

# Stakeholders Perception of Socio-Economic Benefits of Rural Electrification Programme in Zimbabwe: A Case of Umzingwane District

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**Abstract** The government of Zimbabwe has embarked on the Rural Electrification Programme from 1989. The programme's objectives are to stimulate socio-economic development in rural areas of Zimbabwe through the provision of access to electricity; to raise the standards of living of rural people through the delivery of enhanced social services in health, education and income generation projects. There is strong belief that the programme will help reverse rural to urban migration. To evaluate the stakeholders' perception of socio-economic benefits of the programme the study employed a quantitative descriptive approach. Descriptive statistics and stepwise regression analysis were applied to draw relationship between variables under study. A self-distributed questionnaire based on a Likert scale of 1-5 was administered to investigate the stakeholders' perception of the benefits of the rural electrification programme in the Umzingwane District for the period 2005 – 2010. A prior or pilot study was conducted to establish the reliability of the instrument and a coefficient of 0.742 was obtained. Data was analyzed with the aid of the Statistical Package for Social Sciences (SPSS). Different classes of respondents had different perceptions on the benefits of the Rural Electrification Programme. Mostly literate respondents perceived that Rural Electrification Programme brought more benefits on service delivery especially on health, communication and human resources retention, while the illiterate, who comprised mainly the villagers, perceived that the Rural Electrification Programme did not bring much of benefits to them.

**Keywords:** rural electrification programme, socio-economic benefit, income generation projects, social services

## 1. Introduction

The approach to rural grid extension in Zimbabwe is to focus on an electrified rural centers, often called 'growth points'. These are rural centers where local government infrastructure such as police stations, agricultural extension and health services is located. Local councils promote enterprise development and let small stands, typically a few hundred square meters to small and medium scale enterprises (SMMEs). Rural electrification has been the cornerstone of rural energy programs in developing countries. Electricity has provided a safe and efficient energy source for residential and public lighting, pumping drinking water, irrigation, refrigeration, rural industries, and many others [1]. Clearly, rural electrification has been beneficial to developed societies, and most early policy planners felt that the same or similar benefits could be achieved in developing societies. Recently questions have been raised regarding whether the benefits of rural electrification for a developed society can be duplicated in the developing country context [2]. There is almost unanimous consensus that electrical energy plays a pivotal role in national development, indeed there is a high degree of correlation between electrical energy use and development [3]. However in spite of the above

assertion, roughly 22% of the world population still does not have access to electricity [4]. The International Energy Agency estimates that in the year 2008 this represented approximately 1.5 billion people, most of whom lived in remote areas often too difficult to access and therefore to connect to national or regional grids [4]. Today the vast majority of these people are found in rural areas in the Sub Saharan Africa and South Asia [5]. In an effort to try and expand access to electricity by its citizens the government of Zimbabwe established the Rural Electricity Agency after studying similar programmes in the SADC region.

The Rural Electrification Agency (REA) is a fairly new organization that was established in terms of the Rural Electrification Fund Act in Zimbabwe. In February 1989 the idea of a countrywide rural electrification programme was mooted. This culminated in the 1995 Africa Development Bank funded Master Plan Study, which was carried out by Water and Power consultancy (WAPCOS) Limited of India. This study led to the current Rural Electrification Programme, which was endorsed as a cabinet approved master plan in 1997. In 2002 the Rural Electrification Fund (REF) Act Chapter (13:20) was passed in Parliament. This resulted in the creation of the Rural Electrification Agency (REA).

The broad objectives of the Zimbabwe's Rural Electrification Agency (REA) are as follows:

- To stimulate economic growth in rural areas of Zimbabwe through the provision of power to the agriculture and commercial sectors;

- To raise the standard of living of rural people through the delivery of enhanced social services in health, education and commercial sectors;

- To help reverse rural to urban migration and related environmental degradation;

The creation of REA resulted in the fast tracking of electricity installation in many parts of the country. Rural electrification has been a source of both praise and criticism by development analysts in terms of its costs and benefits. This study analysed, the stakeholders' perception of socio-economic benefits of rural electrification in the Umzingwane District in Zimbabwe.

## 2. Literature Review and Theoretical Framework

### 2.1. Definition of Rural Electrification

Before focusing on the main issue that this paper seeks to address, that is, the perception of the socio-economic impact or benefit of rural electrification in Zimbabwe it might be pertinent to look at the various definitions of rural electrification. Indeed there is very little disagreement as to what constitutes rural electrification as shown by the following definitions;-

Rural electrification is the process by which access to electricity is provided to households or villages located in the isolated or remote areas of a country. Due to rural electrification the rural population starts participating in a "self-problem solving" climate rather than a "depending on the government" climate. This obviously results in increased net tax revenue to government, thereby improving citizens-government relation [5]. The two authors [6] concur with this definition when they say rural electrification can be defined as the provision of electricity to areas of low demand and highly dispersed potential consumers. Remote or rural regions lacking electricity supply are often characterised by well identified challenges. They may lie at a reasonable distance from national or regional electricity grids (remote villages in the Amazon) and may be difficult to access (far from urban centers with a difficult terrain such as large rivers or jungles). Naturally they may suffer harsh climatic conditions that render electrification through grid extension a perilous task [7]. In addition to these challenges, the rural poor areas without access to electricity either spend relatively large amounts of their scarce financial resources on energy, or a disproportionate amount of time collecting firewood [7].

What should further be emphasized is the fact that rural electrification is essentially a village level input into social and economic development, utilized by households, farms and establishments [5]. The use of rural electrification may lead to certain changes or social/economic development at the village level as well as at the household level. At both levels, these changes might involve employment, incomes, productivity and others. A good example can be cited in the agricultural sector, rural electrification might lead to changes in irrigated area, causing changes in cropping intensity and cropping pattern, which in turn leads to changes in the use of factors

of production (for example, employment, agricultural innovations), all ultimately affecting productivity and income. It is pertinent to note that such change processes might occur in different ways across all sectors. For example the changes at the household and community levels may interact with and reinforce each other, and may become self-sustaining processes. The interaction and changes at both levels produce certain outputs which may ultimately enhance the rural quality and standard of life.

### 2.2. The Relation Between Infrastructure and Growth

Most of the studies that have been conducted in the area of rural electrification have concentrated on the issue of infrastructural development in the rural areas in order to stimulate economic activity in the rural areas and thus minimise rural urban migration. The recent literature on rural electrification has emphasized the importance of linking its development with productive uses for energy. This has been viewed as necessary to increase the pace of rural electrification and reduce its concentration on a relatively small group of developing countries. The slowness to extend electricity to rural areas in a wide range of developing countries through grid extension, stand-alone and mini-grid approaches has resulted in a substantial proportion of the world's population still without access to electricity. It is estimated that worldwide more than 1.4 billion people did not have access to electricity. Regionally, South Asia and Sub-Saharan Africa are amongst the poorest served, with only 48.4 and 11.9% respectively of their rural populations having access to electricity [22]. The disappointing progress towards providing sufficient rural electricity has been partly attributed to the insistence on cost recovery, particularly where projects are privately financed, and to the failure to raise the incomes of rural households and effectively design tariffs and adapt regulatory systems that can make electricity more affordable to poorer communities [23]. The evidence for this conclusion can be seen in the World Bank's most recent ratings for the rural electrification projects it supports. Only 68% of electrification projects supported since 1995 have been ranked satisfactory, which represents a drop from earlier periods, and is below the rated assessment for all World Bank projects in general [21].

However before looking at the socio-economic impact for rural electrification, it might be important to first look at what the International Energy Agency (IAE) calls the preconditions for rural development. Rural electrification has been the cornerstone of rural energy strategies in developing countries. It is also a source of controversy among development analysts, while advocates of rural electrification claim that it has major impacts on agricultural and industrial productivity, reduces rural-urban migration, creates more jobs and significantly raises the overall quality of life in rural areas, critics claim that rural electrification may not have the hoped for impacts on social and economic life and in its unequal incidence could contribute to social tension in an economy [4].

### 2.3. Preconditions for Rural Electrification

The following is a summation of what the IAE calls the baseline preconditions which should essentially serve as a

precursor to effective rural electrification so that whatever socio-economic benefits can be fully realized. In its Comparative Study On Rural Electrification In Emerging Economies [1] gives a practical example of such institutional structures when it gives the example of Brazil whose 1988 Constitution recognizes the distribution of electricity as an essential public service, for which the federal government is to assume full responsibility, either directly or through designated concessions or permits. However unlike in Brazil where the baseline law, the Constitution recognizes the distribution of electricity as an essential public service, in China where the national electrification rate has reached 99% of rural areas [1]. The Department for New and Renewable Energy of the National Energy Administration deals with the bulk of planning related to rural electrification following which the plans are sent to the National Development and Reform Commission NDRC for approval. On the other hand, India, which has a 44% rural electrification rate [8] like Brazil does have baseline legislation in the form of The Electricity Act of 2003, which is the major piece of legislation covering generation, transmission and distribution of electricity in India and which compels utilities to supply electricity to all, including in rural areas. Sound statistical data on populations' geographical distribution and a clear description of the electrification situation are essential if governments are to avoid the risk of overlooking remote population groups and to facilitate the choice of end-use.

## 2.4. The Guiding Principles for Effective Government Planning Policy for Rural Electrification

This is what other authors [9] call counterfactual, "the main difficulty in project impact evaluation" which means examining the scenario as to what would have happened to the households with electricity if they did not have electricity. In fact without data the rural electrification programme might even end up being focused on areas where there is less concentration of the rural population, hence realise reduced maximum benefits for the rural poor. The best way to realise the maximum socio-economic impact of the rural electrification programme is if government support is long term and sustained. On and off support will not result in any benefit at all. Sustained government support and long-term funding will guarantee a more effective implementation of electrification objectives, and the elimination of any misuse of electrification funds in favour of other objectives. The establishment of a strong market infrastructure to attract private investors ensures the wider use of stand-alone systems in remote areas. Related policies and/or regulations including energy efficiency policies should be implemented alongside the electrification process to sustain long-term economic development. Connection costs should be eliminated or spread over time so as to minimise any up-front hindrances to being connected, and electricity tariffs should be affordable but not necessarily subsidised. Effective metering, billing and payment recovery ensure the long-term viability of the electricity supplier and therefore of the electrification process as a whole. Full involvement of the rural communities in the electrification efforts throughout the decision-making

process increases their sense of ownership and brings support to utilities' efforts to encourage customers to use electricity wisely once they are connected.

## 2.5. Household Characteristics and Electricity Adoption

The first use of electricity in rural areas is household lighting. The reason is that electric light is much brighter than that provided by kerosene lamps and the price per unit of light can be hundreds of times cheaper [9]. Because of frequent power outages, people do not discard their kerosene lamps after they have grid connection, but relegate it to a standby energy source. Over time households diversify their electricity consumption by acquiring different electric appliances such television, radio, electric fans, refrigerator, electric pumps (for expanding crop production) and other tools and machinery (for home-based or outside enterprises). According to an analysis carried out in Bangladeshi [9] the major uses of electricity in rural Bangladesh are reported to be for children's education (83 percent), followed by entertainment (44 percent), information access (22 percent), and home-based businesses (9 percent).

### 2.5.1. The Growth and Persistence of the Benefits of Household Electricity

The welfare impacts estimated so far report the average value of benefits accrued to all households that have electricity [7]. However, another important issue to point out is how these benefits grow over time as the households add electricity appliances and increase the use of electricity. It is quite likely that the benefits vary according to the length of time that a household has electricity. For example, a household with electricity service for 5 years would be expected to benefit more than the one having it for just a few months. Over time, households are expected to consume more electricity, diversify its use through accumulation of various appliances, and make more productive use of electricity.

### 2.5.2. The Cited Benefits of Rural Electrification

In the book, *Electrifying the Countryside Means* [10] it is pointed out that farms are factories as well as homes therefore the electrification of rural America means more than comfort and convenience. It means profit to the farmer, to utility, to appliance manufacturer. True in that regard the Georgia Power Company spent more than \$4million bringing the modern advantages of electricity-light, power heat to some 15 000 people in the area it served. Three thousand of new distribution lines of which 1026 miles serving 2500 customers were completed the first year. The three year plan means at least 5000 refrigerators, 1500 electric, 6000 radios, 750 electric water heaters, as well as the safety and convenience of electric lighting and modern plumbing was provided on thousands of southern farms. The book suggests that rural electrification has profound impact on the way Americans live and work today. It has provided high quality food and fiber for the nation and beyond. As one American social commentator put it "the provision of electricity has allowed small and large industries to locate in rural areas. Thousands of companies have been aided by economic development initiatives of rural electric leaders, providing

hundreds of thousands of new jobs and relieving pressure on American cities" [10]. The same commentator went on to say that because there was electricity in rural America, there were now choices in people's lives about where and how they lived, many finding rural America an attractive and desirable place to work and raise their families still a land opportunity [10].

By far the greatest accolade came from a farmer in Tennessee in the early 1940s who summarized it all when he said this in church; *"brothers and sisters, I want to tell you this, the greatest thing on earth is to have the love of God in your heart, and the next greatest thing is to have electricity in your house"* [15].

### 2.5.3. Industry and Other Related Benefits

The industry benefits that have accrued are:

Markets and stores started utilizing refrigeration resulting in the decrease in the spoilage of perishables, especially in tropical areas. There was also the development of small industries to meet created demand for simple electric appliances. Also the development of industries supplying poles, cross arms, insulators, hardware, meters and transformers for electric distribution systems. Other factors worth mentioning were the several employment opportunities created by Cooperatives, contractors, auditing and accounting firms.

The setting up of irrigation systems utilizing electric system equipment, tube wells, etc., and allowing for multiple cropping. Property formulated livestock and poultry feeds prepared in small mills and automated poultry processing/breeding systems. In addition to that the refrigeration of perishable farm agricultural products and utilization of milk coolers. Electrically powered grain drying, processing, storage systems and fumigation. In timber plantations the conservation of export quality timber (electricity replaces wood for cooking and heating. Also there was the setting up of fish farms in areas where pumps were required. Even working through his Cooperative provides the farmer with some degree of leverage in the marketplace as well as lots of agriculture employment opportunities that were generated.

The setting up of electrically powered handicraft industries allowing for varied and increased production. Besides, it is a fact that cottage or home produced items can be made during off peak seasons of agricultural cycles. Also there were lots of employment opportunities, especially for women, in commercial non-agricultural industries. Indeed due to electricity, women with reduced homemaking chores were able to earn much needed extra income either on full time either on full-time or part-time basis.

Other benefits realized were:

Most benefits were realized in the education sector and in social recreation, where education service delivery improved with facilities being utilized for night classes as well; libraries opening in evenings as well. The rural electrification programmes also allowed for home economics training for women utilizing sewing machines and home appliances. Women's routine home chores eased, and this allowed for daughters to be freer to attend school. Community activities were enhanced with lighted outdoor athletic facilities such as basketball courts to allow for community recreation. Besides, in some areas it was too hot in tropical countries to participate in sport activities

during daytime. With electrification teachers became more productive and better prepared due to home lighting and students academically improved as their homework was better prepared.

Health care service delivery also improved significantly. Medical supplies by clinics and hospitals could be now refrigerated for preservation. Something which could not have been possible without electricity. With reliable sources of power hospitals and operating rooms operated more effectively, more so with the use of sterilizers and electrical detection equipment in rural clinics and more was guaranteed. Eventually socio-economic development in the rural areas resulted in reduced rural to urban-migration. With expanded communication systems as a result of rural electrification the government is able to communicate effectively with the entire population or its citizens.

There is no evidence in literature of studies that have been conducted on the perceptions of the benefits of rural electrification programmes. It is this gap that this study seeks to cover.

## 3. Research Methodology

This study employed a quantitative descriptive approach in the evaluation of the stakeholders' perception of the socio-economic benefits of the Rural Electrification Programme. Descriptive statistics and step wise regression analyses were used to assist the researcher explain and draw data relationship of variables under study. The qualitative descriptive design method was used in this study. The method included the process of describing, analyzing and interpreting both qualitative and quantitative data that evaluate the beneficiaries' perception of the socio-economic benefits of the rural electrification programme. The researcher used a self-constructed questionnaire as a data gathering tool. Accordingly [11], personal administering of questionnaires is a good way of collecting data. When collecting the data, each participant was issued with a questionnaire to complete. Assistance in clarifying certain areas on the questionnaire paper was provided on an individual basis. Certain individuals were hired and trained to assist the researcher in distributing the questionnaires within the targeted population around the two estates. The research data was first coded manually and then entered into a SPSS (Social Package for the Social Sciences). This enabled the researcher to compute the measures of central tendency (mean, median and mode) and the standard deviation as a means of dispersion. Through regression analysis the researcher was able to measure relationships between the benefits of electricity to villagers, and the educated members of society.

## 4. Analysis of Data

This section deals with data analysis. Research questions and objectives of the study were addressed with a view of paving way for making informed recommendations.

**Research Question One: The demographic characteristics of the respondents.**

**Table 1. Distribution of respondents by gender**

	Frequency	Percentage	Valid Percent	Cumulative Percent
Valid Female	63	45.0	45.0	45.0
Male	77	55.0	55.0	100.0
Total	140	100.0	100.0	

There were a total of 140 respondents of which 63 constituting 45.0% of the total were females and the rest were males (77 constituting 55.0%), as shown in Table 1 above. The reason could be that when the researcher visited the respondents the males as head of the family were the ones who welcomed him home and answered the questionnaire that he may have brought.

**Table 2. Distribution of respondents according to category of Villagers**

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid Not villager	91	65.0	65.0	65.0
Villager	49	35.0	35.0	100.0
Total	140	100.0	100.0	

The majority of the respondents 91 constituting 65.0% were non-villagers while 49 respondents were villagers constituting 35.0% as indicated in Table 2 above.

There were 27 respondents constituting 19.3% who were administrators and 113 constituting 80.7% who were not administrators, as indicated in Table 3 above.

**Table 3. Administrators**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No	113	80.7	80.7	80.7
Yes	27	19.3	19.3	100.0
Total	140	100.0	100.0	

**Table 4. Business operators**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No	97	69.3	69.3	69.3
Yes	43	30.7	30.7	100.0
Total	140	100.0	100.0	

Forty three (43) respondents constituting 30.7% were business operators while 97 constituting 69.3% were non-business operators, as indicated in Table 4 above.

**Table 5. Local Government Authority**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No	118	84.3	84.3	84.3
Yes	22	15.7	15.7	100.0
Total	140	100.0	100.0	

Table 5 above indicates that out of the total 140 respondents 22 constituting 15.7% were local government authorities while 118 constituting 84.3% were not local government authorities.

**Research Question Two: Is there any difference in the perceptions of respondents considering their education levels?**

**Table 6. Education**

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound
Health	never went to school	23	3.4638	.60083	.12528	3.2039
	Primary education	17	3.7255	.50326	.12206	3.4667
	Secondary education	38	3.9825	.48982	.07946	3.8215
	First degree	62	4.1290	.53767	.06828	3.9925
	Total	140	3.9310	.58011	.04903	3.8340
Human	never went to school	23	3.5870	.57706	.12033	3.3374
	Primary education	17	3.4412	.60936	.14779	3.1279
	Secondary education	38	3.9342	.66952	.10861	3.7141
	First degree	62	3.8548	.55358	.07030	3.7143
	Total	140	3.7821	.61519	.05199	3.6793
Communication	never went to school	23	3.7826	.86374	.18010	3.4091
	Primary education	17	3.9412	.52685	.12778	3.6703
	Secondary education	38	4.0263	.71610	.11617	3.7909
	First degree	62	4.3710	.58629	.07446	4.2221
	Total	140	4.1286	.70039	.05919	4.0115

Table 6 above indicates overall response and shows that the highly educated generally perceive that the Rural Electrification Programme brought great benefits on health and human resource retention. This included those with secondary education and first degree. They strongly agreed that more patients now visit health care centres. They also agreed that Rural Electrification Programme has helped attracted and retained more qualified personnel who are customer oriented and that the programme has helped increase facilities in health centres, which included laboratories, X-rays and mortuaries. Educated people seem to observe lots of benefits in the electrification programme because most of them have electrical appliances such as stoves and television sets. This makes them realize and appreciate the benefits and importance of the programme unlike the uneducated ones who may not own many electrical appliances and seem not to realize

and appreciate the importance of the electrification programme.

Highly skilled manpower is now willing to work in the rural areas because of the electrification programme. Most skilled workers need to be up-to-date with current affairs and also need to upgrade themselves in their academic qualifications. The latest technology in the form of internet helps anyone to study on their own from any point where there is internet coverage. (See Table 7 below).

In Table 7 above the literate respondents' perceptions of the benefits of rural electrification are rated high on health, communication and human resources retention services respectively: Health services with the F Value of 9.738 significant at 0.000 level of significance; Human resources retention with the F Value of 3.790 significant at 0.012 level of significance and Communication services

with the F Value of 5.511 significant 0.001 level of significance.

**Table 7. Communication**

		Sum of Square	df	Mean Square	F	Sig.
Health	Between Groups	8.271	3	2.757	9.738	0.000
	Within Groups	38.506	136	.283		
	Total	46.777	139			
Human	Between Groups	4.059	3	1.353	3.790	.012
	Within Groups	48.546	136	.357		
	Total	52.605	139			
Communication	Between Groups	7.390	3	2.463	5.511	.001
	Within Groups	60.796	136	.447		
	Total	68.186	139			

**Research Question Three: What are the respondents' perceptions of the Rural Electrification Programmes' impact on health delivery and communication services?**

#### 4.3.1. Regression Analysis on Health

**Table 8. Coefficients-a**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	4.081	.057		71.454	.000
	villager	-.428	.097	-.353	-4.29	.000

In [Table 8](#) above the illiterate respondents' perception of the benefits of rural electrification are rated very low on health service delivery with a beta coefficient of -.353 and t value of -4.29 at a level of significance of 0.000.

#### 4.3.2. Regression Analysis for Communication Services. Model Summary

**Table 9. Predictors: (Constant), villager**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.232 a	.054	.047	.68379

#### Coefficients -a

**Table 10. Dependent Variable: Communication**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	4.247	.072		59.253	.000
	villager	-.339	.121	-.232	-2.799	.006

In [Table 9](#) and [Table 10](#) above the illiterate respondents also perceive the benefits of rural electrification very low on communication services with a beta coefficient of -.232 and a t value of -2.799 at a level of significance of 0.006.

## 5. Conclusion and Recommendations

In this study most educated respondents perceived that Rural Electrification Programme brought more benefits on service delivery especially on health and communication. Secondly the educated category perceived some degree of value in the programme in that it improved human resource retention. The survey has indicated how the rural population perceived the benefits of the Rural Electrification Programme in Umzingwane district to be in significant. The researcher recommends future further study to find reasons why the uneducated or the rural

villagers perceived the Rural Electrification Programme benefits to have been in significant. In other words, the wide gap between the perceptions of the educated respondents and the general villagers is a cause for concern and a source of gap that can be filled by some further future study.

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