

**A STUDY ON IMPACT OF SUSTAINABILITY INDICATORS ON EDUCATIONAL
INSTITUTION OF 10 DISTRICTS IN TAMIL NADU WITH SPECIAL REFERENCE
(MGNCRE)**

Submitted in partial fulfillment of the requirements for the award of

MASTER OF BUSINESS ADMINISTRATION

By

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DEPARTMENT OF BUSINESS ADMINISTRATION
SCHOOL OF MANAGEMENT STUDIES

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC | 12B Status by UGC | Approved by AICTE JEPPIAAR
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SCHOOL OF MANAGEMENT STUDIES BONAFIDE CERTIFICATE

This is to certify that this Project Report is the Bonafide work of **VISHNU PRIYA R (41410347)** who carried out the project entitle "A STUDY ON IMPACT OF SUSTAINABILITY INDICATORS ON EDUCATIONAL INSTITUTION OF 10 DISTRICTS IN TAMIL NADU WITH SPECIAL REFERENCE (MGNCRE)" under my supervision from January 2023 to April 2023.

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ABSTRACT

Sustainable development involves many things. More appropriate technologies, supportive policies, different ethics, and changes in individual behaviour are among the more obvious factors. One contributing factor that deserves more attention is the element of institutions. Hence, recently, researchers, planners, policy makers and practitioners have paid a considerable attention to the role of adequate and effective institutions for development. In addition, it can be argued that institutions and the institutional arrangements and mechanisms for development provide the missing link that can explain the differences in growth rates and development trends across developing countries. It is, therefore, important to address the questions of how particular institutions work efficiently in developing countries and how to overcome existing institutional bottlenecks. The objective of this research paper is to highlight the importance of institutions with regard to economic development and in achieving sustainable development. It also examines the development plans carried out and investment programmes announced in Sudan since its Independence. This research paper constitutes five major sections in addition to the introduction and conclusion.

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A STUDY ON IMPACT OF SUSTAINABILITY INDICATORS ON EDUCATIONAL INSTITUTION OF 10 DISTRICTS IN TAMIL NADU WITH SPECIAL REFERENCE (MGNCRE)

CHAPTER 1

1.1 INTRODUCTION:

MGNCRE:

Mahatma Gandhi National Council of Rural Education under the Ministry of Human Resource Development, in Government of India strives to promote resilient rural India through Higher Education interventions. MGNCRE designs, develops and promotes curriculum inputs for higher education programmes offered by Universities and Autonomous Institutions in India. The higher educational streams of focus for MGNCRE include: Rural Studies, Rural Development, Rural Management, Social Work and Education. The curriculum inputs are both theoretical and practical field-related relevant to rural India.

SUSTAINABILITY DEVELOPMENT:

Sustainable development is a process that envisions a favorable future for human societies in which living conditions and the use of resources meet human needs without compromising the integrity, beauty, and stability of vital systems.

SUSTAINABILITY INDICATORS

GREEN COVER ON CAMPUS:

A Green Campus is a place where environmental friendly practices and education combine to promote sustainable and eco-friendly practices. The green campus concept offers an institution an opportunity to take a lead in redefining its environmental concern

and develop new paradigms by creating sustainable solutions to environmental and social needs of the inhabitants. For ideal educational institutional buildings, it is imperative to put in place sustainable environmental management in terms of green cover, solid, liquid and e-waste management, rain water harvesting, water and energy conservation, waste reuse and recycling, to cite a few. Greening the campus is all about turning around wasteful inefficiencies and using conventional sources of energies for its daily energy needs, correct disposal handling, procurement of environment friendly supplies and effective recycling program. Institute has to work out the time bound strategies to implement green campus initiatives.

ROOF TOP SOLAR SYSTEM:

Setting up solar rooftops is also philanthropic in nature. It not only serves the environment but serves society as a whole. There are schools and colleges in various small districts of the nation where the supply of electricity is improper, this poses a threat to education of the pupils, also because of lack of power the students in villages cannot take up digital education, especially during the night they are not able to study because of darkness. All these problems could be overcome by adopting solar techniques. The hospitals will not face any obstacle in treating their patients because of lack of power. The use of cleaner energy will also increase the life expectancy rate among people. Solar rooftops are very cost effective. They are one-time investments which continue to serve both nature and the society for a much longer time. In the long run, they turn out to be less expensive as compared to diesel generators or even grid electricity. People who switch to solar energy experience a huge cut in electricity bills, hence saving a lot of money.

WASTE MANAGEMENT:

The educational institutions represent the main components of sustainability promotion in our society. Waste management is one of the challenges that educational institutions have to face in accomplishing sustainability goals. waste management done in a proper

manner not only eliminates the surrounding waste but also will reduce the intensity of the greenhouse gases like methane, carbon monoxide which is emitted from the wastes accumulated. 3Rs of waste – Reduce, Reuse and Recycle. Reduce the amount of waste we make to a feasible extent by using resources wisely and using less than usual. For example, packaging. Reducing waste will not only protect the environment but will also save on costs or reduce expenses for disposal. In the same way, recycling and/or reusing the waste that is produced benefits the environment by lessening the need to extract resources and lowers the potential for contamination.

RAIN WATER /SURFACE WATER HARVESTING:

Rainwater harvesting (RWH) is the collection and storage of rain, rather than allowing it to run off. Rainwater is collected from a roof-like surface and redirected to a tank, cistern, deep pit (well, shaft, or borehole), aquifer, or a reservoir with percolation, so that it seeps down and restores the ground water. Dew and fog can also be collected with nets or other tools. Rainwater harvesting differs from stormwater harvesting as the runoff is typically collected from roofs and other surfaces for storage and subsequent reuse.^{[2]:10} Its uses include watering gardens, livestock,^[3] irrigation, domestic use with proper treatment, and domestic heating. The harvested water can also be committed to longer-term storage or groundwater recharge.

Rainwater harvesting is one of the simplest and oldest methods of self-supply of water for households, having been used in South Asia and other countries for many thousands of years.^[5] Installations can be designed for different scales including households, neighbourhoods and communities and can also be designed to serve institutions such as schools, hospitals and other public facilities.

1.2 BACKGROUND OF THE STUDY:

Sustainable development (SD) has become a popular catchphrase in contemporary development discourse. However, in spite of its pervasiveness and the massive popularity it has garnered over the years, the concept still seems unclear as many people continue to ask questions about its meaning and history, as well as what it entails and implies for development theory and practice. The purpose of this paper is to contribute to the discourse on SD by further explaining the paradigm and its implications for human thinking and actions in the quest for sustainable development of educational institutions.

1.3 NEED / SIGNIFICANCE OF THE STUDY:

- ☉ To Increase sustainability awareness throughout campus.
- ☉ To Identify and document sustainable practices followed by the institutions.
- ☉ To Identify strengths and weaknesses of sustainability practices.
- ☉ To Analyze and suggest solutions to enhance sustainability practices identified from the survey.

1.4 OBJECTIVE OF THE STUDY:

Primary objective:

- ☉ To study Impact of sustainability indicators on educational institution of districts in Tamil Nadu.

Secondary objective:

- ☉ To measure the sustainability indicators named green cover, rooftop solar systems , surface water harvesting, rain water harvesting and waste management of Higher Educational institutions.

- ☉ To promote sustainable actions in rural higher educational institutions.

1.5 SCOPE OF THE STUDY:

- ☉ To Protect and enhance the environment and natural resources of the institutions.
- ☉ To develop more knowledge towards sustainability indicators.
- ☉ To improve the standards of sustainability performance of the institutions.
- ☉ To educate students about the vital role of sustainability indicators in the higher educational institutions.

1.6 LIMITATIONS OF THE STUDY:

The primary limitation to the generalization of the study is collection of data from higher secondary institutions with proper permission from all the 10 districts of Tamil nadu.

CHAPTER -2

2.1 REVIEW OF LITERATURE

1. Alonso-Almeida et al., 2015, Wright and Wilton, 2012 Braulio-Gonzalo et al. (2015) performed a detailed analysis of these tools, including: LEED ND (Leadership in Energy and Environmental Design for Neighborhood Development).
2. BREEAM Communities (Building Research Establishment Environmental Assessment Method), CASBEE UD (Comprehensive Assessment System for Built Environmental Efficiency),
3. Eco city, Le Modele INDI-RU 2005 (indicator), the BRIDGE project (Bridging resources and agencies in large-scale emergency management) and others.
4. García-Sánchez et al. (2015) explored Environmental Performance Indicators (EPIs) for countries in the process of a composite index proposal based on the Driving Force-Pressure-State-Exposure-Effect-Action (DPSEEA) methodology, a robust and complete method focused on reducing the environmental impact on human health. LCA and multi-criteria analysis are combined with EPIs in COMPLIMENT, a tool designed to assess the environmental impact of businesses
5. (Hermann et al., 2007). During the process, an exhaustive description of EPIs is made which highlights strengths and weaknesses as assessment instruments. Later,

6. Hourneaux Jr. et al. (2014) studied the usefulness of EPIs for businesses. Both studies provide knowledge that can be brought to HEIs with some considerations already studied by Walton and Galea (2006).
7. Moldan et al. (2012) compared a wide number of indicators environmentally-related while Singh et al. (2012) overviewed all sustainability assessment methodologies, including several environmental composite indexes, such as ecological footprint. Furthermore, there exist several handbooks and databases about defining EPIs,
8. KPIs are commonly applied with economic or financial purposes, e.g. Azma, 2010, Serdar, 2010. Regarding standards, ISO 14031 includes a procedure for environmental performance assessment through KPIs (International Organization for Standardization, 2013, Campos et al., 2015).
9. Although HEIs substantially differ from corporations (in size, aim, and management structure, among others), the procedure and outcomes also deserve consideration. Dočekalová and Kocmanová (2016) identified KPIs related to the environment along with societal and economic indicators for sustainability measurement of corporations by analyzing different sustainability reporting and managing tools from the Braulio-Gonzalo et al. (2015) analysis.
10. Fernández et al. (2011) applied Bayesian networks to define the relevance of the indicators that better describe the academic performance of a HEI. Barnetson and Cutright (2000) analyzed funding related PIs applied in HEIs, including an extensive and rigorous review of related literature, to develop a typology of assumptions commonly embedded in these types of indicators that may contest objectivity.
11. The use of environmental indicators in HEIs is extended although they are not defined and/or managed as key indicators. Olszak (2012) studies the

sustainability assessment of campuses where environmental indicators are included as part of the sustainability concept.

12. Waheed et al. (2011) developed a sustainability indicators-based tool for HEIs using DPSEEA framework where the environment is well represented.
13. Finally, two reporting tools deserve to be highlighted: (a) the Global Reporting Initiative (GRI), a sustainability reporting guidance for any type of organization (Global Reporting Initiative, 2013, Lo-Iacono-Ferreira et al., 2016b) and (b) the Sustainability Tracking, Assessment & Rating System STARS (The Association for the Advancement of Sustainability in Higher Education, 2016); a self-reporting framework for HEIs to measure their sustainability performance. Both tools include environmental performance indicators as part of their reporting process. The main difference between them is the complexity of the indicator; while GRI offers simple indicators, the Association for the Advancement of Sustainability in Higher Education (AASHE) suggests composite indicators that require significant time and resources to be measured.
14. (Lee et al., 2013). HEIs should lead by example, integrating these principles within education, research, campus operations and community outreach (Lozano et al., 2013). Therefore, it can be said that sustainability in HEIs encompasses the classic three dimensions of any organization (social, environmental and economic), also including its main activity: curricular or academic sustainability (Amaral et al., 2015, Fernández-Sánchez et al., 2014).
15. Lozano et al. (2015) made a survey of 70 HEIs worldwide regarding sustainability in universities. They conclude that efforts and measures towards sustainability were not fully integrated in HEIs' strategies. It would be necessary for sustainability assessment and reports to be integrated in decision-making by top tiers of management, in order to create strategies that consider sustainability as an essential component. A strong link between commitment and real sustainability implementation was found.

16. (Quist and Tukker, 2013) Participatory processes are valuable for a paradigm shift by contributing towards the discussion of how to integrate sustainability into the university (Disterheft et al., 2016).
17. In order to enable the path towards sustainability, Sustainability Assessment Tools (SATs) have become a crucial element (Lambrechts, 2015). SATs play an essential role in HEIs and thus, they allow the creation of strategies and planning towards a sustainable university.
18. The approaches are facilitators of change, but researchers have not paid much attention to what these tools conclude about what is or should be a sustainable university. Henceforth, they are becoming an informal standard to follow (Fischer et al., 2015). Indeed, Lozano et al. (2015) stated that sustainability assessment and reporting in HEIs is lagging behind.
19. Sustainability reporting in Higher Education is a voluntary activity derived from a sustainability assessment. The Global Reporting Initiative (GRI) defined it as: “the practice of measuring, disclosing, and being accountable to internal and external stakeholders for organizational performance towards the goal of sustainable development” (GRI, 2011: 3). A recent study (Ceulemans et al., 2015) showed that in 2014 only 35 universities from around the world published their sustainability reports, compared with the total number of HEIs, estimated at over 20,000 worldwide. Hence, its applicability is still slow and a literature review is needed in order to study sustainability assessments and existing SATs, beyond reports which are currently available.
20. Education, research, operations and community engagement are the four key areas for almost every SAT (Stephens et al., 2008). A diverse number of SATs and approaches have emerged in the past decade (Caeiro et al. eds., 2013). They have different purposes: for monitoring, to draw comparisons, and to establish internal strategies towards sustainability (Jenssen, 2012). Since these approaches are actually influencing activities in HEIs (Yarime and Tanaka,

2012), to know what these tools are assessing, turns out to be a critical issue for ESD.

21. Shriberg (2002) analysed 11 sustainability assessment tools, Cole (2003) reviewed 13 tools, Yarime and Tanaka (2012) developed the third comprehensive comparative analysis of 16 approaches, and the most recent study provided the last existing study of 12 sustainability assessment tools. In these studies, different tools are compared theoretically by analysing indicators and criteria. Following on from this, a qualitative assessment is conducted of what is understood as a sustainable university based on each tool and manual. Table 1 summarizes previous studies referenced, their scope and main findings.
22. Caeiro et al. (eds., 2013) have analysed the technicality of current sustainability practices with a specialized focus on assessment and reporting tools developed for HEIs. Certain tools are analysed, such as AISHE (Auditing Instrument for Sustainability in Higher Education; Lambrechts and Ceulemans, 2013), GASU (Graphical Assessment of Sustainability in Universities tool; Lozano et al., 2013), USAT (Unit-based Sustainability Assessment Tool; Togo and Lotz-Sisitka, 2013) and STAUNCH (Sustainability Tool for Auditing Universities Curricula in Higher Education; Lozano and Watson, 2013).
23. Sierra Youth Coalition (Cole, 2003), Some SATs are focused on curricula and educational areas. STAUNCH created by BRASS Research Center at Cardiff University (Lozano, 2011), and AUA (Alternative Universal Appraisal, Prosper.net, 2010) are a good example of these. Other tools use campus-based approaches. Indeed, this is the case with some programs, such as the Campus Sustainability Assessment Framework (CSAF) developed by which is more oriented to operations on the campus.
24. The tool with the most specific quantitative indicators, which is mainly used in the USA, is STARS, with real multiple case studies and a worthy practical application

(eg. Richardson and Kachler, 2016). STARS provides a framework that recognises relative progress towards sustainability as an integral quantitative and qualitative tool, used in diagnosis but also to rate effort and progress

25.(Martins and Borges, 2015). However, most common SATs are qualitative indicator-based. In this sense USAT tries to establish the status of ESD by facilitating a quick assessment of the integration level of sustainability issues in university functions and operations (Caeiro et al., 2013). The AISHE tool is also qualitative and it has proven to be a reliable tool, giving a qualitative approach for a sustainable assessment and reporting.

26. Lambrechts and Ceulemans (2013) made a deep SWOT analysis of this tool. AISHE is one of the most complete and complex tools to address sustainability focused on education, but with less interest in environmental management or research (Martins and Borges, 2015), and the new version AISHE 2.0 tackles this deficit

27.(Roorda et al., 2009) SAQ tool (Sustainability Assessment Questionnaire) was developed by University Leaders for a Sustainable Future (ULSF, 2009). It is a qualitative tool designed for the evaluation of the various objectives of universities: to raise awareness about the sustainable development, to encourage debate on what sustainability in HEIs means, to give a picture of the state of sustainability in the institution, and to discuss about next steps towards sustainability.

28. SustainTool (Program Sustainability Assessment Tool) was developed by Washington University (2013) and focused on program. Yet it has a vague concept of these program, since it integrates indicators and criteria of the whole institution in different contexts, taking into account the concept of program, generically considering different areas.
29. Lozano et al. (2006) proposed the GASU tool (Graphical Assessment of Sustainability in Universities) by adapting the GRI framework to universities, finally applying it to 12 universities. They conclude that universities are still in the early stages compared with business organisations. There are also multiple ad-hoc proposals to fit singular cases (eg. Kamal and Asmuss, 2013).
30. To know not only the diagnosis from one university through different approaches, but also how the efforts towards sustainability of a real strategic plan are measured and rated through these tools. In this direction, Ramos and Pires (2013) state that the contribution of sustainability assessment to structural organizational change in HEIs needs more research and this article will try to contribute towards this.
31. Peres, Camponogara, Costa, Gomes, and Nietzsche, who in their 2013 study with 17 postgraduate professors in nursing from the Superior Education Institutions in Rio Grande do Sul found bias in relation to sociocultural factors and values, and environmental education; they believe that it is necessary to encourage teachers to think from a critical perspective on the environmental and social problems that current society faces, and relate them to the subjects taught or in the research they conduct.
32. Richardson et al. add that nursing teachers have a responsibility to incorporate practical examples into their learning activities that address sustainable development in their context.
33. Schenk et al. of Washington State University, developed the evaluation tool Nurses Environmental Awareness Tool (NEAT); they found that environmental

degradation creates risks to human health, and nurse practices contribute to the same degradation. They argue that in the literature, it is an under-addressed topic and that the proposed tool is ready for testing that will contribute to the environmental sciences. In this way health professionals will be better prepared to develop plans and strategies to mitigate the damage.

34. In this sense, to contribute to the strengthening of the training of nurses, Torres-Alzate describes a process for the development of a framework of competencies in global nursing health, integrated into seven categories, including sustainability. She argues that they are relevant in the study plans to guide the training of nurses.
35. Chen and Price agree on the importance of climate change and sustainability in nursing training, which is why they consider that they should be included in the curricula.
36. Richardson, Clarke, Grose, and Warwick who found that students in their first, second, and third year of undergraduate nursing are more aware of sustainability; additionally, students of third year could apply sustainability in their clinical practices and address environmental issues in a responsible manner. In a similar study made by the School of Nursing and Midwifery at the University of Plymouth, United Kingdom,
37. Richardson et al identified that students have limited knowledge about natural resources but are more aware of waste management.
38. Richardson et al. in the United Kingdom; they identified changes in attitudes about sustainability and climate change.
39. Nigatu, Asamoah, and Kloos of Haramaya University found that most students know that climate change damages health, as well as that electronic means of communication are (although insufficient) the main source of information.
40. Yang, Liao, Liu, Zhang, Zhong, and Huang conducted a research project on knowledge and perception with students from Chinese universities; they found that 83% of students think climate change is “bad”, and 88% think it is affecting human health; 67% believe it is manageable; most participants recognized that

diseases are derived from different problems related to climate change and air quality; they also showed students' limited knowledge of the causes of the same phenomenon.

41. Chen and Price found that Chinese nursing students place greater importance on sustainability than their English peers; they also highlight that their conceptual understanding focused on environmental aspects and clinical waste management.
42. Von Haartman et al. applied a survey at the beginning and end of two nursing and engineering courses (2010 and 2013) with students from a Swedish university; they found that there were changes in their awareness of sustainability at “extremely high” levels; on a scale of 1 to 5, they were located at 4.5.
43. According to the biogram, students demonstrated an unstable state; this is attributed to their access to information networks, under which they are immersed in the digital age and technologies; these influence the perception and awareness of the problems of the environment; they show more alignment with target 4.7 on the 2030 ASD. Similarly, directors are at an unstable level. The teachers were placed in a state of collapse, which means they are further away from sustainability. It is urgent to design strategies so that the whole school community achieves an optimal state, especially the teachers.
44. Freeman distinguished two types of change, focused on stakeholder involvement: internal change (*i.e.*, changes that affect or are affected by internal stakeholders); and external change (*i.e.*, changes that occur on the outskirts of the organization, or linked to external stakeholders). Organizations have, in general, more control over internal changes than over external ones, which can make them more proactive
45. According to Bennis *et al.* there can be three types of organizational change, according to intervention in the change process: (1) radical intervention, organized strictly top-down and emphasizes conflict; (2) serendipitous change, a continuous and unpredictable, “laissez-faire” style process of adaptation to

changing conditions; and (3) planned change, which offers the advantage of some type of guidance, without being too constrictive or too serendipitous.

46. Doppelt; Dunphy *et al.* ; Lozano have addressed SD through organizational change. They have proposed that organizational change management for sustainability (OCMS) is aimed at making organizations more sustainable by focusing on, and addressing, “soft issues”, *i.e.*, culture, employee behavior, leadership or stakeholder engagement, rather than changes in technologies or management systems
47. DeSimone and Popoff ; Doppelt ; Henriques and Richardson , relying on strategic adoption and development of SD activities and management practices Fewer authors have dealt with internal change and innovation, *i.e.*, focusing on more proactive approaches, and on participative cultural changes
48. Lozano proposed a framework, based on Bennis *et al.* Lewin ,Anderson & Ackerman Anderson and Luthans for explaining the dynamics of orchestrating change for corporate sustainability .The framework depicts organizational change dynamics, where orchestrated planned change can disrupt the *status quo* (SQ) and help the move towards a *More Sustainability-Orientated State* (MSOS), in a continuously iterative process.
49. Adams and McNicholas’ work stating that the process of preparing a sustainability report could lead to OCMS; Mitchell *et al.*’s paper discussing that SR’s change potential could be undermined by failing to link SR with SD strategy implementation; and Lozano’s work highlighting that the SR process is an important driver for change towards SD.
50. Albrecht *et al.* who indicated that SR can initiate organizational learning in HEIs, because of its potential to mobilize stakeholders and allow for incremental and fundamental learning.

CHAPTER-3

RESEARCH METHODOLOGY

3.1 OBJECTIVE:

To collect data from 100 higher educational institutions of 10 districts of Tamil Nadu using a questionnaire.

3.2 SOURCES OF DATA:

EDUCTIONAL INSTITUTIONS OF SELECTED DISTRICTS:

KANCHIPURAM- 10 HEI'S

CHENGALPATTU- 10 HEI'S

CHENNAI- 10 HEI'S

ERODE- 10 HEI'S

TRIPPUR- 10 HEI'S

THIRUPPATHUR- 10 HEI'S

THIRUVANNAMALAI- 10 HEI'S

THIRUVALLUR- 10 HEI'S

VILLUPURAM- 10 HEI'S

COIMBATORE- 10 HEI'S

3.3 DATA TYPE:

PRIMARY DATA IS COLLECTED FROM EACH INSTITUTION USING A QUESTIONNAIRE.

3.4 SAMPLE SIZE: 100

1. Kanchi Shri Krishna College of arts and science
2. Sri Sairam Institute of Technology
3. DMI College of Engineering

4. Sri Sairam Engineering College
5. CSI Ewart Women's Christian College
6. Sri Sairam Ayurveda Medical College
7. Dhanalakshmi College of Engineering
8. Sathyabama Institute of Science
9. The Quaide Milleth College for men
10. Dhaanish Ahmed College of Engineering
11. Chettinad Academy of Research
12. B. S. Abdur Rahman Crescent Institute
13. Sri Sivasubramaniya Nadar College
14. Vidhya Sagar Women's College
15. Tamilnadu Teachers Education University
16. Anand Institute of Higher Technology
17. Vels Institute of Science Technology
18. SRM University
19. Hindustan Institute of Technology
20. Tagore Engineering College
21. Annai Velankanni College
22. New College
23. S A College of Arts and Science
24. Women's Christian College
25. S.I.V.E.T College
26. Loyola College

27. Madras School of Social Work
28. St. Anne's Arts and Science
29. SRM Easwari Engineering College
30. St. Thomas College of Arts and science
31. Nandha Arts and Science College
32. Vellalar College for Womens
33. Kongu Arts and Science College
34. Palaniswamy Arts and Science College
35. Bannari Amman Institute of Technology
36. Sri Vasavi College
37. Erode Sengunthar Engineering College
38. kongu Engineering College
39. Shree Venkateshwara Hi Tech College
40. Erode Arts and Science College
41. Angel college of engineering and arts and science
42. St. Joseph college for women
43. Govt. Arts and Science college
44. Govt. Arts and Science college
45. Gvg College of Arts and science
46. Vidhyasagar college of Arts and science
47. Kamalam college of Arts and Science
48. Builders Engineering college
49. Park's College

50. Govt. Arts and Science college
51. Sacred Heart College
52. Islamiah College (Autonomous)
53. Islamiah Women Arts and Science
54. Don Bosco College(Co-Ed)
55. Marudhhar Kesari Jian College
56. Priyadharshini Engineering College
57. Priyadharshini Polytechnic College
58. Podhigai Engineering college
59. Bharathidasan Engineering College
60. Vanavil Arts and Science College
61. Idhaya College for Womens
62. Kamban College of Arts and Science
63. Sun Arts and Science College
64. Aruna Vidhya Arts and Science
65. Sri Balaji Chockalingam Engineering
66. Dr.M.G.R. Chockalingam Engineering
67. S.K.P. Engineering College
68. Arunai Engineering College
69. Suraj College of Education
70. Sri Balaji College of Education
71. RMK Engineering college
72. RMD Engineering College

73.Velammal Institute of Technology
74.RMK College of Engineering
75.Panimalar Engineering College
76.Nazareth College of Arts and Science
77.Dharmamurthi Rao Bahadur Calavala Cunnan Chetty's Hindu College
78.Sindhi College of Arts & Science
79.Jaya College of Arts & Science
80.T.J.S. Engineering College
81.Theivanai Ammal College for Women
82.E.S. Arts and Science College
83.E.S College of Nursing
84.BWDA Arts and Science College
85.Valliammai Women's College
86.Dr.M.G.R.Government Women's college
87.Sacred Heart Arts and Science
88.University College of Engineering
89.Karpagam Academy of Higher Education
90.Rathinam College of Arts and Sscience
91.SNMV College of Arts and Science
92.Nehru Arts and Science College
93.Sri Krishna Arts and Science College
94.Sri Krishna Adithya College of
95.PSG College of Arts And Scienc

96. GRD College Of Science
97. P.A College Of Engineering and technology
98. NGM College of Arts and Science
99. Mahendra Institute of engineering and technology
100. KSR college of engineering

3.5 SAMPLING METHOD:

THE SAMPLING METHOD USED IN THE STUDY IS CONVENIENCE RANDOM SAMPLING. THE DISTRICTS AND INSTITUTIONS ARE SELECTED RANDOMLY.

3.6 METHOD OF DATA COLLECTION:

A PRE PREPARED QUESTIONNAIRE IS USED FOR DATA COLLECTION.

3.7 VARIABLES

DEPENDENT : SUSTAINABILITY INDICATORS

INDEPENDENT : LOCATION ,AREA TYPE ,NO.OF POPULATION

CHAPTER-4

DATA ANALYSIS:

4.1 PERCENTAGE ANALYSIS:

It is the process of inspecting, narrowing, transforming, and modelling data from a huge amount of information or data. The percentage is one of the essential components of data analysis, which helps find a value from a huge amount of data and information.

4.2 PAIRED T TEST

The paired t-test gives a hypothesis examination of the difference between population means for a set of random samples whose variations are almost normally distributed. Subjects are often tested in a before-after situation or with subjects as alike as possible.

4.3 ONE WAY ANOVA

One-Way ANOVA ("analysis of variance") compares the means of two or more independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different. One-Way ANOVA is a parametric test. This test is also known as: One-Factor ANOVA.

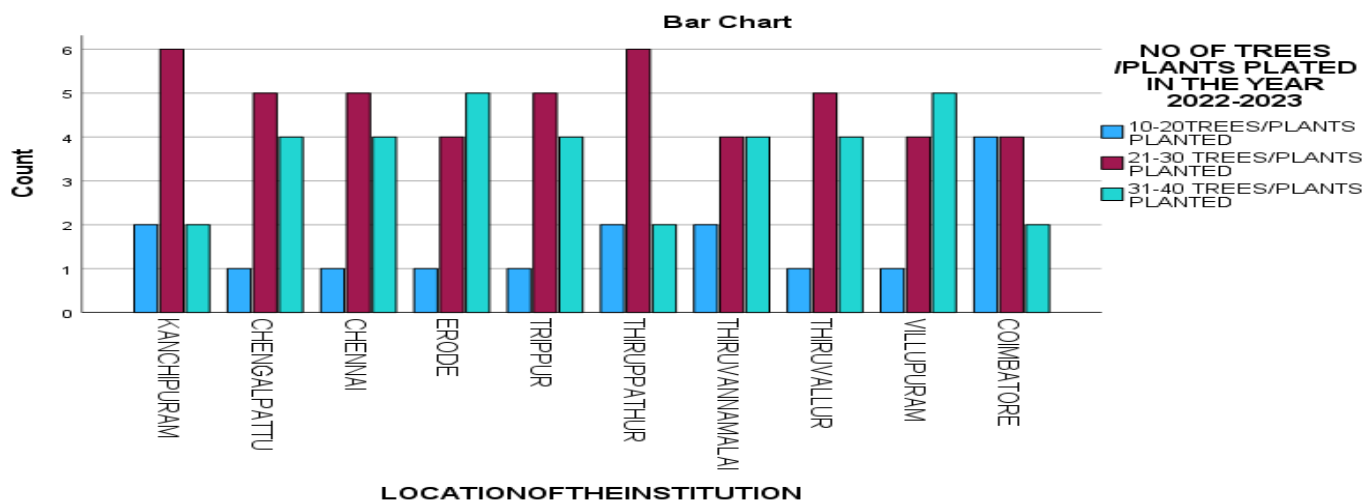
GREEN COVER PERCENTAGE ANALYSIS			NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023			Total
			10- 20TREES/ PLANTS PLANTED	21-30 TREES/ PLANTS PLANTED	31-40 TREES/ PLANTS PLANTED	
LOCATION OF THE INSTITUTION	KANCHIPU RAM	Count	2	6	2	10
		% within LOCATIONOF THEINSTITUT ION	20.0%	60.0%	20.0%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	12.5%	12.5%	5.6%	10.0%
	CHENGALP ATTU	Count	1	5	4	10
		% within LOCATIONOF THEINSTITUT ION	10.0%	50.0%	40.0%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	6.3%	10.4%	11.1%	10.0%
	CHENNAI	Count	1	5	4	10
		% within LOCATIONOF THEINSTITUT ION	10.0%	50.0%	40.0%	100.0%

		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	6.3%	10.4%	11.1%	10.0%
	ERODE	Count	1	4	5	10
		% within LOCATIONOF THEINSTITUTION	10.0%	40.0%	50.0%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	6.3%	8.3%	13.9%	10.0%
	TRIPPUR	Count	1	5	4	10
		% within LOCATIONOF THEINSTITUTION	10.0%	50.0%	40.0%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	6.3%	10.4%	11.1%	10.0%
	THIRUPPATTUR	Count	2	6	2	10
		% within LOCATIONOF THEINSTITUTION	20.0%	60.0%	20.0%	100.0%

		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	12.5%	12.5%	5.6%	10.0%
	THIRUVAN NAMALAI	Count	2	4	4	10
		% within LOCATIONOF THEINSTITUTION	20.0%	40.0%	40.0%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	12.5%	8.3%	11.1%	10.0%
	THIRUVALLUR	Count	1	5	4	10
		% within LOCATIONOF THEINSTITUTION	10.0%	50.0%	40.0%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	6.3%	10.4%	11.1%	10.0%
	VILLUPURAM	Count	1	4	5	10
		% within LOCATIONOF THEINSTITUTION	10.0%	40.0%	50.0%	100.0%

		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	6.3%	8.3%	13.9%	10.0%
	COIMBATORE	Count	4	4	2	10
		% within LOCATIONOF THEINSTITUTION	40.0%	40.0%	20.0%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	25.0%	8.3%	5.6%	10.0%
Total		Count	16	48	36	100
		% within LOCATIONOF THEINSTITUTION	16.0%	48.0%	36.0%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	100.0%	100.0%	100.0%	100.0%

TABLE 1.1 NO.OF TREES /PLANTS PERCENTAGE ANALYSIS



LOCATION OF THE INSTITUTION * TREE COVER AREA IN THE CAMPUS							
Crosstabulation							
			TREE COVER AREA IN THE CAMPUS				Total
			LESS THAN 10% OF TREE COVER	11%-21% OF TREE COVER AREA	22%-33% OF TREE COVER AREA	34%-44% OF TREE COVER AREA	
LOCATION OF THE INSTITUTION	KANCHIPURAM	Count	2	0	6	2	10
		% within LOCATION OF THE INSTITUTION	20.0%	0.0%	60.0%	20.0%	100.0 %

FIG 1.1 NO.OF TREES /PLANTS PERCENTAGE ANALYSIS

		% within TREE COVE R AREA IN THE CAMP US	11.8%	0.0%	14.3%	6.5%	10.0 %
	CHENGALPATT U	Count	2	1	5	2	10
		% within LOCAT IONOF THEIN STITUT ION	20.0%	10.0%	50.0%	20.0%	100.0 %
		% within TREE COVE R AREA IN THE CAMP US	11.8%	10.0%	11.9%	6.5%	10.0 %
	CHENNAI	Count	1	0	5	4	10
		% within LOCAT IONOF THEIN STITUT ION	10.0%	0.0%	50.0%	40.0%	100.0 %

		% within TREE COVE R AREA IN THE CAMP US	5.9%	0.0%	11.9%	12.9%	10.0 %
	ERODE	Count	2	2	4	2	10
		% within LOCAT IONOF THEIN STITUT ION	20.0%	20.0%	40.0%	20.0%	100.0 %
		% within TREE COVE R AREA IN THE CAMP US	11.8%	20.0%	9.5%	6.5%	10.0 %
	TRIPPUR	Count	2	2	2	4	10
		% within LOCAT IONOF THEIN STITUT ION	20.0%	20.0%	20.0%	40.0%	100.0 %

		% within TREE COVE R AREA IN THE CAMP US	11.8%	20.0%	4.8%	12.9%	10.0 %
	THIRUPPATHU R	Count	2	0	5	3	10
		% within LOCAT IONOF THEIN STITUT ION	20.0%	0.0%	50.0%	30.0%	100.0 %
		% within TREE COVE R AREA IN THE CAMP US	11.8%	0.0%	11.9%	9.7%	10.0 %
	THIRUVANNAM ALAI	Count	2	2	3	3	10
		% within LOCAT IONOF THEIN STITUT ION	20.0%	20.0%	30.0%	30.0%	100.0 %

		% within TREE COVE R AREA IN THE CAMP US	11.8%	20.0%	7.1%	9.7%	10.0 %
	THIRUVALLUR	Count	1	2	3	4	10
		% within LOCAT IONOF THEIN STITUT ION	10.0%	20.0%	30.0%	40.0%	100.0 %
		% within TREE COVE R AREA IN THE CAMP US	5.9%	20.0%	7.1%	12.9%	10.0 %
	VILLUPURAM	Count	2	0	5	3	10
		% within LOCAT IONOF THEIN STITUT ION	20.0%	0.0%	50.0%	30.0%	100.0 %

		% within TREE COVER AREA IN THE CAMPUS	11.8%	0.0%	11.9%	9.7%	10.0 %
	COIMBATORE	Count	1	1	4	4	10
		% within LOCATION OF THE INSTITUTION	10.0%	10.0%	40.0%	40.0%	100.0 %
		% within TREE COVER AREA IN THE CAMPUS	5.9%	10.0%	9.5%	12.9%	10.0 %
Total		Count	17	10	42	31	100
		% within LOCATION OF THE INSTITUTION	17.0%	10.0%	42.0%	31.0%	100.0 %

	% within TREE COVE R AREA IN THE CAMP US	100.0%	100.0%	100.0%	100.0%	100.0%
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TABLE 1.2 TREE COVER AREA PERCENTAGE ANALYSIS

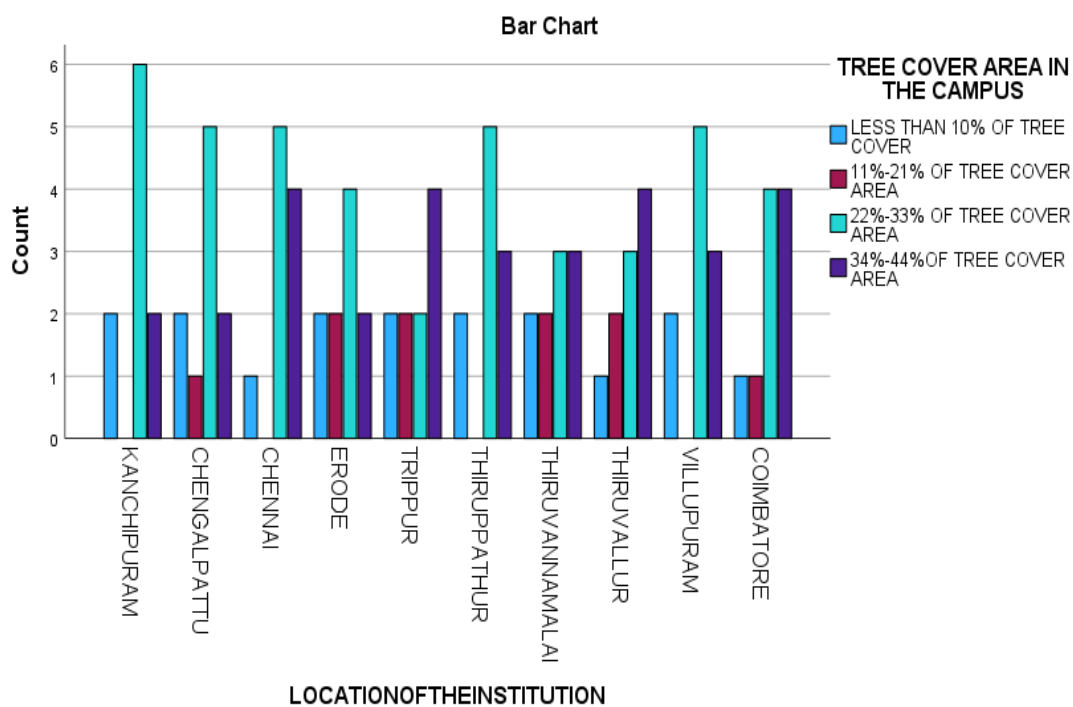


FIG 1.2 TREE COVER AREA PERCENTAGE ANALYSIS

TYPE OF AREA * NO OF TREES / PLANTS PLANTED IN THE YEAR 2022-2023 Crosstabulation		
	NO OF TREES / PLANTS PLANTED IN THE YEAR 2022-2023	Total

			10-20TREES/P LANTS PLANTED	21-30 TREES/PLA NTS PLANTED	31-40 TREES/PLA NTS PLANTED	
TYPEOFA REA	URBA N	Count	9	21	16	46
		% within TYPEOFAREA	19.6%	45.7%	34.8%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	56.3%	43.8%	44.4%	46.0%
	RURA L	Count	7	27	20	54
		% within TYPEOFAREA	13.0%	50.0%	37.0%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	43.8%	56.3%	55.6%	54.0%
Total		Count	16	48	36	100
		% within TYPEOFAREA	16.0%	48.0%	36.0%	100.0%
		% within NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	100.0%	100.0%	100.0%	100.0%

TABLE 1.3 CROSSTABULATION OF NO.OF TREES AND PLANTS

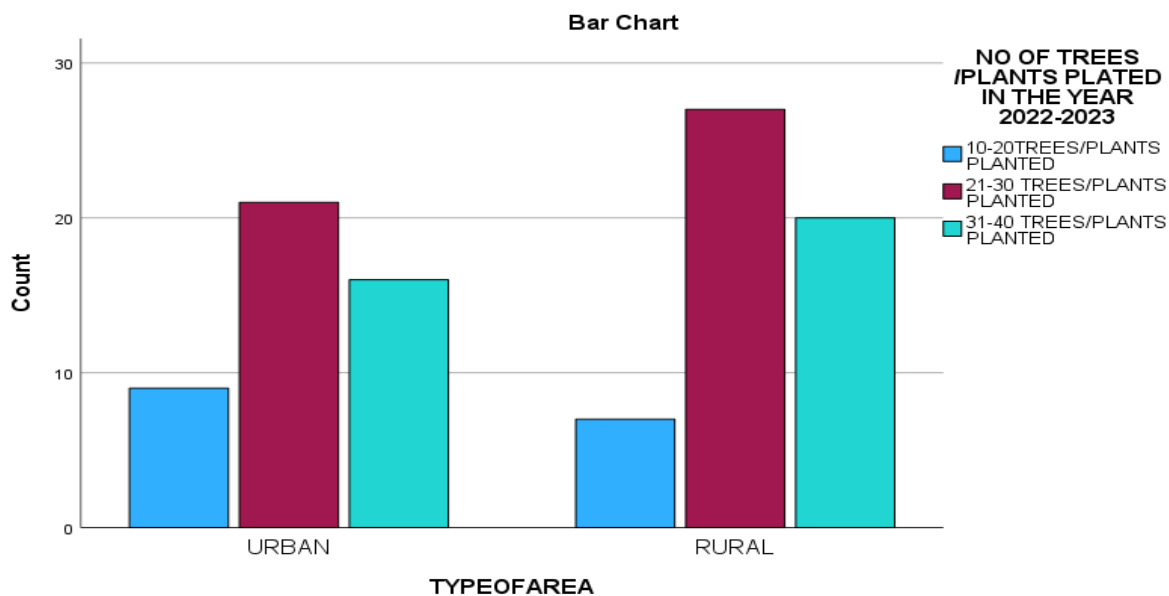


FIG 1.3 CROSSTABULATION OF NO.OF TREES AND PLANTS

TYPE OF AREA * TREE COVER AREA IN THE CAMPUS Crosstabulation							
		TREE COVER AREA IN THE CAMPUS				Total	
		LESS THAN 10% OF TREE COVER	11%-21% OF TREE COVER AREA	22%-33% OF TREE COVER AREA	34%-44% OF TREE COVER AREA		
TYPE OF AREA	URBAN	Count	7	5	20	14	46
		% within TYPE OF AREA	15.2%	10.9%	43.5%	30.4%	100.0%

		% within TREE COVER AREA IN THE CAMPUS	41.2%	50.0%	47.6%	45.2%	46.0%
	RURAL	Count	10	5	22	17	54
		% within TYPEOFAREA	18.5%	9.3%	40.7%	31.5%	100.0%
		% within TREE COVER AREA IN THE CAMPUS	58.8%	50.0%	52.4%	54.8%	54.0%
Total		Count	17	10	42	31	100
		% within TYPEOFAREA	17.0%	10.0%	42.0%	31.0%	100.0%
		% within TREE COVER AREA IN THE CAMPUS	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 1.4 CROSS TABULATION OF TREE COVER AREA

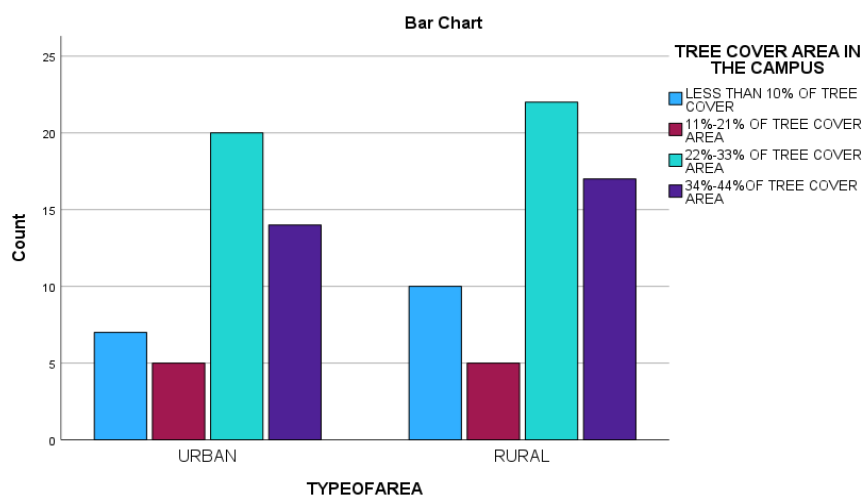


FIG 1.4 CROSS TABULATION OF TREE COVER AREA

INFERENCE : FROM THE ABOVE TABLE AND BAR GRAPHS IT IS SHOWN THAT 46 INSTITUTIONS IN URBAN AREA IN TAMILNADU DISTRICTS HAVE TREE PLANTATION ACCORDING TO THE CRITERIAS AND 54 INTITUTIONS IN RURAL AREA OF TAIL NADU DISTRICTS HAVE TREE PLANTATION ACCORDING TO THE CRITERIAS.

ERODE AND VILLUPURAM DISTRICTS HAVE HIGHEST NO.OF TREES PLANTED BY THE INSTITUTIONS AND COIMBATORE HAS LEAST NO.OF PLANTS PLANTED BY THE INSTITUTIONS IN TAMIL NADU .

GREEN COVER

PAIRED T TEST

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	LOCATIONOFTHEINSTI TUTION	5.50	100	2.887	.289
	NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	3.20	100	.696	.070
Pair 2	LOCATIONOFTHEINSTI TUTION	5.50	100	2.887	.289
	TREE COVER AREA IN THE CAMPUS	2.87	100	1.041	.104
Pair 3	TYPEOFAREA	1.54	100	.501	.050
	NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	3.20	100	.696	.070
Pair 4	TYPEOFAREA	1.54	100	.501	.050
	TREE COVER AREA IN THE CAMPUS	2.87	100	1.041	.104

TABLE 1.5 GREEN COVER PAIRED T TEST

		Paired Differences			T	df	Significance	
		Mean	Std. Deviation	Std. Error Mean			One-Sided p	Two-Sided p
Pair 1	LOCATION OF THE INSTITUTION - NO OF TREES /PLANTS PLANTED IN THE YEAR 2022-2023	2.300	3.003	0.300	7.658	99	0.000	0.000
Pair 2	LOCATION OF THE INSTITUTION - TREE COVER AREA IN THE CAMPUS	2.630	3.011	0.301	8.736	99	0.000	0.000
Pair 3	TYPE OF AREA - NO OF TREES /PLANTS PLANTED IN THE YEAR 2022-2023	-1.660	0.831	0.083	19.965	99	0.000	0.000
Pair 4	TYPE OF AREA - TREE COVER AREA IN THE CAMPUS	-1.330	1.164	0.116	11.427	99	0.000	0.000

TABLE 1.6 GREEN COVER PAIRED T TEST

HYPOTHESIS:

H₀ - THERE IS NO IMPACT OF LOCATION OF THE INSTITUTION , TYPE OF AREA ON NO.OF TREES PLANTED AND TREE COVER AREA.

H₁- THERE IS IMPACT OF LOCATION OF THE INSTITUTION , TYPE OF AREA ON NO.OF TREES PLANTED AND TREE COVER AREA.

INFERENCE:

THE P VALUE OF THE PAIRED T TEST ANALYSIS IS LESS THAN 0.05 SIGNIFICANCE VALUE.HENCE THE ALTERNATE HYPOTHESIS IS ACCEPTED. THEREFORE THERE IS IS IMPACT OF LOCATION OF THE INSTITUTION , TYPE OF AREA ON NO.OF TREES PLANTED AND TREE COVER AREA.

ONE WAY ANOVA

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	Between Groups	.195	1	.195	.399	.529
	Within Groups	47.805	98	.488		
	Total	48.000	99			
TREE COVER AREA IN THE CAMPUS	Between Groups	.039	1	.039	.035	.851
	Within Groups	107.271	98	1.095		
	Total	107.310	99			
LOCATION OF THE INSTITUTION	Between Groups	5.797	1	5.797	.693	.407
	Within Groups	819.203	98	8.359		
	Total	825.000	99			

TABLE 1.7 ANOVA OF TREE COVER AREA, NO. OF PLANTS & LOCATION.

HYPOTHESIS:

H₀- THERE IS NO ASSOCIATION OF LOCATION OF THE INSTITUTION WITH NO. OF TREES PLANTED OR TREE COVER AREA.

H₁- THERE IS ASSOCIATION OF LOCATION OF THE INSTITUTION WITH NO. OF TREES PLANTED OR TREE COVER AREA.

INFERENCE: ACCORDING TO THE ONE WAY ANOVA ANALYSIS IT IS FOUND THAT THE P VALUE IS GREATER THAN THE SIGNIFICANCE VALUE OF 0.05 HENCE THE NULL HYPOTHESIS IS ACCEPTED. THEREFORE THERE IS NO ASSOCIATION OF LOCATION OF THE INSTITUTION WITH NO. OF TREES PLANTED OR TREE COVER AREA.

**ROOFTOP SOLAR PANEL/SOLAR ENERGY CONSERVATION:
PERCENTAAGE ANALYSIS**

TYPEOFAREA * SOLAR PANEL INSTALLATION DEPENDS ON THE POPULATION						
Crosstabulation						
			SOLAR PANEL INSTALLATION DEPENDS ON THE POPULATION			Total
			AGREE	NEUTRAL	DISAGREE	
TYPEOFA REA	URBA N	Count	9	21	16	46
		% within TYPEOFAREA	19.6%	45.7%	34.8%	100.0%
		% within SOLAR PANEL INSTALLATION DEPENDS ON THE POPULATION	56.3%	43.8%	44.4%	46.0%
	RURA L	Count	7	27	20	54
		% within TYPEOFAREA	13.0%	50.0%	37.0%	100.0%
		% within SOLAR PANEL INSTALLATION DEPENDS ON THE POPULATION	43.8%	56.3%	55.6%	54.0%
Total		Count	16	48	36	100
		% within TYPEOFAREA	16.0%	48.0%	36.0%	100.0%
		% within SOLAR PANEL INSTALLATION DEPENDS ON THE POPULATION	100.0%	100.0%	100.0%	100.0%

TABLE 1.8 CROSSTABLUTION OF SOLAR PANEL INSTALLATION

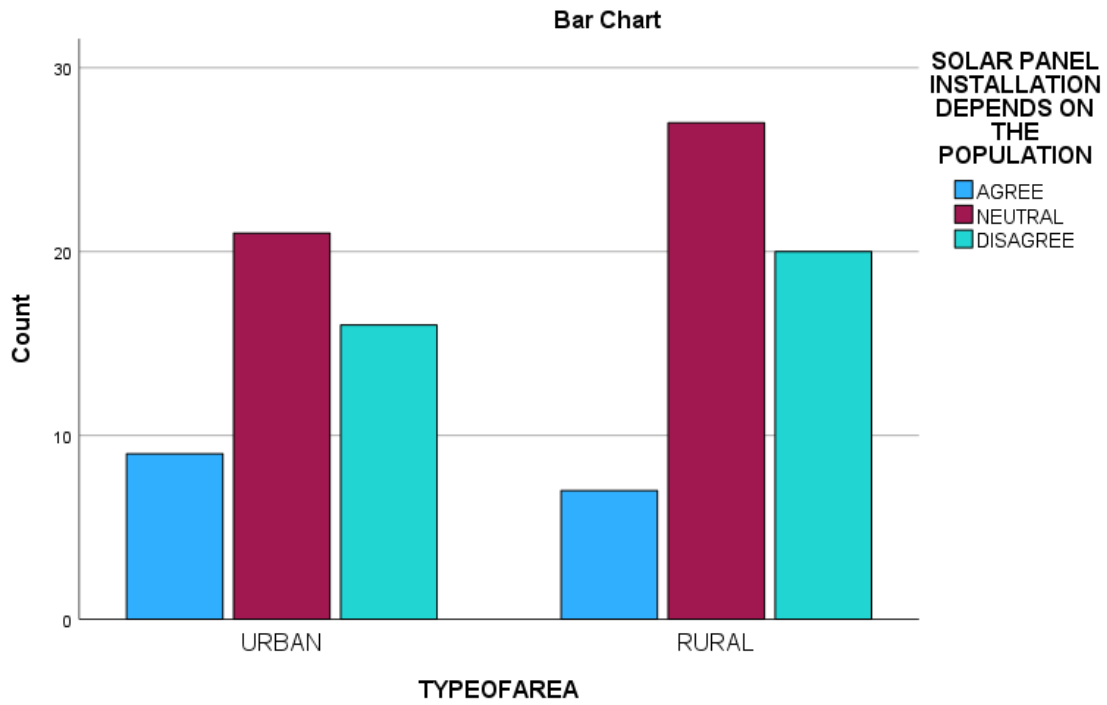


FIG 1.5 CROSS TABULATION OF SOLAR PANEL INSTALLATION

TYPEOFAREA * AMOUNT OF ENERGY GENERATED Crosstabulation							
			AMOUNT OF ENERGY GENERATED				Total
			STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	
TYPEOFAREA	URBAN	Count	7	5	20	14	46
		% within TYPEOFAREA	15.2%	10.9%	43.5%	30.4%	100.0%
		% within AMOUNT OF ENERGY GENERATED	41.2%	50.0%	47.6%	45.2%	46.0%
	RURAL	Count	10	5	22	17	54
		% within TYPEOFAREA	18.5%	9.3%	40.7%	31.5%	100.0%
		% within AMOUNT OF ENERGY GENERATED	58.8%	50.0%	52.4%	54.8%	54.0%
Total		Count	17	10	42	31	100
		% within TYPEOFAREA	17.0%	10.0%	42.0%	31.0%	100.0%
		% within AMOUNT OF ENERGY GENERATED	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 1.9 CROSSTABULATION TYPE OF AREA AND AMOUNT OF ENERGY GENERATED

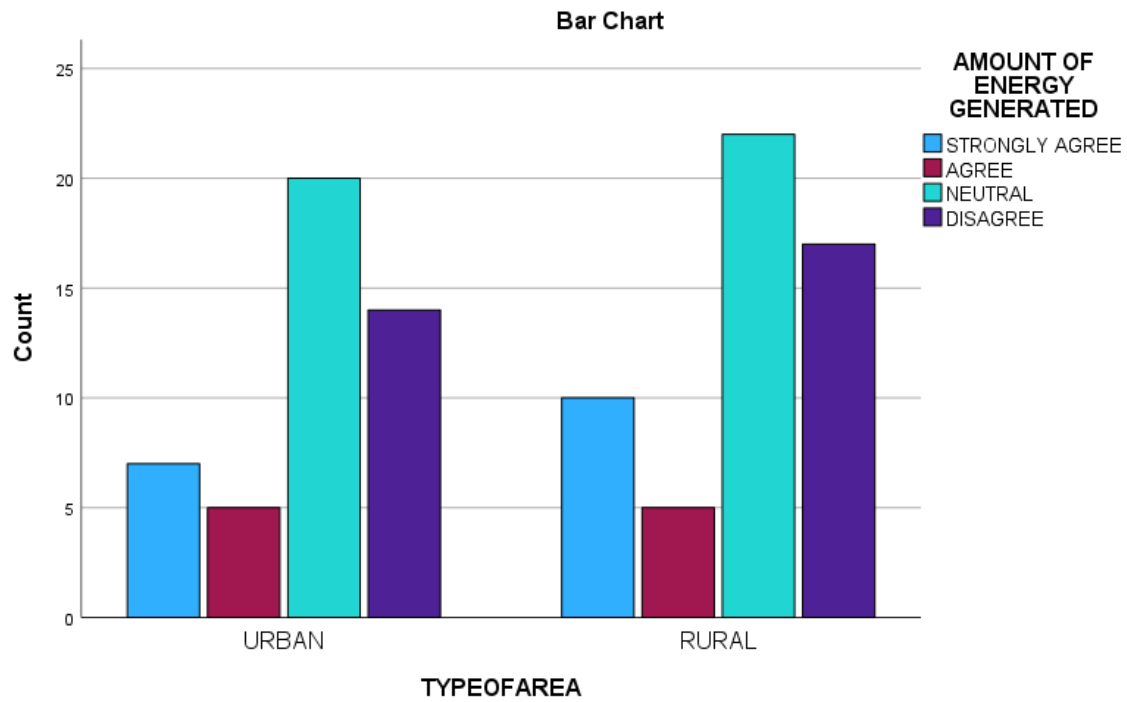


FIG 1.6 CROSSTABULATION TYPE OF AREA AND AMOUNT OF ENERGY GENERATED

TYPEOFAREA * NO OF SOLAR PANELS INSTALLED Crosstabulation								
			NO OF SOLAR PANELS INSTALLED					Total
			NO SOLAR PANELS INSTALLE D	0-10 PANELS INSTALLED	11-30 PANELS INSTALLED	31-50 PANELS INSTALLE D	MORE THAN 50 PANELS INSTALL ED	
TYPE OF AREA	URBAN	Count	1	25	15	1	4	46
		% within TYPEOFAREA	2.2%	54.3%	32.6%	2.2%	8.7%	100.0 %
		% within NO OF SOLAR PANELS INSTALLED	16.7%	67.6%	55.6%	16.7%	16.7%	46.0%
	RURAL	Count	5	12	12	5	20	54
		% within TYPEOFAREA	9.3%	22.2%	22.2%	9.3%	37.0%	100.0 %
		% within NO OF SOLAR PANELS INSTALLED	83.3%	32.4%	44.4%	83.3%	83.3%	54.0%
Total		Count	6	37	27	6	24	100
		% within TYPEOFAREA	6.0%	37.0%	27.0%	6.0%	24.0%	100.0 %
		% within NO OF SOLAR PANELS INSTALLED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0 %

TABLE 1.10 CROSSTABULATION OF NO.OF PANELS AND TYPE OF AREA

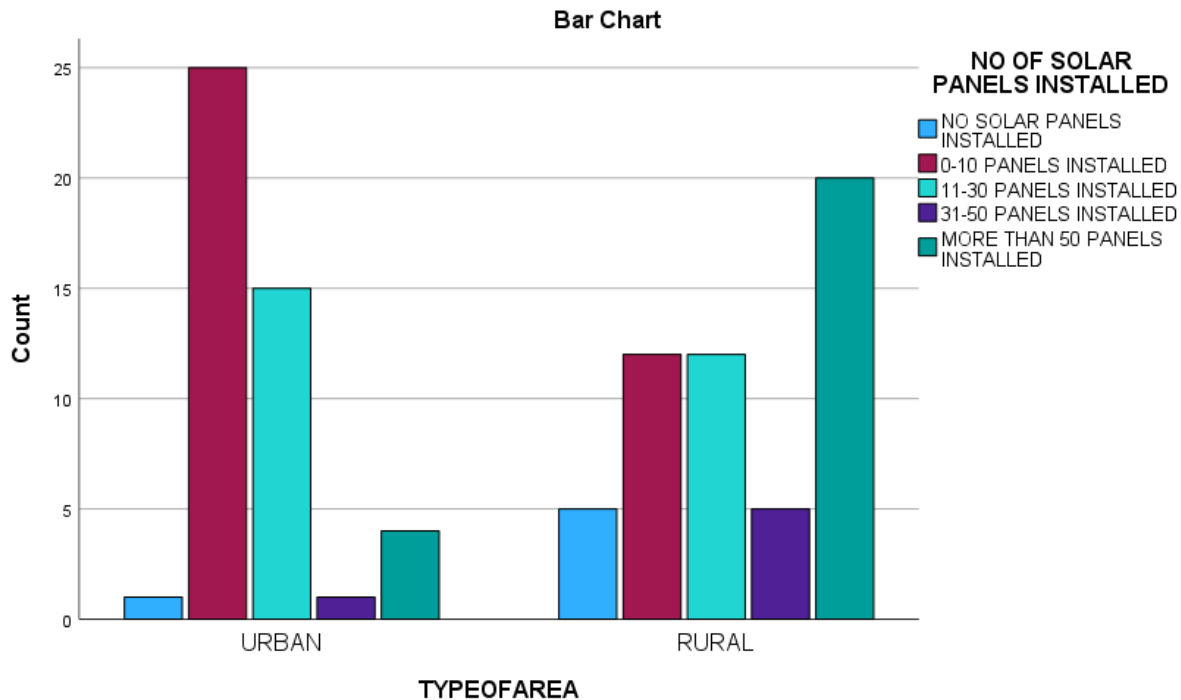


FIG 1.7 CROSSTABULATION OF NO.OF PANELS AND TYPE OF AREA

INFERENCE:

ACCORDING TO THE PERCENTAGE ANALYSIS IT IS FOUND THAT URBAN AREAS OF THE DISTRICTS OF TAMIL NADU 25 INSTITUTIONS HAVE 0-10 PANELS INSTALLED AND 15 INSTITUTIONS HAVE 11-30 PANELS INSTALLED AND 4 INSTITUTIONS HAVE MORE THAN 50 PANELS INSTALLED. IN THE RURAL AREAS OF THE DISTRICTS OF TAMIL NADU 20 INSTITUTIONS HAVE MORE THAN 50 PANELS INSTALLED 12 INSTITUTIONS HAVE 11-30 PANELS AND 12 INSTITUTIONS HAVE 0-10 PANELS 5 INSTITUTIONS HAVE 31-50 PANELS INSTALLED.

PAIRED T TEST:

Paired Samples Test								
		Paired Differences			t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean			One-Sided p	Two-Sided p
Pair 1	LOCATIONOF THE INSTITUTION - SOLAR PANEL INSTALLATION DEPENDS ON THE POPULATION	2.300	3.003	0.300	7.658	99	0.000	0.000
Pair 2	LOCATIONOF THE INSTITUTION - AMOUNT OF ENERGY GENERATED	2.630	3.011	0.301	8.736	99	0.000	0.000
Pair 3	LOCATIONOF THE INSTITUTION - NO OF SOLAR PANELS INSTALLED	2.450	3.167	0.317	7.737	99	0.000	0.000

TABLE 1.11 PAIRED T TEST OF SOLAR PANEL

HYPOTHESIS:

H₀- THERE IS NO IMPACT OF LOCATION OF THE INSTITUTION ON SOLAR CONSERVATION.

H₁- THERE IS IMPACT OF LOCATION OF THE INSTITUTION ON SOLAR CONSERVATION.

INFERENCE:

ACCORDING TO THE ANALYSIS THE P VALUE IS LESSER THAN THE SIGNIFICANCE VALUE OF 0.05 .HENCE THE ALTERNATE HYPOTHESIS IS ACCEPTED. THEREFORE THERE IS IMPACT OF LOCATION OF THE INSTITUTION ON SOLAR CONSERVATION.

ONE WAY ANOVA:

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
SOLAR PANEL INSTALLATION DEPENDS ON THE POPULATION	Between Groups	3.600	9	.400	.811	.607
	Within Groups	44.400	90	.493		
	Total	48.000	99			
AMOUNT OF ENERGY GENERATED	Between Groups	3.210	9	.357	.308	.970
	Within Groups	104.100	90	1.157		
	Total	107.310	99			
NO OF SOLAR PANELS INSTALLED	Between Groups	22.450	9	2.494	1.600	.127
	Within Groups	140.300	90	1.559		
	Total	162.750	99			

TABLE 1.1
2 SOLAR PANEL ONE WAY ANOVA

HYPOTHESIS:

H0- THERE IS NO ASSOCIATION OF LOCATION OF THE INSTITUTION WITH SOLAR PANEL INSTALLATION.

H1- THERE IS ASSOCIATION OF LOCATION OF THE INSTITUTION WITH SOLAR PANEL INSTALLATION.

INFERENCE:

FROM THE ABOVE ANALYSIS IT IS SHOWN THAT THE P VALUE OF THE ANALYSIS IS GREATER THAN THE 0.05 HENCE NULL HYPOTHESIS IS ACCEPTED .TEHREFORE, THERE IS NO ASSOCIATION OF LOCATION OF THE INSTITUTION WITH SOLAR PANEL INSTALLATION.

WASTE MANAGEMENT

PERCENTAGE ANALYSIS

LOCATION OF THE INSTITUTION * BIOGAS PRODUCED Crosstabulation							
			BIOGAS PRODUCED				Total
			0-100KG	101-500KG	501-1TON	MORE THAN 1 TON	
LOCATION OF THE INSTITUTION	KANCHIPURAM	Count	7	1	1	1	10
		% within LOCATION OF THE INSTITUTION	70.0%	10.0%	10.0%	10.0%	100.0%
		% within BIOGAS PRODUCED	21.9%	2.1%	5.3%	50.0%	10.0%
		% of Total	7.0%	1.0%	1.0%	1.0%	10.0%
	CHENGALPATTU	Count	2	5	2	1	10
		% within LOCATION OF THE INSTITUTION	20.0%	50.0%	20.0%	10.0%	100.0%
		% within BIOGAS PRODUCED	6.3%	10.6%	10.5%	50.0%	10.0%
		% of Total	2.0%	5.0%	2.0%	1.0%	10.0%
	CHENNAI	Count	7	3	0	0	10
		% within LOCATION OF THE INSTITUTION	70.0%	30.0%	0.0%	0.0%	100.0%
		% within BIOGAS PRODUCED	21.9%	6.4%	0.0%	0.0%	10.0%
		% of Total	7.0%	3.0%	0.0%	0.0%	10.0%

		% of Total	7.0%	3.0%	0.0%	0.0%	10.0 %
	ERODE	Count	2	7	1	0	10
		% within LOCATION OF THE INSTITUTION	20.0%	70.0%	10.0%	0.0%	100.0%
		% within BIOGAS PRODUCED	6.3%	14.9%	5.3%	0.0%	10.0 %
		% of Total	2.0%	7.0%	1.0%	0.0%	10.0 %
	TRIPPUR	Count	4	0	6	0	10
		% within LOCATION OF THE INSTITUTION	40.0%	0.0%	60.0%	0.0%	100.0%
		% within BIOGAS PRODUCED	12.5%	0.0%	31.6%	0.0%	10.0 %
		% of Total	4.0%	0.0%	6.0%	0.0%	10.0 %
	THIRUPPATHUR	Count	2	6	2	0	10
		% within LOCATION OF THE INSTITUTION	20.0%	60.0%	20.0%	0.0%	100.0%
		% within BIOGAS PRODUCED	6.3%	12.8%	10.5%	0.0%	10.0 %
		% of Total	2.0%	6.0%	2.0%	0.0%	10.0 %
	THIRUVANNAMALAI	Count	3	5	2	0	10
		% within LOCATION OF THE INSTITUTION	30.0%	50.0%	20.0%	0.0%	100.0%
		% within BIOGAS PRODUCED	9.4%	10.6%	10.5%	0.0%	10.0 %
		% of Total	3.0%	5.0%	2.0%	0.0%	10.0 %

	THIRUVALLUR	Count	0	10	0	0	10
		% within LOCATION OF THE INSTITUTION	0.0%	100.0%	0.0%	0.0%	100.0%
		% within BIOGAS PRODUCED	0.0%	21.3%	0.0%	0.0%	10.0%
		% of Total	0.0%	10.0%	0.0%	0.0%	10.0%
	VILLUPURAM	Count	4	5	1	0	10
		% within LOCATION OF THE INSTITUTION	40.0%	50.0%	10.0%	0.0%	100.0%
		% within BIOGAS PRODUCED	12.5%	10.6%	5.3%	0.0%	10.0%
		% of Total	4.0%	5.0%	1.0%	0.0%	10.0%
	COIMBATORE	Count	1	5	4	0	10
		% within LOCATION OF THE INSTITUTION	10.0%	50.0%	40.0%	0.0%	100.0%
		% within BIOGAS PRODUCED	3.1%	10.6%	21.1%	0.0%	10.0%
		% of Total	1.0%	5.0%	4.0%	0.0%	10.0%
Total		Count	32	47	19	2	100
		% within LOCATION OF THE INSTITUTION	32.0%	47.0%	19.0%	2.0%	100.0%
		% within BIOGAS PRODUCED	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.0%	47.0%	19.0%	2.0%	100.0%

TABLE 1.13 WASTE MANAGEMENT PERCENTAGE ANALYSIS

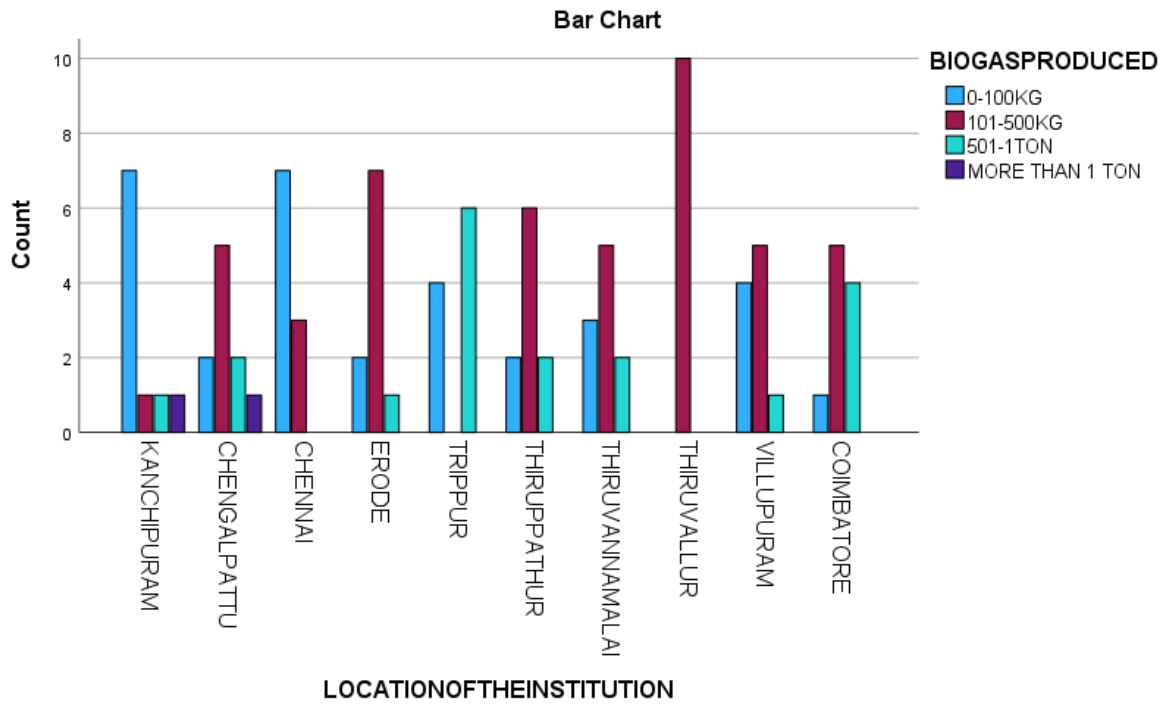


FIG 1.8 WASTE MANAGEMENT PERCENTAGE ANALYSIS

LOCATION OF THE INSTITUTION * RECYCLAGE OF SOLID WASTE Crosstabulation								
			RECYCLAGE OF SOLID WASTE					Total
			NO SOLID WASTE IS RECYCLED	0-100 KG WASTE RECYCLED	101-500KG WASTE RECYCLED	501-1000 KG WASTE RECYCLED	MORE THAN 1000KG WASTE RECYCLED	
LOCATION OF THE INSTITUTION	KANCHIPURAM	Count	1	2	2	1	4	10
		% within LOCATION OF THE INSTITUTION	10.0%	20.0%	20.0%	10.0%	40.0%	100.0%
		% within RECYCLAGE OF SOLID WASTE	16.7%	5.4%	7.4%	16.7%	16.7%	10.0%
		% of Total	1.0%	2.0%	2.0%	1.0%	4.0%	10.0%
	CHENGALPATU	Count	1	5	3	0	1	10
		% within LOCATION OF THE INSTITUTION	10.0%	50.0%	30.0%	0.0%	10.0%	100.0%
		% within RECYCLAGE OF SOLID WASTE	16.7%	13.5%	11.1%	0.0%	4.2%	10.0%
		% of Total	1.0%	5.0%	3.0%	0.0%	1.0%	10.0%
	CHENNAI	Count	0	3	3	1	3	10

		% within LOCATION OF THE INSTITUTION	0.0%	30.0%	30.0%	10.0%	30.0%	100.0%
		% within RECYCLED SOLID WASTE	0.0%	8.1%	11.1%	16.7%	12.5%	10.0%
		% of Total	0.0%	3.0%	3.0%	1.0%	3.0%	10.0%
	ERODE	Count	1	4	3	0	2	10
		% within LOCATION OF THE INSTITUTION	10.0%	40.0%	30.0%	0.0%	20.0%	100.0%
		% within RECYCLED SOLID WASTE	16.7%	10.8%	11.1%	0.0%	8.3%	10.0%
		% of Total	1.0%	4.0%	3.0%	0.0%	2.0%	10.0%
		Count	0	5	2	1	2	10
	TRIPPUR	% within LOCATION OF THE INSTITUTION	0.0%	50.0%	20.0%	10.0%	20.0%	100.0%
		% within RECYCLED SOLID WASTE	0.0%	13.5%	7.4%	16.7%	8.3%	10.0%
		% of Total	0.0%	5.0%	2.0%	1.0%	2.0%	10.0%

	THIRUPPATHUR	Count	1	2	3	1	3	10
		% within LOCATION OF THE INSTITUTION	10.0%	20.0%	30.0%	10.0%	30.0%	100.0%
		% within RECYCLED SOLID WASTE	16.7%	5.4%	11.1%	16.7%	12.5%	10.0%
	THIRUVANMALAI	% of Total	1.0%	2.0%	3.0%	1.0%	3.0%	10.0%
		Count	0	7	2	0	1	10
		% within LOCATION OF THE INSTITUTION	0.0%	70.0%	20.0%	0.0%	10.0%	100.0%
	THIRUVANMALAI	% within RECYCLED SOLID WASTE	0.0%	18.9%	7.4%	0.0%	4.2%	10.0%
		% of Total	0.0%	7.0%	2.0%	0.0%	1.0%	10.0%
		Count	1	0	4	1	4	10
	THIRUVALLUR	% within LOCATION OF THE INSTITUTION	10.0%	0.0%	40.0%	10.0%	40.0%	100.0%
		% within RECYCLED SOLID WASTE	16.7%	0.0%	14.8%	16.7%	16.7%	10.0%

		% of Total	1.0%	0.0%	4.0%	1.0%	4.0%	10.0 %	
	VILLUPURAM	Count	0	7	3	0	0	10	
		% within LOCATION OF THE INSTITUTION	0.0%	70.0%	30.0%	0.0%	0.0%	100.0%	
		% within RECYCLED SOLID WASTE	0.0%	18.9%	11.1%	0.0%	0.0%	10.0 %	
		% of Total	0.0%	7.0%	3.0%	0.0%	0.0%	10.0 %	
	COIMBATORE	Count	1	2	2	1	4	10	
		% within LOCATION OF THE INSTITUTION	10.0%	20.0%	20.0%	10.0%	40.0%	100.0%	
		% within RECYCLED SOLID WASTE	16.7%	5.4%	7.4%	16.7%	16.7%	10.0 %	
		% of Total	1.0%	2.0%	2.0%	1.0%	4.0%	10.0 %	
		Total		Count	6	37	27	6	24
			% within LOCATION OF THE INSTITUTION	6.0%	37.0%	27.0%	6.0%	24.0%	100.0%

	% within RECYLC EOFSOL IDWASTE	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	6.0%	37.0%	27.0%	6.0%	24.0%	100.0%

TABLE 1.14 WASTE MANAGEMENT PERCENTAGE ANALYSIS

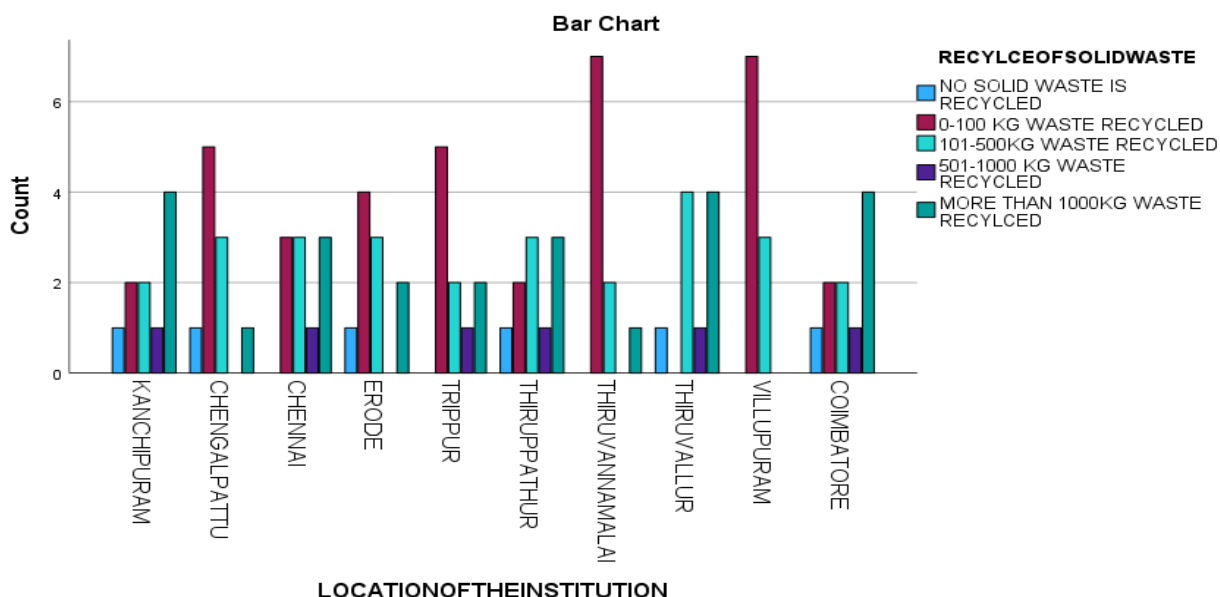


FIG 1.9 WASTE MANAGEMENT PERCENTAGE ANALYSIS

INFERENCE :

FROM THE ABOVE PERCENTAGE ANALYSIS IT IS SHOWN THAT KANCHIPURAM AND VILLUPURAM DISTRICTS IINSTITUTION HAVE HIGHEST WASTE MANAGEMENT COMPARED TO OTHER DISTRICTS. THIRUVALLUR, THIRUPATUR COIMBATORE HAVE NO EFFICIENT WASTE MANAGEMENT.

BIO GAS PRODUCTION IS VERY EFFICIENTLY DONE IN KANCHIPURAM AND VILLUPURAM DISTRICTS AND THIRUVALLUR COIMBATORE HAS LEAST PRODUCTION OF BIO GAS.

PAIRED T TEST

Paired Samples Test								
		Paired Differences			t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean			One-Sided p	Two-Sided p
Pair 1	LOCATION OF THE INSTITUTION – BIOGAS PRODUCED	2.590	2.882	0.288	8.987	99	0.000	0.000
Pair 2	LOCATION OF THE INSTITUTION - RECYCLAGE OF SOLID WASTE	2.450	3.167	0.317	7.737	99	0.000	0.000

TABLE 1.15 WASTE MANAGEMENT PAIRED T TEST

HYPOTHESIS:

HO- THERE IS NO IMPACT OF LOCATION OF INSTITUTION ON WASTE MANAGEMENT.

H1- THERE IS IMPACT LOCATION OF INSTITUTION ON WASTE MANAGEMENT.

INFERENCE :

FROM THE ABOVE PAIRED T TEST THE P VALUE IS LESS THAN THE SIGNIFICANCE VALUE HECE THE ALTERANATE HYPOTHESIS IS ACCEPTED .THEREFORE, THERE IS IMPACT LOCATION OF INSTITUTION ON WASTE MANAGEMENT.

ONE WAY ANOVA:

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
RECYLCEOFSOLIDWASTE	Between Groups	16.590	1	16.590	11.123	.001
	Within Groups	146.160	98	1.491		
	Total	162.750	99			
BIOGASPRODUCED	Between Groups	.001	1	.001	.001	.971
	Within Groups	58.189	98	.594		
	Total	58.190	99			

TABLE 1.16 WASTE MANAGEMENT ONE WAY ANOVA

HYPOTHESIS:

H0- THERE IS NO ASSOCIATION OF AREA TYPE WITH EFFICIENT WASTE MANAGEMENT.

H1- THERE IS ASSOCIATION OF TYPE WITH EFFICIENT WASTE MANAGEMENT.

INFERENCE:

FROM THE ABOVE ONE WAY ANOVA TEST IT IS FOUND THAT THE P VALUE IS GREATER THAN THE SIGNIFICANCE VALUE 0.05.HENCE THE NULL HYPOTHESIS IS ACCEPTED. THEREFORE, THERE IS NO ASSOCIATION OF AREA TYPE WITH EFFICIENT WASTE MANAGEMENT.

RAIN WATER & SURFACE GROUND WATER HARVESTING:

PERCENTAGE ANALYSIS:

RAINWATERHARVESTED * TYPEOFAREA Crosstabulation					
			TYPEOFAREA		Total
			URBAN	RURAL	
RAINWATERHARVE STED	0-500L	Count	46	0	46
		% within RAINWATERHARVES TED	100.0%	0.0%	100.0%
		% within TYPEOFAREA	100.0%	0.0%	46.0%
		% of Total	46.0%	0.0%	46.0%
	501- 1000L	Count	0	54	54
		% within RAINWATERHARVES TED	0.0%	100.0%	100.0%
		% within TYPEOFAREA	0.0%	100.0%	54.0%
		% of Total	0.0%	54.0%	54.0%
Total		Count	46	54	100
		% within RAINWATERHARVES TED	46.0%	54.0%	100.0%
		% within TYPEOFAREA	100.0%	100.0%	100.0%
		% of Total	46.0%	54.0%	100.0%

**TABLE 1.17 RAIN WATER& SURFACE WATER HARVESTING PERCENTAGE
ANALYSIS CROSSTABULATION**

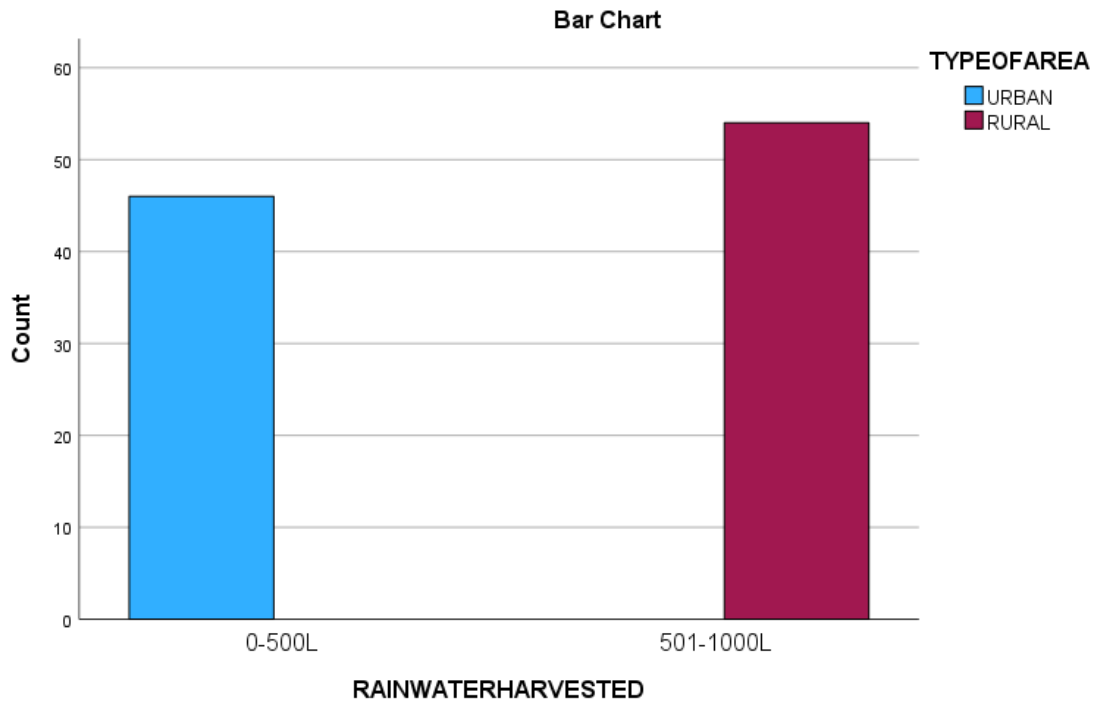
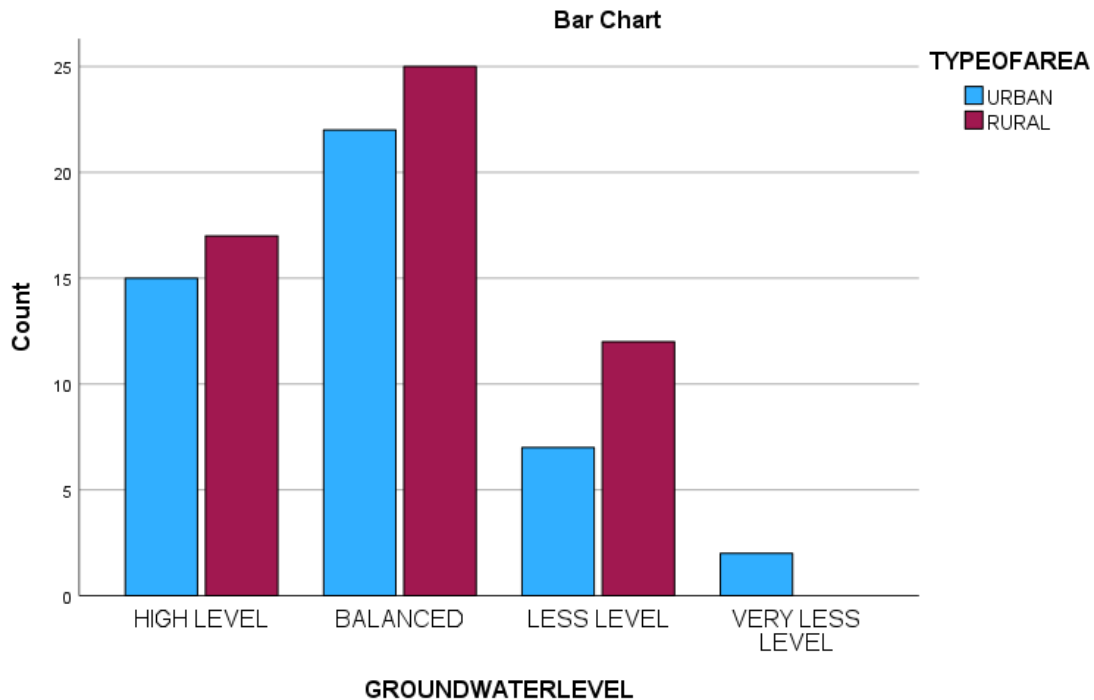


FIG 1.10 RAIN WATER& SURFACE WATER HARVESTING PERCENTAGE ANALYSIS

GROUNDWATERLEVEL * TYPEOFAREA Crosstabulation					
			TYPEOFAREA		Total
			URBAN	RURAL	
GROUNDWATERLEVEL	HIGH LEVEL	Count	15	17	32
		% within GROUNDWATERLEVEL	46.9%	53.1%	100.0%
		% within TYPEOFAREA	32.6%	31.5%	32.0%
		% of Total	15.0%	17.0%	32.0%
	BALANCED	Count	22	25	47
		% within GROUNDWATERLEVEL	46.8%	53.2%	100.0%
		% within TYPEOFAREA	47.8%	46.3%	47.0%

	LESS LEVEL	% of Total	22.0%	25.0%	47.0%
		Count	7	12	19
		% within GROUNDWATERLEVEL	36.8%	63.2%	100.0%
		% within TYPEOFAREA	15.2%	22.2%	19.0%
		% of Total	7.0%	12.0%	19.0%
	VERY LESS LEVEL	Count	2	0	2
		% within GROUNDWATERLEVEL	100.0%	0.0%	100.0%
		% within TYPEOFAREA	4.3%	0.0%	2.0%
		% of Total	2.0%	0.0%	2.0%
		Total			
Count		46	54	100	
% within GROUNDWATERLEVEL		46.0%	54.0%	100.0%	
% within TYPEOFAREA		100.0%	100.0%	100.0%	
% of Total		46.0%	54.0%	100.0%	

**TABLE 1.18 RAIN WATER& SURFACE WATER HARVESTING PERCENTAGE
ANALYSIS CROSS TABULATION**



**FIG 1.11 RAIN WATER& SURFACE WATER HARVESTING PERCENTAGE
ANALYSIS CROSS TABULATION**

INFERENCE:

46% OF THE URBAN DISTRICTS HAVE 0-500LITRES OF RAIN WATER HARVESTED AND 54% OF RURAL DISTRICTS HAVE 500-1000LITRES OF RAIN WATER HARVESTING. 15% OF THE URBAN INSTITUTIONS OF THE TAMILNADU HAS HIGH GROUND WATER LEVEL AND 17% OF RURAL INSTITUTIONS HAVE HIGH GROUND WATER LEVEL.

PAIRED T TEST:

Paired Samples Test								
		Paired Differences			t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean			One-Sided p	Two-Sided p
Pair 1	LOCATION OF THE INSTITUTION - GROUNDWATER LEVEL	2.590	2.882	0.288	8.987	99	0.000	0.000
Pair 2	LOCATION OF THE INSTITUTION - RAINWATER HARVESTED	3.960	2.888	0.289	13.711	99	0.000	0.000

TABLE 1.19 RAIN WATER HARVESTING AND SURFACE WATER HARVESTING PAIRED T TEST

HYPOTHEIS:

H₀- THERE IS NO IMPACT OF LOCATION OF THE INSTITUTION ON RAIN WATER HARVESTING.

H₁- THERE IS IMPACT OF LOCATION OF THE INSTITUTION ON RAIN WATER HARVESTING

INFERENCE

: FROM THE ABOVE PAIRED T TEST IT IS SHOWN THAT THE P VALUE OF THE T TEST IS LESS THAN THE SIGNIFICANCE VALUE OF 0.05. HENCE THE ALTERNATE HYPOTHESIS IS ACCEPTED. THEREFORE, THERE IS IMPACT OF LOCATION OF THE INSTITUTION ON RAIN WATER HARVESTING

ONE WAY ANOVA:

ANOVA					
RAIN WATER HARVESTED					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.040	9	.560	2.545	.012
Within Groups	19.800	90	.220		
Total	24.840	99			

TABLE 1.20 WATER HARVESTING AND SURFACE WATER HARVESTING ONE WAY ANOVA

HYPOTHESIS:

H0- THERE IS NO ASSOCIATION OF LOCATION OF THE INSTITUTION WITH RAIN WATER HARVESTING.

H1- THERE IS ASSOCIATION OF LOCATION OF THE INSTITUTION WITH RAIN WATER HARVESTING.

INFERENCE:

FROM THE ONE WAY ANOVA TEST IT IS FOUND THAT THE P VALUE OF THE ANALYSIS IS LESS THAN 0.05 HENCE THE ALTERNATE HYPOTHESIS IS ACCEPTED .THEREFORE, THERE IS ASSOCIATION OF LOCATION OF THE INSTITUTION ON RAIN WATER HARVESTING.

CHAPTER 5

FINDINGS,SUGESSTIONS & CONCLUSION

5.1 FINDINGS OF THE STUDY:

Institutions of KANCHIPURAM and CHENNAI have SD policies and promotes and follow better than other districts. THIRUVANAMALAI ,THIRUVALLUR AND VILLUPURAM districts is very less active in sustainability performance comapared to other districts. Few institutions of SALEM AND ERODE districts have considerably started promoting and acting upon the sustainable indicators. All the district institutions need to install and understand the need of conserving renewable energy. Rural and semi urban institutions in all the districts have better green cover compared to institutions in urban places. Waste management is facilitated in few no.of institutions and cultivation of bio gas needs to be given importance.

5.2 SUGGESTIONS/RECOMMENDATIONS OF THE STUDY :

It is suggested that the HEI's in rural and semi urban areas to widely adopt the SD practices and promote awareness programmes. Waste management indicator needs to have certain level of importance in all the institutions to have sustainability development in the institutions.

5.3 CONCLUSION OF THE STUDY :

The overall performance of 10 districts HEI's of Tamil Nadu have been examined based on three sustainability indicators namely green cover on the campus, rooftop solar panel, waste management . The impact of these sustainability indicators on the development of the institutions was the prime objective of the study. It is found that all the districts has promoting sustainability indicators through out the campus in various subjective methods. Few institutions of every districts needs to provide more awareness about the necessity of solar energy conservation and waste management and greenery management to the students and promote efficiently in the campus area. HEIs around the world have been integrating SD into their systems to achieve lasting change towards SD. The SR process has been identified as one of the drivers contributing to change for SD in corporations. This paper offers an initial exploration of the interconnections between the SR process and OCMS in HEIs, where SR is an important driver for change in HEIs.

The research shows that SR in HEIs is predominantly driven by internal motivations, with the majority of the efforts being mainly led by staff, and sometimes by students. The sustainability reporting process is currently leading to incremental changes, such as an increase in awareness of sustainability, and improvements in communication with internal stakeholders, while factors impeding the change process are the absence of an external stakeholder engagement process, the lack of inclusion of material impacts in reports, and the lack of institutionalization of SR.

SR can serve as an instrument for HEIs to assess where they are, and to plan the future direction of change towards SD in HEIs. The changes due to sustainability reporting need to be institutionalized and fed back into the higher education system.

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QUESTIONNAIRE:

- ⊙ NAME OF THE INSTITUTION:
- ⊙ NAME OF THE PRINCIPAL/HOD:
- ⊙ NAME OF THE DISTRICT:
- ⊙ UNIVERSITY AFFILATED TO:
- ⊙ TOTAL NUMBER OF FACULTY MEMBERS:
- ⊙ TOTAL NUMBER OF NON-TEACHING STAFF:
- ⊙ TOTAL NUMBER OF STUDENTS:
- ⊙ TOTAL NUMBER OF STUDENTS RESIDING IN HOSTELS:
- ⊙ Area (sq mtrs) of the intitution:

GREEN MANAGEMENT:

1.AVAILABILITY OF NURSERY ON CAMPUS?

YES/NO

2. AREA UNDER GREEN COVER IS MORE THAN 33%?

YES/NO

3. DOES THE INSTITUTION HAS PLANT PROTECTION MANAGEMENT ?

YES/NO

4.NUMBER OF PLANTS/TREES PLANTED IN 2021-2022?

- Less than 10 plants/trees planted
- 10-20 plants/trees planted
- 21- 30 plants /trees planted
- 31-40 plants /trees planted
- More than 40 plants /trees planted

5.EXTENT OF AREA UNDER TREE COVER?

- Less than 10% of tree cover area
- 11%-21% of tree cover area
- 22% -32%of tree over area
- 34% -44%of tree cover area
- More than 44% of tree cover area

SURFACE WATER HARVESTING :

1.water needs (litres) in your institution in a day ?

- Less than 500 litres
- 501-1000 litres
- 1001-2500 litres
- 2501- 3500 litres
- More than 3500 litres

2. Water availability for usage in the institution?

- Abundant availability to meet the requirement
- High availability to meet the requirement
- Equal availability to the requirement
- Low availability to the requirement
- Scarcity to meet the requirement

3. What is the Ground water level of the institution ?

- Very high ground water level
- High ground water level
- Balanced ground water level
- Less ground water level
- Very less ground water level

RAIN WATER HARVESTING:

1. How much Litres of rain water harvested on the campus in heavy rainy days?

- 0-500 ltrs
- 501-1000 ltrs
- 1001- 2000 ltrs
- 2001-3000Ltrs
- More than 3000 ltrs

2. Water sources audit? Utilize swatch campus manual?

Done

Not done

SOLAR ENERGY AND ENERGY CONSERVATION

1. Institution is a part of installation of renewable energy project.

Yes/no2. Are you taking any remarkable action for energy conservation.

Yes/n

3.Installation of Solar panels depends on population of the institution.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

4.Amount of energy generated via solar systems does highly meets electricity requirement?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

5. No.of solar panels installed in the institution

- No solar panels
- 0-10 panels
- 11-30 panels
- 31-50 panels
- More than 50 solar panel

WASTE MANAGEMENT

1.Collection of solid waste(kg/day)

- No solid waste collection
- 0-100 kg
- 101-500kg
- 501-1000kg
- More than 1000 kg

2. Is the segregation of solid waste done in the institute? If yes how many kg of waste is segregated as bio degradable per day?

- No waste is segregated
- 0-100 kg
- 101- 500kg
- 501- 1000kg
- More than 1000 kg

3. Approx.how much of solid waste is recycled every day(kg/day)

- No solid waste is recycled
- 0-100 kg/day
- 101- 500kg/day
- 501-1000 kg/day
- More than 1000kg/day

4. Approx.howmuch of solid waste is disposed(kg/day)

- 100 kg/day
- 101- 500kg/day
- 501-800 kg/day
- 801-1000 kg/day

- More than 1000kg/day

Bio medical waste management is done in the institution

Yes

No

Not applicable

5. How frequently Recycling of water from sewage treatment plant is done in a month?

- Very frequently
- More frequently
- Frequently
- Less frequently
- Very less frequently

6. Availability of functional drainage system?

Yes

No

7. Whether there is a bio gas management plan available for the campus?

Yes

No

Not applicable

8. How much tons of bio gas is produced in the institution?

- No biogas produced
- 0-100kg

- 101kg-500 kg
- 501-1 ton
- More than a ton

ANNEXURE-II

ARTICLE

A STUDY ON IMPACT OF SUSTAINABILITY INDICATORS ON EDUCATIONAL INSTITUTION OF 10 DISTRICTS IN TAMIL NADU WITH SPECIAL REFERENCE (MGNCRE)

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ABSTRACT

Sustainable development involves many things. More appropriate technologies, supportive policies, different ethics, and changes in individual behaviour are among the more obvious factors. One contributing factor that deserves more attention is the element of institutions. Hence, recently, researchers, planners, policy makers and practitioners have paid a considerable attention to the role of adequate and effective institutions for development. In addition, it can be argued that institutions and the institutional arrangements and mechanisms for development provide the missing link that can explain the differences in growth rates and development trends across developing countries. It is, therefore, important to address the questions of how particular institutions work efficiently in developing countries and how to overcome existing institutional bottlenecks. The objective of this research paper is to highlight the importance of institutions with regard to economic development and in achieving sustainable development. It also examines the development plans carried out and investment programmes announced in Sudan since its Independence. This research paper constitutes five major sections in addition to the introduction and conclusion.

1.INTRODUCTION

MGNCRE:

Mahatma Gandhi National Council of Rural Education under the Ministry of Human Resource Development, in Government of India strives to promote resilient rural India through Higher Education interventions. MGNCRE designs, develops and promotes curriculum inputs for higher education programmes offered by Universities and Autonomous Institutions in India. The higher educational streams of focus for MGNCRE include: Rural Studies, Rural Development, Rural Management, Social Work and Education. The curriculum inputs are both theoretical and practical field-related relevant to rural India.

SUSTAINABILITY DEVELOPMENT:

Sustainable development is a process that envisions a favorable future for human societies in which living conditions and the use of resources meet human needs without compromising the integrity, beauty, and stability of vital systems.

SUSTAINABILITY INDICATORS

Green cover on campus

Roof top solar system

Waste management

Rain water /surface water harvesting

NEED / SIGNIFICANCE OF THE STUDY:

- To Increase sustainability awareness throughout campus.
- To Identify and document sustainable practices followed by the institutions.
- To Identify strengths and weaknesses of sustainability practices.
- To Analyze and suggest solutions to enhance sustainability practices identified from the survey.

OBJECTIVE OF THE STUDY:

Primary objective:

- ☉ To study Impact of sustainability indicators on educational institution of districts in Tamil Nadu.

Secondary objective:

- ☉ To measure the sustainability indicators named green cover, rooftop solar systems, surface water harvesting, rain water harvesting and waste management of Higher Educational institutions.
- ☉ To promote sustainable actions in rural higher educational institutions.

SCOPE OF THE STUDY:

- ☉ To Protect and enhance the environment and natural resources of the institutions.
- ☉ To develop more knowledge towards sustainability indicators.
- ☉ To improve the standards of sustainability performance of the institutions.
- ☉ To educate students about the vital role of sustainability indicators in the higher educational institutions.

LIMITATIONS OF THE STUDY:

The primary limitation to the generalization of the study is collection of data from higher secondary institutions with proper permission from all the 10 districts of Tamil Nadu.

2.REVIEW OF LITERATURE

Alonso-Almeida et al., 2015, Wright and Wilton, 2012 Braulio-Gonzalo et al. (2015) performed a detailed analysis of these tools, including: LEED ND (Leadership in Energy and Environmental Design for Neighborhood Development).BREEAM Communities (Building Research Establishment

Environmental Assessment Method), CASBEE UD (Comprehensive Assessment System for Built Environmental Efficiency), Eco city, Le Modele INDI-RU 2005 (indicator), the BRIDGE project (Bridging resources and agencies in large-scale emergency management) and others.

García-Sánchez et al. (2015) explored Environmental Performance Indicators (EPIs) for countries in the process of a composite index proposal based on the Driving Force-Pressure-State-Exposure-Effect-Action (DPSEEA) methodology, a robust and complete method focused on reducing the environmental impact on human health. LCA and multi-criteria analysis are combined with EPIs in COMPLIMENT, a tool designed to assess the environmental impact of businesses (Hermann et al., 2007). During the process, an exhaustive description of EPIs is made which highlights strengths and weaknesses as assessment instruments. Later, Hourneaux Jr. et al. (2014) studied the usefulness of EPIs for businesses. Both studies provide knowledge that can be brought to HEIs with some considerations already studied by Walton and Galea (2006).

Fernández et al. (2011) applied Bayesian networks to define the relevance of the indicators that better describe the academic performance of a HEI. Barnetson and Cutright (2000) analyzed funding related PIs applied in HEIs, including an extensive and rigorous review of related literature, to develop a typology of assumptions commonly embedded in these types of indicators that may contest objectivity. The use of environmental indicators in HEIs is extended although they are not defined and/or managed as key indicators. Olszak (2012) studies the sustainability assessment of campuses where environmental indicators are included as part of the sustainability concept.

3.RESEARCH METHODOLOGY

OBJECTIVE:

To collect data from 100 higher educational institutions of 10 districts of Tamil Nadu using a questionnaire.

SAMPLING:

This study has a sample size of 100 with a convenience random sampling.

All the data were collected from the heads of selected districts of Tamil Nadu using a prepared questionnaire.

VARIABLES

Dependent : sustainability indicators

Independent : location ,area type ,no.of population

TOOLS USED FOR THE STUDY:

Percentage analysis

Paired T test

One way ANOVA

4.DATA ANALYSIS

GREEN COVER ON CAMPUS

ONE WAY ANOVA

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
NO OF TREES /PLANTS PLATED IN THE YEAR 2022-2023	Between Groups	.195	1	.195	.399	.529
	Within Groups	47.805	98	.488		
	Total	48.000	99			
TREE COVER AREA IN THE CAMPUS	Between Groups	.039	1	.039	.035	.851
	Within Groups	107.271	98	1.095		
	Total	107.310	99			
LOCATION OF THE INSTITUTION	Between Groups	5.797	1	5.797	.693	.407
	Within Groups	819.203	98	8.359		
	Total	825.000	99			

HYPOTHESIS:

H0- THERE IS NO ASSOCIATION OF LOCATION OF THE INSTITUTION WITH NO.OF TREES PLANTED OR TREE COVER AREA.

H1- THERE IS ASSOCIATION OF LOCATION OF THE INSTITUTION WITH NO.OF TREES PLANTED OR TREE COVER AREA.

INFERENCE: ACCORDING TO THE ONE WAY ANOVA ANALYSIS IT IS FOUND THAT THE P VALUE IS GREATER THAN THE SIGNIFICANCE VALUE OF 0.05 HENCE THE NULL HYPOTHESIS IS ACCEPTED. THEREFORE THERE IS NO ASSOCIATION OF LOCATION OF THE INSTITUTION WITH NO.OF TREES PLANTED OR TREE COVER AREA.

SOLAR PANEL SYSTEM

ONE WAY ANOVA:

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
SOLAR PANEL INSTALLATION DEPENDS ON THE POPULATION	Between Groups	3.600	9	.400	.811	.607
	Within Groups	44.400	90	.493		
	Total	48.000	99			
AMOUNT OF ENERGY GENERATED	Between Groups	3.210	9	.357	.308	.970
	Within Groups	104.100	90	1.157		
	Total	107.310	99			
NO OF SOLAR PANELS INSTALLED	Between Groups	22.450	9	2.494	1.600	.127
	Within Groups	140.300	90	1.559		
	Total	162.750	99			

HYPOTHESIS:

H0- THERE IS NO ASSOCIATION OF LOCATION OF THE INSTITUTION WITH SOLAR PANEL INSTALLATION.

H1- THERE IS ASSOCIATION OF LOCATION OF THE INSTITUTION WITH SOLAR PANEL INSTALLATION.

INFERENCE:

FROM THE ABOVE ANALYSIS IT IS SHOWN THAT THE P VALUE OF THE ANALYSIS IS GREATER THAN THE 0.05 HENCE NULL HYPOTHESIS IS ACCEPTED .TEHREFORE, THERE IS NO ASSOCIATION OF LOCATION OF THE INSTITUTION WITH SOLAR PANEL INSTALLATION.

WASTE MANAGEMENT

ONE WAY ANOVA:

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
RECYLCEOF SOLID WASTE	Between Groups	16.590	1	16.590	11.123	.001
	Within Groups	146.160	98	1.491		
	Total	162.750	99			
BIO GAS PRODUCED	Between Groups	.001	1	.001	.001	.971
	Within Groups	58.189	98	.594		
	Total	58.190	99			

HYPOTHESIS:

H₀- THERE IS NO ASSOCIATION OF AREA TYPE WITH EFFICIENT WASTE MANAGEMENT.

H₁- THERE IS ASSOCIATION OF TYPE WITH EFFICIENT WASTE MANAGEMENT.

INFERENCE:

FROM THE ABOVE ONE WAY ANOVA TEST IT IS FOUND THAT THE P VALUE IS GREATER THAN THE SIGNIFICANCE VALUE 0.05. HENCE THE NULL HYPOTHESIS IS ACCEPTED. THEREFORE, THERE IS NO ASSOCIATION OF AREA TYPE WITH EFFICIENT WASTE MANAGEMENT.

RAIN WATER & SURFACE GROUND WATER HARVESTING:

ONE WAY ANOVA:

ANOVA

RAIN WATER HARVESTED					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.040	9	.560	2.545	.012
Within Groups	19.800	90	.220		
Total	24.840	99			

HYPOTHESIS:

H0- THERE IS NO ASSOCIATION OF LOCATION OF THE INSTITUTION WITH RAIN WATER HARVESTING.

H1- THERE IS ASSOCIATION OF LOCATION OF THE INSTITUTION WITH RAIN WATER HARVESTING.

INFERENCE:

FROM THE ONE WAY ANOVA TEST IT IS FOUND THAT THE P VALUE OF THE ANALYSIS IS LESS THAN 0.05 HENCE THE ALTERNATE HYPOTHESIS IS ACCEPTED .THEREFORE, THERE IS ASSOCIATION OF LOCATION OF THE INSTITUTION ON RAIN WATER HARVESTING.

5.FINDINGS,SUGESSTIONS & CONCLUSION

FINDINGS OF THE STUDY:

Institutions of KANCHIPURAM and CHENNAI have SD policies and promotes and follow better than other districts. THIRUVANAMALAI ,THIRUVALLUR AND VILLUPURAM districts is very less active in sustainability performance comapared to other districts. Few institutions of SALEM AND ERODE districts have considerably started promoting and acting upon the sustainable indicators. All the district institutions need to install and understand the need of conserving renewable energy. Rural and semi urban institutions in all the districts have better green cover compared to institutions in urban places. Waste management is facilitated in few no.of institutions and cultivation of bio gas needs to be given importance.

CONCLUSION OF THE STUDY :

The overall performance of 10 districts HEI's of Tamil Nadu have been examined based on three sustainability indicators namely green cover on the campus, rooftop solar panel, waste management . The impact of these sustainability indicators on the development of the institutions was the prime objective of the study. It is found that all the districts has promoting sustainability indicators through out the campus in various subjective methods. Few institutions of every districts needs to provide more awareness about the necessity of solar energy conservation and waste management and greenery management to the students and promote efficiently in the campus area. HEIs around the world have been integrating SD into their systems to achieve lasting change towards SD. The SR process has been identified as one of the drivers contributing to change for SD in corporations. This paper offers an initial exploration of the interconnections between the SR process and OCMS in HEIs, where SR is an important driver for change in HEIs.

The research shows that SR in HEIs is predominantly driven by internal motivations, with the majority of the efforts being mainly led by staff, and sometimes by students. The sustainability reporting process is currently leading to incremental changes, such as an increase in awareness of sustainability, and improvements in communication with internal stakeholders, while factors impeding the change process are the absence of an external stakeholder engagement process, the lack of inclusion of material impacts in reports, and the lack of institutionalization of SR.

SR can serve as an instrument for HEIs to assess where they are, and to plan the future direction of change towards SD in HEIs. The changes due to sustainability reporting need to be institutionalized and fed back into the higher education system.

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