

THE INTERNATIONAL JOURNAL OF HUMANITIES & SOCIAL STUDIES

Energy Conservation by Women in Madurai City

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Abstract:

The Paper envisions the conservational attitude of women in Madurai city towards use of household energy. Women folk at Madurai are no longer only home makers. They also work in many sectors across the city. Cooking is carried out by women in the homes and the urgency of completion of this work may result in planned or unplanned usage. To find the attitude towards energy conservation at homes, especially towards that of electricity, liquefied petroleum gas and diesel; petrol; auto gas the study has been taken up. Variables are interpreted applying t-test.

1. Introduction

Energy efficiency has assumed greater urgency due to extreme volatility in energy prices during the last few months and perceived threat of global warming. There is, therefore, a need for paradigm shift in approach towards, energy efficiency. Going away from the traditional approach of augmenting energy supplies, energy efficiency can substantially bring about conservation. The measures include the use of energy –efficient appliances, fuel efficient vehicles, efficient lighting system, efficient cooking appliances, improved stores and so on in households. The tariff revision of energy prices, is bound to burn the pockets of residents. Energy conservation would bring down energy costs by identifying how and where to opt for energy – efficient products. Replacing power –guzzling old electrical fittings and appliances, with energy efficient ones, revamping entire home is the smartest way to avoid a hole in the pocket and is achieved by women in households of Madurai district

2. Analytical Framework

This paper presents a qualitative analysis of the data, obtained from residents of 100 households from the study area. It demonstrates their perception or potentiality to save energy through suitable measures. In order to promote measures for accelerating conservation of energy products used in households, attitudinal variable measurement becomes imperative. Conservation of household energy for meeting environmental concerns such as energy security and capacity building leads to improvement in quality of life. Based, on the reviews, 30 variables are created with respect to perception of household energy conservation. The respondents were asked to rate all the 30 variables at five point scale, namely strongly agree ‘no opinion’ disagree and ‘strongly’ disagree. The scores assigned on these ratings are 5,4,3,2 and 1 respectively. In order to analyze the perception towards household energy conservation management, the mean score of each variable are measured and interpreted. Attitude towards households energy conservation are measured through ‘t’ statistics, For this purpose, variables are categorized into 6 energy conservation strategies – The activities being financial strategies, monitoring & reporting strategies Implementation Strategies, behavioral strategies, awareness (information) strategies and normative strategies. A sample of 50 respondents each in urban and rural areas of the district is taken for study.

3. Energy Efficiency Strategies

3.1. Implementation Strategy

In managing energy guidance is needed, without which clear program not in place; This implementation, requires understanding of energy management needs, and support from members of households perceived positive status quo and good communication.

3.2. Monitoring Strategy

This plays a significant role in energy management. This includes installation of smart meters, which in turn reduces time to perform complex tests, and optimize operations.

3.3. Financial Strategy

Implementation and monitoring control over energy use, reduces, downtime, maintenance costs, and brings about cost and energy savings. With limited financing, efficiency is achieved. It is estimated that energy is bound to burn the pockets of residents, with a bimonthly consumption of above 500 units. Energy consultants say the time is ripe for everyone to go in for a power audit at their homes. This process, would help figure out ways to bring down electricity costs by identifying to opt for energy efficient products. With costs rising, it makes sense for those, who consume less than 500 units to go for energy efficient equipments.

3.4. Behavioural Strategy

Changes in behavior can have a great impact on energy conservation. Switching off lights, & fans when not in use, task lighting often save very small amounts of energy at once, but taken continuously over long periods, they can have a great effects.

3.5. Informational Strategy

Training and awareness campaigns promote energy efficiency in day-to-day life practices. Members from the head of the family to the smallest member are made aware of energy use and its efficiency Promotion of energy conservation through mass media contributes to improvement.

3.6. Normative Strategy

Government and environmental rules play an important role in the acceptability of energy savings policy, after other than energy cost savings. Energy policies are more acceptable when individuals value the environment, and feel responsible and morally obliged to help conserve energy. Individuals' nature, his freedom of choice. This behavior towards target efficiency is behind motivations for energy conservation.

4. Attitude towards Household Energy Conservation

4.1. Needful

Energy conservation or energy savings is the need of the hour. The state is running an acute power crisis, and it is important that energy conservation is practiced. Reduced energy wastage through usage, is of utmost necessity. The respondents view that switching off equipments, when not used is needed to conserve energy. Petroleum products need to be conserved as extraction results in depletion of natural resources. Therefore cooking fuel and transport fuel need to be conserved. The attitude of the respondents is examined and has been analysed using, ' t ' test.

	Urban	Rural	Mean Difference	t-statistic
Needful	2.5862	3.0581	0.47186	3.099*

Table 1: Needful
Source: Primary Data

The mean scores of urban and rural areas are 2.5862 and 3.0581 respectively and the t statistic shows significant difference.

4.2. Improves Quality of Life

For sustainable economic growth rate conservation of energy is vital India's commercial energy demand is increasing and energy demand at households on account of growing population is also increasing. Energy efficiency is increasingly recognized as the key solution, to satisfy needs. Improved efficiency in consumption is imperative.

Households target at energy conservation through energy efficiency leading to improvement in quality of life. T statistics is applied and mean scores of urban and rural respondents towards, quality of life is determined.

	Mean Score		Mean Difference	T-Statistic
	Urban	Rural		
Quality of life	3.4483	3.3935	.05473	0.471 ^{NS}

Table 2: Better Quality of Life
Source: Primary Data

There's no significant difference in attitude about increased quality of life through energy efficiency.

4.3. Enhances Energy Efficiency

Areas characterised by higher density of population per unit area, are hubs of various activities. Energy efficiency of a nation's economy is measured by energy intensity. Lower the intensity, the lower is the cost of energy. This will facilitate energy conservation. Energy efficiency at households, contributes to country's energy security. The National Action Plan on Climate Change (NAPCC) lists enhanced energy efficiency as a key mission to representing multi-pronged, long-term and integrate strategies, for achieving key goals, in the context of climate change. The attitude to respondents in Madurai District towards, enhanced efficiency leading to energy conservation is described.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Enhanced energy efficiency	3.0897	3.3806	.29099	-2.705**

Table 3: Enhances Energy Efficiency
Source : Primary Data

Both urban and rural respondents view energy conservation is increased, when there is enhanced energy efficiency.

4.4. Facilitates Change

Probable saving of energy occurs on replacement of conventional equipments like choke with electric choke, lighting appliances by energy efficient lights makes energy savings achievable. Improved regulators for fans, usage of energy star devices results in energy savings. This will promote the households, own Specific Energy Consumption. This is tested by applying t statistics, on rural and urban respondents attitude towards replacement of assets.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Promotion of Replacement of conventional equipments	2.9103	3.1419	.23159	-1.982*

Table 4: Facilitates Change
Source : Primary Data

Respondent's have favourable attitude towards, replacement of conventional equipments, promoting energy conservation.

4.5. Promotes Economy

Reduction in utilization of energy is possible, by designing buildings in such a way that more natural light and air is received. Use of incandescent lamps which produces, more heat and less light can be replaced by CFL. To bridge the gap, between costs and usage one on hand and supply on the other hand, conservation of energy in households is necessary. This aspect is fulfilled through proper lighting and ventilation. Use of proper regulators and switches, is achieved through promotion of energy savings by avoiding energy leakage.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Promotion of Proper Economy	4.1724	4.1871	0.1468	-0.330 ^{NS}

Table 5: Lighting and Ventilation
Source : Primary Data

't' statistics shows now significant difference in attitude concerning the need for proper lighting and ventilation, for household energy conservation.

4.6. Promotes Adoption of New Practices

Energy audit provides positive results, in reduction of billing, through suitable preventive and cost effective maintenance and quality control programs. These are essential leading to economic utility of assets at households. A comprehensive plan helps in energy conservation at households. Almost care is needed to understand and record energy consumption and control of assets at households. This practice though not prevalent in the study area, is viewed by respondents as an essential attribute to energy conservation.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Utility of assets by audit	1.5448	1.5548	.01001	-0.174 ^{NS}

Table 6: Energy Audit and Utility
Source : Primary Data

Assets are better utilized, when meticulous recording and control of usage of assets is performed.

4.7. Promotes Good Actions

Planning for Maintenance and operational actions such as framing parameters for usage of assets, and energy wastage, help conserve energy at homes. Maximum efficiency of assets, help in energy savings. Energy conservation is included in PM's Common Minimum Need Programme, Implementing proper operational actions envisages savings of energy. Respondents view the need to conserve energy, promotes good actions.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Promotion good actions	3.0897	3.3806	.29099	-2.705*

Table 7
Source : Primary Data

Both rural and urban respondents feel energy conservation promotes good actions.

4.8. Brings Eustress

Energy crisis has created a positive impact on energy conservation. Energy saved is energy produced. Slogans like 'Beat the power crisis. Conserve Energy' 'Turn energy scarcity into energy opportunity. Sun light is free – use it!' have created and motivated households to conserve energy, Reduction of energy consumption is seen over time ; as various steps to tackle energy shortage namely implementation of Restriction and Control (R&C) Measures, fixing cap on LPG cylinders and market pricing of petroleum products are taken. Respondents view there is positive impact of energy crisis.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Eustress	2.9172	3.1355	0.21824	-1.867 ^{NS}

Table 8: Brings Eustress

Source : Primary Data

The opinion on Eustress has no significant difference between urban and rural respondents, as mean difference is small, that is, 0.21824.

4.9. Apt Solution to Energy Crisis

Energy a major input for households, has continuous spiraling costs. In this context, energy conservation is a good solution, to escalating energy demand Good housekeeping, results in friction reducing activities and produces annual savings in the use of assets. Using improved gear efficient vehicles, brings reduction in energy waste, while propr maintaining and lubricating brings energy conservation through reduced costs.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Promotes Economy	4.2759	4.3032	0.02736	-0.520 ^{NS}

Table 9: Economy

Source: Primary Data

There's no significant difference in respondents' opinion that conservation promotes economy, among rural and urban respondents.

4.10. Lowers Fuel Usage

During late afternoons and early evenings the load on the electrical systems usually reaches its peak Back-up generating equipments that is not energy efficient namely solar power systems can be used. Energy intensive appliances is utilized on the early mornings or at night to help reduce peak load. Thus daily fuel use is reduced and energy consumed is lowered. Also, to cover short distances, bicycles are preferred rather than motor vehicles. This also lowers fuel usage.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Low fuel usage	3.1724	3.5161	0.34372	-3.062*

Table 10: Reduction In Fuel Usage

Source : Primary Data

The mean difference is low among rural and urban respondents with regard to their attitude on energy conservation, promoting lower fuel usage.

4.11. Stimulates Systems Design

Designing systems such as to provide task lighting, local switching, reducing exterior illumination to minimum stage level, increasing reflectance and developing optimal housing design orientation of activities towards south results in potential savings of energy. Practical guide to designing assistance promotes energy conservation. The corollary is also true.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
System design	3.0621	3.5742	.51212	-3.590**

Table 11: Promotes System Design

Source : Primary Data

There is significant difference at 99% confidence level that system design aids in energy conservation.

4.12. Positive Reinforcement

Energy conservation increases the frequency of positive reinforcement. Applauding people at home after they take steps to conserve energy, creates, positive reinforcement. Household members learn about household energy conservation quickly and there's continuous reinforcement of conservation. Extinction of unwarranted behaviour also occurs very quickly.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Promotes positive reinforcement	3.3793	3.3419	0.03737	0.346 ^{NS}

Table 12: Positive Reinforcement
Source: Primary Data

Positive Reinforcement is well accepted by respondents as a behavioural variable gained through energy conservation.

4.13. Creates Impulse

Energy conservation, controls and redirects internal states, impulses and resources. It keeps disruptive impulses in check, helping in maintaining the drive to perform well. It helps in transparency of details like. Adaptability, achievement and optimism. Thus it enables motive or drive in oneself to rise higher, for achieving energy savings.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Promotes impulse	4.2000	4.2191	0.01935	-0.284 ^{NS}

Table 13: Impulse
Source: Primary Data

There is no significant difference in opinion, among rural and urban respondent towards impulse as an attitude towards energy conservation.

4.14. Creates Voice

Energy conservation creates voice, in that, it provides to attempt to change in behavior of respondents members, rather than quitting. Active help to improve savings in energy is achieved and hence, it is constructive. It energizes members to aid energy conservation. This attitude prevails among urban and rural respondents of Madurai District.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Create voice	4.2552	4.2452	.01001	0.199ns

Table 14: Voice Creation
Source: Primary Data

There's no significant difference in attitude between urban and rural respondents as regards creation of voice.

4.15. Justice, Support

Affective commitment to household energy, commitment helps in abiding by humanitarian values such as fairness, courtesy, conservation in action that promote involvement in guiding sustainable development.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Justice & support	3.9103	3.6968	0.21357	1.649 ^{NS}

Table 15: Justice and Support
Source: Primary Data

Urban and rural respondents view that energy conservation guides sustainable development and is a necessary component energy management.

4.16. Socially Responsible

Energy conservation creates drive to acquire, bond, and learn. These drives, create emotional makers that indicate the relevance clearance and strength of information about energy and motivates one to act on conditions resulting in savings. These drives, influence different innate drives, and increase significantly higher citizenship behaviour. Energy conservation, hence is a socially significant act, in the perception of respondents.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Socially Responsible	3.3103	3.6645	0.35417	-2.553*

Table 16: Socially Responsible

Source: Primary Data

Social responsibility as one attitude of energy conservation is increasingly felt by both urban and rural respondents.

4.17. Increase Persistence

Culture influences energy conservation persistence, respect for status, and thrift that carefully, make members, to budget their energy consumption but are also more likely to spend towards sentiments. People with strong egalitarian value do not openly display their budget consciousness towards energy costs. Culture and values play a vital role in determining attitude towards energy conservation.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Culture & values	1.7793	1.7806	.00133	-0.028

Table 17: Culture & Values

Source: Primary Data

There is no significant difference in opinion among respondents, with regard to culture & values influencing energy conservation in households, thus promoting energy management, since mean difference is .00133.

4.18. Improves Standardisation

Energy conservation results in systematic portioning of work into its smallest elements and standardization of tasks to achieve maximum efficiency. Work efficiency increases with specific aptitude and skills, matched to energy savings. Collective effort produces more results. Family members divide their common task among themselves, according to member's capability, thus increasing efficiency and therefore contributing to energy conservation.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Promotes standardisation	3.2897	3.6710	.38131	-2.767*

Table 18: Standardisation

Source: Primary Data

It is inferred that since the mean difference is 0.38131, energy conservation promoting standardization is largely among urban and rural respondents.

4.19. Inculcates Self – Transcendence

Energy conservation helps in motivation to promote the welfare of others and nature it relates to the values of benevolence (concerns for others) and universalism. Thus socially desirable values like environmentalism guides energy spending decisions and actions. This aspect is promoted through energy conservation and helps in energy management effectiveness.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Self – transcendence	4.1931	4.2645	0.07141	-1.033ns

Table 19: Self – Transcendence

Source: Primary Data

There is no significant difference between urban and rural respondents in their positive attitude towards energy conservation, evident through the principle of self – transcendence.

4.20. Brings Goal Alignment

To look for better ways to guide household decisions and behavior, value system is needed. Today's adolescents resent the traditional "command-and-control" supervision which is far from perfect. To keep them in alignment for household actions such as energy conservation, values represent the unseen magnet that pulls people in the same direction, representing a common bond and ensure that everyone at home – has aligned goals.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Goal and Alignment	1.7517	1.7484	.00334	0.066 ^{NS}

Table 20: Goal and Alignment

Source: Primary Data

Tables 20 shows that goal alignment is possible through energy conservation, since the mean difference is 0.00334, among urban and rural mean scores.

4.21. Promotes Participation

Household members are like 'well oiled machine'. They have accurate role perceptions to achieve desired behavior and results. Elders in the family understand their required responsibilities and to show how these help in achieving energy conservation. Frequent and meaningful feedbacks help members in optimizing energy use. Energy conservation thus promotes involvement and participation of all members in households.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Role-playing and participation	3.1793	3.5097	.33037	-2.939*

Table 21: Role-Playing and Participation

Source: Primary Data

Respondents believe energy conservation influences member participation and role behavior. This is evident among urban and rural population as their mean scores are 3.1793 and 3.5097 and mean difference being 0.33037.

4.22. Reflects Traits

Friendly compliance with energy savings / conservation reflects members traits of being courteous, good-natured, empathic and casing towards energy savings. Members at households are co-operative, open to ideas of conservation and flexible in their ways. More effectively handling, of household energy is seen, among individual relations among households.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Friendly compliance	2.3379	2.0710	.26696	3.1877 ^{NS}

Table 22: Friendly Compliance

Source: Primary Data

Friendly compliance towards energy management and conservation is noticed among urban and rural respondents.

4.23. Involves Leadership

Energy conservation involves discovering collecting and analyzing ideas, typically in an unstructured setting. Also it involves, leading other members to achieve conservation through result oriented approach. Realistic enterprising type of members, bring effective energy management, in households.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Involvement of Leadership	3.2828	3.6695	.38176	-2.732 ^{NS}

Table 23: Leadership

Source: Primary Data

The attribute of leadership is developed through energy management. Both rural and urban respondents agree to this attitudinal factor, since the mean difference is 0.38176.

4.24. Complex Activity

Achieving energy efficiency is a real, complex and stressful activity. It is responsible for conceptualizing or applying ideas to take the opportunity of energy savings. It enables members to reflect on their observations regarding energy savings. It involves explicit learning, forcing to diagnose new ways, and rethink on current practices on energy conservation.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Complex Activity	2.8138	3.3871	.57330	-3.711**

Table 24: Complexity
Source: Primary Data

The idea of energy conservation as a complex real and stressful activity is agreed by both rural and urban respondents. This is evident through their mean difference of 0.57330.

4.25. Rational

Clean, compatible and agreed upon goals are set for energy conservation. Processing of information about alternate forms of energy, and their outcomes are taken up and evaluation of results is made. Factual information is taken for such analysis. Energy conservation is thus logical and reasonable and enables taking rational decisions.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Aiding logical decision making	2.1931	2.0903	.10278	1.032ns

Table 25: Rationality
Source: Primary Data

Lower mean difference of 0.10278 shows that energy conservation involves rational decision making.

4.26. Promotes Equitability

Energy conservation means avoiding depletion of non-renewable resources. It requires, shifting from reliance on one resource to another. It refers to equal access to resources. Accordingly, it is futile to talk about sustainable development, if problems of inequality are ignored and sustainability is not concern of it energy resource is finite.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Equitability	4.3448	4.3742	.02937	0.528 ^{NS}

Table 26: Equitability
Source: Primary Data

There is no significant difference between mean scores of respondents in urban and rural areas.

4.27. Pro – Active

Pro activity vis-à-vis environment is needed for energy conservation. A sound pro active policy of involving individuals, in each household to manage energy consumption, which is linked to sustainable development is made by members of households. This attitudinal framework yields household energy conservation.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Pro – active	3.3310	3.6774	.34638	-2.458 ^{NS}

Table 27: Pro – Activity
Source: Primary Data

Table 5.27 shows that members exhibit pro-activity in managing and conserving household energy as their, mean difference is 0.34638.

4.28. Agent of Change

Adopting new behavior, is difficult for household members, yet concerns about future, coerce them to bring about a change in behavior. To fit the desired change in energy usage it is needed to abandon, the routines like staying in comfort zone by continuing in routine patterns. Thus, energy conservation is an agent for change. This is increasingly felt by respondents.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Agent for change	3.0828	3.6258	0.54305	0.346 ^{NS}

Table 28: Agent for Change
Source: Primary Data

That energy conservation acts as an agent for change from routine patterns is agreed upon by both urban and rural respondents.

4.29. Co-Ordination

Energy conservation is better achieved out of co-ordination. Simple and routine activities for energy conservation, can be co-ordinated well but the same is less effective when tasks are complex and conditions are ambiguous. The spouse in the family co-ordinate with each other by ensuring that other members, remain on new routine that is scheduled and are compatible with tasks completed by others in the family.

	Mean score		Mean Difference	T statistics
	Urban	Rural		
Co-ordination	3.3172	3.6774	.36018	-2579*

Table 29: Co-Ordination
Source: Primary Data

Energy conservation requires co-ordination of all members in the family, to remain on new scheduled routine. This aspect is believed by both urban and rural respondents as mean difference is 0.36018.

4.30. Integrity

Integrity refers to the consistency in which truthfulness and tendency to translate the principle of conservatism from words into deeds, takes place consistently. This is vital, for performance that results in well being through conservation of energy and it generates a sense of trust. Such an attitude is termed, 'authentic leadership'.

	Mean Score		Mean Difference	t-statistic
	Urban	Rural		
Integrity	4.6483	4.6903	.04205	-0.772 ^{NS}

Table 30: Integrity
Source : Primary Data

Table 5.30 proves that there is no significant difference in views regarding integrity as an attitudinal factor for energy conservation among urban and rural respondents. The highly perceived variables towards energy conservation are that conservation acts as an agent for change, promotes pre activity, integrity, and causes justice & support to the future generalizes urban and rural areas since their mean scores are 4.6483; 4.3448; and 4.2759 (urban) and 4.6903; 4.372 and 4.3032 (rural) respectively.

There is a significant difference in 14 out of 30 variables since their respective t statistics are significant at 5 percent and one percent level.

While university access to clean energy was the 20th century idea now it is access to energy efficiency. Every nation is working relentlessly for a way forward, to increase its energy effectiveness, by using the same amount of resources, for meeting incremental demands. This phenomenon is turning out to be rapid, effective and meticulous.

ALL by Women in Households.

5. References

- i. Organisational Behaviour- L. M. Prasad, Sultan Chand Publishing Company , 2009.
- ii. Business research methods- Donald Cooper, Tata Mc Graw Hill Company, 2001
- iii. Organisational Behaviour-Stephen Robbins, Pearson Publishers, 2000.