

A PEOPLES VIEW ON SMART CITIES AND ASSOCIATED CARBON FOOT PRINTS.

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ABSTRACT:

In last several years, the renewable energy programs have been updated and followed continuously by the government. With the basic cycle adopted in 70's and in some cases early 80s, a forced of research and development was in main focus on renewable energy for reducing carbon emission. Some of the private energy also has taken part in this self motivated energy. This paper gives an insight what different categories have people needed in the name of the development. Development at the cost of pollution is of great matter. Author in this paper had prepared a questionnaire and also did one to one interaction for reading peoples mind.

KEYWORDS: Carbon Emission, One-Way ANOVA, One sample T test, Smart city etc.

INTRODUCTION:

In this paper, research technique employed for data sampling and collection using SPSS modeling of filtered data is been used. Other test used are reliability test, ANOVA test, One -sample T test and their subsequent discussion results are help for a discussion. For studying various significances related to carbon emission associated with smart cities and related problems with actual energy sector have been addressed in this paper with the help of survey. Numerous survey types were executed for obtaining best results from survey, collected data also has been analyze using extensive and well proven tools of six sigma and data statistics. Delimitation from the actual research, this study is limited to the only for various locations from Maharashtra. Reduction in carbon emission can be achieved by using renewable energy sources.

RESEARCH WORK:

PROCEDURE FOR DATA COLLECTION:

- Two types of data collections are implemented
- Questionnaire preparation and studies
 - One to One interaction

DATA COLLECTION QUESTIONNAIRE PREPARATION:

For obtaining appropriate solution for getting better results questionnaire are prepared. Questionnaire prepared while implementing this project was a unique in its nature and type of the questions. For good results questionnaire had been prepared in local language and surveys are carried, questionnaire was also prepared in English for people those who understand English. Questionnaire was filled in front of author in different areas and various community people including metro politician cities as well as villages of Maharashtra.

DATA SAMPLING:

While adopting data sampling systematic approach was used and ended up by picking contributor for the analysis. The sample selection procedure is very difficult, selected data should be well examined and data validation step is necessary. While implementation of this project various tests are carried out and data sample validation is checked thoroughly. The data sample should represent the complete data behavior. Here 400 numbers of samples are taken while carrying out this study in accordance to smart city initiative. The 45000 professional members in Maharashtra use an renewable energy so the sample size is considered as 400.

$$n = N / (1 + (N \times e \times e))$$

n = Sample size for N population
 N= Population
 e= Variance of sample (0.05)
 $n = 45,000 / (1 + (45000 * 0.05 * 0.05))$
 $n \cong 400$

Table 1. Sample size from Renewable Energy (RE) user

Respondent	Population	Sample
Professionals, RE users, under Maharashtra, India	45,000	400

DATA COLLECTION:

While collecting the data professionals, teachers and other associated members were appointed for

collection of data from renewable energy user in Maharashtra. Questionnaire was first made to understand in representative and then they have deputed to field. While designing an questionnaire carbon foot reduction related questions were asked and people were made aware of what is renewable energy and advantages associated with it.

IN-DEPTH INTERVIEWS WITH SELECTED MEMBERS:

One- to one interviews were carried out for the those were already aware of basics of electrical energy and same has been issued, question mentioned in questionnaire were been asked and one - to - one discussion of each question done in detail for better understanding of the issues. All participants were made aware of renewable energy and usage of fossil fuels and how they will increase a carbon foot printing.

DESCRIPTIVE STATISTICS:

In this section the data of questionnaire and one to one interview has been summarized and overall opinion regarding renewable energy and their future opportunities were concerned.

Table 2: Age Analysis
Age

Age	Frequency	Percentage (%)
18 - 25	91	22.75
25 - 34	192	47.34
35 - 44	97	22.72
45 - 55	17	3
Total	400	100

Table 3: Gender Analysis
Gender.

Gender	Frequency	Percentage (%)
Male	245	61.21
Female	149	36.71
Total	400	100

Table 4: Marital status analysis
Marital status

Marital Status	Frequency	Percentage (%)
Single	147	36.75

Married	253	63.25
Total	400	100

Table 5: Personal monthly income Analysis
Personal monthly income.

Income	Frequency	Percentage (%)
30,000 Rupees or below	138	34.5
30,001 - 60,000 Rupees	232	58
60,001 - 90,000 Rupees	21	5.25
Above 90,000 Rupees	9	2.25
Total	400	100

6: Highest education analysis
Education Level

Degree	Frequency	Percentage (%)
Lower than Bachelor's degree	30	7.5
Bachelor's degree	225	56.25
Higher than Bachelor's degree	145	36.25
Total	400	100

4.7 INFERENCE STATISTICS:

- RELIABILITY TESTING result of the questionnaire.

In this section result obtained from reliability testing was presented based on Cronbach's Alpha for measuring for finding data reliability.

Table 7: Reliability tests results

Factor/Purpose	Cronbach's Alpha	N
Knowledge about renewable energy	.779	40
Need of renewable energy for rural development	.821	40
Desire to promote renewable energy for sustainable future	.857	40
Need of RET over fossile fuel	.841	40
Economical, social and cross-	.739	40

cultural factors		
Expenditure and other government policies/financial support facilities for RE	.861	40
RET understanding and implementation need	.765	40
Impact of professional involvement in RET implementation	.752	40
Impact of autonomous body to improve quality of RET	.720	40
Impact of overall RET implementation on energy performance	.831	40
Benefit of renewable energy to reduce carbon foot printing	.834	40
Social and economic equity by providing global exposures in renewable energy	.775	40
Standardized energy policy/process will give more scope for sustainable development	.781	40

ONE-WAY ANOVA:

This is best statistical tool for utilized for testing hypotheses and which will decide key success factors, and it solve purposes and intention for decision which will follow renewable energy in the state of Maharashtra. Research hypotheses were tested for 95% confidence interval and 0.05 level of significance and tests were made so that null hypothesis will be accepted.

ANOVA

Intention of decision
 Table 8: ANOVA test age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.354	2	3.824	16.034	.016
Within Groups	91.021	396	0.271		
Total	100.624	398			

The result of the significant level is .016 which is less than .05 means that the null hypothesis is rejected.

ANOVA

Intention of decision
 Table 9: ANOVA test gender

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.550	2	9.450	40.557	.011
Within Groups	92.012	397	0.233		
Total	100.624	399			

The result of the significant level is .010 which is less than .05 means that the null hypothesis is rejected.

ANOVA

Intention of decision
 Table 10: ANOVA test RE practices

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.441	4	1.147	4.588	.002
Within Groups	99.081	395	.250		
Total	100.624	399			

The result of the significant level is .003 which is less than .05 means that the null hypothesis is rejected.

ANOVA

Intention of decision
 Table 11: ANOVA test income

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.733	3	1.911	7.831	.016
Within Groups	96.789	396	0.244		
Total	100.624	399			

The result of the significant level is .021 which is less than .05 means that the null hypothesis is rejected.

ANOVA

Intention of decision
 Table 12: ANOVA test Energy education

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.508	2	2.168	8.958	.019
Within Groups	96.014	397	.242		
Total	100.624	399			

The result of the significant level is .018 which is less than .05 means that the null hypothesis is rejected.

ANOVA

Intention of decision

Table 13: ANOVA test RET Knowledge

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.733	1	2.366	9.617	.006
Within Groups	97.789	398	0.246		
Total	100.624	399			

The result of the significant level is .003 which is less than .05 means that the null hypothesis is rejected.

ANOVA

Intention of decision

Table 14: ANOVA test social and economical factors

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.533	3	1.766	7.092	.001
Within Groups	98.989	396	0.249		
Total	100.624	399			

The result of the significant level is .025 which is less than .05 means that the null hypothesis is rejected.

ANOVA

Intention of decision

Table 15: ANOVA test government funding/financial supporter renewable energy

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.251	2	1.125	4.466	.014
Within Groups	100.271	397	0.252		
Total	100.624	399			

The result of the significant level is .027 which is less than .05 means that the null hypothesis is rejected.

Table 16: ANOVA test Rural RET implementation

ANOVA

Intention of decision

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.020	3	1.006	4.010	.003
Within Groups	99.502	396	0.251		
Total	100.624	399			

The result of the significant level is .001 which is less than .05 means that the null hypothesis is rejected.

Table 17: ANOVA test Global RET policy

ANOVA

Intention of decision

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.054	4	.763	3.041	.012
Within Groups	99.468	395	0.251		
Total	100.624	399			

The result of the significant level is .011 which is less than .05 means that the null hypothesis is rejected.

Table 18: ANOVA test Impact of support by people

ANOVA

Intention of decision

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.566	2	1.283	5.111	.002
Within Groups	99.956	397	0.251		
Total	100.624	399			

The result of the significant level is .006 which is less than .05 means that the null hypothesis is rejected.

Table 19: ANOVA test Impact of support of government

ANOVA

Intention of decision

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.997	5	0.799	3.197	.005
Within Groups	98.525	394	0.250		
Total	100.624	399			

The result of the significant level is .004 which is less than .05 means that the null hypothesis is rejected.

Table 20: ANOVA test Standardized RE process

ANOVA

Intention of decision

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.015	4	0.503	1.983	.005
Within Groups	100.507	395	0.254		
Total	100.624	399			

The result of the significant level is .002 which is less than .05 means that the null hypothesis is rejected.

ONE-SAMPLE T-TEST:

This research applied measurement values by Likert scaling technique as described below;

Interval (I) = Rang (R) / Class (C)

$R = \text{Highest score} - \text{Lowest score} = 7 - 1 = 6$

$C = \text{Interval Scale} = 7$

$\text{Interval (I)} = (7 - 1) / 7 = 0.85$

The formal of seven-point numerical scale of question with measurement' interpretation:

1 - 1.85 - Significant negative relationship

1.85 - 2.7 - Moderate negative relationship

2.7 - 3.55 - Weak negative relationships

3.55 - 4.4 - Neutral relationship

4.4 - 5.25 - Weak positive relationships

5.25 - 6.15 - Moderate positive relationship

6.15 - 7.0 - Significant positive relationship

The table 21 of One-sample T-test of key-success factors indicates that all four factors have positive relationship with efforts required for social, economical and renewable energy practices in Maharashtra noticed during year 2014- 2016.

Table 21: One-sample t-test of factors

Factors	N	Mean	Std. Deviation	Std. Error Mean
Impact of people support for RE implementation	400	6.1422	0.8652	.07421
Impact of government body support	400	5.5411	0.9534	.07350
Impact of Standardized policy/ processes	400	6.2534	0.8156	.07539
Impact of support by individual	400	5.8491	0.8874	.07812

According to the One-sample T-test of key-success factors, Impact of people support for RE implementation is 6.1422 considered as moderate positive relationship. Impact of government body support mean is 5.5411 and considered as moderate positive relationship too. Impact of Standardized policy/ processes considered as significant positive relationship with the mean of 6.2534. Impact of support by individual has moderate positive relationship with meaning of 5.8491.

Table 22: One-sample t-test of purposes

Purposes	N	Mean	Std. Deviation	Std. Error Mean
renewable energy for sustainable development of Smart City	400	6.3412	.7607	.0653
Social and economical environment for Smart City	400	6.2165	.7289	.0631
Govt. support for improvement of renewable energy technologies for Smart City	400	6.1156	.8278	.0726
Benefits of renewable energy to society for Smart City	400	6.1832	.6501	.0683
renewable energy promotion and social opportunities for Smart City	400	6.1527	.6695	.06499

The table 22 of One-sample T-test for indicating all five factors possesses positive relationship with efforts may be required for social-economic equilibrium between 2014-2016.

CONCLUSION:

In this paper, author has tried to give an justice to answer a problem of smart cities over increased production and it has been observed that different age groups and different education background people has different opinion. Around 400 people opinion had been considered for deciding a sample. Sample reliability was tested and different hypothesis testing was also carried for checking accuracy of judgment in the 95% confidence interval or 5% level of significance.

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