SOLAR POWER AN ACCEPTED ALTERNATIVE FOR RURAL ELECTRIFICATION IN TANZANIA? A SOCIO-ECONOMIC DRAWBACKS IDENTIFICATION STUDY IN DODOMA

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SOCIO-ECONOMIC FACTORS AFFECTING SOLAR ELECTRICITY ADOPTION IN DODOMA REGION

ABSTRACT

Solar electricity is a practical technology for rural Tanzania to get out of bio-energy crisis. This study identifies and describes effects of socio-economic factors for adoption of solar energy. The study involved 80 subjects randomly sampled. Data were collected by using questionnaire and in-depth interviews. SPSS 11.5 was used to process and analyse data. The study revealed that the more one is educated the more likely can use solar electricity. People with average income to rich are more likely to adopt solar power technology than the very poor ones. Common adopted type of solar energy technologies are solar lights and cookers. Factors limiting adoption of solar energy include economic constraints, housing type and size, conservatism, settlement instability, lack of incentives, cost effectiveness and high installation costs. It is recommended that special efforts should be done by all energy stakeholders for a remarkable shift from using biomass energy into solar electricity.

1.0 INTRODUCTION

1.1 Background to the study

Forest resource shrinking and Shortage of biomass for fuel are now severe in many parts of the world. Tens of millions of people suffer from acute scarcity of fuel wood and over two billion are cutting wood faster than it is growing back (Miller *et al*, 1986). Without fire that comes mainly from fuel wood wo/man's vegetable diet would be limited to fruits, nuts and the like. In developing countries including Tanzania availability of fuel wood is increasing at lesser rate than human population (Cook, 1976). Thus it can be argued that availability of fuel wood resources is an issue, its shortages restrict individuals' freedom and increase work burden among people especially rural women. In the face of man's relentless and indiscriminate plundering of nature many people are now beginning fully to appreciate the vulnerability of our planet's life support system. Indeed conservationists continue warning that unless urgent action is taken in the very near future, our children will inherit a barren, polluted and decimated World (Micuta, 1985). In response to this situation more ways and means of

utilising primary renewable energy resources to ameliorate the unduly heavy burden being placed on the Earth's rapidly receding woody resources. Taking concrete steps to reverse trends that are already assuming disaster proportions especially making use of fuel saving stoves and other alternatives sources of energy like solar electricity/energy. Adoption of technologies is assumed to be determined by a series of social-economic and political factors. This study intends to examine the adoption of solar power/electricity technologies for forest resource conservation and reduction of wood fuel crisis. This study focuses on the adoption of solar power use technology both in rural and urban areas of Tanzania. Though understanding how in practice solar power/electricity is being utilised is important, the rate of adoption of such a technology currently is of higher priority.

1.2 Problem statement and justification

Adoption of innovations by people in Tanzania both in urban and rural areas is assumed to be determined among other factors by socio-economic variables. In many developing countries including Tanzania a number of innovations have been developed, however their adoptions are assumed to vary from place to place and among households, both in urban and rural areas. It is expected that making use of a variety of innovations for energy supply would have been conserved forest resource to a greater extent. A considerable number of Tanzanians are expected to be using solar energy/electricity, unfortunately a large number of them are not using it, instead rely on three stone stoves and metal charcoal stoves for cooking and heating homes. Major assumed causes are social-cultural, economic, political and environmental factors. Thus innovations adoption rate is assumed to relate significantly with people's social-cultural, economic, political and environmental conditions prevailing is specific localities. Such an observation strongly calls for undertaking a study which provides a clear understanding of determinants of adoption of solar power/electricity both in rural and urban areas. The problem of fuel wood crisis and natural forest shrinking is increasing at a rampant speed. This is due to the fact that many people have not entered the edge of fossil fuel and other alternative energy sources; they still depend on wood for warmth, light and cooking. Since trees are increasingly being cut down, fuel wood is becoming scarce over large parts of our country Tanzania.

In this problem very little has been done to assess adoptions of alternative energy sources like use of solar energy/electricity as a strategy to reduce number of people being caught in the poor wo/man's energy crisis trap.

A range of alternative energy sources have been introduced in Sub-Saharan Africa including Tanzania. However there has been no wide spread success, in increasing number of instances substantial number of alternative energy resource use technologies has not been significantly disseminated for utilisation. This research is made more important by the fact that, no comprehensive study has been done to find out reasons for the situation. There is lack of information pertaining use rate of solar power and its impact on forest resource base. While a considerable number of people rely on three stone stoves, it is argued that, it could be due to social- cultural and economic reasons to energy crisis problem.

This study therefore examines the rate of adoption of solar energy use technologies as an acceptance indicator of the technology. The study generates information on factors determining the use of solar energy/electricity. The information generated may play a significant role in the formulation and implementation of appropriate policies and strategies aimed at achieving the Tanzania Development Vision 2025 and implementation of the National Strategy for Economic Growth and Reduction of Poverty (NSEGRP) in the fields of energy resources use and rural development. The information is critical and highly needed by Ministries responsible for Energy, Forestry, Rural Development, Environment, Agriculture, Community Development Gender and Children, also to the energy analysts, development planners, extension officers and grass root leaders.

1.3 Study objective

The study intended to identify and describe socio-economic variables determining adoption of solar energy at household level so as to provide indices for different forms of policy intervention aimed at reducing energy crisis and conserving forest resources

1.4 Conceptual framework

This study assumes that adoption of energy related innovations by people is determined by independent variables namely house hold head education level, taboos, involvement in the innovation, income, type of occupation, return of the technology, incentives, construction/purchasing costs, availability of fuel wood, Thus the rate of adoption is predicted to be determined by interplay of background variables and independent variables. Indeed it is true that such factors vary from one community to another and from one household to another, and this may result into variation of use of the innovation in the course of forest resource conservation.

1.5 Hypothesis

House hold perceived benefits, education, family size, taboos, involvement in the innovation, income, type of occupation, incentives, availability of fuel wood, local weather condition, government policies, and dissemination for the concerned innovations are not associated with adoption of solar energy use technologies. **Justification**: Individuals with knowledge on solar energy use technologies, small family size, unrestricted taboos, involved in the innovation, better income, formal occupation, get incentives, live in conducive weather condition are more likely to adopt the innovations than others.

2.0 METHODOLOGY

2.1 Study location

The study was carried out in Dodoma region that lies at 004^0-007^0 south and 035^0-037^0 east, and is centrally positioned in Tanzania. In the north is bordered by Arusha region, in the east by Morogoro region, in the south by Iringa region and in the west by Singida region (URT, 1997). Dodoma in its all districts there is greater woody-biomass resource supply problem (Millington and Townsend, 1989). Thus this study was conducted in this area because house holds in these areas are seriously facing fuel wood crisis hence assumed to be suitable for provision of information about adoption of solar energy/electricity.

2.2 Sources of data and research design

Primary data were collected from household heads and change agents as key informants. Secondary data were abstracted from documents available in libraries, Websites and other resource centres. The study employed a cross–sectional or correctional research design. Because the study is descriptive; hence a proper research design is cross sectional. The design has greater degree of accuracy and precision in social science studies than other designs like participatory observation or case studies. Unlike participatory observation and experimentation the design provides findings a-gently, thus helps researchers to get quick results.

2.3 Sampling and sample size

Multistage sampling was used to obtain districts, divisions and villages to take part in the study. Simple random sampling (SRS) procedure was applied to obtain household heads while key informants were selected purposively. The sampling units were house hold and individuals. The sample size comprised 80 subjects selected from rural, sub urban and urban areas. Basically, there are two major groups of sampling methods namely probability methods and none probability methods. In this study random sampling as probability method was employed to get household head respondents. This technique ensures that every sampled respondent has equal chance of being selected; hence reduces biases in sampling respondents. Thus, these techniques were used because they are more precise for correlation studies like this one.

2.4 Data collection

Researchers assisted by three trained graduates collected data using questionnaires, none participatory observation, in-depth interviews and documentation methods. Primary data were collected using non-participatory observation, and questionnaire (structured in-person interview) to all respondents. The methods are good in obtaining facts about current prevailing practices or behaviours hence is preferred to and widely employed by most modern social science researchers. Secondary data were collected by abstraction from various documents.

2.5 Data processing, analysis and presentation

Collected data were processed and verified prior to analysis using SPSS 11.5 for windows computer software. For univariate analysis, descriptive statistics was used to find the sample means and percentages for studied variables. Also was used for drawing important frequency distribution graphs and tables. For bivariate analysis; cross-tabulation and correlation were applied to test association of two variables. Multivariate analysis was not done because most of the predictor variables were scaled nominal in a binary dependent variable. In this study; tables and graphs have been used to present data for different studied variables.

3.0 RESULTS AND DISCUSSION

3.1 Respondents' background characteristics

3.1.1 General

The backgrounds characteristics of respondents involved in this study are shown in table one. The parameters included sex, age, location, education level, religion, marital status, household heads' gender/sex, respondent's wealth group, married wives/husbands for couples, spouse's education level of married respondents and respondents' ethnic groups/tribes.

3.1.2 Sex

The selected sample for the present study comprised 80 subjects, 50% were males and 50% female respondents, respectively. The chi-square (χ^2) test indicated statistical ($P<0.05$) association between sex of respondents and adoption of solar power technology.

3.1.3 Age

Age is among the subjects' characteristics, which is often examined in adoption studies as it may influence adoption in many ways. Since all the subjects had equal chances of participating in this study there fore, no age group had special treatment. Higher proportion of subjects (63.75%) aged between 35 - 44 years, flowered by 45-54 (26.25%) year's age group. The minimum age was 26 years, maximum was 71years and mean age was 26 years. According to the chi-square (χ^2) test, the age distribution of respondents was not significantly ($P>0.05$) associated with solar power utilisation.

This means that there was no specific individual age group among respondents with special solar power adoption capability.

Table 1: Summary of study sample characteristics

Characteristics	Number	%
Sex		
Male	40	50
Female	40	50
Total	**80**	**100**
Age (Years)		
25-34	2	2.5
35-44	51	63.75
45-54	21	26.25
55-64	2	2.5
65-74	4	5.0
Total	**80**	**100**
Location		
Urban	21	26.3
Sub urban	37	46.3
Rural	22	27.7
Total	**80**	**100**
Level of education		
None formal Primary education	2	2.5
Adult education	3	3.8
Primary education	40	50
Secondary education	19	23.8
Diploma	16	20
Total	**80**	**100**
Religion		
Christian	37	71.3
Muslims	23	28.8
Total	**80**	**100**
Marital status		
Never married	16	20
Currently married	45	56.3
Widowed	2	2.5
Divorced	8	10
Separated	9	11.3
Total	**80**	**100**
Household heads' gender/sex		
Male	54	67.5
Female	26	32.5
Total	**80**	**100**
Respondents wealth group		
Better off	15	18.8
Average rich	10	12.5
Poor	35	43.8
Very poor	20	25
Total	**80**	**100**

3.1.4 Location

Interviewed subjected were categorised into three locations of residence, urban, sub-urban and rural. Large proportion of subjects (46.3%) was unintentionally drawn from sub-urban area, 27.7% and 26.3% from rural and urban areas respectively. Respondents' variation by area of residence revealed no statistical ($P>0.05$) association with adoption of solar energy use technologies.

3.1.5 Level of education

Educational wise half (50%) of subjects had attained formal primary education followed with those attained secondary education (23.8%). The chi-square (χ^2) test revealed that variation in attained formal education has a significant ($P<0.05$) association with adoption of solar energy use technologies. That is the more one is educated the more likely can use solar power/electricity.

3.1.6 Religion

Majority of subjects were Christians (71.3%) the rest (28.2%) were Muslims, the variation of subjects by religion indicated significant ($P<0.05$) association with adoption of solar power use technologies. In number, 18 (22.2%) Christians respondents were observed using solar power and none Muslims observed using it, perhaps due to the influence of change agent which are attached with church organisation (Evangelical Lutheran Church of Tanzania).

3.1.7 Marital status

Large proportion of respondents were married (56.3%) followed by never married ones (20%) variation of subjects by marital status indicated significant ($P<0.05$) association with adoption of solar power use technologies. In number, 19 married respondents observed using solar power and six respondents living single observed not using it, this implies that married couples are eager in looking for alternatives for energy crisis compared to those living single.

3.1.8 Household heads' gender/sex

Majority of household head respondents (67.5%) were males the rest (32.5%) were females, the variation in gender of household heads indicated no ($P>0.05$) association with adoption of solar power technology. This implies that decision to use or not using solar power is not dictated by the gender or sex of the house hold head but his/her education and resources.

3.1.9 Respondents wealth group

Large proportion of respondents were economically poor (43.8%) followed by very poor (25%) and better off (18.8%) groups. The variation of subjects by economic status indicated significant ($P<0.05$) association with adoption of solar power technology. This implies that people with average income to

rich both in rural and urban areas are more likely to adopt solar power technology than very poor ones.

3.2 Types of solar energy use technologies

Identification of types of solar use technologies was one of the study objectives. Since solar energy use technologies range from lights, cookers, powering small appliances to full home solar system, identification of types of solar technology that adopters in Domoma dominantly use was critical. Respondents were asked a series of questions on types of technologies for tapping solar energy do they use themselves and others as well, and then suggest the type that fits their needs.

Table 2: Respondents' views on utilised type of solar power technology

	Response				
	Yes		No		Total
	Number	%	Number	%	(%)
Do know different types of solar power use technologies?	42	52.5	38	47.5	100
Do you use one of the solar power technologies?	18	22.2	62	77.8	100
Do you plan to use it in future?	48	60	32	40	100

Which type of solar power do you know?		
	Number	%
None	38	47.5
Cookers and lights	25	31.3
Cookers, lights and home system	17	21.3
Total	**80**	**100**
Which type of technology do use?		
None	62	77.5
Solar lights	08	10
Cooker and lights	06	7.5
Lights and powering small appliances	04	5
Complete solar home system	00	0
Total	**80**	**100**
Which solar power technology is suitable?		
None	35	43.8
Solar lights	07	8.8
Cooker and lights	00	0.0
Lights and powering small appliances	00	0.0
Complete solar home system	38	47.5
Total	**80**	**100**

Data in table two indicate that over fifty percent (52.5%) of people both in rural and urban areas know different types of solar power technologies that people use. However, a considerable proportion (47.5%) as well knew northing about such a technology. This implies that change agents still have a lot to be done on dissemination of solar power technologies.

Majority (78.8%) of people both in rural and urban areas of Dodoma region are still not using solar energy, thus utilisation of solar resource in Dodoma is so minimum (22.2%) besides of being plenty in the area. However majority (60%) have the opinion of using it sometimes in future. This implies that the technology has not been accepted as an alternative electrification problem especially in rural areas

Over a half (52.5%) of people in Dodoma have knowledge on solar energy use technologies (Solar lights, cookers, and home systems). However, a considerable proportion of people (47.5%) have no knowledge on the use of solar power technologies perhaps due to dissemination problems. This calls for repeated dissemination programmes on the use of solar energy for various purposes.

In terms of solar technologies that beneficiaries in Dodoma region use, table two depict that (77.5%) of them use none, majority of adopters (10%) use solar lights only, 7.5% use solar cookers and lights, 05% use solar lights and powering small appliances. These findings imply that popular adopted type of solar energy use technologies are solar lights, cookers and powering appliances like radios, TVs, and cell phone chargers. Advanced types of the technology like complete home solar systems are not adopted, perhaps due to its high initial cost or availability of other power sources like hydroelectricity and wood. These findings concur with Hankins (1995) observations that common use of solar electricity includes solar lights, cooking and heating. However, like any other innovations/technologies like biogas, improved wood stoves and the like that benefit rural people, solar energy/electricity relies on a wide network of people in its development and dissemination.

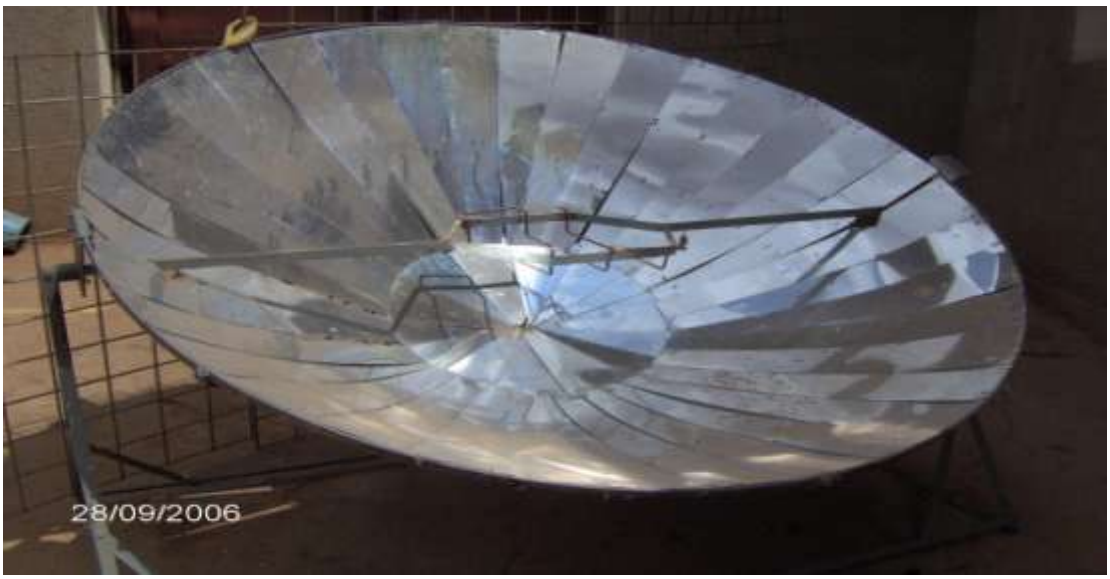

Figure 1: One of the solar cookers (concentrating) type assembled by CAPU

Respondents views on the appropriate solar use technology was also captured, nearly a half of respondents (47.5%) proposed that home system is the one that fits most, 08% advocated soar lights, while 43.8% new northing about the appropriate solar use technology. These findings reveal that majority people are interested in solar home system, but because it costs high they opt for none or for solar lights, cookers and powering small appliances.

3.3 Socio-economic factors for adoption of solar power

Socio-economic factors were among the variables presupposed to influence both positively and negatively adoption of solar power, the extent to which socio-economic aspects determined adoption of solar energy was captured when respondents were asked to provide their views on socio-economic aspects that limit adoption of solar power. The respondents pointed out a number of socio-economic factors influencing adoption of solar power technology. A list of possible socio-economic factors was established, and respondents were asked to respond to each possibility. The survey data in table three shows various socio-economic factors determining adoption of solar power technologies both in rural and urban areas of Dodoma.

Table 3: Socio-economic factors determining adoption of solar power technology

Factors	Response				
	Agree	Strongly agree	Disagree	Strongly disagree	Total
Conservatism/satisfied with present operation i.e easier to continue to do things they are accustomed to χ^2 =1.367 df =1 Pvalue = 0.242 NS	58 (72.5)*	22 (27.5)	-	-	80 (100)
Traditions: Natural inclination to resist change χ^2 =35.686 df =2 Pvalue = 0.000 S	44 (55)	20 (25)	16 (20)	-	80 (100)
Taboos χ^2 =10.304 df =3 Pvalue =0.016 S	10 (12.5)	9 (11.3)	47 (58.8)	14 (17.5)	80 (100)
External financial support χ^2 =12.311 df =2 Pvalue = 0.002 S	61 (76.3)	17 (21.3)	2 (2.5)	-	80 (100)
Availability of other sources of energy/ fuel wood χ^2 =3.703 df =1 Pvalue = 0.054 S	69 (86.3)	11 (13.8)	-	-	80 (100)
Lack of confidence in making innovations success (fear of failure) χ^2 =6.657 df =2 Pvalue = 0.036 S	47 (58.8)	16 (20)	17 (21.3)	-	80 (100)
Land and house ownership (tenants) χ^2 =20.731 df =3 Pvalue =0.000 S	40 (50)	25 (31.3)	10 (12.5)	5 (6.3)	80 (100)
Settlement instability; rural urban migration χ^2 =4.313 df =1 Pvalue = 0.038 S	48 (60)	32 (40)	-	-	80 (100)
Lack of incentives/motivation χ^2 =0.011 df =1 Pvalue = 0.916 NS	66 (82.5)	14 (17.5)	-	-	80 (100)
Peer pressure: Fear of ridicule and criticisms by neighbours χ^2 =14.916 df =3 Pvalue = 0.002 S	27 (33.8)	12 (15)	37 (46.3)	4 (5)	80 (100)
Limited education level of house hold heads χ^2 =1.239 df =2 Pvalue = 0.538 NS	54 (67.5)	22 (27.5)	4 (5.0)	-	80 (100)
Shortage of dissemination agents χ^2 =5.034 df =3 Pvalue = 0.169 NS	23 (28.8)	44 (55)	7 (8.8)	6 (7.5)	80 (100)
Cost effectiveness and social acceptability of technology, worry of not to address priority needs. Energy is not a priority need χ^2 =0.878 df =1 Pvalue = 0.349 NS	64 (80)	16 (20)	-	-	80 (100)
High value attached to system output χ^2 =6.891 df =3 Pvalue = 0.075 NS	50 (62.5)	29 (36.3)	1 (1.3)	-	80 (100)
Participation by end users in system adoption or construction χ^2 =3.969 df =2 Pvalue = 0.137 NS	38 (47.5)	25 (31.3)	17 (21.3)	-	80 (100)
Compatibility with existing local fabricating facilities χ^2 =3.335 df =2 Pvalue = 0.189 NS	38 (47.5)	32 (40)	10 (12.5)	-	80 (100)
Flow in the assistance agencies approach to technical change in the field of energy χ^2 =30.845 df =2 Pvalue = 0.000 S	42 (52.5)	30 (37.5)	8 (10)	-	80 (100)
Socio-economic characteristics of users, fuel wood users for solar power χ^2 =10.557 df =1 Pvalue = 0.001 S	55 (68.8)	25 (31.3)	-	-	80 (100)
Efficiency of new technology/products show no significant difference with traditional ones χ^2 =10.369 df =2 Pvalue = 0.006 S	34 (42.5)	29 (36.3)	17 (21.3)	-	80 (100)
Benefit of the technology: Return with and without the technology χ^2 =8.707 df =2 Pvalue = 0.013 S	31 (38.8)	39 (48.8)	10 (12.5)	-	80 (100)
Construction/installation costs χ^2 =0.734 df =1 Pvalue = 0.392 NS	33 (41.3)	47 (58.8)	-	-	80 (100)

*Numbers in parentheses indicate percentages

S=Significant

NS=Not significant

The dominant socio-economic factors limiting adoption of solar power technology as mentioned by over 90% respondents are conservatism/peoples satisfaction with the present operation that is it is much

easier to people to continue doing things they are accustomed to (P>0.05); availability of other sources of energy especially fuel wood (P<0.05); settlement instability (rural-rural or rural-urban migration) (P<0.05); lack of incentives/motivation (P>0.05); cost effectiveness and social acceptability of the technology, worry of the technology not to address priority needs, energy is not a priority need (P>0.05); socio-economic characteristics of users (P<0.05) and construction/installation costs (P>0.05) that ranges from five to seven million Tshs for complete solar home system, a favourite of majority beneficiaries in Dodoma. However, among the critical socio-economic factors determining utilization of solar power the chi-square (χ^2) test denoted statistical significance for availability of other sources of energy, unstable settlement and the socio-economic characteristics of technology users. The findings support Karekezi and Ranja (1997) observation that success in adoption of modern technologies has been limited by many factors including high initial investment costs coupled with the absence of supporting financial instruments, hence making its acceptance in rural areas difficult. The findings in table three imply that the present low adoption rate of solar power technologies in is a function of a series of interrelated factors. This supports Hankins (1995) argument that solar electric systems are expensive investments; installation and maintenance cost are compared with other options before a decision to use or not use, which is why majority people have not accepted by adopting it.

3.4 Political factors

Political factors were among the variables assumed to determine adoption of solar power, hence respondents were asked to provide their views on political factors that limit adoption of solar power. The respondents pointed out political factors limiting adoption of solar power technology. A list of possible factors was established, and respondents were asked to respond to each possibility. The survey data in table four reveal various political factors determining adoption of solar power technologies both in rural and urban areas of Dodoma.

The dominant political factors limiting adoption of solar power technology as mentioned by over 75% respondents are a segmented rather than a system approach (P<0.05), shaky national economy

(P>0.05), unstable government policies (P>0.05), and attitudes of extension agents not being helpful in promoting innovations (P<0.05). Others are conflicting propaganda from politicians of opposition and ruling parties (P<0.05), and increased government interference and regulations (P<0.05). However, unlike in other four factors the chi-square (χ^2) test denoted no statistical significance for shaky national economy (P>0.05) and unstable government policies (P>0.05). These findings imply that the present low adoption rate of solar power technologies in Dodoma is a result of interlinked factors including political ones as stipulated in table four. The findings concur with Karekezi and Ranja (1997) observation that success in adoption of modern technologies like improves stoves, biogas, solar energy and crop husk has been limited by several factors including inadequate renewable energy technologies (RET) planning policies and lack of coordination and linkages in RET.

Table 4: Political factors determining adoption of solar power technology

Factors	Response				
	Agree	Strongly agree	Disagree	Strongly disagree	Total
Attitudes of extension agents not helpful in promoting innovations χ^2 = 52.784 df = 6 Pvalue = 0.000 S	48 (60)*	14 (17.5)	17 (21.3)	1 (1.3)	80 (100)
A segmented rather than a system approach χ^2 = 11.438 df = 2 Pvalue = 0.003 S	66 (82.5)	14 (17.5)	-	-	80 (100)
Increased government interference and regulations χ^2 = 66.811 df = 6 Pvalue = 0.000 S	37 (46.3)	3 (3.8)	35 (43.8)	5 (6.3)	80 (100)
Shaky national economy χ^2 =8.700 df =4 Pvalue = 0.69 NS	57 (71.3)	16 (20)	7 (8.8)	-	80 (100)
Unstable government policies χ^2=1.704 df =2 Pvalue =0.427 NS	66 (82.5)	-	14 (17.5)	-	80 (100)
Conflicting propaganda from politicians of opposition and ruling parties χ^2 = 12.413 df =4 Pvalue =0.015 S	33 (41.3)	14 (17.5)	33 (41.3)	-	80 (100)

*Numbers in parentheses indicate percentages

S=Significant

NS=Not significant

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

The socio-economic factors observed limiting adoption of solar energy in the study area include people's conservatism, (laggards being a dominant group in the study areas), availability of other sources of energy especially wood, settlement instability, lack of incentives, cost effectiveness of the new technology and high installation costs especially for the home system. Political factors that adversely affect adoption of solar energy include a segmented approach instead of a system one, economic constraints, extension/change agents not being helpful in promoting the technology, conflicting propaganda from politicians of both ruling and opposition parties.

4.2 Recommendations

With presence of plenty solar energy in Dodoma efforts should be done by the government, none government organisations and individuals to embark on a remarkable shift of people from using biomass energy into solar electric energy through installation of full solar home systems, otherwise rural electrification and rural industrialisation will stand still and depletion of forest resources coupled with desertification will be hardly minimised or ameliorated in Dodoma region. Solar energy/electricity is a practical technology for rural Tanzania to get out of the rural bio-energy crisis in our country. The use of common types of solar lights, cookers and powering small appliances should be encouraged by change agents and extension workers. However, credits/incentives should be offered to people who are in need to install complete home solar system. Change agents should re-think of new dissemination and promotion approaches for the innovation to reach majority. A variety of announcements and advertisements should be done so as to increase community awareness on the new innovations. Politicians should have common agenda about energy crisis and the possible ways and means to curb it, should avoid confusing people on realistic and critical issues like energy. Innovators/producers and suppliers or change agents should assure users with adequate demonstration of how the new innovation works and fits in their local settings, sophisticated

recommendations should be avoided so as users comprehend them easily. To increase acceptance and adoption rate of solar energy use technologies several things should be reformulated and implemented including reducing or subsidising the initial costs for installation of solar systems and increasing promotions and advertisements. Qualified technicians for solar energy should be made available so as to assure people with perfect installation of the technology to adopters.

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