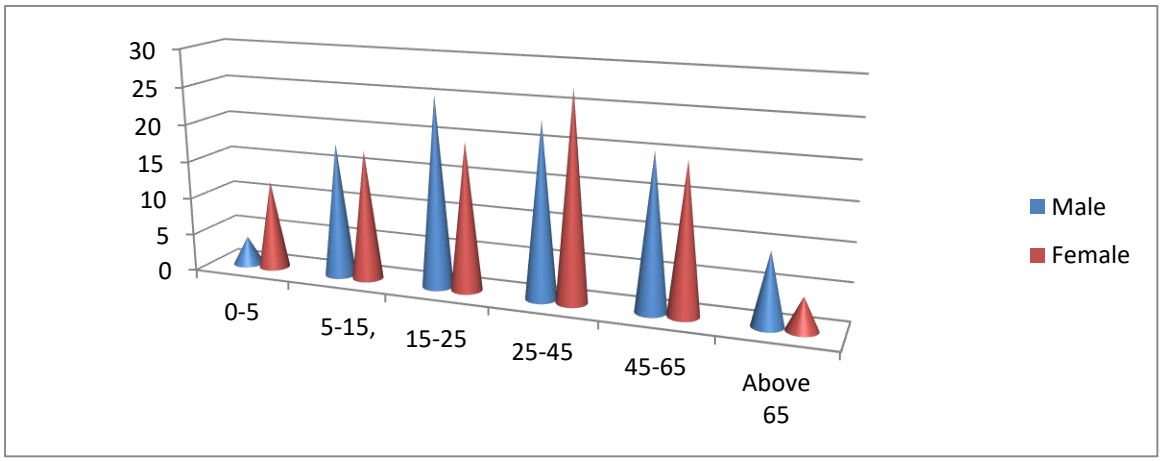
The paper is based on primary data to show that people living in the areas where there is more availability of modern fuel are more likely to use modern for domestic purpose in comparison to other areas. Multi stage purposive random sampling techniques have been used in order to select the respondents from the block of particular selected district. The final sample size for the collection of primary data is 180 households 30 from each village and 90 from each block. After data collection from the field, edition, tabulation and finally analysis was done by using simple statistical tools like percentages, averages etc. In addition to the primary data the study is based on the extensive study of past literature and uses secondary data for the same.

Discussion and Analysis

Demographic and educational profile

Demographic profile and Educational profile shows the population characteristics. In the study area total population is 925, out of which 470 were male and 455 females. Out of the total 54 percent of sample population is educated the age wise total educational composition is given in the figure 1

Figure1: Age wise- Educational profile in the study area



Source: Field Survey

Status of fuel used in the study area

Various fuels are used depending upon the availability, price, time consumed for bringing the same to home etc. In the rural areas most commonly used fuels are firewood, cow dung, LPG etc. The status of fuel in rural areas in comparison to urban areas do not involve clean energy as these areas have less access to the same because of lack of proper infrastructural facilities. The fuel used in the study area is given in the table1

Table 1: Status of Fuel used in the Study Area for domestic purpose

S. No	***Block***	***Village***	**Wood**	**LPG**	**Electric heater**	**Mix of LPG and Wood**	**Total**
	Bhaderwah	***Kansar***	10	-	-	20	30
			(33.3)a			(66.7)a	100)a
			(27.0)b			(26.3)b	16.7)b
		Hadal	8	4	-	18	30
			26.7)a	13.3)a		60.0)a	100)a
			(22.2)b	(6.5)b		(23.7)b	16.7)b
		Barie	10	5	-	15	30
			33.3)a	16.7)a		50.0)a	(100.0)a
			(27.7)b	(8.2)b		(19.7)b	16.7)b
2	***Thatri***	***Badanu***	5	20	-	5	30
			16.7)a	66.6)a		16.7)a	100.0)a
			(13.9)b	32.8)b		(6.6)b	16.7)b
		Kutan	3	17	-	10	30
			10.0)a	56.7)a		33.3)a	100.0)a
			(0.1)b	(27.8)b		(13.2)b	16.7)b
		Tipri	-	15	7	8	30
				50.0)a	(23.3)a	26.7)a	100.0)a
			-	(24.6)b	100.0)	(10.5)b	16.7)b
3		***Total***	36	61	7	76	180
			(20.2)a	33.8)a	3.8)a	42.2)a	(100)a
			(100)b	(100.0)b	(100.0)b	(100.0)b	100)b

Source: Field survey

Subscript a-shows the percentage of family type with respect to row total

b- shows the percentage of family type with respect to column total

From table1 it is clear that in the study area maximum are using a mix of fuels ie wood and LPG. In comparison to block Thatri more people using firewood for domestic purpose is seen in Bhaderwah villages because of lack of road facilities in the area and lack of infrastructure

Availability of clean fuel for domestic purposes

Various fuels are used like firewood, cow dung cakes, LPG etc. Most common fuel which is commonly available is firewood but it is not preferred because of high smoke level, dirt level, time spent in collection of the same etc.

Table 2: Do you Have you LPG Cylinder

S. No	*Block*	*Village*	**Yes**	**No**	**Total**
	Bhaderwah	***Kansar***	25	5	30
			83.3)a	16.7)a	100)a
			14.7)b	45.5)b	16.7)b
		Hadal	28	2	30
			93.3)a	6.7)a	100)a
			16.5)b	18.1)b	16.7)b
		Barie	26	4	30
			86.7)a	13.3)a	(100.0)a
			15.4)b	36.4)b	16.7)b
	Thatri	***Badanu***	30	-	30
			100)a		100.0)a
			17.8)b		16.7)b
		Kutan	30	-	30
			100.0)a		100.0)a
			17.8)b		16.7)b
		Tipri	30	-	30
			100.0)		100.0)a
			17.8)b		16.7)b
3		***Total***	169	11	180
			93.9)a	6.1)a	(100)a
			100)b	100)b	100)b

Source: Field survey

Subscript a-shows the percentage of family type with respect to row total

b- shows the percentage of family type with respect to column total

From 2 it is clear that LPG has been made available in the area as 94 percent have LPG facility but the problem seen in the remote areas is the filling at proper time.

1. Information regarding filling of cylinders

Having modern fuel i.e LPG cylinders is not sufficed but timely filling of these cylinders is very essential. In the of the country which lie in most of the remotest areas there is lack of filling these LPG cylinders etc. Questions have been asked from the respondents whether lpg cylinders are timely filled the respose is given below in table 3

Table 3 Have you regular supply of filling LPG cylinders

S. No	*Block*	*Village*	Yes	No	Total
	Bhaderwah	***Kansar***	-	30	30
				100)a	100)a
				16.7)b	16.7)b
		Hadal	-	30	30
				100)a	100)a
				16.7)b	16.7)b
		Barie	-	30	30
				100.0)a	100)a
				16.7)b	16.7)b
	Thatri	***Badanu***	30	-	30
			100)a		100)a
			16.7)b		16.7)b
		Kutan	30	-	30
			100)a		100)a
			16.7)b		16.7)b
		Tipri	30	-	30
			100)a		100)a
			16.7)b		16.7)b
3		***Total***	90	90	180
			50.0)a	50.)a	100)a
			100)b	100)b	100)a

Source: Field survey

Subscript a-shows the percentage of family type with respect to row total

b- shows the percentage of family type with respect to column total

From table 3 shows in the three villages from block Thatri where there is proper availability of roads there is timely filling of these cylinders in comparison to other three villages of block Bhaderwah. So there is need to see over the issue

2. Interval after which LPG are filled

LPG cylinders have quality of being durable and able to be used again and again, for using again and again these require to be filled. Interval after which LPG are filled question has been asked from the respondents whether they have LPG cylinders

Table 4: After how much interval you get LPG filled

S. No	*Block*	*Village*	1month	1-2 months	2-6 months	Not using	Total
	Bhaderwah	***Kansar***	10	10	5	5	30
			33.3)a	33.3)a	16.6)a	16.6)a	100)a
			9.7)b	26.3)b	17.9)b	45.5)b	16.7)b

		Hadal	6	15	7	2	30
			20.0)a	50.0)a	23.3)a	6.7)a	100)a
			5.8)b	39.5)b	25.0)b	1.8)b	16.7)b
		Barie	5	10	11	4	30
			16.7)a	33.3)	36.7)a	13.3)a	100)a
			4.8)b	26.3)b	39.3)b	36.3)b	16.7)b
2	***Thatri***	***Badanu***	25	3	2		30
			83.3)a	10.0)a	6.7)a		100)a
			24.2)b	7.8)b	7.1)b		16.7)b
		Kutan	27		3		30
			90.0)a		10.0)a		100)a
			26.2)b		10.7)b		16.7)b
		Tipri	30				30
			100)a				100)a
			29.1)b				16.7)b
		Total	103	38	28	11	180
3			57.2)a	21.2)a	15.5)a	6.1)a	100)a
			100.0)b	100.0)b	100.0)b	100.0)b	100)a

Source: Field survey

Subscript a-shows the percentage of family type with respect to row total

b- shows the percentage of family type with respect to column total

From the table 4 it is clearly seen that most of the households fill cylinders after 1 month followed by those households who fill after 1-2 months. Most of the people want to fill the cylinders after 1 month but in three villages of Bhaderwah have no filling facility but still they manage to fill it by sending it to urban area.

3. Means by which the filling the cylinders is taking place

In some places near the urban area and those areas which are properly connected with roads as these have regular and proper supply of filling the cylinders

Means by which the supply reach to the customers

S. No	***Block***	***Village***	**Via Vehicles**	**Via Donkeys**	**Not using**	**Total**
	Bhaderwah	***Kansar***		25	5	30
				83.3)a	16.7)a	100)a
				14.7)b	45.5)b	16.7)b
		Hadal		28	2	30
				93.3)a	6.7)a	100)a
				16.5)b	18.1)b	16.7)b
		Barie		26	4	30

				86.7)a	13.3)a	100)a
				15.4)b	36.4)b	16.7)b
2	***Thatri***	***Badanu***	30			30
			100)a			100)a
			17.8)b			16.7)b
		Kutan	30			30
			100.0)a			100)a
			17.8)b			16.7)b
		Tipri	30			30
3		***Total***	90	79	11	180
			50.0)a	43.9)a	6.1)a	100.0)a
			100.0)b	100.0)b	100.0)b	100.0)b

Source: Field survey

Subscript a-shows the percentage of family type with respect to row total

b- shows the percentage of family type with respect to column total

From table 5 it is clear that the three villages of Thatri have proper filling facility as the place is connected via roads while other three places have no proper road facility especially in Kansar, Hadal and Barie of Bhaderwah where people still manage to bring the LPG via donkeys. It means even if an area is far away but people are induced by modern fuel.

Conclusion

From the above discussion it can be concluded that in rural areas people are still dependent on firewood which is not sustainable. There is a need for making these rural households to switch to modern renewable and clean sources of energy for reaping all round benefits like clean environment, proper hygiene and indirect benefits like saving time. Government is taking steps for proper improvement in infrastructure so that there may be a complete switching to these modern sources of energy. There is need for improving supply chain and proper market development for these rural households which are the base of economy to shift to modern energy resources. Villagers should be encouraged to use of renewable energy resources like solar energy and LPG which are clean and renewable sources. Community biogas plants should be installed which is clean, green and convenient fuel for cooking. Apart from it proper awareness to villagers should be provided about the need of using clean and renewable sources of energy. More and more subsidized LPG and solar lights facilities should be made for rural households. Repairing facilities in case of damage of the solar lights and other new modern devices should be made so that in case of damage these equipment should be repaired. Awareness about the clean renewable sources of energy requires most attention. Training programmes are needed to be developed in the local languages so that information about benefits of solar energy and its proper use and the maintenance plants being installed in the villages. Awareness about the clean renewable sources of energy should be also be telecasted on national television and radio in the regional or Hindi language for these people. Involvement of women is

very important as women are the chief end users of electricity in the households as they spend most of their time indoors doing most of the household work. Empowering them is related to empowering whole society. So, special training programmes need to be generated for women and be delivered from time to time.

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