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EVALUATING NLP MODELS FOR SENTIMENT ANALYSIS

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Abstract: Sentiment analysis, a foundational task in natural language processing (NLP), involves the automatic detection and classification of sentiment in textual data. With the advent of advanced NLP models such as BERT, GPT, and RoBERTa, there arises a necessity to assess and compare their performance in sentiment analysis tasks. This research paper conducts a detailed comparative analysis focusing on the NLP models VADER and RoBERTa in the context of sentiment analysis, systematically evaluating their efficiency. The primary goal is to offer insights into the strengths and limitations of these models, aiding researchers and practitioners in the judicious selection of NLP models for sentiment analysis applications. The comparative analysis is executed on a dataset comprising customer reviews from Amazon, and statistical tests are applied to ascertain the statistical significance of performance differences. The findings underscore the distinct strengths and weaknesses of various NLP models for sentiment analysis. Notably, the RoBERTa model emerges as the most effective for the specified dataset, as evidenced by the outcomes of the comparative performance evaluation.

Keywords: Sentiment analysis, NLP models, VADER, RoBERTa

I. Introduction

A. Sentiment Analysis

Sentiment analysis, a subfield of natural language processing, focuses on deciphering and examining sentiments conveyed through spoken or written language. It aims to discern whether a given text holds a positive, negative, or neutral sentiment by evaluating its polarity [1]. Various industries, including marketing, customer service, politics, and healthcare, leverage sentiment analysis to comprehend customer feedback, monitor brand reputation, and gauge public opinion on their products and services. In the realm of marketing, sentiment analysis proves valuable for companies seeking a deeper understanding of client preferences, identifying trends, and enhancing overall customer satisfaction. Challenges in sentiment analysis encompass the identification and handling of elements like sarcasm, irony, and figurative language [2]. Additionally, the cultural and linguistic context must be taken into account, as these factors can influence the analysis based on the target audience.

B. Natural Language Processing (NLP)

Natural Language Processing (NLP) stands at the intersection of computer science and artificial intelligence, concentrating on the interplay between computers and human language [3]. Its overarching objective is to enhance the computer's ability to comprehend, interpret, and respond to human language in a more natural manner. NLP involves the analysis, understanding, and generation of human language, and this is made possible through the utilization of algorithms collectively referred to as NLP models. These models enable computers to both comprehend and generate human language. Employing statistical methodologies and machine learning techniques, NLP models play a crucial role in the analysis of sentiments and the identification of patterns in human language [4]. In the context of sentiment analysis, this research has specifically opted for the VADER from rule-based models and roBERTa from deep learning models.

VADER Model

VADER (Valence Aware Dictionary and Sentiment Reasoner) is a sentiment analysis model grounded in rule-based principles, designed explicitly for the scrutiny of social media text [2]. Its fundamental structure relies on a curated dictionary comprising words and phrases, each manually assigned a positive, negative, or neutral sentiment score. Complementing this lexicon, VADER incorporates a set of guidelines and heuristics to navigate through intensifiers, negations, and other linguistic nuances that can influence sentiment. The rule-based approach makes VADER particularly advantageous for assessing concise, informal, and colloquial content, such as tweets and online reviews [4].

roBERTa Model

The state-of-the-art language model roBERTa (Robustly Optimized BERT Approach) originates from Facebook AI Research. It evolves from the renowned BERT (Bidirectional Encoder Representations from Transformers) approach, leveraging transformer architecture and an extensive text corpus to generate high-quality language representations [5]. To augment roBERTa's resilience and generalization capabilities, a suite of strategies, including dynamic masking, continuous training, and larger batch sizes, were employed during its refinement [6]. Markedly advancing the landscape of natural language processing, roBERTa has become an indispensable tool for numerous researchers and developers working with language data.

II. Methodology

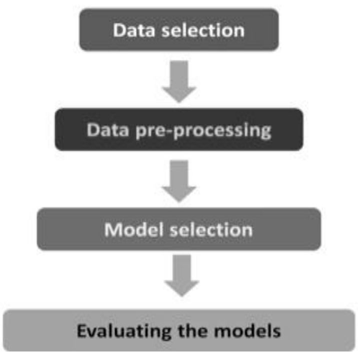

Fig.1 Flow of Process

This section elucidates the methodology employed in this research paper. Fig. 1 visually represents the step-by-step progression of the process. The study focuses on online food review data. Initial data pre-processing steps, including the removal of stop words and tokenization, are performed on the raw data to transform it into a suitable format for analysis. In this context, the VADER model, representing rule-based models, and roBERTa, a representative of deep learning models, are employed. The evaluation criteria encompass efficiency, and the selection of the most accurate model is the ultimate outcome.

A. Data Selection

A benchmark dataset sourced from Amazon's food reviews on the internet is selected for analysis. Table I provides a detailed breakdown of the dataset's attributes, comprising 10 distinct features. With a substantial volume of 568,450 records, the dataset's size enhances the precision of the analysis.

TABLE I. DESCRIPTION OF THE DATASET

Columns of the Dataset	Description
Id	A unique identifier assigned to a particular product in a database.
ProductId	A unique code or number assigned to a specific product.
UserId	A unique name or code assigned to a particular user of a product.
ProfileName	A name or username that a user chooses to represent themselves on a particular platform.
HelpfulnessNumerator	The number of times a review or feedback has been marked as "helpful" by other users.
HelpfulnessDenominator	The total number of votes or ratings that a review or feedback has received, regardless of whether they are marked as "helpful" or not.
Score	Contains ratings of how satisfied customers are with the product, with higher scores (5) indicating greater satisfaction.
Time	Represents time of the comment.
Summary	A one or two words description by the customers about the product usefulness.
Text	A brief description by the customers about the usefulness of the product.

B. Data Pre-processing

VADER and roBERTa leverage preprocessing techniques, such as stop word removal and tokenization, to dissect the input text into discrete units, such as words or phrases. While stop words removal is known to enhance recall, it can compromise precision; hence, stop words are retained in this analysis. Tokenization, involving the segmentation of phrases into words, is facilitated by the AutoTokenizer, providing a consistent interface for handling diverse text inputs. This module automatically selects the optimal tokenizer based on the model architecture and settings provided. It supports tokenizers from various pre-trained models like BERT, GPT-2, roBERTa, and others, streamlining the process of employing different tokenization methods. The refined data is subsequently converted into numerical representations through embedding. In Python, the LabelEncoder() method is employed to encode categorical values, assigning numeric values to the attributes.

C. *Implementation of NLP Models*

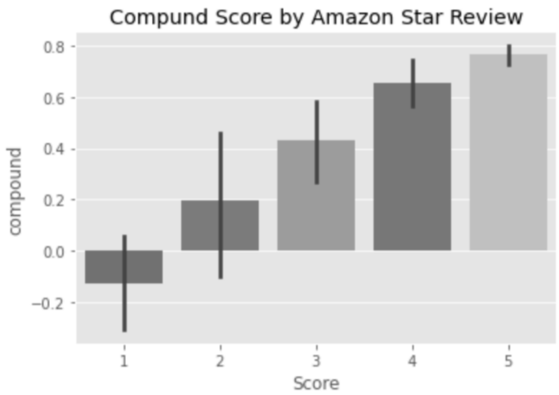

Fig. 2 Comparison of Polarity Score and Compound Score

VADER

Utilizing the SentimentIntensity Analyzer, polarity scores have been generated for the dataset, yielding results in positive, neutral, negative, and compound (an aggregate score of positive, neutral, and negative) categories. A comparison is conducted to validate whether the compound score aligns with the "score" column in the dataset. Remarkably, the compound scores align with the scores in the dataset: at a score of 1, the compound score leans towards 0, signifying that all reviews are negative, and as scores (ratings) ascend, the compound scores progressively incline towards 1, indicating that at a score of 5, all reviews are positive. Furthermore, a comprehensive comparison is performed to ascertain whether the positive, neutral, and negative scores correspond with the "score" column in the dataset.

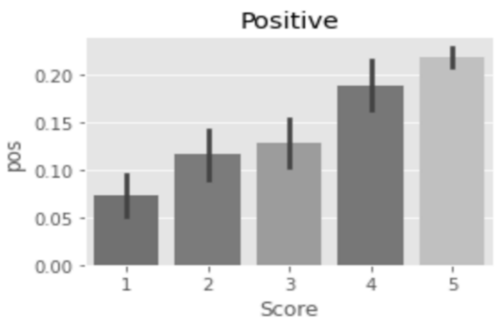

Fig. 3 Comparison of “Score” from dataset and Positive Score

The positive score obtained from VADER exhibits a positive correlation with the scores in the dataset, indicating that as ratings increase, the prevalence of positive reviews also rises. Specifically, at a rating of 1, the positive score registers around 0.7, while at a rating of 5, the positive score remains above 0.20.

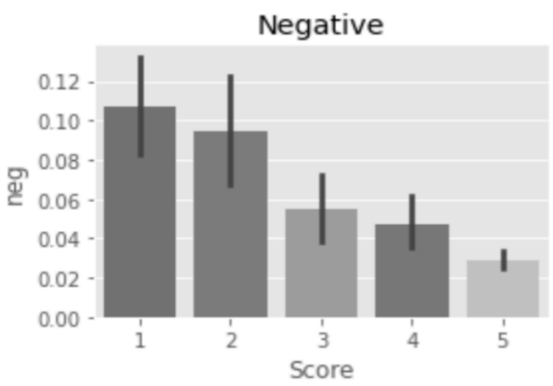

Fig. 4 Comparison of “Score” from Dataset and Negative Score

The negative score derived from VADER demonstrates an inverse relationship with the scores in the dataset, indicating that as ratings increase, the prevalence of negative reviews tends to decrease. Specifically, at a score of 1, there is a negative score surpassing 0.10, while at a score of 5, the negative score drops below 0.04.

roBERTa

In this context, sentiment analysis is executed using tensors with the roBERTa model. The function takes a text string as input, employs the roBERTa tokenizer to tokenize the text, and then converts the tokenized text to a scale ranging from 0 to 2. The final result is categorized as positive, neutral, or negative based on this scale.

III. Results and Discussion

The scores from both VADER and roBERTa models are computed, and a t-test is conducted, establishing a significant difference between the results from VADER and roBERTa. To assess the accuracy of the models, a correlation coefficient analysis is carried out, and the calculated coefficient is presented in Figure 5.

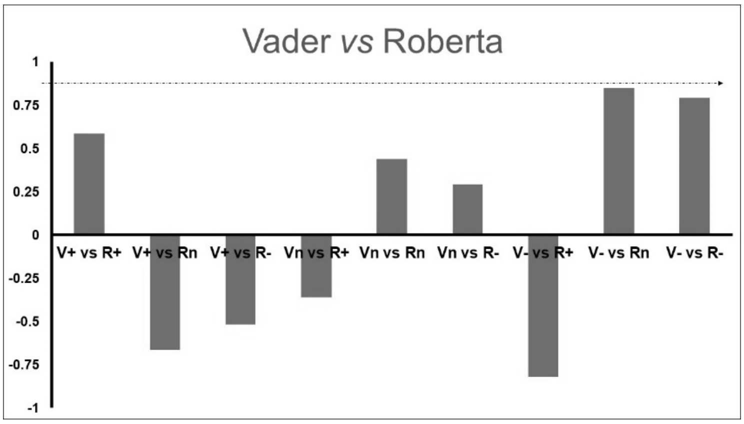

Fig. 5 Comparison of VADER scores with roBERTa with Correlation Coefficient

In the comparison between VADER and roBERTa, the majority of correlation coefficient values are negative while the correlation coefficient of roBERTa is +0.9 which indicates that the VADER model exhibits weaker and less accurate performance compared to roBERTa. Consequently, roBERTa demonstrates superior efficiency over VADER for this dataset.

IV. Conclusion

Both the VADER and roBERTa NLP models play valuable roles in sentiment analysis, but their effectiveness hinges on the nature of the text under evaluation. In the case of the Amazon food review dataset, the roBERTa model demonstrated high efficiency. The choice between NLP models should be guided by the specific requirements and characteristics of the sentiment analysis task at hand. The future enhancement of this research, is to explore the extraction of real-time data from E-Commerce websites using web scraping techniques and to demonstrate the practical application of the research findings in a real-world scenario, showcasing the potential of NLP models in improving decision-making processes in E-Commerce which paves the way for developing a web sentiment analysis application built on the most effective and efficient NLP model identified in this study.

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IS NAMMA CHENNAI CLEAN?
A STUDY ON OUTSOURCED JANITORIAL SERVICE BY REATER CHENNAI CORPORATION

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ABSTRACT

The GCC has entered into a contract with "URBASER SUMEET and RAMKY ENVIRO" for the SWM process in a selected 11 zones of Chennai. This research aims to study the perspective of the public from the selected 11 zones of Chennai towards the effectiveness of the services provided by the newly outsourced companies, their expectation and satisfaction towards the prevailing SWM process and to identify the impact created by Urbaser Sumeet and Ramky Enviro towards Namma Chennai Clean. The findings of the study revealed that these newly outsourced companies have created a significantly noticeable impact towards Namma Chennai Clean.

Key Words: Solid Waste Management, Janitor, Newly outsourced SWM companies

INTRODUCTION

Vantharai Valavaikum Chennai and now popularly known as Namma Chennai is the 4th largest city in India. With over a population of 64,25,000 the city on an average produces 5600 tons of waste. With 15 zones and 200 (chennai.citizenmatters.in, Pinky Chandran (2022)) wards the waste produced is not effectively segregated and at the end of the day they are being dumped in landfills. Out of the total waste going to the dump yards, around 95% of the waste accounts to Household waste (Municipal Solid Waste). Solid waste management is one of the significant responsibilities of the Greater Chennai Corporation (https://chennaicorporation.gov.in/).

And now finally, to achieve zero waste in some upcoming years the Greater Chennai Corporation (GCC) has now sort the service of two big waste management companies "URBASER SUMEET and RAMKY ENVIRO". But to note it down this is not the first time GCC has sort the help of private firms for effective Solid Waste Management (SWM). It dates to 2000 when for the first time ONXY a private waste management company won the contract to keep 3 zones of Namma Chennai clean. Urbaser Sumeet is a joint venture between Urbaser, a leading global environmental management company based in Spain, and Sumeet, a leading waste management company in India (https://urbasersumeet.com/). Ramky Enviro Engineers Limited, commonly known as Ramky Enviro, is a leading provider of environmental services and solutions based in India. The company offers a wide range of services related to waste management, including collection, transportation, processing, and disposal of various types of waste (https://ramky.com/). The zones covered under this contract are Tiruvottriyur, Manali, Madhavaram, Ambattur, Teynampet, Kodambakkam, Valasaravakkam, Alandur, Adyar, Perungudi, Sholinganalur.

According to **(Phonchi-Tshekiso N. D., 2020)** positive results were obtained through including the private sector, as it increased the frequency of solid waste collection and raised the standard of the waste management service**.** Though previous studies suggest that privatization of solid waste management by the government is effective in many ways there are research papers which reveals that the outsourced company for solid waste management are inconsistent in their work due to the delay in the payment made to them by the government **(Teye et al., 2019)**. Therefore, this research aims to study the perspective of the public from the selected 11 zones of Chennai towards the effectiveness of the services provided by the newly outsourced companies, their expectation and satisfaction towards the prevailing SWM process and to identify the impact created by Urbaser Sumeet and Ramky Enviro towards Namma Chennai Clean.

RESEARCH PURPOSE

The purpose of conducting this research is to study the impact created by the newly outsourced janitorial services by GCC towards Namma Chennai Clean. The results of the study will help the government and the newly outsourced SWM companies to take further initiatives for an effective solid waste management process based on the expectations, level of satisfaction among the public.

RESEARCH OBJECTIVE

RO1: To study the impact these janitorial service providers have created towards Namma Chennai Clean.

RO2: To study the satisfaction of the public towards the services of the company.

RO3: To study the effectiveness of service provided by the two newly outsourced SWM companies.

RO4: To determine the expectation of the public from the services provided by the company.

RO5: To find out the relationship between the role played by the public and the effectiveness of the waste management process carried out by the companies.

REVIEW OF LITERATURE

Outsourced Janitorial Service

Effectiveness And Impact

Back in 2000 the Greater Chennai Corporation for the first time outsourced a Solid Waste Management company named ONXY Pvt ltd for the municipal solid waste management in Chennai. Out of 15 zones 3 zones were under the contract of ONXY ltd.

Previous study suggest that waste management process is cost effective when it is provided to private companies **(Esakku, 2007).** The involvement of the private sector yielded positive outcomes, as it increased the solid waste collection frequency and improved the quality of the waste management service **(Phonchi-Tshekiso N. D., 2020)**. Though previous studies suggest that privatization of solid waste management by the government is effective in many ways there are research papers which reveals that the outsourced company for solid waste management are inconsistent in their work due to the delay in the payment made to them by the government **(Teye et al., 2019)**. Therefore, it can be hypothesized that,

- ☐ H 1.1: There is difference in the impact created by the newly outsourced companies and previously contracted private companies.

Satisfaction and expectation of the public on the service provided by the companies

The residents are generally satisfied in solid waste collection services conducted by NGO **(Khanom T. F., 2015)**. A more consolidated strategy for solid waste management needs to be designed and implemented which streamlines the processes of waste collection and disposal **(Sabir et al., 2016)**. Thus based on the above statements the following hypotheses are created

- ☐ H 2.1: There is relationship between the effectiveness of service and satisfaction among public.
- ☐ H 2.2: There is difference in the willingness to retain the company for future based on the satisfaction among the public.

Techniques Used For Effective Solid Waste Management

There are other new technologies such as Persuasive technology which is often used to maintain environment sustainability by making the public aware about the consequence of their everyday action towards the environment **(Karnalim et al., 2020)**. A study by **(Thogersen and Crompton. 2009)** found that providing information about the environmental benefits of recycling increased participation in a recycling program. Waste management companies should use clear and concise communication to promote recycling and waste reduction. Incentives can be effective in promoting environmentally friendly behaviors. A study by **(Li et al. 2015)** found that providing financial incentives increased participation in a recycling program. Thus, based on this discussion the following hypotheses are created.

- ☐ H 3.1: There is relationship between techniques adopted by the companies and the effectiveness of their service.
- ☐ H 4.1: There is relationship between the techniques adopted by the company and the expectation of the public.

Attitude of janitors

A study by **(Babin and Boles. 1998)** found that janitors who had more positive attitudes towards their job were more satisfied with their work and provided better service. Positive attitudes towards the public may also lead to better communication and more effective service. The rag pickers and conservancy workers in the country seldom use protective masks or gloves. Instead, they use their bare hands **(Kandasamy et al. 2013)**. Thus, based on the above discussion, the following hypotheses are created.

- H 3.2: There is relationship between attitude of the janitors and the effectiveness of the service.

- H 4.2: There is relationship between the attitude of the janitors and the expectation of the public.

Knowledge and contribution of public towards solid waste management

According to **(Balasubramanian, Muniyandi. 2018)** the knowledge of the public plays an important role in the contribution by the public for effective solid waste management. Public awareness should be created on the health problems due to the waste. In some cases, though the public had knowledge on what are the health hazards and the new policies and initiatives by the Government, they did not have healthy practices in sanitation, hygiene and waste disposal **(Dandagi et al. 2022)**. Thus based on the above literature reviews done the following hypothesis is created.

- H 5.1: There is association between the knowledge of the public on waste disposal and their contribution towards proper disposal of waste.

Demographics

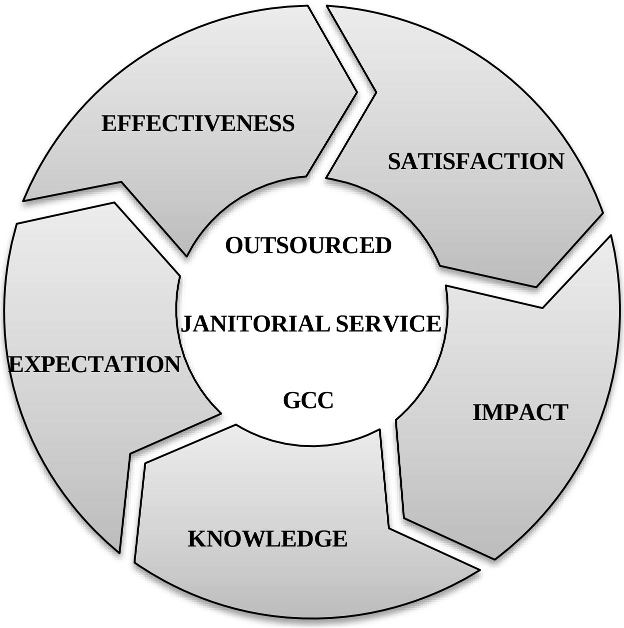
The residents are very much concerned about the poor condition of the environment due to the inappropriate and improper SWM in Chennai Corporation **(Balakrishnan, C. 2016)**. A study by **(Wang et al. 2016)** found that the location and accessibility of waste collection facilities have a significant impact on the efficiency and effectiveness of solid waste management. In a study when the comparison was made between the male and female it was found that people are significantly differing in respect of Knowledge – Solid waste management – Hazardous Waste Management and self-realisation section **(J., Saravanan & Judith, Vinitha. 2014)**. On account of the above literatures, the following hypotheses are created.

- H 2.3: There is difference in the satisfaction on the service provided by the company based on the location of the people.

- H 3.3: There is difference in the effectiveness of service provided by the company based on the location of the people.

- ☐ H 5.2: There is association between gender and role of public for an effective waste management.

Based on the hypotheses framed the conceptual framework for the research is formulated.

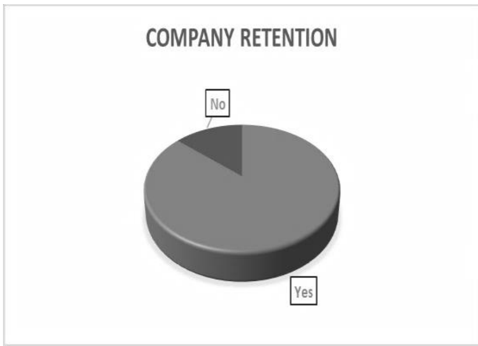


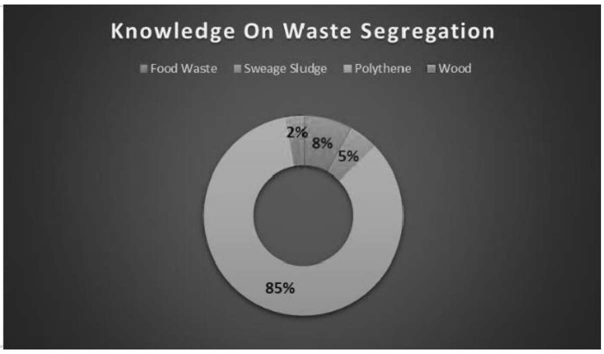
RESEARCH METHODOLOGY

A structured questionnaire was used to collect the data from 300 respondents belonging to the

11 zones of Chennai under the contract of Urbaser Sumeet and Ramky Enviro. The questionnaire contained seven likert scales and nine nominal scales. The respondents were chosen using convenient sampling method. The data collected was coded in excel and later uploaded in SPSS for data analysis. The variables of the Likert scales were computed together. Various tools such as descriptives, t – test, paired t – test, anova, regression and chi square were used to test the hypotheses and reliability test was done to find out the consistency of the Likert scales used in the questionnaire.

RESULTS





The results from the company retention graph explains that around 86% of the respondents are willing to retain Urbaser Sumeet and Ramky Enviro for their respective zone in future.

RELAIBILITY TESTING

VARIABLE	NUMBER OF ITEMS	CRONBACH'S ALPHA	CONSISTENCY
EFFECTIVENESS OFSERVICE BY JANITOR	7	.886	Good
TCEHNIQUES	6	.884	Good
CHARACTERISTICS	5	.900	Good
SATISFACTION	6	.935	Good
IMPACT BEFORE 2019	6	.884	Good
IMPACT AFTER 2019	6	.934	Good
EXPECTATION	6	.846	Good

The above-mentioned table represents the Cronbach's Alpha value for different Likert scales used in the questionnaire. The items are considered to represent an acceptable level of internal consistency if the Cronbach's Alpha value is within 0.5 to 0.7 and a good level if the value is more than 0.7 **(Nunally, 1978)**. Generally, all the subscales have a reliability value above 0.8, which indicates that the scales are reliable, have a very good internal consistency.

HYPOTHESIS TESTING

RESEARCH OBJECTIVE 1

Paired T Test explaining the impact created by the newly outsourced companies before and after 2019.

Time Period	Mean	Significance
BEFORE 2019	3.0222	.000
AFTER 2019	3.6289	

Since $p<0.05$ there is a significant difference in the solid waste management process in the city before and after 2019. Since the mean score for After 2019 is more than Before 2019 the impact created by the newly outsourced companies is higher than the impact created by pervious companies.

RESEARCH OBJECTIVE 2

Regression analysis showing relationship between effectiveness of service and satisfaction among public.

	R	R Square	F value	t value	Significance
EFFECTIVENESS	.731[a]	.534	341.135	18.470	.000

As illustrated in the above table, the study indicates that the satisfaction among the public is highly influenced by the effectiveness of the service provided by the janitors, based on the factor that $p<0.05$. $R = 0.731$ indicates that satisfaction among the public and effectiveness of the service provided by the janitors is highly correlated. R square = 0.534 indicates that the variance in the satisfaction among the public is 53.4% explained by the effectiveness of the service provided by the janitors.

T Test showing difference in the willingness to retain the company for future based on the satisfaction among the public.

Satisfaction	Mean
Yes	3.8044
No	2.7724
Equal variances assumed	.000
Equal variances not assumed	.000

In accordance with the above table, it is inferred that $p<0.05$ there is significant difference in willingness to retain the company in future based on the satisfaction among the public. From the above table we can also find that maximum number of the respondents are willing to retain the same companies in future. This can be inferred from the mean scores calculated for the response 'Yes'.

Anova analysis showing the difference in the satisfaction on the service provided by the company based on the location of the people.

ANOVA

SATISFACTION

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.866	10	1.887	2.289	.014
Within Groups	238.241	289	.824		
Total	257.108	299			

Satisfaction	Mean	Zone
Highest Satisfaction	4.0355	Teynampet
Lowest Satisfaction	2.9667	Perungudi

From the above table it is interpreted that since p<0.05 there is a significant difference in the satisfaction among the public based on the location. Thus, the findings of the study support the hypothesis. From the descriptives table we can also conclude that people belonging to Teynampet zone are overall satisfied with their company and the people belonging to Perungudi zone are least satisfied.

RESEARCH OBJECTIVE 3

Regression analysis explaining the relationship between techniques adopted by the companies for effective waste disposal and the effectiveness of their service.

	R	R Square	F value	t value	Significance
TECHNIQUE	**.735[a]**	**.541**	350.874	18.732	.000

The result from the above table indicates that effectiveness of service provided by the company is highly influenced by the techniques adopted by the company since the value of p<0.05. Since R square = 0.541 it is also concluded that 54.1% of variance of effectiveness of the service provided by the company is explained by the techniques adopted by the companies for solid waste management. Since R = 0.735 it means that the effectiveness of the service and techniques adopted by the companies for solid waste management is highly correlated.

Regression analysis explaining the relationship between attitude of the janitors and the effectiveness of the service.

	R	R Square	F value	t value	Significance
ATTITUDE	**.677[a]**	**.458**	251.717	15.866	.000

From the above table since p< 0.05 it is revealed that the effectiveness of the service provided by the company is highly influenced by the attitude that the janitors possess. R =0.677 indicates that attitude of the janitor and the effectiveness of the service provided by the newly outsourced companies are moderately correlated. Having a R square = 0.458 indicates that 45.8% of variance of effectiveness of the service provided the companies is explained by the attitude of its janitors.

Anova analysis showing the difference in the effectiveness of service provided by the company based on the location of the people.

ANOVA

EFFECTIVENESS

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.005	10	1.800	2.566	.005
Within Groups	202.747	289	.702		
Total	220.752	299			

Effectiveness	**Mean**	**Zone**
Highly effective	3.8936	Teynampet
Least effective	2.7429	Perungudi

From the above table it is interpreted that since $p<0.05$ there is a significant difference in the effectiveness of the service provided by the company based on the location. Thus, the findings of the study support the hypothesis. From the descriptives table we can also infer that the service provided by the company in Teynampet zone highly effective with a mean score of 3.8936 and it is least effective in Perungudi zone with a mean score of 2.7429.

RESEARCH OBJECTIVE 4

Regression analysis explaining the relationship between the techniques adopted by the company and the expectation of the public.

	R	**R Square**	**F value**	**t value**	**Significance**
TECHNIQUE	**.540[a]**	**.292**	122.890	11.086	.000

As illustrated in the above table, the study indicates that the expectation of the public is highly influenced by the techniques adopted by the company for an effective waste collection based on the factor that $p<0.05$. $R = 0.540$ indicates that techniques adopted by the companies and the expectation of the public on the service provided by the company is moderately correlated. R square = 0.292 indicates that the variance in the expectation of the public on the service is 29.2% explained by the techniques adopted by the newly outsourced companies

Regression analysis explaining the relationship between the attitude of the janitors and the expectation of the public.

	R	R Square	F value	t value	Significance
ATTITUDE	.479[a]	.229	88.515	9.408	.000

From the above table it is indicated that the there is a significant effect on the expectation by the public based on the attitude of the janitors since the $p<0.05$. Since the value of $R = 0.479$ it is evident that the attitude of the janitors and the expectation of the public is moderately correlated. The R square value being 0.229 indicates that the variance of expectation of the public is 22.9% explained by the attitude of the janitors.

RESEARCH OBJECTIVE 5

Chi Square analysis showing the association between the knowledge of the public on waste disposal and their contribution towards proper disposal of waste.

Pearson Chi-Square			
Association between	**Value**	**df**	**Asymp. Sig. (2- sided)**
frequency of throwing waste and knowledge on impact of burning solid waste	4.424[a]	9	.881
frequency of throwing waste and knowledge on segregation of waste	11.592[a]	9	.237

Referring to the above table since $p>0.05$ there is no significant association between frequency of throwing waste and their knowledge on the waste that is degradable and non-degradable.

Pearson Chi-Square			
Association between	**Value**	**df**	**Asymp. Sig. (2- sided)**
frequency of segregating the waste and knowledge on impact of burning solid waste	17.690[a]	9	.039
frequency of segregating the waste and knowledge on segregation of waste	27.788[a]	9	.001

Referring to the above table since $p<0.05$ it is concluded that there is a significant association between citizens segregating the waste and their knowledge on impact of burning solid waste as well as knowledge on the waste that will degrade and the waste that will not degrade.

Chi Square analysis showing the association between gender and role of public for an effective waste management.

Pearson Chi-Square			
Association between	**Value**	**df**	**Asymp. Sig. (2- sided)**
gender and frequency of disposing waste	11.592[a]	3	.009
gender and frequency of segregating the waste	4.996[a]	3	.172
gender and willingness to segregate the waste in future	2.260[a]	2	.323

From the above table it is inferred that where $p>0.05$ it indicates that there is no significant association between gender and willingness to segregate the waste in future as well as gender and frequency of segregating the waste. When $p<0.05$ it indicates that there is a significant association between gender and the frequency in disposing the waste.

DISCUSSION

The study revealed that the effectiveness of the service depends upon the techniques used by and the attitude of the janitors. The techniques used by the janitors for effective solid waste management and the attitude of the janitors towards the public also have a significant influence on the perception of the public on how effective the solid waste management process in Chennai is. From the above study it is inferred that techniques like alarm in the way of song, usage of battery-operated vehicle is highly effective and used in practice than techniques like the janitors asking the public to segregate the waste. We can also conclude that the awareness of waste disposal among the janitors and the usage of mask and glows by them while collecting the waste is least practiced. The public feel that the services provided by these companies is highly effective. The study also reveals that people belonging to Teynampet zone find that the service provided by the newly outsourced company is highly effective and people belonging to Perungudi zone find that the service provided by the newly outsourced company is least effective. The level of effectiveness varies from zone to zone.

When exploring the satisfaction level of the public the study revealed that the satisfaction among the public on the services provided Urbaser Sumeet and Ramky Enviro depends upon the techniques used by and the attitude of the janitors. It is evident from the study that the techniques such as alarm in the form of song played while entering the street, battery operated vehicle used for the collection of waste, infusion of fluorescent strips on the janitor's uniform, awareness about waste segregation among the janitors, frequency of cleaning the street and the area and the attitude of the janitors has a significantly improved the level of satisfaction among the public. We can also find that the public are less satisfied with the information told while playing the song since they find it less effective. The study also reveals that almost 86% of the public want to retain the same companies for their respective zones in future. This indicates that the public are highly satisfied with the services provided by these companies. The study also reveals that people belonging to Teynampet zone are highly satisfied and people belonging to Perungudi zone are least satisfied. The level of satisfaction varies from zone to zone.

The study also found that the public are highly expecting that there should be a supervisor from government visiting the area once a month and supervise the work done by the janitors. It is also found that the public is moderately comfortable with the existing alarm method (i.e., playing a song at a very high sound). The public also highly expect that the janitors should wear gloves and mask, should wait at least 20 mins in a street and should not ask money from the public for collecting the garbage. This indicates that most of the janitors do not wear mask and gloves and they wait less than 20 mins for one street. It is also found that there are a few janitors who collect money from every street for collecting waste and during festivals. Based on the above conclusion there are various key areas where the government and the newly outsourced companies should investigate.

Interpreting the responses for the questions raised to study the situation of SWM in Chennai before and after the deployment of Urbaser Sumeet and Ramky Enviro it can be concluded that these companies have created a significant impact in the SWM process those 11 zones of Chennai. This is because before 2019 the alarm system was in the form the blowing whistle whereas now a song is being played at a very high volume which is audible even the vehicle is two streets apart. This is helping the public to collection the waste from their house beforehand and dispose it when the vehicle arrives. It is also found that the companies have created a noticeable improvement in keeping the streets clean, sweeping on streets on daily basis and during festival days leading to less garbage on the road. Finally, to conclude we can say that the newly outsourced SWM companies have created a positively noticeable impact in the selected 11 zones.

From the previous studies done it is said that the public play an important role in keeping the city clean which indirectly affects the effectiveness of the janitorial services. The contribution given by the public in this regard plays an important role and their contribution is highly related to their knowledge on the impacts of disposing waste through the process of incineration, knowledge on segregation of biodegradable and non-biodegradable waste and gender. There is a close relationship between people segregating their waste and their knowledge on waste segregation and impact of burning waste. Based on these factors we can conclude that though the SWM companies, government and the janitors take various steps to keep the city clean at the end of the day it is in the hands of the public who should stop throwing waste on the road and should start segregating their waste.

CONCLUSION

Finally, to conclude the findings of the study indicate that Urbaser Sumeet and Ramky Enviro have created a significantly noticeable impact towards Namma Chennai Clean. The level of satisfaction indicates that the services provided by these companies are greatly acknowledged by the public. At present there are various expectations from the public for an effective solid waste management in the city. One of the most preferred expectations is the appointment of supervisor to inspect the effectiveness of janitorial services for every zone. The public prefer that the government retains the existing outsourced companies for the upcoming years. Referring the quote given by Fredrik Nael " It takes both sides to build a bridge", similarly it is not only the company and its janitors who play an important role in keeping this Chennai city clean but it is also the public who play a more important role in keeping their locality clean by segregating the waste before disposing it, avoiding burning of solid waste, disposing waste in garbage cans and not in road etc. Last but not the least it is in the hands of the government who have the power to take initiatives to keep Namma Chennai Clean.

THEORETICAL IMPLICATIONS

The study will be helpful for future review of literature as there are very few papers on public perception towards SWM process in their locality and nil papers referring to the viewpoint of Chennai residents. Another theoretical implication is that the variables such as level of satisfaction and expectation among public, techniques used by janitors, attitude of janitors, effectiveness of their service etc. will give a deeper insight on the prevailing SWM situation in Chennai.

MANAGERIAL IMPLICATION

Based on the findings of the study it is suggested that the government and the SWM companies take necessary initiatives in creating awareness among the janitors on the waste disposal methods and segregation of waste and ensure that they wear mask, gloves and other protective measures while collecting the waste. They should also ensure that the janitors sweep the street twice a day without fail. It is highly suggested that the government should bring in the policy of the supervisors visiting the areas allotted to them, inspect and create a monthly report on the janitorial services provided in that area. The government should also take necessary initiatives to create awareness among public about waste segregation and make them segregate their household waste before disposing it. It is also suggested that it would be highly appreciated if the government acknowledge and reward the zone which is kept highly clean and the janitors responsible for that respective zone when compared with other zones of Chennai city. Another major suggestion based on the findings of the study is that the outsourced SWM companies should take steps to ensure that no janitors collect money from the public for collecting the waste and for festivals. The findings of the study reveal that level of effectiveness of service and satisfaction among public is less in Perungudi zone, which indicates that Urbaser Sumeet should concentrate more on Perungudi zone as it is one of the dumpsites in Chennai. The study also reveals that the level of effectiveness of service is less at Tiruvottriyur zone, which indicates that Ramky Enviro should concentrate more on Tiruvottriyur. Based on the findings of the study it is also suggested that it would be effective if the government outsource SWM companies for the rest of 4 zone in Chennai and retain the same companies in future.

DIRECTIONS FOR FUTURE RESEARCH

- Collect equal number of responses from all 11 zones.
- Increase the sample size to 500 - 1000 to increase the validity of the study.
- Focus on many aspects and provide more statements in the Likert scales to study the effectiveness of service, attitude of janitors, techniques used by the janitors, satisfaction & expectation among public and knowledge of public on waste disposal and segregation of waste.
- Use an appropriate method of sampling technique to generalize the findings of the research.
- If in future if the four zones of Chennai (Tondiarpet, Royapuram, Thiru-Vi-Ka Nagar, Anna Nagar) comes under the management of any outsourced SWM companies, research should be done to find out the impact created by these outsourced companies in the entire Chennai city.

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CONSUMER PERCEPTION AND AWARENESS OF SELF-MEDICATION

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ABSTRACT

The study hypothesizes that individuals who engage in self-medication may lack the necessary knowledge and expertise to accurately diagnose their symptoms, leading to the wrong medication or dosage, ineffective treatment, and possible worsening of the condition. Furthermore, the potential for adverse drug interactions and drug abuse and addiction associated with self-medication may increase the risks and consequences for individuals. Data was collected via a Google Forms survey from a random sample. The questionnaire covered demographics, self-medication practices, awareness of risks, attitudes towards professional advice, and perceptions of self-medication safety and efficacy. Statistical tools, including SPSS, were used for analysis. Results revealed a significant portion practising self-medication with allopathic medicines. Many lacked awareness of associated risks. Most respondents favoured seeking professional medical advice but viewed self-medication as convenient. The study underscores the need to educate the public on self-medication risks, stress professional guidance, and emphasize healthcare providers' role in promoting responsible self-medication.

Keywords: Self-medication, Consumer Awareness, Consumer Perception, Acceptance

1. INTRODUCTION

The term "Self-care" has been a growing trend and the searches for the same have quadrupled since 2018. Maintaining and promoting health, as well as managing illness, are achieved through self-care practices undertaken by individuals themselves **(Levin & Idler, 1983)**. Between 70% and 95% of ailments are reportedly treated without a doctor's help overall. While self-care and self-medication involve taking better steps to better one's health, self-medication can be harmful and potentially have adverse effects if it is not carried out under the supervision of a healthcare expert. It is crucial to comprehend the distinction between both ideas.

The term medication refers to the substance used to prevent, alleviate, treat, or cure an individual's condition or illness. A qualified healthcare professional prescribes usage of the medication as it requires careful consideration and knowledge of factors such as dosage, frequency of administration, potential side effects, and interactions with other drugs and medical conditions. Seeking self-recovery through the use of medication is an inherent psychological instinct of human beings **(Alqarni et al., 2023)**.

Self-medication refers to the practice of using medication or remedies devoid of guidance or even prescription medications obtained without a doctor's advice **(Montastruc et al., 1997)**. Ivan Illich coined the phrase "self-medication" in his influential book "Medical Nemesis: TheExpropriation of Health," which was released in 1974. He used the term "self-medication" in the book to describe the practice of taking medications without a doctor's approval or prescription. He has argued that the medicalization of society had made people believe they needed drugs to treat even minor health issues, which was the reason self-medication had become more common **(Illich, 1974)**.

Self-medication has some benefits **(Hughes et al., 2012)**, but there are also a few drawbacks **(Ruiz, 2010)** that should be taken into consideration before engaging in this activity. Self- medication provides the convenience and cost-effectiveness necessary for addressing minor afflictions such as headaches, colds, and allergies through easily accessible over-the-counter (OTC) medications. This approach not only economizes time by obviating the need for medical appointments and prescription retrieval but also affords the discretion required when dealing with sensitive health issues. Conversely, the drawbacks of self-medication encompass the risk of misdiagnosis stemming from a lack of expertise, an elevated potential for side effects due to improper OTC medication use, the possibility of adverse drug interactions when multiple medications are concurrently employed, delayed medical attention, and the potential obfuscation of underlying symptoms indicative of serious medical conditions.

Various studies have pointed out the fact that Self-medication is a public health concern and isan escalating behaviour all over the globe **(Grigoryan et al., 2008) (Martins et al., 2002)**. It is a prevalent issue in developing countries where it has both economic and social impacts **(Parulekar et al., 2016)**. It can be observed that India is one of the countries that have irrational usage of medical drugs which raises a major concern **(Kumar et al., 2013)**.

The self-medication trend shot sharply when the world was novel to the COVID-19 pandemic which was endangering millions of lives worldwide. The viral illness could not be treated or prevented by any effective medications or vaccines at that time. Due to this circumstance, social media has a greater impact on inaccurate information about drugs, which causes public confusion and panic and increases the use of Self-medication, including home remedies, without proof of their safety and efficacy **(Malik et al., 2020)**.

2. PURPOSE OF THE RESEARCH

The primary aim of this research is to gain insight into consumers' cognitive frameworks, levels of acceptability, and awareness regarding self-medication. The overarching objective is to delve into the intricacies of how consumers perceive and engage in self-medication and to identify any gaps in information or misunderstandings they may have. This is aimed at facilitating the promotion of the safe and effective utilization of medicines, all the while assisting in making well-informed decisions in the realms of policy and regulation.

Moreover, it is crucial to ascertain whether attitudes towards self-medication exhibit variations based on demographic and cultural factors. This investigation can serve as a foundation for addressing the needs and preferences of specific communities. Confronting these aspects holds the potential to foster the creation of secure and efficient self-care practices, ultimately leading to improved health outcomes and a reduced burden on healthcare systems.

The findings of the research have the potential to provide valuable insights into areas requiringfurther investigation. This information can assist us in effectively dealing with the associated concerns and creating opportunities for fresh research endeavours.

3. OBJECTIVES OF THE RESEARCH

RO1: To create and evaluate the awareness of the potential and adverse effects of self-medication among consumers

RO2: To identify factors influencing/ contributing to self-medication

RO3: To identify the root cause and gauge the usage of self-medicated drugs

RO4: To study the demographic profile of the respondent

4. LITERATURE REVIEW

This chapter presents an overview of relevant theories from previous research, where the literature was gathered from reviewed journals and articles. The theories included in this section are consumer awareness, demographic profile study and consumer perception of self- medication. Based on the findings a conceptual framework was developed.

4.1 AWARENESS

Self-medication involves taking medication without seeking advice from a healthcare professional. Although it may be convenient, it can be risky due to the lack of knowledge and experience required. This can lead to adverse drug reactions, incorrect diagnosis, drug interactions, and the emergence of antibiotic resistance. Several studies indicate a lack of publicawareness regarding the dangers of self-medication. In Jordan, only 14% of participants were aware of associated risks **(Alshogran et al., 2022)**, and in Bangladesh, only 33.6% were aware of potential health risks **(Paul, Swapon, & Kibria, 2022).** This highlights the need for greatereducation and understanding of the consequences of self-medication in various countries.

In Palestine and Saudi Arabia, high percentages of participants believed self-medication to be safe despite low awareness of associated risks **(Al-Ramahi, 2013).** Adverse drug reactions, drug resistance, incorrect diagnosis, and delayed treatment are common risks of self- medication, as reported in several studies. For example, over 60% of participants who self- medicated experienced adverse drug reactions in Pakistan and Jordan. Self-medication with antibiotics is a prevalent practice, as highlighted by studies in Iran **(Sarahroodi et al., 2012),** Iraq, Lebanon **(Ramia et al., 2017),** and Jordan **(Mukattash et al., 2019).** Lack of knowledgeregarding correct usage and associated risks contributes to the development of antibiotic resistance. Misuse of antibiotics leads to the emergence of antibiotic-resistant bacteria, which is a major public health concern. Self-medication can lead to undiagnosed medical conditionsand incorrect diagnoses, resulting in delayed treatment or exacerbation of symptoms.

H1: There is a significant relationship between awareness and the perception

H2: There is a significant difference in awareness level based on consumer self-medicating forchronic disease

H3: There is a significant difference in awareness level based on accepting self-medication asa standard or regular practice.

4.2 ACCEPTANCE

The acceptance of self-medication has been a topic of interest in numerous studies conducted worldwide. The results of these studies have been mixed, with some reporting a high level of acceptance of self-medication, while others have reported opposing views. Studies show that self-medication is prevalent in some regions **(Mukattash et al., 2019),** but not widely acceptedas a standard practice. In Saudi Arabia **(Al-Ghamdi et al., 2020)** and Vietnam, (**Nguyen et al, 2023)** healthcare professionals and pharmacy customers reported a high level of acceptance and effectiveness of self-medication for minor health issues.

Certainly, the acceptability of self-medication varies between different populations and regions. Despite its prevalence, a significant proportion of the population opposes self-medication as a standard practice due to associated health risks. However, in some areas and communities, self-medication is widely accepted as a practical and convenient way to manageminor health issues. Additional research is necessary to identify the determinants of attitudes and perceptions towards self-medication and to promote responsible self-medication practices.

H4: There is a significant association between accepting self-medication as a standard/regularpractice and the perception of self-medicine being effective

4.3 PERCEPTION AND PRACTICE

Self-medication is a widespread practice globally, and its prevalence varies depending on the socio-demographic characteristics of the population. This practice is becoming increasingly common globally, including in developing countries. It is often driven by a lack of access to healthcare, low health literacy, and a desire for convenience and cost savings. The practice is more prevalent in developing countries where access to healthcare is limited, and people maybe compelled to self-medicate for minor ailments due to the cost and unavailability of healthcare services. Several factors shape people's perception of self-medication, including education, culture, accessibility of healthcare services, and affordability. A study conducted in Nepal found that 77% of respondents' participants practised self-medication, with analgesics and antibiotics being the most commonly used medications **(Paudel & Aryal, 2020).** The review found that self-medication was common among the Nepalese population and was drivenby several factors, including a lack of access to healthcare and high healthcare costs.

Cultural factors also play a significant role in shaping people's perception of self-medication. In some cultures, self-medication is seen as an acceptable practice, and people may rely on home remedies or traditional medicines to treat minor ailments. A study conducted in Jordan found that traditional and herbal remedies were commonly used for self-medication, and the practice was considered a cultural norm **(Alkhatatbeh, Alefan, & Alqudah, 2016).** The study found that self-medication was common in Jordan and that it was driven by several factors, including convenience, cost savings, and a lack of access to healthcare.

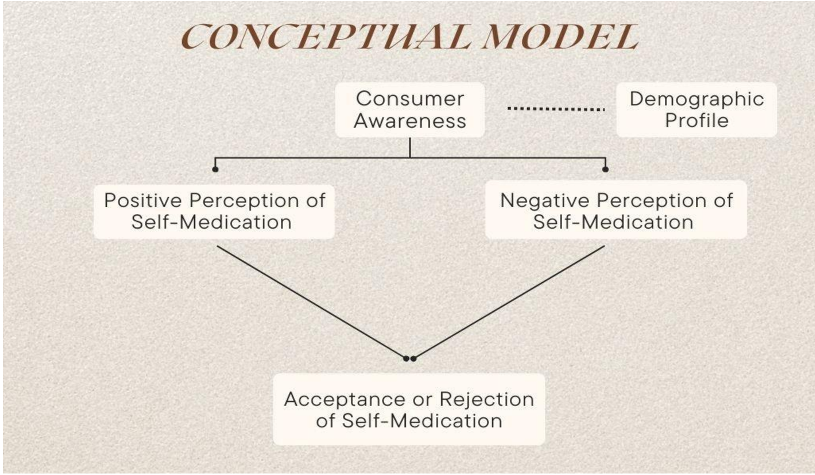
H5: There is a significant association between self-medicating for chronic disease and encouraging others to opt for self-medication

4.4 DEMOGRAPHIC PROFILE

The demographic profile of consumers constitutes a pivotal element in any research endeavour, as it provides insightful and valuable indications into consumer behaviour and preferences. Parameters such as age, gender, income, education, and geographical location are prime examples of demographic factors that researchers may employ to identify target markets, ascertain consumer needs, scrutinize trends, and evaluate the efficacy of the study. Numerous academic works underscore the paramountcy of demographic profiling in marketing research. **(Ailawadi, Lehmann, & Neslin, 2003)** study evinced the considerable influence of demographic variables on consumer behaviour and purchase decisions. Various studies have explored the relationship between self-medication practices and demographic factors among different populations. **(Alkhatatbeh, Alefan, & Alqudah, 2016)** found that a significant proportion of Jordanians (62.5%) practised self-medication, and this behaviour was associatedwith factors such as age, education level, and income.

H6: There is a significant association between accepting relatives' and friends' suggestions to opt for self-medication and gender

5. CONCEPTUAL FRAMEWORK



The Conceptual Framework was developed for this based on the aforementioned Hypothesis:

6. RESEARCH METHODOLOGY

The study utilized a questionnaire survey distributed through Google Forms to collect data from a sample of 303 using convenient sampling method. This questionnaire consisted of various items aimed at evaluating respondents' demographic information, self-medication practices, awareness of potential risks associated with self-medication, attitudes towards seeking professional medical advice, and perceptions of the safety and efficacy of self-medication. The collected data underwent analysis using a range of statistical techniques including frequencies, percentages, chi-square tests, ANOVA, t-tests, and regression. This analysis was conducted using SPSS version 29.0, a statistical software program. The data was efficiently structured and prepared using Excel's coding system beforebeing imported into SPSS. This process, in turn, enabled a more thorough analysis of the data,leading to a more profound understanding of the research results.

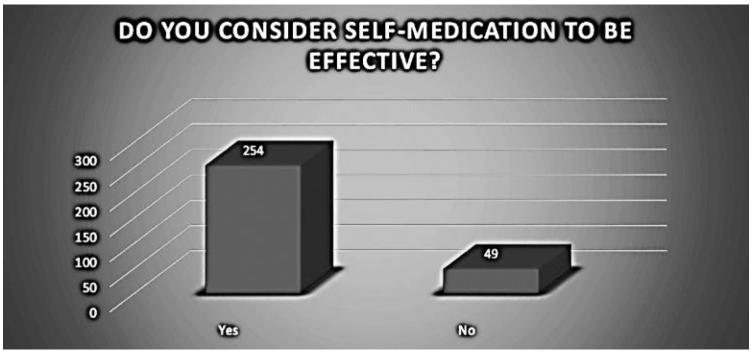
7. DATA ANALYSIS AND HYPOTHESIS TESTING

Various statistical techniques, such as Mean, T-Test, ANOVA, Chi-Square, and Regression, were employed for data analysis. These methods facilitated a comprehensive examination of the data, ensuring the provision of current and relevant information. The results are as follows:

RESULTS

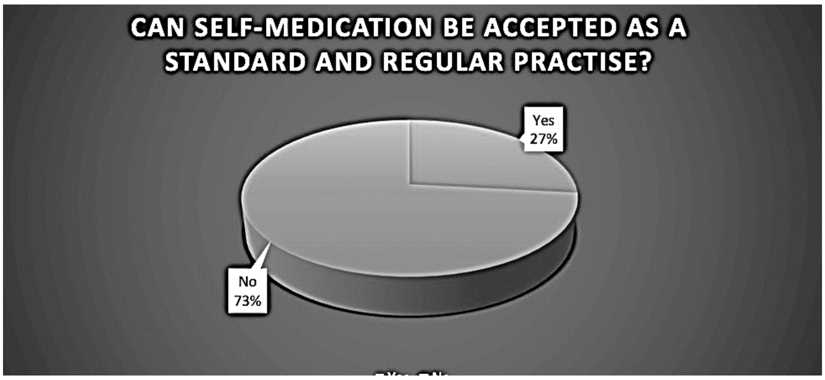
7.1 DESCRIPTIVES OF THE STUDY

[A] Consumer's perception towards the effectiveness of Self-Medication



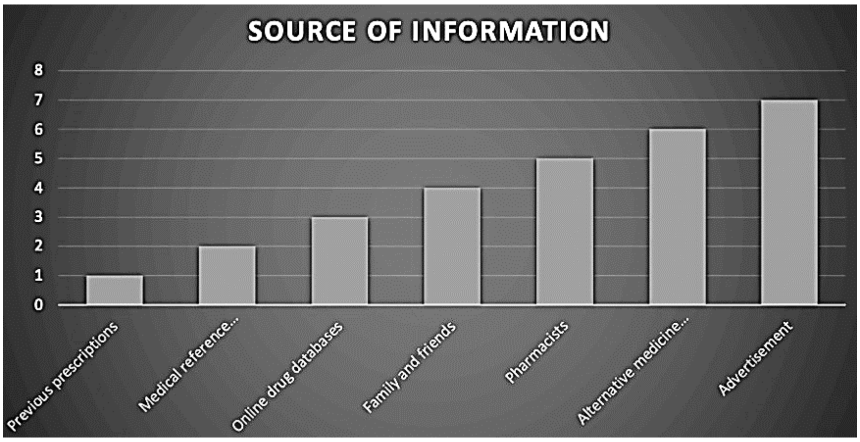
The bar graph represents the classification of individuals based on their perception of whether self-medication is effective or not. Out of the total 303 respondents, 254 respondents believe that self-medication is effective, while 49 respondents do not believe in the effectiveness of self-medication. In terms of percentage, 83.8% of respondents believe that self-medication is effective, while 16.2% of respondents do not believe in the effectiveness of self-medication.

[B] Perception of Self-Medication being accepted as a standard and regular practice byconsumers



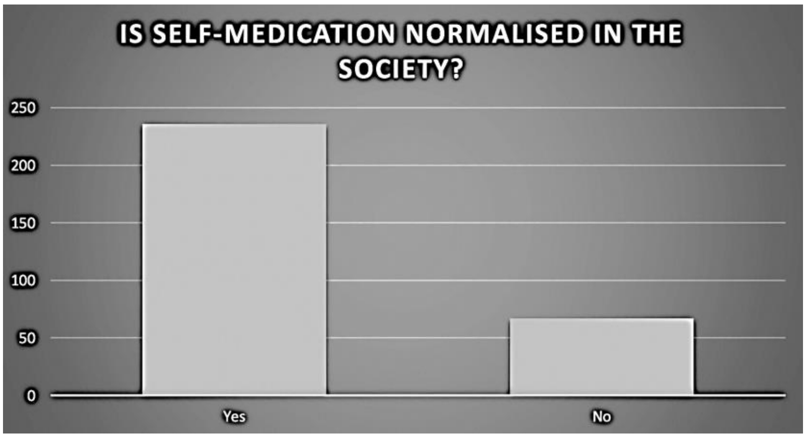
The pie chart represents the views of individuals on whether self-medication can be accepted as a standard or regular practice. Out of the total 303 respondents, 81 (26.7%) respondents believe that self-medication can be accepted as a standard or regular practice, while 222 (73.3%) respondents do not consider it acceptable

[C] Consumer's source of information for Self-medication



- The most reliable source for obtaining information is previous prescriptions.
- Medical reference books/magazines/newspapers and online drug databases follow closely behind in second and third place respectively.
- Seeking information from family and friends is the fourth rank.
- Suggestions from Pharmacists are the 3rd least preferred source of information.
- Finally, alternative medicine and advertisements are the least preferred sources ofinformation.

[D] If consumers consider Self-Medication to be normalised in the society



The data suggests that a significant proportion of respondents (77.9%) believe that self- medication is normalised in society. However, it is noteworthy that 22.1% of respondents do not consider self-medication to be normalised, indicating that there is some degree of concernamong a subset of the population regarding the practice.

[E] Classification Based On Mean Descriptive Of Awareness Likert Scale

Descriptive Statistics

LIKERT-AWARENESS	N	Minimum	Maximum	Mean	Std. Deviation
Incorrect self-diagnosis	303	1	5	3.84	1.007
Self-medication may suppress your symptoms and delay the underlying condition's diagnosis.	303	1	5	3.70	.997
Potential adverse reactions	303	1	5	3.68	1.036
Worsening of the condition the individual is trying to self-treat	303	1	5	3.76	1.026
Dangerous drug interaction (This may even influence the effect of another medicine that you may be taking)	303	1	5	3.73	1.110
Increase in drug resistance (bacteria can become resistant to antibiotics and stop responding to treatment)	303	1	5	3.66	1.064
Inaccurate Doses	303	1	5	3.90	.996
Consumption of expired medicine without realising it	303	1	5	4.02	1.044
Valid N (listwise)	303				

Based on the mean scores provided, we can make the following observations:

- Incorrect self-diagnosis has the highest mean score of 3.84, indicating that participants have a relatively high level of awareness that self-diagnosis can be inaccurate.

- "Worsening of the condition" and "Dangerous drug interaction" have mean scores of 3.76 and 3.73, respectively, indicating that participants are moderately aware of these potential consequences of self-treatment.

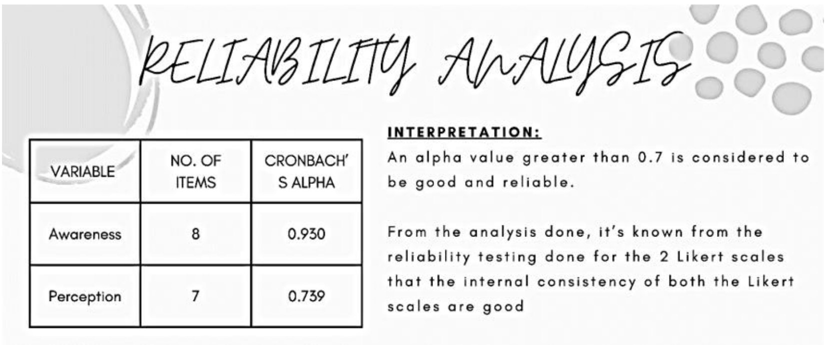
- The variables "Self-medication may suppress symptoms" and "Potential adverse reactions" have mean scores of 3.70 and 3.68, respectively, indicating that participants have moderate awareness of these potential consequences of self-treatment.

- "Increase in drug resistance" has a mean score of 3.66, indicating that participants havemoderate awareness of this potential consequence of self-treatment.

- The variable "Inaccurate doses" has a relatively high mean score of 3.90, suggesting that participants are somewhat more aware of the potential risks associated with incorrect dosing.

- The variable "Consumption of expired medicine" has the highest mean score of 4.02, indicating that participants are relatively aware of the potential risks associated with consuming expired medicine.

7.2 RELIABILITY ANALYSIS



VARIABLE	NO. OF ITEMS	CRONBACH'S ALPHA
Awareness	8	0.930
Perception	7	0.739

When using Cronbach's alpha, a coefficient value closer to 1.0 indicates higher internal consistency reliability. A value of Cronbach's alpha exceeding 0.7 is considered good and reliable. The analysis revealed that all Likert scales had good and reliable reliability testing.

7.3 HYPOTHESIS TESTING

The hypotheses have been tested using independent samples t-test, Chi-Square, and ANOVA.The results are as follows.

RESEARCH OBJECTIVE 1

H1: There is a significant relationship between awareness and the perception towards the effectiveness of Self-Medication

MODEL SUMMARY

R	R Square	Adjusted R Square	Std error of the Estimate
.210[a]	.044	.041	.68904

a. Predictors: (Constant), AWARENESS

ANOVA[a]

	Sum of Squares	df	Mean Square	F	Sig.
Regression	6.589	1	6.589	13.877	<.001[b]
Residual	142.907	301	.475		
Total	149.495	302			

a. Dependent Variable: PERCEPTION

b. Predictors: (Constant), AWARENESS

Coefficients[a]

	Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	2.669	.181	Beta		
Awareness	.174	.047	.210	3.725	<.001

a. Dependent Variable: PERCEPTION

The above table shows that the hypothesis was tested under the linear regression method and it was significant at $p < 0.05$. The first table shows R- 0.210' which is the correlation between general awareness and perception of self-medication. In the model summary table, R^2 - 0.044 which means 4% of the variability in the perception of self-medication is determined by general awareness of self-medication. The ANOVA table shows the F- 13.877 is significant at p= 0.000 and the t=3.725 is significant.

H2: There is a significant difference in awareness level based on consumer self-medicating forchronic disease

Group Statistics					
	SM for CHRONIC ILLNESS	N	Mean	Std. Deviation	Std. Error Mean
AWARENESS	1	35	3.2714	.84968	.14362
	2	268	3.8517	.82550	.05043

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
AWAR	Equal variances assumed	.672	.413	-3.898	301	<.001	<.001	-.58025	.14886	-.87320	-.28730
	Equal variances not assumed			-3.812	42.816	<.001	<.001	-.58025	.15222	-.88726	-.27324

The above data table reveals a significant discrepancy in the level of awareness among consumers who self-medicate for chronic disease, as evident from t-value of -3.898 and $p<.05$. This finding substantiates the hypothesis, highlighting a considerable variance in the awareness level based on self-medication for chronic disease among consumers.

H3: There is a significant difference in awareness level based on accepting self-medication asa standard or regular practice.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
AWAR	Equal variances assumed	1.611	.205	-4.618	301	<.001	<.001	-.49172	.10649	-.70128	-.28216
	Equal variances not assumed			-4.523	136.806	<.001	<.001	-.49172	.10872	-.70671	-.27673

Group Statistics					
	SM as STANDARD & REGULAR PRACTICE	N	Mean	Std. Deviation	Std. Error Mean
AWARENESS	1	81	3.4244	.84726	.09414
	2	222	3.9161	.81040	.05439

The results in the above data table show that there is a difference in awareness level based onaccepting self-medication as a standard or regular practice at t = -4.618 and p<.05 The result supports the hypothesis and there is a significant difference in awareness level based on accepting self-medication as a standard or regular practice

RESEARCH OBJECTIVE 2

H4: There is a significant association between accepting self-medication as standard/regularpractice and the perception of self-medicine being effective

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.291[a]	1	.001		
ContCorrectionection[b]	9.191	1	.002		
Likelihood Ratio	12.461	1	<.001		
Fisher's Exact Test				<.001	<.001
Linear-by-Linear Association	10.257	1	.001		
N of Valid Cases	303				

The table indicates a statistically significant association ($p<0.05$) between accepting self-medication as a standard/regular practice and perceiving it as effective. The chi-square value of 10.291a supports the hypothesis that there is a significant association between the two factors.

RESEARCH OBJECTIVE 3

H5: There is a significant association between self-medicating for chronic disease andencouraging others to opt for self-medication

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.855[a]	4	<.001
Likelihood Ratio	22.465	4	<.001
Linear-by-Linear Association	12.614	1	<.001
N of Valid Cases	303		

From the results in the above table, there is a significant association between self-medicating for chronic disease and encouraging others to opt for self-medication and is statistically significant at p<.05 The table shows a chi-square value of 26.855a and it is significant at p<.05

RESEARCH OBJECTIVE 4

H6: There is a significant association between accepting relatives' and friends' suggestions toopt for self-medication and gender

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.373[a]	2	<.001
Likelihood Ratio	14.608	2	<.001
Linear-by-Linear Association	.019	1	.892
N of Valid Cases	303		

The above table's results indicate a significant association between accepting self-medication suggestions from friends or relatives and gender, with statistical significance at $p<.05$. The chi-square value of 15.373a in the table is also significant at $p<.05$. This finding supports the hypothesis that accepting self-medication recommendations from acquaintances is linked to gender.

8. DISCUSSION

Self-medication is a widespread practice among individuals seeking prompt relief from minorailments without consulting a healthcare professional or obtaining a prescription. However, theimproper use of drugs in this manner can result in adverse effects. A study involving 303 participants unveiled that the primary factor influencing the choice of self-medication is the perception of its effectiveness. Additionally, recommendations from friends or relatives and the societal normalization of self-medication also contribute significantly. Nevertheless, only 26.7% of respondents expressed the belief that self-medication can be considered a standard or routine practice, indicating a degree of apprehension among a segment of the population regarding this behaviour.

The study indicates that consumers are aware of the potential risks associated with self- medication, as only a small percentage of respondents consider it an acceptable standard or routine practice. The perceived effectiveness of self-medication, along with the societal normalization of this practice and recommendations from friends or relatives, contributes to itsacceptance. Consumer choices and attitudes are influenced by awareness and acceptance of self-medication, demonstrating a significant link between considering self-medication as a standard or regular practice and respondents engaging in self-medication for chronic diseases or experiencing adverse events. Demographic variables also play a role, with notable associations between accepting recommendations for self-medication from relatives/friends and gender, as well as considering self-medication as a standard or regular practice and the location of residence (Urban/Rural/Semi-Urban).

Overall, the study underscores the importance of education and awareness regarding the potential risks of self-medication and the significance of seeking medical advice from a healthcare professional. While self-medication can offer quick relief for minor ailments, it also carries the risk of adverse effects and may not be suitable for everyone. Consumers should be encouraged to make informed decisions about their healthcare and seek medical advice when necessary.

9. CONCLUSION

Based on the data presented, it can be inferred that self-medication is a ubiquitous phenomenon,particularly among the younger populace and those pursuing higher education. The perceptionthat self-medication is an efficacious remedy, coupled with its normalization within society and persuasive recommendations from acquaintances, constitute the primary factors that propel individuals towards self-medication. Nevertheless, the study illuminates that respondentspossess an awareness of the potential risks inherent in self-medication, and there is a limited acceptance of it as a regular practice.

Additionally, the research underscores the influence of awareness and acceptance of self- medication on the decision-making and perspectives of consumers, as well as the impact of demographic variables on their behaviour. Therefore, it is imperative to impart knowledge to consumers regarding the potential dangers of self-medication and advocate for responsible medication practices. Healthcare professionals and policymakers should endeavour to devise interventions that increase awareness and encourage safe medication practices, particularly among the younger populace and students who are more prone to engage in self-medication.

10. IMPLICATIONS

The study mentioned above implies several significant conclusions, including the following:

[A] MANAGERIAL AND PRACTICAL IMPLICATIONS

Self-medication, the practice of self-administering medical treatments without consulting healthcare professionals, is a widespread global phenomenon driven by factors such as easy access to over-the-counter medications and inadequate awareness of their potential risks. This practice poses significant dangers, including adverse effects, drug interactions, and the development of antibiotic resistance, necessitating urgent intervention. To tackle this issue effectively, a multi-faceted approach is imperative. Firstly, there is a crucial need to enhance public awareness regarding the potential risks and consequences of self-medication. Public health campaigns and educational programs can play a pivotal role in educating individuals about the importance of seeking medical advice before taking any medication. These initiatives can also provide comprehensive information about the perils of self-diagnosing health conditions and consuming medications not prescribed by healthcare professionals. Secondly, promoting access to healthcare services and reducing the cost of medications is essential to encourage individuals to seek professional guidance rather than resorting to self-medication. This may involve governmental subsidies for medication costs and the provision of free health check-ups, especially in remote areas with limited access to healthcare facilities. Thirdly, imposing stricter regulations on the sale of over-the-counter medications can serve as a crucial deterrent to self-medication. Pharmacies and drug stores could be mandated to maintain meticulous records of the medications sold and verify the prescription status of purchasers before dispensing certain drugs, thereby preventing the sale of medications that are not safe for self-administration. Fourthly, engaging healthcare professionals, including pharmacists and doctors, in public education efforts is instrumental. They can impart valuable insights regarding the appropriate use of medications, potential side effects, and the significance of completing prescribed courses, thereby reinforcing the importance of seeking medical advice. Lastly, technology can play a pivotal role in curbing self-medication. The development of mobile applications and online resources can provide easily accessible information about the proper use of medications, thereby encouraging individuals to consult healthcare professionals beforeself-administering treatments. In conclusion, self-medication presents substantial risks, and it is imperative to adopt a comprehensive approach to curtail this practice. By increasing public awareness, improving healthcare access, enforcing stringent regulations, involving healthcare professionals in education, and harnessing technology, we can effectively address this issue, reducing self-medication incidents and ensuring that individuals receive appropriate medical care.

[B] SOCIETAL IMPLICATIONS

The investigation of self-medication contributes significantly to augmenting consumers' awareness of the possible positive and negative outcomes of unregulated medication consumption. The enhancement of knowledge and comprehension regarding self-medication among consumers may lead to more informed and prudent utilization, thereby curbing the emergence of microbial resistance issues and constraining the extent of undesirable health complications in the broader societal context. By shedding light on the risks and benefits associated with self-medication, research can empower consumers to make informed decisions regarding their healthcare practices. This may entail increased caution towards the use of certain medications and a more judicious approach to self-diagnosis and treatment. Such an approach may ultimately help to mitigate the deleterious effects of uncontrolled medication consumption, such as the exacerbation of microbial resistance and the escalation of health risks. The promotion of responsible self-medication behaviours may thus have far-reaching implications for public health and the development of more sustainable healthcare systems.

11. SUGGESTIONS FOR FURTHER STUDIES

Medical research is a critical aspect of modern healthcare, as it enables medical professionals to understand various diseases and their underlying causes, as well as develop effective treatments and therapies. Self-medication is an area of research that has been gaining increasing attention in recent years, as more individuals are turning to self-medication practices to managetheir health. Nonetheless, there exist various deficiencies in the current research concerning self-medication that require attention. For future research, it would be advisable to use a much bigger sample size, more than 500 respondents to get more accurate results. In conclusion, self- medication is an area of research that requires further attention to address the gaps in current research. It is important to conduct rigorous studies to understand the ‘safety and effectiveness’ of self-medication practices, the ‘impact’ of self-medication on healthcare systems and patient outcomes, psychological factors that influence self-medication behaviour and decision- making, and the potential risks and benefits of online self-diagnosis. Addressing these gaps will not only enhance our understanding of self-medication but also improve healthcare outcomes for individuals who choose to self-medicate.

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CONSUMER PERCEPTION TOWARDS CLOUD KITCHEN

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ABSTRACT

This research topic aims to investigate how people perceive Cloud Kitchen. This paper investigates the perception towards cloud kitchen and future purchase intention as well. This study was conducted by constructing a conceptual framework. This research states that the perception of consumers are influenced by the awareness and satisfaction of consumers towards cloud kitchen and these influence the future purchase intention of consumers.

Key Words: Consumer perception, consumer awareness, consumer satisfaction, future purchase intention of consumers

1. INTRODUCTION

Consumer perception is the way a consumer interprets information about a product or service. It is a psychological process that affects consumers' views and decisions about what to buy. Knowing consumer perception is essential for businesses to understand how their target market perceives their products and how to communicate with them.

A cloud kitchen is a restaurant without a physical location that solely operates through food delivery services and has no dine-in facility. Cloud kitchens are often based in industrial or commercial structures and these kitchens have cutting-edge appliances and technology, like automated ordering systems and data driven insights of variables. Moreover, some cloud kitchens might even include many kitchens at one location, enabling them to serve a variety of cuisines from a single location. Being able to serve more customers at a lesser cost with a smaller cooking space with a relatively lesser staff and having the convenience of various food delivery services makes Cloud Kitchen an attractive business model. In order to better understand their customer base and streamline their operations, businesses also profit from the data-driven insights offered by delivery services. In order to survive during the pandemic and to also confirm to the various lockdown restrictions a number of business owners switched to the cloud-based business model. Cloud kitchens are good for the environment as well since they don't require a physical location, they don't contribute to urban sprawl and they also lessen carbon footprint are customers can also choose eco-friendly packing. Companies like Rebel foods and Eat Club provide culinary facilities to restaurants, enabling them to set up their cloud kitchen without having to pay a large setup fee. In addition to Rebel Foods and Eat Club there are several other cloud kitchens which are run independently.

It is evident that many previous research papers have concentrated more on how cloud kitchen benefits the owners, and there are very few papers relating to consumer perception, so this study mainly focuses on the people's perception towards cloud kitchen also making people understand its benefits and become more aware them.

RESEARCH PURPOSE

People prefer a simple, quick manner to cook food rather than spending too much time cooking, and time savings orientation influences customers' propensity to employ technology-based self-service. Prior to the pandemic, people would commonly have restaurant meals delivered to their homes, but due to the closure of eateries, society has been forced to rely on home-cooked meals or food delivery. Cloud kitchens saw an increase in orders due to customer awareness of food safety and sanitation, and the ease of ordering through apps without the drudgery of going out to eat. Today, individuals and households are considering reducing expenses due to the cost of living crisis and rising cost of living. This research aims to examine the consumer awareness, perception and future purchase intention towards cloud kitchen, their satisfaction towards the services provided by cloud kitchen and to study the demographic profile of the respondents.

RESEARCH OBJECTIVE

1. To analyse the consumer's awareness, perception and future purchase intention towards cloud kitchen
2. To measure satisfaction of consumers towards the services provided by cloud kitchens
3. To study the demographic profile of the respondents.

2. REVIEW OF LITERATURE

PERCEIVED VALUE

Consumer perception is the way in which a consumer interprets information about a product or service. It is a psychological process that affects the way consumers' view a product or service and the way they make decisions about what to buy (Business Management Ideas, 2010). The acceptance of anything is based on awareness and perception, as consumers are best expected to accept products about which they are most aware about (Vyshali, 2022). In terms of buyer motivations, the integration of consumer perception helps to explain the complex array of issues that might influence various market behaviours (Thilmany, 2010).

Due to lifestyle pressure, people prefer an easy, fast way of cooking (Goindi, 2021) and they would prefer that food come to them without much effort and to delivered as fast as possible (Yeo, 2017). The closure of restaurants due to the lockdown has pushed a majority of the population to opt for either home cooked meals or depend on food deliveries. Hence, many cloud kitchens witnessed an upward trend with a surge in the number of orders. The convenience of ordering through apps without the drudgery of going out to eat has driven demand (National Herald, 2020). In China, five-star hotel restaurants that enhanced value-for-money by offering a fine-dining at home had customers who were satisfied with the perceived quality of dining experience, were happy to recommend the restaurant and indicated a willingness to order again. The pleasant experience encouraged them to dine at the restaurant again. (Fiona X. Yang, 2021).

Therefore, based on the literature the following hypotheses are framed:

H1.1: There is significant relationship between awareness of consumers and their perception towards cloud kitchen

H1.2: There is significant relationship in the buying behaviour of consumers and their perception towards cloud kitchen

H1.3: There is significant difference in the perception of consumers about cloud kitchen based on future purchase intention

CONSUMER SATISFACTION

Customer satisfaction is defined as a comparison of the level of product/service performance, quality, or outcomes perceived by the consumer with an evaluative standard (Westbrook, 1991). Customer satisfaction and customer perception are not the necessarily the same things. How customers perceive service will affect their satisfaction with your whole brand (Fonolo, 2021). With specific relation the food industry, food quality is acknowledged as a basic and most important factor, and is related to customer satisfaction. It affects customer loyalty, and customer assesses the restaurant on the basis of food quality. Food quality entails food taste, presentation, temperature, freshness, nutrition, and menu variety (Rajput, 2020).

Time saving orientation is the most critical factor to influence customers' motivation to use the technology-based self-service (Meuter, 2003). Customers are satisfied when the food is stored in hygienic containers, neatly packed, and provided with clean tableware. Satisfied customers appreciate leak free measures such as airtight seals, mess-free and individually packed sauces, and spill-free containers for liquid products (Fiona X. Yang, 2021). Price also plays a major role since impact of price perception on consumers' behaviour is likely because customers' experiences will not be identical, despite providing similar services from the same service providers (Han, 2009). Customers who are satisfied with quality of dining experience at home are happy to recommend and are willing to order again or try different items. (Fiona X. Yang, 2021).

Therefore, based on the literature the following hypotheses are framed:

H2.1: There is significant relationship between satisfaction of consumers and their perception towards cloud kitchen

H2.2: There is significant association between satisfaction and future purchase intention

DEMOGRAPHICS

Demographics are various characteristics of a population. Examples of demographics include race, sex, and age of the population that is being studied. (Indeed, 2023). In Finland, the respondents (who were primarily university students) enjoy eating foods at home more often than eating outside and delivering food at home eliminates the extra work of choosing and reaching the restaurant and through a virtual restaurant it will be much easier as they are accessible from anywhere and saves time (Vaidya, 2017). In Mumbai it is the male population who orders more from cloud kitchens (Kinjal Gosai, 2020). In Bangkok, the survey found that the segments with the highest percentage of usage of food delivery are those between 20 and 29, as this segment has high spending power and they are willing to spend more on food. (Bunnag, 2020)

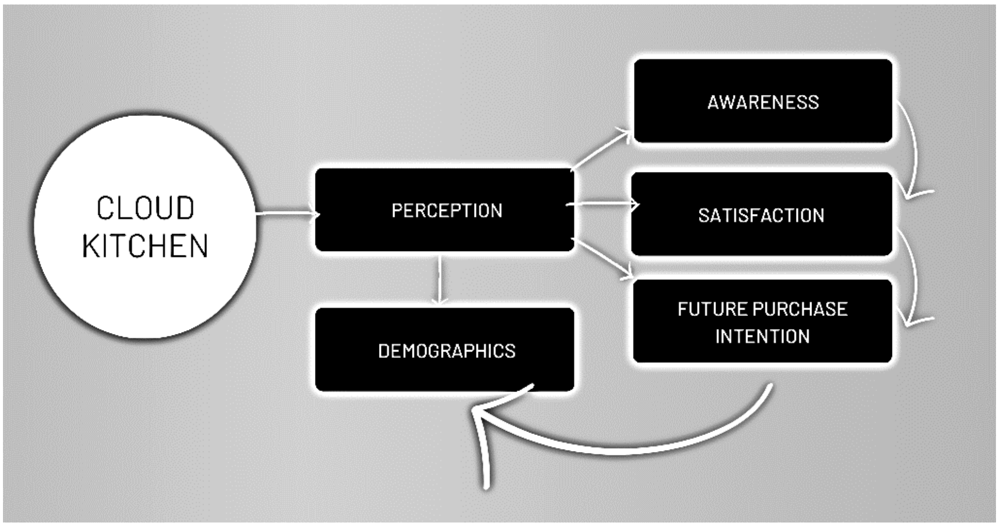
Therefore, based on the literature the following hypotheses are framed:

H3.1: There is significant difference in the perception of consumers towards cloud kitchen based on different age groups

H3.2: There is significant difference in the buying behaviour of consumers towards cloud kitchen based on gender

Based on the hypothesis the conceptual framework for the research is formulated

CONCEPTUAL FRAMEWORK



3. RESEARCH METHODOLODY

The research design was descriptive. Following a thorough review of the literature, a conceptual framework was developed on which a questionnaire was built. The data was gathered from both surveys and other sources. The survey approach comprised delivering questionnaires to the sample population, whereas secondary data was acquired from existing sources such as journals and articles. The questionnaire was distributed to 300 respondents using convenience sampling. Collected data was coded using Excel and the data was loaded into SPSS 21 for analysing data.

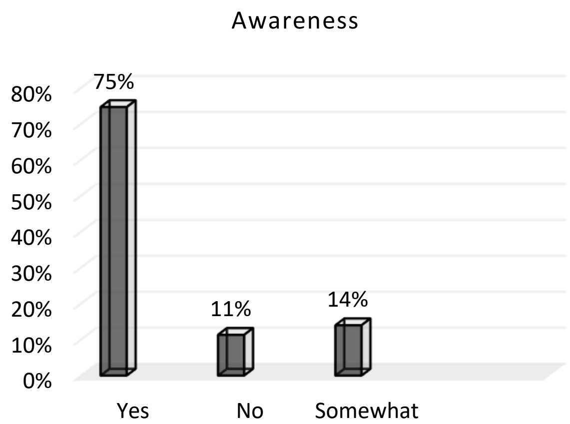
4. DATA ANALYSIS AND INTERPRETATION

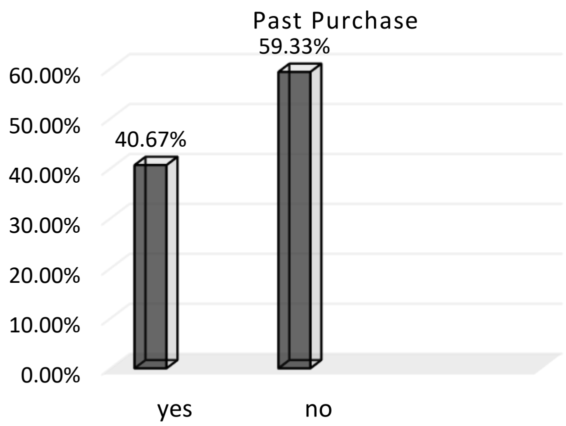
RELIABILITY TESTING

	NO. OF ITEMS	CRONBACH'S ALPHA	CONSISTENCY
Awareness	4	.858	Good
Perception	6	.821	Good
Buying Behaviour	6	.889	Good
Satisfaction	5	.845	Good
Issues faced	5	.910	Good

According to Cronbach's Alpha, the internal consistency of reliability increases with the coefficient alpha's proximity Cronbach's Alpha for all scales is more than 0.7. Therefore, all Likert scales are considered to be consistent, good and reliable.

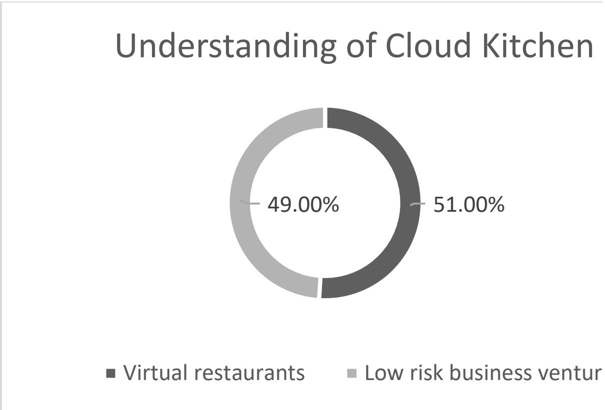
AWARENSS & PAST PURCHASE





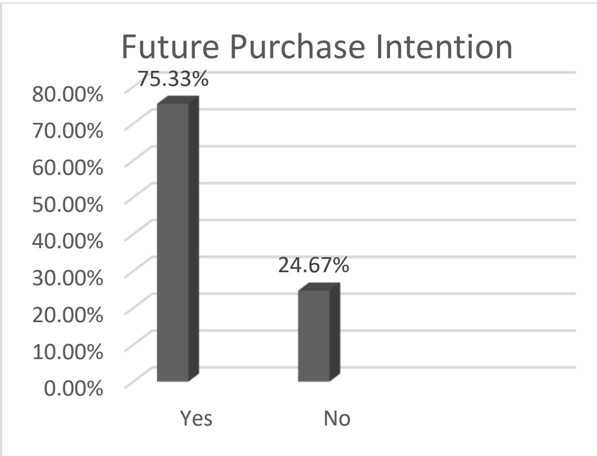
Nearly 75% of the respondents are aware of the term Cloud Kitchen and roughly 60% had previously purchased from Cloud kitchen.

UNDERSTANDING OF CLOUD KITCHEN



Half the respondents view cloud kitchen as a virtual kitchen and the rest view it as a low-risk business venture.

FUTURE PURCHASE INTENTION



From the above chart it is found that 75.33% of the respondents are willing to order from Cloud Kitchen on a regular basis.

HYPOTHESIS TESTING

H1.1: There is significant relationship between awareness of consumers and their perception towards cloud kitchen

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.023	.174		11.608	.000
	awareness	.452	.043	.524	10.621	.000
R			.524[a]			
R Square			.275			
Adjusted R Square			.272			
F			112.806			
Significance			.000			

The above table shows that the hypothesis tested under linear regression method is significant at **p=0.000**, the first table shows **R= 0.524** which is the correlation awareness of consumers and their perception towards cloud kitchen and **R square is 0.275** which means 27% of variance in the perception of cloud kitchen is explained by the level of awareness.

H1.2: There is significant relationship in the buying behaviour of consumers and their perception towards cloud kitchen

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.207	.102		11.784	.000
	perception	.719	.027	.835	26.240	.000
R			.835[a]			
R Square			.698			
Adjusted R Square			.697			
F			688.521			
Significance			.000			

The above table shows that the hypothesis tested under linear regression method is significant at **p=0.000**, the first table shows **R= 0.835** which is the correlation awareness of consumers and their perception towards cloud kitchen and **R square is 0.698** which means 69.8% of variance in the perception of cloud kitchen is explained by the buying behaviour.

H1.3: There is a significant difference in the perception of consumers towards Cloud Kitchen based on future purchase intention

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.474	1	13.474	37.762	.000
Within Groups	106.329	298	.357		
Total	119.803	299			

The result shows that there is a significant difference in the perceptions of consumers towards cloud kitchen based on future purchase intention at **F=37.762** and **P<0.05**.

H2.1: There is significant relationship between satisfaction of consumers and their perception towards cloud kitchen

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.149	.180		6.377	.000
	satisfaction	.713	.047	.659	15.133	.000
R			.659[a]			
R Square			.435			
Adjusted R Square			.433			
F			229.017			
Significance			.000			

The above table shows that the hypothesis tested under linear regression method is significant at **p=0.000**, the first table shows **R= 0.659** which is the correlation satisfaction of consumers and their perception towards cloud kitchen and **R square is 0.435** which means 43.5% of variance in the perception of cloud kitchen is explained by the level of satisfaction.

H2.2: There is a significant association between satisfaction and future purchase intention

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	55.743[a]	14	.000
Likelihood Ratio	53.866	14	.000
Linear-by-Linear Association	10.684	1	.001
N of Valid Cases	300		

The result shows that there is a significant association between satisfaction and future purchase intention as it is statistically significant at **p=0.000** and chi square value is **55.743**.

H3.1: There is a significant difference in the perception of consumers towards Cloud Kitchen based on different age groups

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.914	3	3.971	10.896	.000
Within Groups	107.889	296	.364		
Total	119.803	299			

The result shows that there is a significant difference in the perceptions of consumers towards cloud kitchen based on different age groups at **F=10.896** and **P<0.05**.

H3.2: There is a significant difference in the buying behaviour of consumers towards Cloud Kitchen based on gender

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	37.005	.000	5.016	298	.000	-.41335	.08240	.57551	.25119
Equal variances not assumed			4.769	213.985	.000	-.41335	.08668	.58420	.24250

The result shows that there is a significant difference in the buying behaviour of consumers towards Cloud Kitchen based on gender at **F=5.016** and **P<0.05**.

5. DISCUSSIONS

The concept of cloud kitchen has certainly evolved in recent years, taking inspiration from Chinese takeout and pizza delivery to multi-million dollar businesses. The awareness, perception, and understanding of cloud kitchen vary across different groups. In this study, most of the respondents are aware of what cloud kitchen means but are unaware of the term. As to how consumers view cloud kitchen, nearly half of the respondents' view cloud kitchen as a virtual kitchen, which is an extension of an existing dine-in that uses its own kitchen to create a delivery-only menu that is separate from the dine-in menu. The remaining half view it as a low-risk business venture, as it is relatively safe to invest and many of these brands benefit from marketing through social media. The respondents view cloud kitchen in a positive light- firstly that it is convenient to order from as it can be done from the comfort of our home or workspace, and it is very time efficient, and that it offers more choices.

The factors that influence the future purchase intentions of consumers are their awareness, past purchases, and satisfaction. In this study, nearly 75% of the respondents are willing to order from Cloud Kitchen on a regular basis in the future, and 25% are not willing to order on a regular basis. Those consumers who have a positive perception, are aware of, and are satisfied with Cloud Kitchen are willing to order on a regular basis in the future. Other factors contributing to respondents' unwillingness to order in the future include a lack of awareness among people. Respondents in the middle age group who are not aware of cloud kitchen and various brands were not clearly informed, so they were not ready to accept it. But from this study, it is evident that most of the respondents are students and employees with an age group of 18 to 25, and they are very willing to order from Cloud Kitchen on a regular basis. However, there is still some lack of knowledge about cloud kitchen. Some people are not familiar with it, or they might have a vague idea of it. But, if the term cloud kitchen is correctly understood, it will be beneficial to the consumers and to the business as well.

There is a significant relationship between the level of satisfaction and the perception of consumers towards Cloud Kitchen. Respondents are satisfied with almost all the features of Cloud Kitchen. Those who are not satisfied with the services of Cloud Kitchen have either never ordered from them or are unfamiliar with them. Satisfied customers are willing to order on a regular basis in the future.

In terms of demographics, it is evident that both genders are aware of and have a positive perception of Cloud Kitchen, but it is mostly women who are willing to order on a regular basis. Younger generations like millennials and Gen Z were willing to order from Cloud Kitchen on a regular basis because it was convenient to order and time-efficient. Based on the results, the new generation have understood cloud kitchen and are ready to order from it in the future. They are ready to accept this new emerging concept.

CONCLUSION

In terms of perception and future purchase intention, it is most likely that cloud kitchen will become more popular and main stream in the coming years, the demand for convenient, high-quality food delivery isn't going away anytime soon. As such, the cloud kitchen industry is likely to continue growing and expanding in the coming years, with new players entering the market and existing operators expanding into new markets and geographies. Adoption rates are expected to rise as more people become aware of various brands and their benefits. The study of perception of cloud kitchen has several implications that individuals, organisations, and policymakers must consider. It is important to approach the creation and adoption of this business model in an ethical and responsible way to maximise its benefits while minimising any negative effects.

MANAGERIAL IMPLICATIONS

The consumer perception study on cloud kitchens has several managerial implications for cloud kitchen start-ups and brands. To begin, owners may leverage this study to raise brand recognition and exposure for cloud kitchens, which can then be spread through multiple sales channels and social media. Owners should join up for multiple sales platforms such as e-commerce, delivery services, and social media, owners may utilise the findings of perception research to design marketing tactics that boost consumers' future buy intentions as well as optimise their profile in various delivery apps and provide discounts on their top 3-5 selling meals. They must guarantee that the quality of their food and beverages, which includes flavour, portion size, and quality in proportion to the price point, makes a good impression on customers who sample them. Since there are low entry barriers to this business model, entrepreneurs can cater to niche cuisines such as vegan, health, regional, and delicacies. Finally, owners can experiment on new business models such as, development of shared kitchen spaces, as well as new models that combine elements of cloud kitchens and traditional restaurants. Overall, this research has various managerial implications for owners or managers or those who want to start one should consider when starting, growing, or marketing.

SUGGESTIONS FOR FUTURE RESEARCH

Suggestions for future research would be to conduct research with a much bigger sample size 500-1000. The research can be conducted in different cities. Various areas like consumer retention, willingness to support local and small-scale cloud kitchens can be studied upon. Further interviews, observations and schedules can be used to record attitudes and perception of consumers to interpret the results in a better way.

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PUBLIC AWARENESS AND ACCEPTANCE TOWARDS RESIDENTIAL ELECTRIFICATION THROUGH SOLAR ENERGY

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ABSTRACT

In investigating the public`s awareness and acceptance level on one of the prominent renewable sources of energy such as “solar energy” for residential electrification, this study extends the focusby analyzing their acceptance level after the recent hikes in electricity prices that happened in Tamil Nadu (September, 2022). Results confirm the hypothesis, as the hikes in electricity prices positively and significantly impact their acceptance level. In addition, future perception, government actions to be taken with regard to outset the effect of hikes, and other factors affectingthe public`s buying behaviour for solar energy have also been analyzed in detail.

Keywords: Electrification, Solar energy, Public Awareness, Public Acceptance and Awarenesslevel, Hikes in electricity prices, Future Perception.

INTRODUCTION

Out of all renewable sources of producing electricity solar energy is considered to be the best, innovative and most sustainable form of energy (Salman Ahmad, 2016) as we have a natural asset called “sun” which is the most abundant source of energy on the planet, generating 173,000 terawatts of solar energy every second. And that is more than 10,000 times the overall cumulativeenergy usage of the entire planet, and another added advantage is that it's completely replenishable. Fossil fuels, on the other hand, are polluting and non-renewable. They will either vanish or the expense of locating and removing them will be prohibitively costly for our already strained population (S U Zakaria et al., 2019). Moreover, solar installations do not affect the environment and can be built in a few months compared to other energy plants. Land or rooftop installation is easy to maintain and can be set up almost anywhere as sunshine in India fluctuates far less frequently compared to other renewable energy sources.

Recently there has been hike in the power tariff for TANGEDCO consumers proposing an increaseof ₹27.50 (per month) for those using up to 200 units and 65 pa paise per unit rise for railways and educational institutions with effect from September 2022. The scheme of providing free electricity of up to 100 units remains unchanged. From the above, we can say that the electricity bill is set to rise by 12% to 52%, as the Tamil Nadu government has proposed a tariff hike for all consumers. Those who paid 170 for 200 units for two months will have to shell out 55 more. Those who paid 4,420 for 900 units will have to pay 5,550. The biggest hike is for the 500 units slab, where the tariff has shot up from 1,130 to 1,725. (Source:- https://www.thenewsminute.com/article/new- electricity-tariff-hike-comes-effect-tamil-nadu-see-revised-rates-167740)

Due to the above-mentioned reasons which are the overconsumption of electricity, and hikes in electricity prices, people suffer a lot and this can be overcome by using renewable sources of energy such as solar energy. Solar energy is a new form of producing electricity and a sustainableform of energy.

Research objectives :

The research objectives of the study are developed are as follows:

1. To examine respondents' demographic factors that impact their awareness level of solarenergy.
2. To analyse respondents' demographic factors and other factors that influence their acceptance decisions for residential electrification through solar energy.
3. To examine the acceptability of residential solar energy after hikes in electricity prices

REVIEW OF LITERATURE

- **Public Awareness**

According to (Bang et al., 2000) study shows that people with more knowledge and concern for the environment have a positive impact on the willingness to pay for adopting solar panels than the people who have less knowledge about it. Gender plays a significant role in the awareness levelof solar energy. Gender is roles and differences between men and women that are socially constructed. These roles are made from practices that are repeated and negotiated (J Butler, 2004). As per the research made by (Daniela Lazoroska et al., 2021), it is evident that "solar energy wasrecognized as an appealing choice for women", this is because women were perceived as resonating with their awareness about renewable sources of energy, their family orientation, and their aversion to environmental risk. Thus, it is assumed that gender and educational qualificationwill affect the awareness level about solar energy.

H 1: Demographic factors positively impacts the awareness level of solar energy.

H 1.1: There is a significant association between the level of education and awarenessabout solar energy for electrification.

H 1.2: There is a significant association between gender and awareness about solar energyfor electrification.

- **Public acceptance**

There are many demographic factors that influence people's acceptance level for solar energy. (Guta, 2018) investigated the determinants of household adoption of solar energy. The finding showed that the household's income, landholding size, number of cattle, age of household head, family size, and education level of the head positively affect solar home system adoption. A furtherstudy made by (Abera et al., 2019) also examined determinants for lighting Energy transitions in rural Ethiopia and revealed that landholding size, level of education, house type, and modern communication technologies have a positive influence on the adoption of renewable energy resources including solar.

Here residential type refers to the ownership of the house ie., either the public lives in their own house or rented house. In the study of (Sylvia M. Aarakit et al., 2021), it is seen that about 70% of the total respondents who own a house have adopted solar energy than the people living in the rented house (only 11% of them adopted solar energy). In the latter case, though people are willingto adopt solar energy other factors (lack of space in a rented house, house owner`s consent) makethem reluctant to opt for solar energy. The following hypothesis can be developed from the aboveliterature review :

H2: Demographic factors and other factors significantly influence the adoption and acceptance level of solar energy

H 2.1 : There is a significant relationship between factors influencing towards adoption ofsolar energy and acceptance of solar energy.

H 2.2 : There is a significant difference in acceptance for solar energy based on residentialtype.

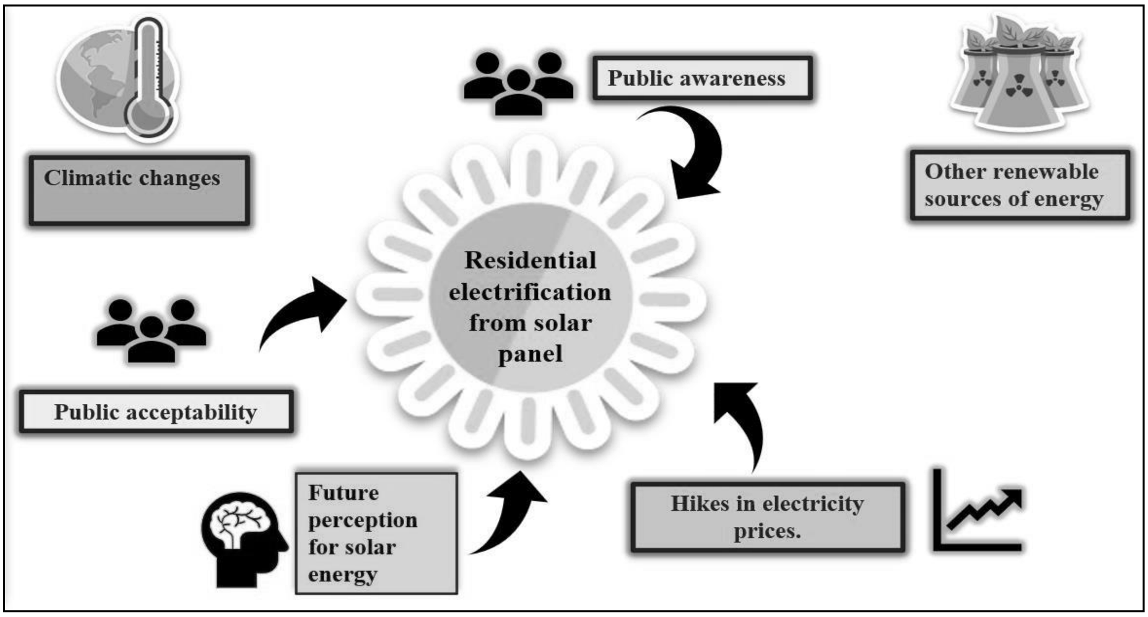
- **Hikes in electricity prices**

According to the study by (Boqiang Lin et al., 2019) it is shown that "Electricity prices have a positive effect on the innovation and acceptance of renewable energy technologies in the long run". Further, the researcher found out that – "a 1% increase in electricity price can make renewable energy usage increase by 0.7825%–1.0952%". The increase in electricity prices is mainly due to: less availability of fossil fuels which are necessary to generate electricity and to make the public use less electricity thus reducing its harnessing effects on the environment. In the short run, Electricity prices do not seem to have any impact on driving innovation on solar renewable energies. IEA released the article "Impact of increasing commodity and energy prices on solar PV, wind and biofuels" on 01 December 2021. The main findings in their articles are that – Due to the 13 increase in electricity prices there will be an increasing demand for solar PV modules, wind turbines, and biofuels which eventually increases the cost of production for the same. But thoughthere is an increase in the prices it has been highlighted that the future demand will still increase and people, manufacturers, and industrialists will be a catalyst for the increasing demand.

H3: There is a significant association between awareness about the hikes in electricity pricesand the adoption of solar energy after hikes in prices.

RESEARCH METHODOLOGY

The type of research conducted here is descriptive research (describe a phenomenon and its characteristics) as it aims to study the relationship between public acceptance and awareness of solar energy after hikes in electricity prices. Further, this study follows a deductive approach as it includes a clearly constructed framework and hypothesis (Blaikie, 2000). Also, the hypothesis is tested to find out answers to the problem. A structured questionnaire was used to collect the data, which was formulated using four major variables such as acceptance, non-acceptance, factors influencing the adoption level, and future perception of solar energy. The questionnaire is self- filled and therefore it includes first-hand data that is primary data. A total of three hundred and one (301) responses were collected and used for data analysis. And the collected data was analysed and drawn conclusions by conducting various appropriate tests in SPSS version 21.0.

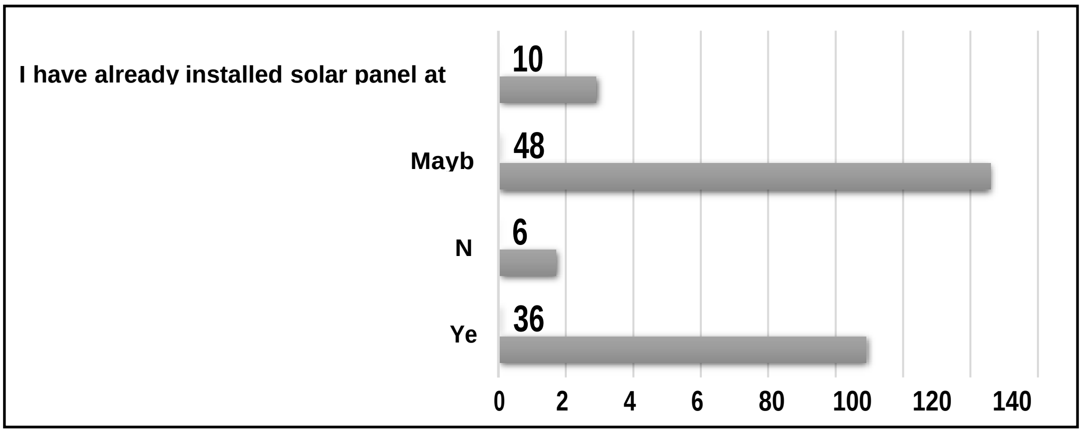


DATA ANALYSIS

Reliability testing

Variable	No. of items	Cronbach`s Alpha
Acceptance for solar PV	5	0.867
Non- acceptance for solar PV	5	0.836
Factors affecting adoption of solar panel	5	0.825
Future perception amongst public on solar energy	5	0.899
Source of awareness	8	0.874

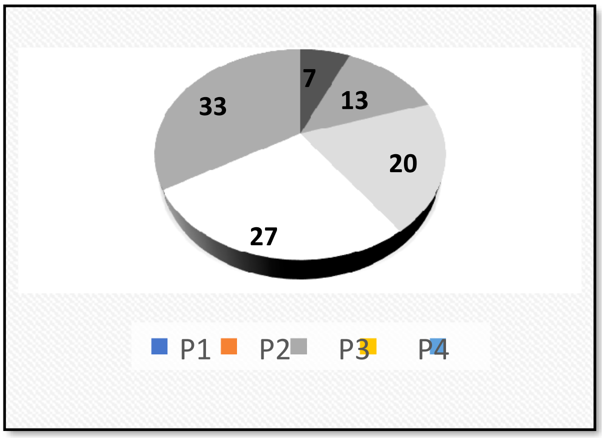
The items were considered to represent an acceptable level of internal consistency if the Cronbach’s alpha value within 0.5 to 0.7 and a good level if the Cronbach’s alpha value more than (Nunally, 1978). The result showed that all variables obtained good level reliabilities of Cronbach alpha larger than 0.8. Therefore, all measures used in this study were reliable.



- **Acceptance level for solar energy (post hikes in prices)**

From the above chart, it is evident that about 36% of the respondents are willing to adopt solar energy after considering hikes in electricity prices, only 6% of the population are not willing to adopt solar energy and about 48% of the respondents are half minded ie., either they may or may not adopt solar energy after the price hikes.

- **Government policies or actions supported by the public**



P1 – Keeping electricity prices low
P2 – Campaigns encouraging people to switch to solar energy
P3- Investing in renewable energy projects

P4- Adding taxing on households that consume a lot of electricity

P5- Bringing lots of policies with regard to alternative and sustainable sources of producing electricity

From the above tables, it is evident that the public wishes the government should keep electricity prices low. And it is also seen that the public is not supporting the government in ***bringing policies***

with regard to alternative and sustainable sources of producing electricity and they are also against another policy with regard to ***adding taxes on the basis of electricity prices***. This might bebecause in both cases public think about the increased cost, as an increase in tax and bringing up new alternative will incur lots of cost to them.

- **Most preferred source of awareness about solar energy**

Source of awareness	Newspaper	Radio	Television	Social media	Advertise-ment	Magazine and articles	Expert speech	Self-awareness
Mean	3.77	3.20	4.00	4.20	3.73	3.95	3.91	4.10

The above table shows the mean for the sources of awareness for solar panels. It is evident from the above table that all the respondents are agreeing to the awareness of solar panels created by the above-mentioned sources (as mean scores for all the statements are above 3). It is noted that the respondents are strongly agreeing that ***Social media and Television*** are some sources that create awareness about solar. Apart from this, it is also seen that most of the respondents are self- aware of the existence of solar energy for residential electrification.

- **Future perception on solar energy**

Future perceptions about solar energy	Mean
I will definitely switch to solar energy in the mere future	3.95
I wish that government should still create more awareness of electrification throughsolar energy and provide subsidies for the same	4.18
I believe that the usage of solar energy will create a path for a better Chennai byreducing environmental degradation	4.20
I will teach others and share my knowledge regarding the solar panel	4.13
I believe that solar energy is the only energy that is most sustainable among all andcan be easily adopted in houses	4.04

The above table shows a few statements related to the respondent`s future perception of solar energy. It is evident that most of the respondents are agreeing to the perception statements given above (as the mean score is above 3). It also noted that most of the respondents are ***strongly agreeing with the perception that solar energy will create a path for a better Chennai by reducing environmental degradation*** (highest mean score 4.20).

Hypothesis testing

- **Chi-square analysis showing the relationship between level of education and awareness**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.023[a]	4	.403
Likelihood Ratio	5.562	4	.234
Linear-by-LinearAssociation	.157	1	.692
N of Valid Cases	301		

It is known that there is no significant association between the level of education and awareness about solar energy for electrification as it is statistically insignificant at p>0.05. Thus , the findings support the hypothesis and the table shows the chi-square value of 4.023, which is insignificant atp=0.403.

- **Chi-square analysis showing the relationship between gender and awareness**

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.364[a]	1	.067		
Continuity Correction[b]	2.517	1	.113		
Likelihood Ratio	3.289	1	.070		
Fisher's Exact Test				.084	.058
Linear-by-Linear Association	3.353	1	.067		
N of Valid Cases	301				

It is known that there is no significant association between gender and awareness about solar energy for electrification as it is statistically insignificant at p>0.05. Thus, the findings support the hypothesis and the table shows the chi-square value of 2.517, which is insignificant at p=0.113.

- **Regression analysis showing the relationship between factors influencing buying decisions and acceptance level of solar energy**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.943	.170		17.297	.000
	Factors influencingbuying decisions	.331	.048	.374	6.972	.000
R		.374				
R Square		.140				
Adjusted R Square		.137				
F		48.609				
Significance		.000				

The above table shows that the hypothesis was tested under the linear regression method and it was significant at **p=0.000**, the first table shows **R= 0.374** which is the correlation between the factors influencing towards adoption of solar energy and acceptance of solar energy. **R^2 =0.14** which means 14% of the variance is caused on the acceptance of solar energy by the factors influencing the buying decisions. And further, the table shows that **F =48.609** is significant at **p=0.000** and **t =6.972** is significant.

- **Chi-square analysis showing the relationship between acceptance for solar energy and residential type**

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.019[a]	1	.025		
Continuity Correction[b]	4.365	1	.037		
LikelihoodRatio	5.338	1	.021		
Fisher's ExactTest				.034	.016
Linear-by- Linear Association	5.002	1	.025		
N of ValidCases	301				

It is known that there is a significant association between residential type and the adoption of solarenergy in houses as it is statistically significant at $p<0.05$. Thus, the findings support the hypothesisand the table shows the chi-square value of 4.365, which is significant at p=0.037.

- **Chi-square analysis showing the relationship between awareness about the hike in electricity prices and the adoption of solar energy after hikes in prices.**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.147[a]	3	.003
Likelihood Ratio	15.801	3	.001
Linear-by-LinearAssociation	.556	1	.456
N of Valid Cases	301		

It is known that there is a significant association between awareness about the hike in electricity prices and the adoption of solar energy after hikes in prices as it is statistically significant at $p<0.05$. Thus, the findings support the hypothesis and the table shows the chi-square value of 14.147, whichis significant at p=0.03

DISCUSSIONS

Though many demographic factors impact their awareness level about solar energy, the study clearly shows that the respondent`s educational level and gender don`t have any impact on their awareness level. Awareness can be gained through many sources, for example, the respondent might have gained it through their practical and general knowledge or through their workexperience which is given by their educational qualification. Likewise, gender might not influencethe awareness level, male and females have an equal amount of capabilities in knowing or getting aware of things. It is again their interest and practical exposure which enables them to develop more awareness about electricity.

There are many factors that affect the respondent`s acceptance and adoption decision towards solarenergy. One among those which is being found out from study is that "Lack of space" which is evident from the findings (significant relationship between residential type and acceptance) Mostof the samples taken in the study don`t have their own house, though they possess a house it is a big question that whether they have sufficient space to install solar panels. So, it is necessary that manufacturers of solar panel should know the factors/characteristics in the solar panel that are notaccepted or disliked by the users in order to increase their sales. The factors that are disliked by the people is also studied in this research and they think that solar energy "being costly" is the factor that hinders them to purchase it. Hence necessary steps should be taken in reducing the price, in other words to make solar affordable.

It is also evident from the study, that about 36% of the population are willing to adopt solar energyafter considering the hikes in electricity prices. The analysis also shows that there is a significant relationship between awareness about hikes in electricity prices and adoption of solar panel at theirhouses. This indirectly implies that people are willing to adopt solar energy and consider them as a most sustainable form of energy in long run to meet their increased expenses caused due to hikesin prices.

MANAGERIAL AND SOCIETAL IMPLICATIONS

The findings from the study would help solar panel-manufacturing companies, thereby aiding themin analyzing the future demand for solar panels, especially after hikes in electricity prices. Further,they can also get a clear idea of factors influencing the buyer`s behaviour and they can take necessary steps to reduce the effect of those influencing factors. This study also highlights the source of information widely used by the public for seeking information about solar energy, this data can be used by the marketing team of the solar panel-producing company to create more awareness about the same.

Solar energy is one of the most sustainable and renewable sources of energy that can be used to meet the electricity needs of various concerns be it for industries or residential purposes. The carbon emission created during the generation of electricity through the usage of fossil fuels such as coal and gases can be minimized due to the usage of solar energy. Government investment in solar energy either in form of subsidies or installing big panels for overall electrification can helpto attain economies of scale and thus reduce the high spending on fossil fuels.

CONCLUSION

The study reveals that people are aware about solar energy and they use advanced means of information to get to know the latest data about solar energy. It further elucidates the factors (bothdemographic and others) that influence their adoption decisions. Acceptance and adoption level for solar energy after hikes in prices also seems to be higher among the respondents.

Nowadays, solar energy not only used to generate electricity, apart from this it has wide range of uses and applications. Be it for cooking, solar-powered roads, solar noise barriers till the drones which are used to serve emergency goods to the victims of covid are operated using the solar energy. Further, it is evident that in the future, solar energy will be used in day-to-day things that we use and the manufacturers for solar panel may definitely see a shine in their sales like the sun!

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IMPACT OF MOONLIGHTING AND QUIET QUITTING ON PRODUCTIVITY

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ABSTRACT

This study investigates the various factors that contribute to moonlighting and quiet quitting and the impact on the company's and employees' productivity. This research aims to investigate the ethicality of moonlighting. The results derived show that various factors influence moonlighting and quiet quitting. Both have an impact on productivity. Moonlighting is accepted in a positive way. The research also provides measures to combat and control the employment situations.

Keywords: Moonlighting, quiet quitting, employment situations, productivity, measures

1. INTRODUCTION

The economy's growth depends significantly on the vital contribution of human resources (Wheeler, 1980). Companies' success depends majorly on the productivity and performance of the employees. Various employment trends significantly impact their productivity. Moonlighting is the practice where employees take up an additional job while working full- time (Outlook, 2022). An employee would work for one company and also take up a second job. In most cases, this would happen without the employer's knowledge. According to Satarupa Banerjee (2012), moonlighting is classified as blue moonlighting which is failed effort. Quarter moonlighting refers to working a full-time and a part-time job alongside. Whenan employee spends more time on a second job it is called half moonlighting. Full moonlightingis working two full-time jobs. As per an article in Mint, taking up a second job and moonlighting may not necessarily be solely motivated by the desire to earn more money. Plansto change careers, passion, multiple sources of income, and pay off debts are various factors that influence moonlighting among employees (Mukhopadhyay, 2022). Quiet quitting refers toemployees taking very little effort to perform duties assigned to them. They are not motivatedto perform better. The authors of the Harvard Business Review article on quiet quitting concluded that "Quiet quitters continue to fulfill their primary responsibilities, but they're less willing to engage in activities known as citizenship behaviors: no more staying late, showing up early, or attending non-mandatory meetings" (Klotz & Bolino, 2022). The Gallup Survey concluded that 50% of the US working population are quiet quitters. It also found that the level of engagement among Gen Z and

Millennials declined during and post-pandemic (Harter, 2022). Companies have to boost their productivity. Meeting social sustainability requirementsis essential (Amrutha; Geetha, 2020). The authors insist on green human resources management. In the present economic condition, there is a need to understand the various reasons that contribute to moonlighting and quiet quitting among employees because there willbe an impact on productivity of the companies and employees in Chennai. It is necessary to understand the ethicality of moonlighting. In addition to finding out the various factors, this research seeks to explore the linkages among moonlighting, quiet quitting, and productivity. The study further aims to provide suggestions to companies to tackle the employment situations.

Purpose of research

This study focuses on finding out how moonlighting and quiet quitting affect the employees' productivity and aims to discover the solution to the employment situations.

Research objectives

- To study the impact of moonlighting on productivity
- To explore the factors that contribute to moonlighting
- To examine the ethical aspects of moonlighting
- To study the demographic profiles of the respondents
- To determine the factors that influence quiet quitting
- To examine the impact of quiet quitting on productivity

2. LITERATURE REVIEW

2.1 Moonlighting and Productivity

Moonlighting means employees taking up an additional job or other work assignments along with their full-time job (Outlook India, 2022). The management of human resources is also undergoing changes and development and taking on different dimensions. Due to this, they now have other jobs with additional money from some firms in addition to their core employment (Banerjee, 2012). A few companies are opposed to this employment situation. Theemployees may reveal sensitive information to the other company. An expert from Safalta said that, secondary employment may take away the time of the employee from primary employment. There are high chances of misusing the company resources. The employees maybe physically and mentally exhausted leaving them lethargic towards the job. It may damage their productivity (Bawa, 2023).

H1: There is a significant relationship between moonlighting and productivity

2.2 Influential factors, and ethicality of Moonlighting

Skill diversity, job autonomy impacts the choice of moonlighting (Ara, Akbar, 2016). As per, Dr.S.Nafeesa, and Mrs. Uthra. R (2020) inadequate compensation in their primary job and the aspiration to explore alternative career options prompt many school teachers to engage in moonlighting. According to Dr. A. Shaji George, and A.S. Hovan George (2022), IT workers may choose to take on another job to learn new skills that will allow them to transition to a different field of work. Even though politicians are permitted to engage in moonlighting and earn income from outside sources, the ethical implications of such actions are a source of heated public debate (Geys; Mause, 2011), from an article in Business Insider, the author said that moonlighting proponents contend that it is not unethical if the employee is not helping a rival or interfering with the employer's work (Sethi, 2022).

H2: There is a significant association between perception and choice for moonlighting

H3: There is a significant association between income and perception of moonlighting

H4: There is a significant association between the total members in a family and the perceptionof moonlighting

2.3 Influential factors and Quiet quitting

Quiet quitters nonetheless carry out their necessary job functions, but they may not be as enthusiastic about attending optional meetings, arriving early, or staying late. The ability of a team to exceed the call of duty is a critical competitive advantage for many businesses (Klotz & Bolino, 2022) (Harvard Business Review). With work-from-home, it was widely reported that the employees found it difficult to differentiate between work and home since it was at thesame place (Forbes, 2022). No proper recognition and rewards, job dissatisfaction, workplacechanges, lack of empowerment, and poor workplace interactions are a few factors that contribute to quiet quitting (Workplace Safety and Prevention Services, 2022). Working remotely under pandemic limits has numerous drawbacks, including a hard workload, role uncertainty, lack of support, and a blurring of the lines between work and personal life (Baumann & Sander, 2021; Ipsen et al., 2021).

H5: There is a significant association between Work-life balance and quiet quitting

2.4 Quiet quitting and Productivity

According to Gallup's survey, worldwide, the economy loses $7.8 trillion due to productivity losses resulting from disengaged and discontented employees. Job dissatisfaction is currently at an unprecedented level, leading to potential conflicts between coworkers who have to shoulder additional responsibilities due to employee disengagement (TIME, 2022). Accordingto a study by the Journal of Organizational Behavior, "lower levels of effort can lead to lower- quality work, which can have a negative impact on the organization" (Diefendorff; Richard, 2003). This can result in errors, missed deadlines, and lower customer satisfaction. Accordingto the Gallup Survey, women faced more burnout at work than men.

H6: There is a significant difference in quiet quitting and productivity based on gender

H7: There is a significant relationship between Quiet quitting and productivity

Based on the above literature review, the following conceptual framework was developed.

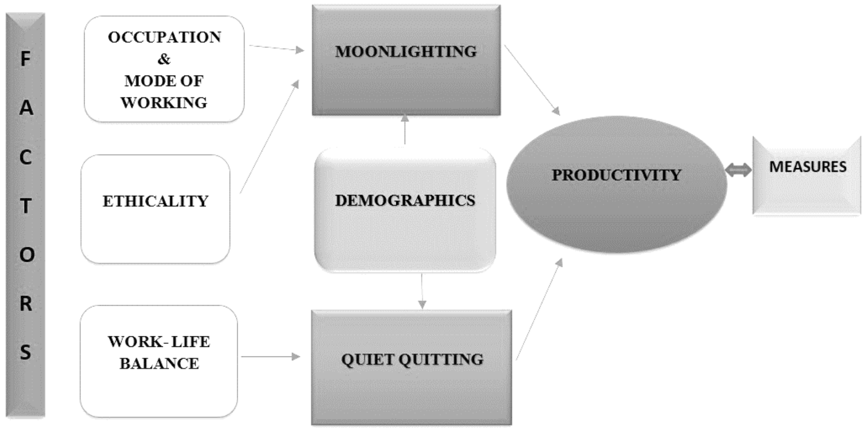


Figure 1 Conceptual Framework

3. RESEARCH METHODOLOGY

The research design followed was descriptive. Through an extensive examination of the literature, a conceptual framework was established based on which a questionnaire was formulated. The data was collected using both survey and secondary data. The survey method involved administering questionnaires to the sample population, while secondary data was obtained by accessing existing sources like journals, and articles. The questionnaire was collected from 311 respondents across Chennai using convenience sampling. A cross-sectional approach was utilized in the study. Collected data was coded using Excel and the data was loaded into SPSS 21 for analyzing data. Data was analyzed descriptive statistics such as mean, and inferential statistics such as regression analysis, ANOVA, T-Tests, and chi-square tests. These tests helped in understanding the relationship and association between various factors.

4. DATA ANALYSISReliability testing

SCALE	NO. OF ITEMS	CRONBACH'S ALPHA
Factors influencing moonlighting	8	0.893
Impact of Moonlighting on Productivity	7	0.916
Measures to control moonlighting	5	0.88
Factors influencing quiet quitting	8	0.926
Impact of Quiet Quitting on Productivity	6	0.909
Measures to control quiet quitting	8	0.945

The above results show that the items have good level of internal consistency and the measuresare reliable since Cronbach's Alpha value exceeds 0.7.

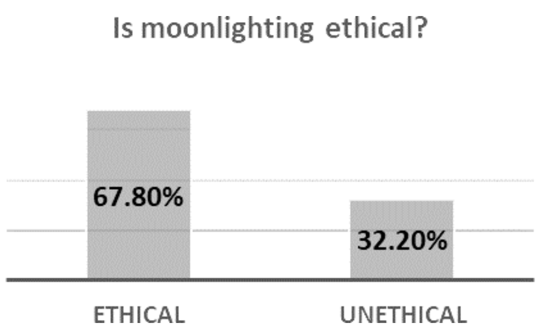
Descriptives

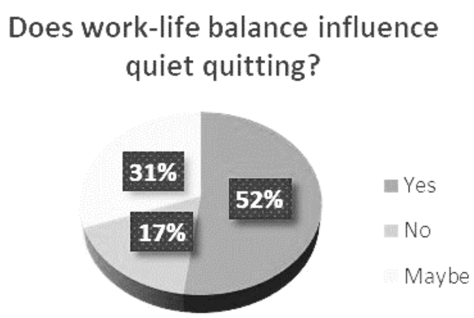
Factors influencing quiet quitting	Mean
Lack of job satisfaction	3.69
Stress or burnout	3.74
Lack of interest in work	3.75
Less engagement in the organization	3.79
Lack of motivation	3.80
Working conditions	3.82
No opportunities for promotion	**3.89**
Relationship with colleagues	3.72

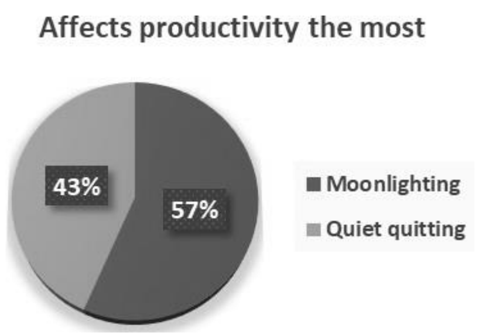
Factors affecting moonlighting	Mean
Extra pay	**3.93**
Passion/ Hobby	3.65
Utilise free time	3.73
Acquire knowledge/ Develop skills	3.75
Ensure job security	3.73
Analyse competency	3.60
Mode of working	3.75
Plans to change career	3.73

Mean is above 3 in all cases which implies that the respondents accept that all these factorsinfluence moonlighting and quiet quitting among the employees.

The charts depict the perception of moonlighting and quiet quitting







Moonlighting is considered ethical and work-life balance is seen to a factor influencing quiet quitting. The above charts depict the impact of quiet quitting on an organization and it also shows that moonlighting affects productivity the most when compared to quiet quitting.

Hypothesis testing

Regression analysis for the relationship between moonlighting and productivity

		Unstndrdzd cf		Stndrdzd cf	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.419	0.209		6.778	0.000
	Moonlighting	0.589	0.055	0.522	10.745	0.000
Dependent variable	Productivity					

R	0.522
R Square	0.272
Adjusted R Square	0.270
F	115.470
Significance	0.000

- The above table indicates that there is a significant relationship between moonlighting and productivity. The R value that indicates the strength between moonlighting and productivity the R Square is 27% the statistical significance is 0.00<0.05. Therefore, it is evident that moonlighting impacts productivity. Hypothesis 1 is accepted.

Chi-square analysis for the perception of moonlighting

	Value	df	Asymp sig (2 sided)	Exct sig. (2 sided)	Exct sig, (1 sided)
Pearson Chi-Square	150.629	1	0.000		
Continuity Correction	147.501	1	0.000		
Likelihood Ratio	155.286	1	0.000		
Fisher's Exact Test				0.000	0.000
Linear-by-Linear Association	150.144	1	0.000		
N of Valid Cases	311				

- From the above table, the value of continuity correlation is 0.00< 0.05. H2 is accepted. There is a significant association between the perception of moonlighting and choice ofmoonlighting. The perception related to the ethicality of moonlighting. Based on the perception of moonlighting the choice for moonlighting will vary.

Chi-square test to determine if there is a significant association between income and perception of moonlighting

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.868[a]	3	.000
Likelihood Ratio	17.204	3	.001
Linear-by-Linear Association	14.306	1	.000
No. Valid Cases	311		

- The Pearson chi-square value is 17.868 and the significance value is 0.00<0.05. H3 is accepted. Therefore, there is a significant association between income and perception of moonlighting. The perception of moonlighting changes according to the income levels of the respondents.

Chi-square test for exploring association between total members in a family and the perception of moonlighting

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	10.107[a]	4	.039
Likelihood ratio	10.121	4	.038
Linear-by-Linear Association	2.466	1	.116
N of Valid Cases	311		

- From the above table, the Pearson chi-square value is 10.107 and the significance is 0.039<0.05. Therefore, there is a significant association between the total members in a family and the perception of moonlighting. Thus, H4 is accepted.

Chi-square test to determine the association between Work-life balance and quiet quitting

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	15.288[a]	6	.018
Likelihood ratio	16.042	6	.014
Linear-by-Linear Association	3.220	1	.073
N of Valid Cases	311		

- The Pearson chi-square value is 15.288 and its significance value is 0.018< 0.05. Therefore, there is a significant association between Work-life balance and quiet quitting. This implies that the work-life balance contributes to quiet quitting. Employees tend to take minimum efforts to spend more time with themselves and theirfamilies. H5 is accepted.

T-test to find if there is a significant difference in quiet quitting and productivity based on gender

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Prodtv yQQ	Equal variances assumed	0.037	0.848	-2.072	309	0.039	-0.2069	0.0999	-0.4034	-0.0104
	Equal variances not assumed			-2.098	235.82	0.037	-0.2069	0.0986	-0.4012	-0.0127

- T VALUE= -2.072 and P VALUE= 0.039< 0.05. There is a significant difference in quiet quitting and productivity based on gender. H6 is accepted.

Regression analysis to determine the relationship between quiet quitting and productivity

		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1		0.969	0.163		5,961	0.000
	Quiet quitting	0.707	0.042	0.691	16.802	0.000
Dependent variable	Productivity					

R	0.691
R Square	0.477
Adjusted R Square	0.476
F	282.307
Significance	0.000

- R VALUE = 0.691, R SQUARE = 0.477, T VALUE = 16.802, P VALUE = 0.000<

  0.05. Therefore, there is a significant relationship between quiet quitting and productivity. H7 is accepted.

5. DISCUSSIONS

The study revealed that moonlighting impacts the productivity of the employees and has an impact on the organizations. There are chances of leakage of confidential information and the employees may misuse the company resources. The employees may not perform well due to fatigue. The research revealed the various factors that contribute to moonlighting among employees. It is observed that additional pay is the main reason for moonlighting. The respondents consider moonlighting ethical. There are high chances of moonlighting because people consider it ethical. Few companies have contradicting views that led them to the removal of employees. The perception also varies according to their income levels. Gender hasno impact on moonlighting choices. Quiet quitting and its impact on productivity have a difference based on gender. Employees who are stressed or facing burnout may not be involvedin the job and that may lead to quiet quitting. It is evident that quiet quitting affects the organization and has a significant impact on the productivity of the employees. They may not contribute and put forward their best efforts for achieving goals the company may lose its competitive advantage. The company may have to incur additional costs. Currently, the growth of companies has declined. It is essential that they focus on human resources to improve productivity. Employees take up another job to maintain their job security and develop skills while few others focus on mental health and underperform. It is necessary to maintain sustainable policies for both companies and employees.

Implications

Inadequate income and the desire to explore alternative career paths influence moonlighting among the teachers (Uthra & Nafeesa, 2020). Dr., İbrahim YIKILMAZ has concluded that it greatly impacts business performance and that there is a need for developing various management practices that would improve the current situation. Companies must adopt policies to control the employment situation (Satarupa Banerjee, 2012). The research will help in analyzing the perception and mindset of the employees towards the employment situations. It will enable the companies to frame proper policies regarding moonlighting and quiet quitting. The company can create proper moonlighting policies so that there would not be a conflict of interest. Clear-cut policies must be framed that are on par with the current needs of the employees. Terms must be clearly specified while recruitment. If the company allows moonlighting, then the limit and scope must be defined so the employees will not exceed them. It must be made sure that the employees put adequate effort into all the jobs they work. Also, companies can provide extra work and pay extra for the employees who are willing to work more for more money. This will benefit the employee to earn more for the work done and increase the productivity of the company. The company can further track the time spent by the employees on a particular device used for work specially in the IT sector. It is necessary to address quiet quitting because it leads to dissatisfaction for the employees in the long run. Onlya few will be satisfied with the job and work. Others may quit. Proper recognition and promotional aspects will encourage employees to perform better. Regular increments and incentives will motivate the employees to work better. Since most of them quiet quit to take care of their mental health, companies must make employees' mental health their priority. They can organize stress management programs regularly. Companies must also fix the workload only after discussing it with the employees so that it will not be a burden for them. Companies must have realistic expectations from their employees and set achievable targets There must be good grievance redressal and proper communication between the company and employees.

Suggestions for future research

The research could be done by covering 500 to 1000 respondents so that the results can be generalised. The responses can be collected equally from all the gender and age groups. The research can be conducted in different cities. A non-probability sampling technique can be usedso that the results will be valid. The study can be further extended to analyse behavioural economics and it can be conducted exclusively with employees to understand why they chooseto work in more than one job and why they are not satisfied with their company.

6. CONCLUSION

It is important for companies to grow and develop in the present economy. It depends majorlyon its human resources. It is necessary that their productivity is improved. Moonlighting and quiet quitting are current employment situations. Moonlighting is working more than one job while quiet quitting is not being involved in the job. This may have an impact on productivity.The research found that moonlighting and quiet quitting are caused due to various reasons andincome and promotional aspects are seen to be the major factors. Moonlighting is found to be ethical. Moonlighting and quiet quitting negatively affect the productivity of the company. There are various measures that can be taken by companies to combat employment situations.Providing increased pay and timely grievance addressal will help the employees. There must be proper communication between employers and employees so that there would not be a negative impact on productivity. It is evident that necessary actions must be taken by the companies to keep the employees satisfied throughout their job.

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PERCEPTION AND LEVEL OF ACCEPTANCE OF CONSUMERS TOWARDS EDIBLE CUTLERY

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ABSTRACT

This research evaluates the perception and level of acceptance of consumers towards edible cutlery. This research focuses on the awareness of consumers towards edible cutlery and how it influences the perception of consumers, the preference of consumers regarding cutlery is also being studied under this research. This research states that the perception and awareness of consumers heavily affects the preference of consumers towards different forms of cutlery and the level of acceptance towards edible cutlery.

1. INTRODUCTION

Food is compulsory and imminent for the survival of life; food provides us with necessary nutrients that ensure our living. Cutlery is basically of two forms, plastic based and metallic based. Both formsof cutlery pose various challenges; single use plastic cutlery harms the environment and the human body by contributing to pollution and climate change. Metallic cutlery though better compared to plastic cutlery, still poses a threat with regards to hygiene while being used between two or more consumers. The cutlery that can be consumed is called as edible cutlery. The concept of edible cutlery is that after using this cutlery to eat food, the cutlery itself can be eaten. This will ultimately result in improving the individual's health as edible cutlery is made out of millets and pulses. Edible cutlery will also reduce pollution and other health hazards (Das S 2020). Moreover the concept of edible cutlery serves as a solution to various present hazards like climate change and pollution.Edible cutlery is an innovative idea that can serve as a platform for new businessmen who wish to start a sustainable business or those who have lost their business due to recession.

Perception is the idea or the understanding of a person; consumers perceive edible tableware/cutlery to be a form of cutlery that can be consumed once it is used for eating food. The consumers also perceive edible cutlery to be in brown colour and made out of millets and grams (Spence C et al. 2012). The level of willingness of consumers to use a product can be stated as the level of acceptance of consumers, acceptance can also be attributed to the affirmation of consumers towards a product (Roy TR 2019). Though there are multiple researches on edible cutlery with regards to its awareness and benefits, there are only few researches on the level of acceptance of consumers with regards to edible cutlery which forms the research gap. The level of acceptance of consumers towards edible cutlery will be further evaluated under this research.

2. PURPOSE OF RESEARCH

This research is conducted with an aim to analyse the level of acceptance of consumers towards edible cutlery and to also study the perception of consumers towards edible cutlery. This research will provide valuable insight to various interested parties while producing edible cutlery, to understand the consumer requirements in a better way a produce products accordingly. The research will also enable the new entrepreneurs and businessmen to start or diverse their existing businesses to be in par with the present challenges like climate change, sustainable development etc.

3. RESEARCH OBJECTIVES

The following are the objectives of this research

1. To evaluate the perception, awareness and the level of acceptance of consumers towardsedible cutlery
2. To identify the cutlery that is most preferred by the consumers (edible, plastic or metallic)
3. To analyse the demographic profile of consumers of edible cutlery

4. LITERATURE REVIEW

4.1 AWARENESS

Consumer awareness is the term which states the knowledge of consumers regarding a product, feature, service. There is awareness that edible cutlery is a sustainable product and can be easily biodegradable and eco-friendly, also some people find it difficult to eat with it.(H.N Patil, et al.,2018) Awareness about the subject plays a major part in the preference of cutlery while opting to eat – away from home. Also the usage of such can be influenced when there is going to be sufficient amount of resource or awareness on the subject (GR Chowdury et al.,2021).

4.2 LEVEL OF ACCEPTANCE

The acceptance of anything is based on awareness and perception. As the consumers are best expected to accept or select such products about which they are most aware about (P Vyshali et al.,2022). For example, Sorghum based cutlery has no preservative this might kindle the acceptance and willingness to buy the product of those customers who are inclined to opt for green products or eco-friendly products. (Munir,2016).

4.3 PERCEPTION

Perception is how an individual understands or imagines something to be. Consumer perception is what a consumer thinks about the product that he has in impact on him. The perception about something will be different from person to person, as it is what the brain creates and understands.(Spence C et al.2012). Awareness is important as it plays a major role in the buying behaviour and perception building of consumers. Awareness is one variable that highly influences how a person perceives a product (N Natrajan et al.,2019).

Based on the literature review the following hypothesis are formulated

- Hypothesis 1.1: There is a significant relationship between awareness of edible cutlery andpreference of edible cutlery
- Hypothesis 1.2: There is a significant relationship between awareness of edible cutlery andlevel of acceptance of edible cutlery
- Hypothesis 1.3: There is a significant relationship between awareness and perception ofedible cutlery

4.4 PREFERENCE

Preference is the personal taste or the liking of an individual consumer. Though various factors influence the preference of an individual there are some notable factors like the price range, the availability of resources, the time and place constraint, social status heavily influences the preference(N. Natrajan et al.,2019). The availability of the product also influences the preference as the cost of saving time and place utility is made. The nearness to the product and the easy accessibility plays a major role in the decision making process (Kabir MH 2021).

Based on the literature review the following hypothesis is formulated

- Hypothesis 2.1: There is a significant association between availability of edible cutlery andpreference of consumers

4.5 DEMOGRAPHICS

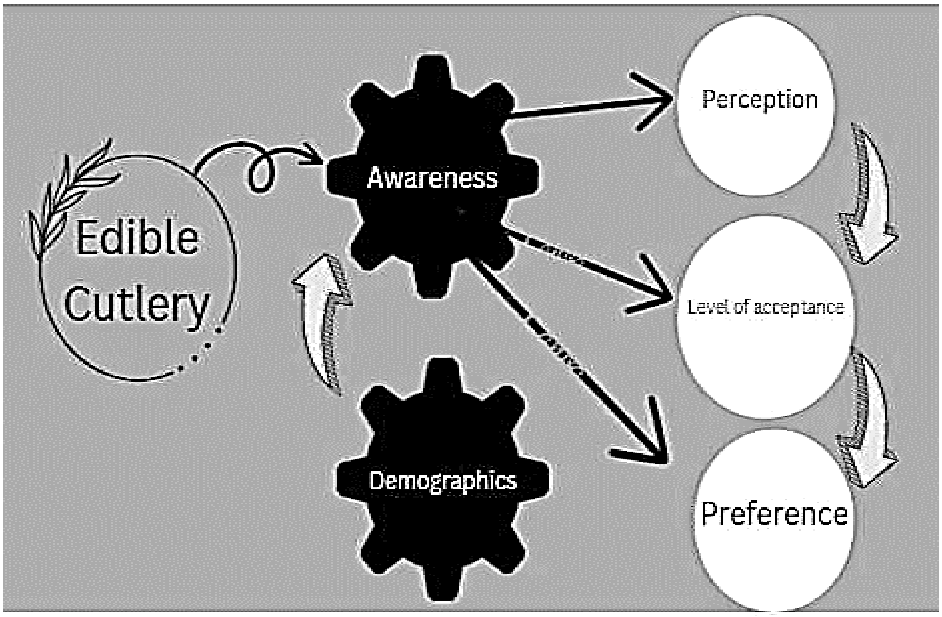
A study states that there is a good understanding on edible cutlery between the individuals who belong to the age group of 28 – 60. Another study states that the 30 - 60 age groups have positive perception towards green movement and good awareness (N Natrajan et al.2019). Gender also influences the acceptance pattern of products. Basic understanding that gender based products are produced could be attributed to the above statement. Past researches show that women are more inclined in purchasing eco friendlier products compared to men. Women are also willing to spend more than men when it comes to purchasing eco-friendly and safe products (Mohd Suki N et al. 2015). Preference as to the usage of edible cutlery also includes the income of the individual as one time use plastic cutlery is very cheap compared to other forms of cutlery (Khare A et al.2014). Preference and acceptance of any product can be directly based on the availability of the product and the easy accessibility. Education does not influence the acceptance directly but, education provides an individual with a wider thought process and indirectly affects the acceptance or non-acceptance ofthe product (H N Patil 2018).

Based on the literature review the following hypothesis are formulated

- Hypothesis 3.1: There is a significant association between age and awareness of ediblecutlery
- Hypothesis 3.2: There is a significant difference in the preference of cutlery based on income
- Hypothesis 3.3: There is a significant difference between the level of acceptance based ongender

5. CONCEPTUAL DEVELOPMENT

Based on the various hypotheses the conceptual framework for the research is formulated



6. RESEARCH METHODOLOGY

A structured questionnaire was framed and was used to collect data from the respondents. Sample size of 300 was used to conduct the research; the questionnaire had various types of questions pertaining to demographics, multiple choice questions and five point likert questions. Once the collection of data was complete, the data was fed to excel and a coded sheet for the data was prepared. According to Pallant (2010), the code book enables the researcher to define his variables by giving those labels and to redefine the answers in a numerical format that can be comprehended by SPSS. The analysis is done by using various statistical tools and charts. The output for the processis also monitored simultaneously. Apart from descriptive analysis various other analyses like correlation was used. Correlation helps to study the amount of association between the variables under research. Regression and ANOVA was also used in Data analysis. To check two continuous variables influence on each other regression was used. To measure one continuous variable and one nominal variable ANOVA was utilised. T-Test was also used in the data analysis of this research.

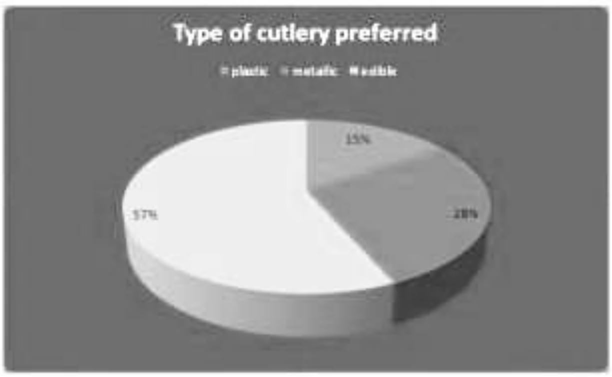
7. RESULTS

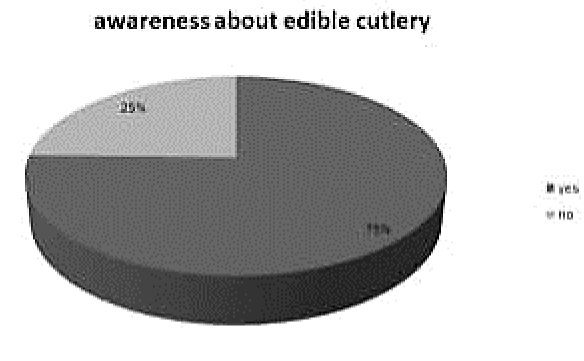
7.1 RELIABILITY TESTING

VARIABLE		Cronbach's Alpha	Consistency
Consumer Awareness	4	0.80	GOOD
Consumer Perception	5	0.85	GOOD
Acceptability level	4	0.83	GOOD
Preference of cutlery	5	0.76	GOOD

According to this test, the internal consistency of reliability increases with the coefficient alpha’s proximity. Since the alpha for all scales is more than 0.7, all Likert scales are considered to be consistent, good and reliable.

7.2 DESCRIPTIVES





From the analysis we can formulate that 57% of the respondents prefer edible cutlery whereas 15% prefer plastic cutlery and 28% prefer metallic cutlery. From the pie chart it is evident that 75% of the respondents are aware about edible cutlery and 25% are not aware about edible cutlery

7.3 HYPOTHESIS TESTING

H1.1 REGRESSION ANALYSIS EXPLAINING THE RELATIONSHIP BETWEEN AWARENESS OF EDIBLE CUTLERY AND PREFERENCE OF EDIBLE CUTLERY

MODEL		UNSTANDARDISED COEFFICIENTS		STANDARDISED COEFFIECEINTS	T	SIG
		B	STD ERROR	BETA		
1	CONSTANT	1.573	0.119		13.22	0.00
	AWARENESS	0.578	0.036	0.685	16.249	0.00
R			0.685			
R SQUARE			0.47			
ADJUSTED R SQUARE			0.468			
F			264.044			
SIGNIFICANCE			0			

There is a significant influence of the awareness of edible cutlery on the preference of cutlery as $p<0.05$. T value is 13.220, and B is 1.573. Through this analysis it is evident that the awareness of edible cutlery highly affects the preference of consumers. Therefore hypothesis is accepted.

H1.2 REGRESSION ANALYSIS EXPLAINING THE RELATIONSHIP BETWEEN AWARENESS OF EDIBLE CUTLERY AND LEVEL OF ACCEPTANCE OF EDIBLE CUTLERY

MODEL		UNSTANDARDISED COEFFICIENTS		STANDARDISED COEFFIECEINTS	T	SIG
		B	STD ERROR	BETA		
1	CONSTANT	2.092	0.160		13.062	0.00
	AWARENESS	0.47	0.048	0.495	9.825	0.00
R			0.495			
R SQUARE			0.245			
ADJUSTED R SQUARE			0.242			
F			96.537			
SIGNIFICANCE			0			

Based on the analysis it is evident that the awareness of edible cutlery significantly influences the level of acceptability of edible cutlery as $p<0.05$. B value is 2.092 and T value is 13.062, thus it is clearly evident that the awareness of edible cutlery significantly influences the level of acceptance ofedible cutlery among consumers.

H1.3 REGRESSION ANALYSIS EXPLAINING THE RELATIONSHIP BETWEEN THEAWARENESS AND PERCEPTION OF EDIBLE CUTLERY

MODEL		UNSTANDARDISED COEFFICIENTS		STANDARDISED COEFFIECEINTS	T	SIG
		B	STD ERROR	BETA		
1	CONSTANT	2.033	0.136		14.936	0.00
	AWARENESS	0.502	0.041	0.581	12.334	0.00
R			0.581			
R SQUARE			0.334			
ADJUSTED R SQUARE			0.336			
F			152.139			
SIGNIFICANCE			0			

Based on the analysis it is evident that the awareness of edible cutlery significantly influences the perception of edible cutlery as $p<0.05$. B value is 2.033 and T value is 14.936. Therefore from the analysis it is evident that awareness has a huge impact on perception. Therefore the understanding and perception of edible cutlery is significantly influenced by awareness of edible cutlery

H2.1 CHISQUARE ANALYSIS EXPLAINING THE ASSOCIATION BETWEEN THE AVAILABILITY OF EDIBLE CUTLERY AND PREFERENCE OF CONSUMERS

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.266[a]	6	.018
Likelihood Ratio	14.514	6	.024
Linear-by-Linear Association	.153	1	.696
N of Valid Cases	300		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 2.76.

From the analysis it is evident that there is a significant relationship between the preference ofcutlery and the composition of edible cutlery as $p<0.05$, Here P is significant at 0.018. Since p is less than 0.05.

H3.1 CHISQUARE ANALYSIS EXPLAINING THE ASSOCIATION BETWEEN AGE AND THE AWARENESS OF EDIBLE CUTLERY

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	105.622[a]	48	.000
Likelihood Ratio	118.697	48	.000
Linear-by-Linear Association	29.308	1	.000
N of Valid Cases	300		

a. 41 cells (60.3%) have expected count less than 5. The minimum expected count is .07.

P is significant here at 0.000. Since p value is less than 0.05, it is evident that there is a significant relationship between age and awareness about edible cutlery.

H3.2 ANOVA ANALYSIS EXPLAINING THE DIFFERENCE IN THE PREFERENCE OF EDIBLE CUTLERY BASED ON INCOME

ANOVA

preference

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.191	2	1.595	2.730	.027
Within Groups	173.569	297	.584		
Total	176.759	300			

Based on the analysis it is evident that the preference of cutlery significantly differs with the level of income. The higher income group prefer the usage of edible cutlery more than the lower income groups.

H3.3 T-TEST ANALYSIS EXPLAINING THE DIFFERENCE IN THE LEVEL OACCEPTANCE BASED ON GENDER

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
acc_ec	Equal variances assumed	1.915	.167	4.350	298	.000	.42542	.09779	.23297	.61786
	Equal variances not assumed			4.395	293.875	.000	.42542	.09679	.23494	.61590

From the analysis it is evident that there is a significant variation with the level of acceptance of edible cutlery with respect to gender as P value is less than 0.05. Therefore the level of acceptance ofedible cutlery varies with gender.

8. DISCUSSION

It is evident from the research that the awareness of edible cutlery is positively related with the perception and level of acceptance of edible cutlery. The more the respondents are aware, the more they are likely to have a correct perception about edible cutlery. There is also correct perception that at present edible cutlery is costly due to its minimal availability in the Indian market. Further there is a very good understanding in the concept of edible cutlery as, most of the respondents think that edible cutlery is not only a form of cutlery that can just be eaten but also a form of cutlery that reduces pollution and wastage, also contributing to the increase in the health of the consumers. The awareness about edible cutlery also influences the level of acceptance; the research shows that there is still no clear awareness among respondents on how to procure edible cutlery therefore this has affected the acceptance, the respondents are highly willing to accept if the edible cutlery is readily available.

It is clearly evident that the respondents prefer edible cutlery over the other forms of cutlery that is plastic and metallic. The acceptance level of edible cutlery is different with gender, though at an overall state the respondents are willing to accept edible cutlery, the acceptance level for men is higher than compared to women. People with more income levels have a higher acceptance level than the lower income group when it comes to accepting edible cutlery as a regular consumable product. The income level also influences the preference of cutlery people with lower income are not that happy in accepting edible cutlery for very frequent usage. The awareness about edible cutlery is undoubtedly highly related with the age of the respondents the age.

Further there is clear results that the present population prefer edible cutlery therefore there is a huge market to capture, this – edible cutlery also serves as a platform for businessmen and entrepreneurs to start a new venture. The present challenges like climate change due to pollution, sustainable environment etc, can be battled with edible cutlery. This might also serve as a step to reduce the severity of recession.

9. CONCLUSION

This research focuses on analysing the perception and level of acceptance of edible cutlery. Various review of literature was made in order to get a clear idea about the variables under study. The different variables were studied under the literature review and the hypotheses were formulated. Data analysis and interpretation was done using SPSS. From the analysis it is evident that the main reason for not using edible cutlery among respondents is the lack of awareness on the sources of availability of edible cutlery. Further the perception of respondents with edible cutlery being environmentally friendly and a product supporting sustainable development also influences the preference of consumers while choosing their cutlery. Therefore it is safe to conclude that edible cutlery is an imminent and essential subject that must be pondered upon more. The consumers are aware about the edible cutlery, but only to a certain extent. Moreover edible cutlery serves as a platform which can reduce the severity of recession by contributing more to sustainable development as edible cutlery itself is a sustainable product and does not damage the environment by any means, further it aids to the native farmers as its primary products are millets. When businesses choose to opt for production of edible cutlery or choose edible cutlery as their business there is high chance to capture the present global market and combat the present challenges like climate change. Therefore the level of acceptance of consumers and the perception of consumers towards edible cutlery has been researched upon.

10. IMPLICATION

The research has various theoretical implications as it adds to the existing theories and research papers on edible cutlery. It has explained and elaborated factors and subjects that were and weren't recorded previously in the researches. This research has bridged the research gap of measuring the level of acceptance of consumers on edible cutlery. This research aids the manufacturing companies to take efficient decisions regarding the production and manufacturing of edible cutlery. These manufacturers can also take decisions based on the preference and acceptance level of consumers. The entrepreneurs and other interested manufacturers of edible

11. FUTURE RESEARCH

Suggestions for future research would be to conduct research with a much bigger sample size 500- 700. Various areas like consumer spending pattern, willingness to switch to edible cutlery and support to edible cutlery as an Indian product can be studied upon. Further interviews, observations and schedules can be used to record the attitudes and perception of consumers to interpret the results in a better way.

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FACTORS INFLUENCING CONSUMER AWARENESS, PERCEPTION AND BEHAVIOURS RELATING TO PREMIUM GOODS

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ABSTRACT

This paper investigates the factors that influence the consumer's awareness, perception and behaviors relating to premium goods. The study reveals that the awareness, perception and behavior are interrelated and that demographic factors play a major role in influencing these variables. This research would be relevant and help companies to understand their customers and their purchasing patterns based on their demographic characteristics and can pave the way to understand the market and create better pricing and marketing strategies.

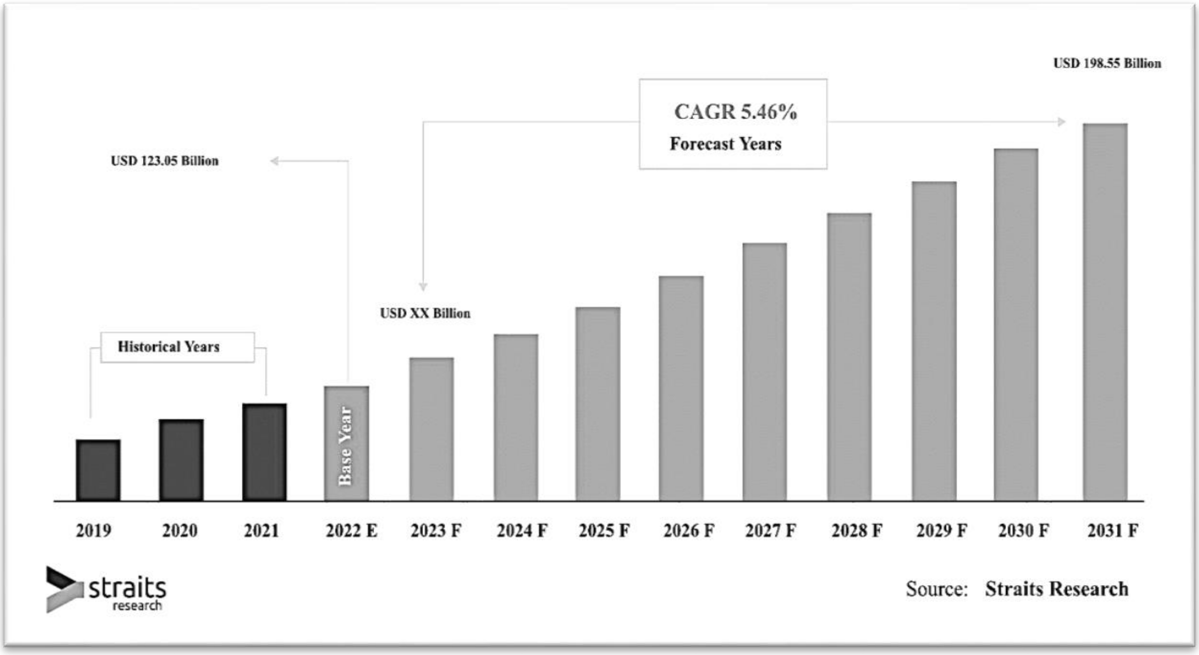
Keywords: Premium goods, consumer awareness, consumer perception, consumer behavior.

INTRODUCTION

The term "premium" is used to describe items of greater quality than ordinary as well as those costing more than usual. These two concepts can be combined to provide the definition of a premium product. A higher-quality item for which we pay a higher price. While both "premium" and "luxury" are used to describe high-quality goods or services, their definitions differ just a little bit. Generally speaking, "premium" refers to goods or services that are superiorto their ordinary equivalents while remaining reachable and affordable to a wider variety of customers. For instance, a premium car may be more feature-rich or perform better than a regular car while still being affordable to a wide range of buyers. We can understand the concept of premium goods with examples like Nike shoes or a Caprese Bag. Contrarily, "luxury" often refers to goods or services that are connected to affluence, exclusivity, and premium quality. Luxury goods and services frequently have significantly higher prices than their premium counterparts and are targeted at a more exclusive and wealthy portion of the market. The only people who can buy a luxury car, for instance, might be those who can afford its unique features, rare materials, and high price. Spending a big portion of their income on highly visible luxury goods may be a strategy used by wealthy consumers interested in communicating status (Berger et al., 2007). Previous studies have solely focused on the perceptions and behavior of consumers who belong to the high income category. At the same time most previous studies only concentrated on luxury goods. My research bridges this gap by finding out the perception of consumers from all different income levels. A phenomenon called the Veblen effect can be explored through this research and its implications can contribute to creating marketing strategies. It is also clear that there is a price-quality relationship of goods and it is also clear that consumer's associate higher prices with higher quality and this in turn affects their purchasing decisions. It also has its significance of study to academia as it adds to the existing research papers and conclusions drawn on and about premium goods. Another important factor that this research shed light upon is the lack of previous papers with data from a wide range of consumers with different characteristics.

Current Statistics

Diagram 1.1



https://straitsresearch.com/report/luxury-fashion-market

In 2022, the size of the global luxury fashion market was estimated to be USD 123.05 billion. It is projected to increase at a CAGR of 5.46% over the forecast period (2023–2031), reaching USD 198.55 billion by 2031.

The phrase "luxury fashion" describes clothing and other items made from high-quality materials, usually with meticulous attention to detail. Wool, fur, leather, and silk are a few materials that can be leveraged to create high-end fashion items. High-end raw materials, distinctive brand values, and rare items with original designs are all components of luxury fashion. Luxury fashion items are usually designed to be snugger than their more affordable alternatives. These products are exceptionally well-featured, very expensive, of the highest calibre, and have attractive looks and design.

With the surge of demand for premium goods in the recent years, this research proves relevant to the ones who wish to understand the behaviors and perceptions of consumers on premium goods.

PURPOSE OF RESEARCH

The goal of this study is to examine how perception, awareness, and behavior shift depending on a variety of conditions. This study also aids in determining the extent to which such elementshave an impact on the same.

RESEARCH OBJECTIVES

- To understand the level of awareness among respondents.
- To assess the relationship between consumer awareness and perception on premiumgoods and behavior towards the same.
- To study how the demographic factors affect the awareness, perception and behaviortowards premium goods.

LITERATURE REVIEW

Consumer awareness and perception

Kotler (2008), defined perception as the method by which a person receives, chooses, organizes, and interprets information. It is a process by which people perceive and interpret their surroundings. According to Heine (2012), consumers' perception of luxury brands include high price, high quality, aesthetics, and a high level of non-functional associations. According to Barreda (2015), strong brand awareness influences other brand elements including brand image. Ana Isabel Rodriguez (2012) examined the impact of luxury brand awareness on perceived brand preference and loyalty. It was found that brand awareness has a positive effect on perceived brand perceptions.

H1: There is a significant relationship between consumer awareness and consumer perceptionof premium goods.

Consumer Awareness and Behavior

Consumer behavior, according to Schiffman (2012), is the study of how people decide how to utilize their available resources (time, money, effort and energy). Several studies demonstratethat consumers' awareness and knowledge have a substantial influence on a range of sensible consumer actions (Ishak, 2012).An aspect of awareness can be found in human instinctive behavior. According to Seetharaman (2001), as consumer awareness and acceptability of a luxury brand grows, so does demand for that brand. Brand Awareness can influence how loyal a customer is to a premium brand. Brand loyalty has generally been regarded as an attitude or

Behavior (Odin et al., 2001). Throughout the decision-making process for a customer's purchase, a high level of brand awareness has a number of benefits, including the learning advantage, consideration advantage, and choice advantage (Sürücü et al., 2019).

H2: There is a significant relationship between consumer awareness and consumer behavior.

Consumer Perception and Behavior

The study of perception focuses solely on the consumer's response in order for them to make a choice or touch a product. These processes are together referred to as perception (Tribhuvan, 2020). According to Franck Vigneron (2004), there are five key variables that may be used to explain a consumer's decision-making process: personal perceptions such as the extended self, hedonism, and non-personal perceptions such as conspicuousness, originality, and quality. Customers believe that luxury items are exclusive and that they cannot be mass-produced in order to ensure their exclusivity. They strongly seek to stand out from the crowd in this situation (Nadine Hennigs, 2013). Consumers believe that hyper-personalized products are worth premium prices, regardless of the desire to own these products (Rosenbaum, 2021).

H3: There is a significant relationship between consumer perception and consumer behavior.

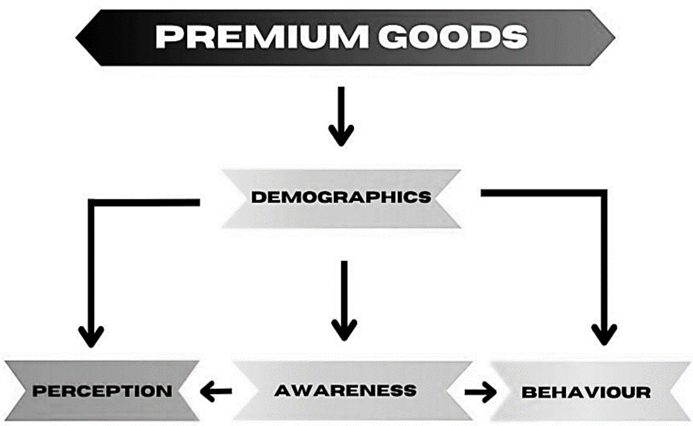
Demographic factor income level

The consumer's income level influences their choice of whether to spend a particular amount on luxuries or decide to save that amount. People who have greater income levels typically spend more money since they consume more and need more amenities as their income rises. As people climb the financial ladder, their purchasing habits also tend to advance (Mohammad Ekhlaque Ahmed, 2016). Income is superior determinant of purchasing behavior (Dorota, 2013).

H4: There is a significant difference in consumer behavior on premium goods based on incomelevel.

Based on the proposed hypotheses, the below shows the conceptual framework for the research.

CONCEPTUAL FRAMEWORK
Diagram 2.1



RESEARCH METHODOLOGY

Primary data was collected using a structured questionnaire with different types of scales from 300 respondents. Secondary data was taken from books and previous research papers and journal articles. Convenience sampling was done. After the data had been collected, it was entered into a Microsoft Excel spreadsheet, and a coded sheet for the data was created. The coded sheet was meticulously reviewed and checked for any errors or discrepancies before the data analysis stage. Once the coding was completed, the data was loaded into SPSS for analysis. Analysis tools such as Anova, Regression, Chi-Square and T-test were used.

DATA ANALYSIS

Reliability testing

Table 1.1

VARIABLE	NO. OF ITEMS	CRONBACH'S ALPHA
Consumer's awareness	9	0.895
Consumer's perception	11	0.850
Consumer behaviour	4	0.858

The items were considered to represent an acceptable level of internal consistency if the Cronbach's alpha value within 0.5 to 0.7 and a good level if the Cronbach's alpha value more than 0.7 (Nunally, 1978). The result showed that all variables obtained good level reliabilities of Cronbach alpha larger than 0.8. Therefore all measures used in this study were reliable.

Descriptive Analysis

Diagram 3.1

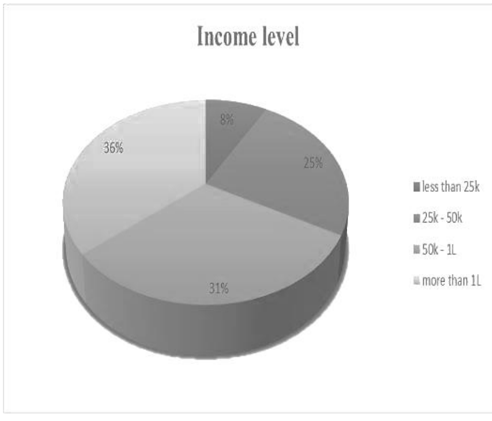


Diagram 3.2

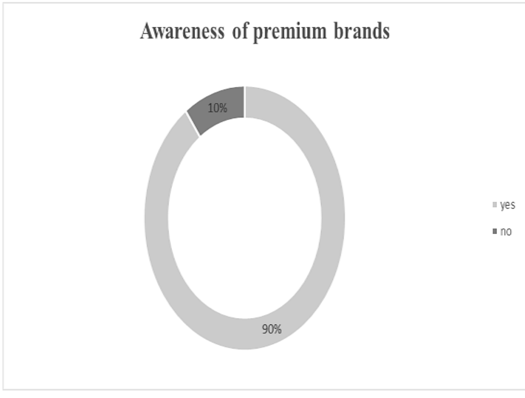


Diagram 3.3

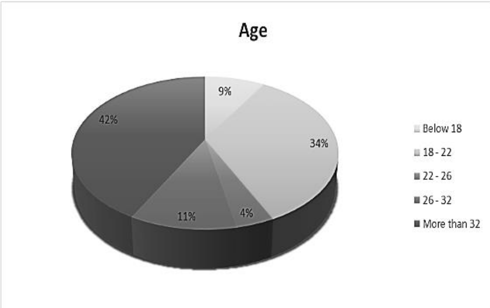
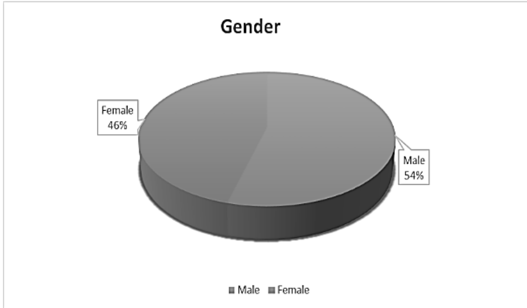


Diagram 3.4



From the above pie charts it is clear that when classified based on level of income, 8% of the respondent have an income less that 25k a month, 25% have about 25k to 50k, 31% have an income in between 50k and 1L and the remaining 36% have an Income above 1L. Based on awareness about premium brands, we infer that 90% of the respondents are aware and 10% aren’t aware of premium brands. Based on age, from the total respondents approximately 9% are below the age of 18 , 34% are between the age of 18 and 22, 4% are between the age of 22 and 26, 11% are between the age of 26 and 32 and the remaining 42% are above the age of 32. Gender wise approximately 54% of the respondents are male and 46% are female. Out of 301 respondents, 163 are men while 138 are women.

DESCRIPTIVES BASED ON THE AWARENESS OF RESPONDENTS ON PREMIUM GOODS

Table 2.1

Word of Mouth					
Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	25	8.3	8.3	8.3
	Disagree	29	9.6	9.6	17.9
	Neutral	84	27.9	27.9	45.8
	Agree	101	33.6	33.6	79.4
	Strongly Agree	62	20.6	20.6	100.0
	Total	301	100.0	100.0	

We can see in the above table that 33.6% of the respondents agree and 20.6% strongly agree that they have heard about premium goods through word out mouth communication.

Table 2.2

Instagram social media					
Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	16	5.3	5.3	5.3
	Disagree	37	12.3	12.3	17.6
	Neutral	56	18.6	18.6	36.2
	Agree	79	26.2	26.2	62.5
	Strongly Agree	113	37.5	37.5	100.0
	Total	301	100.0	100.0	

We can see in the above table that 26.2% of the respondents agree and 37.5% strongly agree that they have heard or seen Ads about premium goods through Social Media platforms like Instagram.

Table 2.3

Television commercials						
Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	15	5.0	5.0	5.0
	Disagree	39	13.0	13.0	17.9
	Neutral	59	19.6	19.6	37.5
	Agree	76	25.2	25.2	62.8
	Strongly Agree	112	37.2	37.2	100.0
	Total	301	100.0	100.0	

We can see in the above table that 37.2% of the respondents strongly agree 25.2% agree that they have seen commercials or ads about premium goods on television advertisements.

Hypothesis testing

- **Regression analysis explaining relationship between consumer awareness and consumer perception.**

Table 3.1

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.166	.147		14.684	.000
	AWARENESS	.309	.043	.387	7.263	.000
R		.387				
R Square		.150				
Adjusted R Square		.147				
F		52.750				
Significance		0.000				

The regression result shows that the R value, indicating the strength of the relationship between awareness and perception was .387. The R^2 score in the analysis indicates the variance of perception is 15%, this percentage was statistically significant ($F=52.750$, $p<0.000$). Therefore Hypothesis 1 is significant showing that consumer awareness influences the consumer perception.

- **Regression analysis explaining relationship between consumer awareness and consumer behavior r.**

Table 3.2

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.746	.225		12.182	.000
	AWARENESS	.224	.065	.195	3.437	.001

R	.195
R Square	.038
Adjusted R Square	.035
F	11.816
Significance	.001

The regression result shows that the R value, indicating the strength of the relationship between awareness and behavior was .195. The R^2 score in the analysis indicates the variance of behavior is 0.38%, this percentage was statistically significant (F=11.816, p<0.005). Therefore Hypothesis 2 is significant showing that consumer awareness influences the consumer behavior.

- **Regression analysis explaining relationship between consumer perception and consumer behavior.**

Table 3.3

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.535	.209		2.562	.011
	PERCEPTIONN	.925	.064	.644	14.549	.000

R	.644
R Square	.415
Adjusted R Square	.413
F	211.684
Significance	.000

The regression result shows that the R value, indicating the strength of the relationship between perception and behavior was .644. The R^2 score in the analysis indicates the variance of behavior is 41.5%, this percentage was statistically significant (F=211.684, p<0.000). Therefore Hypothesis 3 is significant showing that consumer perception influences the consumer behavior.

- **ANOVA showing the difference in consumer behavior based on income level.**

Table 3.4

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	20.558	3	6.853	6.290	.000
Within Groups	323.546	297	1.089		
Total	344.104	300			

The results in the above table shows there is a significant difference in consumer behavior on premium goods based on the income level at F = 6.290 and p= 0.000 i.e. p value <0.05. The result supports the hypothesis 4 and there is a significant difference in consumer behavior on premium goods based on the income level.

DISCUSSION

The study aimed to examine respondents' awareness of premium goods, and how this awareness affects their perception and behavior towards such goods. Demographic factors were also studied to determine their impact on awareness, perception, and behavior. The research found that most respondents were highly aware of premium goods and that awareness influenced their perception andbehavior. Demographic factors such as gender, age, and income were found to have varying degrees of influence on respondents' awareness, perception, and behavior while the level of education and location of residence did not influence the same.

IMPLICATIONS

This research contributes to companies who can now better understand the price sensitivity of their target customers and how they respond to different pricing strategies. Businesses also better understand how to position their products in the market and how to communicate their value propositions to the consumers.

The design, features, or materials of premium products are frequently what set them apart from competing goods. In order to appeal to their target market and differentiate themselves from the competition, businesses must carefully examine how to design and develop their products. Businesses can make well-informed decisions that increase profitability and performance by better understanding the elements that influence consumer demand and the market-leading strategies.

SUGGESTIONS FOR FUTURE RESEARCH

For future research, it would be advisable to use a much bigger sample size in order to get moreaccurate results. Premium goods is a very wide topic and it can be studied in a more detailed manner by including more variables like brand image, brand advertisements etc. Larger Questionnaires, interviews or schedules can be used to determine the attitude and awareness ofthe respondents to interpret the results in a better manner.

CONCLUSION

The study reveals that awareness of the consumers influence the perception and behavior and the demographic factors also influence the awareness, perception and behavior of the consumers relating to premium goods (The 3 variables are inter-linked). We also learn that the majority of the respondents are aware of the term premium goods and also own premium goods. The study also shows that the education and location of the consumers does not affect the perception or awareness. And finally, it can be concluded that these variables are easily influenced by the factors in the environment surrounding the consumers i.e. the demographics.

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EFFECTIVENESS AND ETHICALITY OF CELEBRITY ENDORSEMENTS OF SURROGATE PRODUCTS

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ABSTRACT

This study aims to determine whether celebrity endorsements of surrogate advertisements are considered ethical and effective in today's society. It is to determine what exactly is the opinion ofthe people when it comes to surrogate advertising and seeing their favourite celebrities promote the regulated products in an indirect manner. The study is conducted to see if there is a noticeableassociation between surrogate and regulated products, and to examine whether there is an effect in the level of consumption of the regulated products.

Keywords: Ethicality, Effectiveness, Consumer Perception, Consumer Awareness

1 INTRODUCTION

Celebrities play a major role in our lives. They play a much more vital role than just being singers, actors, sportsmen, etc. Celebrities are often looked to as role models, and they play a leadership role in the society, and as advertisers they play a role in the purchasing decision of the people. In a trying time, such as Covid-19, it is imperative that people spend their money wisely for their sustenance and growth. However, since people are under the impression that celebrities know best, they often spend a fair amount of money on what is advertised by them. Innovative practices are often used in advertising- such as surrogate advertising. However, innovative advertising should have a positive effect, much more than the negative. This implies that celebrities should choose to advertise companies/products which result in sustainable growth of the economy, and not just keep the monetary benefit in mind.

Celebrity Endorsements are when a well-known person or a famous person takes part in an advertisement in order to promote or recommend the particular product or service. Celebrity endorsements do have a positive effect on sales, it increases the attractiveness of the product or service. It has also been inferred that celebrity transgressions or conflicts have a negative effect on the evaluations of endorsed brands (Bergkvist, L., & Zhou, K. Q. 2016). Consumers tend to prefer the products endorsed by their favourite celebrities- they aspire to be like them and think that usingthe products endorsed is the first stepping stone to that. They tend to have a positive effect in the sense of brand symbolism, and the above is utilized often for brand associations and identifying the brand easily (Mukherjee, D. 2009).

Surrogate advertising refers to the promotion of a product or brand indirectly, when advertising ofthat product or brand is prohibited by law. Surrogate Advertising is a strategy of advertising aproduct that cannot be advertised openly. Surrogate advertising is a channel by which brands contact their audience (Rahim, A 2022). Surrogate Advertising is comprehended as a brand extension to get beyond the restrictions imposed by law (Chavan, V 2022). Companies have found loopholes in order to get what they want, which implies that the law is weak and can be bent according to one's requirement (Vihari, S 2016).

Surrogate Advertising is a practice that has been going on for many years now – where companies use other means to advertise regulated products. These regulated products include mainly alcoholand tobacco. After reviewing multiple papers, it has been revealed that recent studies have shownthe effect of surrogate advertising on consumers. This research aims to assess the influence celebrities have on the consumers by endorsing these products, and whether celebrity endorsements are considered ethical or not.

2 PURPOSE OF THE RESEARCH

The purpose of this study is to analyze the effect on the level of consumption of regulated goodsafter surrogate advertisements. This study also helps identifies the level of the influence of celebrities in surrogate advertising and assesses the consumers perception on the ethicality of surrogate advertisements.

3 RESEARCH OBJECTIVES

The following are the research objectives of the study:

- **RO1:** To determine the respondents' association between regulated and surrogateproducts.
- **RO2:** To examine the effect on the level of consumption of regulated goods aftersurrogate advertisements.
- **RO3:** To determine the knowledge of surrogate advertising among the respondents.
- **RO4:** To examine the consumers perception on the ethicality of surrogate advertisements.
- **RO5:** To assess the level of the influence of celebrities in surrogate advertising.
- **RO6:** To study the demographic profile of the respondents.

4 LITERATURE REVIEW

Surrogate advertising is a channel by which brands contact their audience (Rahim, A 2022). Surrogate Advertising is comprehended as a brand extension to get beyond the restrictions imposed by law. It also establishes how the advertisements affect the firm's brand (Chavan, V 2022). Surrogate advertising is becoming more common and frequent, which is advantageous to the company but not to the people in the society since it increases brand memory and promotes regulated products (Varalakshmi, T 2013). Even though people seem to care about public health and the society at large, surrogate advertising still proves to be an effective means ofmarketing regulated products (Chavan, V 2022).

4.1 SURROGATE ADVERTISING AND REGULATED PRODUCTS

Tobacco Products have been banned from advertising since 1st May 2004. Ever since the ban, tobacco companies have had to find other means in order to promote their product, resulting in their surrogate product, Pan Masala. The Regulated Product (Tobacco) and the Surrogate Product (Plain Pan Masala) have the exact same name, thus enabling the viewers of the advertisements to make the link very easily (Sushma, C., & Sharang, C. 2005). The purpose of the advertisements is very evident and the main focus point of sale from these advertisements are definitely the Regulated Product (like Cigarettes and Tobacco) and not the Surrogate Product actually advertised (Chaudhry, S., & Chaudhry, K. 2007). Alcohol Companies also use surrogateadvertisements in order to promote their liquor through attractive measures. The audience are hence more aware of the brand. In order to promote their liquor products marketers, employ various strategies which include promoting the brand of alcohol indirectly, through surrogate advertisements, in order to avoid the restriction on the direct promotion (Singh, K., & Vij, T.S. 2019). Although there is a ban on regulated products being advertised, the companies have developed loopholes to get the needed, and hence the government should come up with regulationsin order to prevent the companies from doing so (Ganesan, D., Shajahan, U. S., & Kiruthika R. 2019).

H1: There is a significant association between knowledge of surrogate advertising and whether itsmessage connects to regulated products

4.2 SURROGATE ADVERTISING AND ITS AWARENESS

Surrogate advertisements seem to easily link with the regulated product and thus have a bad influence on the people. The general society was analyzed and it was given that more than 50% ofthe population (between the ages of 20 and 40) connect the link and give into such advertisements (Dodrajka, S. 2011). Women are aware of surrogate products but not the advertisements as such. Other than that, the response of both men and women to these products and their impact on regulated products are similar. However, due to the direct impact of the advertisements, it has led to an increase in consumption, especially among the youth, no matter how educated. It is very important that the celebrities in these advertisements know what they are advertising to the public and realisethe impact they can have on the audience watching (Tyagi, I., & Tyagi, P. 2022). TV surrogate advertisements are by far the largest and most common channel of surrogate advertisements (Jose,A. P., & Roy, R. 2020)

H2: There is a significant relationship between general awareness of surrogate advertising and the advertising channel

4.3 ETHICALITY OF CELEBRITY ENDORSEMENTS

Surrogate advertisements are known as either ethical or unethical, and these advertisements helps to raise awareness of the regulated product, but they don’t have direct impact on consumers’ decisions, it just acts as a reminder of brand (Dhiman, M 2022) but it still remains to be a controversial and social issue (Singh, K., & Vij, T. S. 2019). Promoting of surrogate products should be stopped as well – to end the never-ending loophole, and legal action must be taken against anyone who tries to do so, for the overall development of the country (Panda, B. 2011). The unethical advertisements are a clear indication of lack of implementation of laws which needs to be rectified (Munjal, N. 2016). While a good number of people think it unethical, there are a few who believe that nothing wrong is being done, in fact they believe that by promoting these products, it will help increase brand awareness and recall, along with the financial component. Many believe that it is just another means of advertising a product as all companies do, nothing else (Jose, A. P., & Roy, R. 2020). Celebrity endorsements do indeed have a negative impact on the society, the audiences abandon their way of living, just to live like their celebrities do. This goes against the morals, norms and behaviours in society (Zipporah, M. M., & Mberia, H. K. 2014).

H3: There is a significant difference on ethicality of celebrity endorsements based on their knowledge of surrogate advertisements

4.4 EFFECTIVENESS OF CELEBRITY ENDORSEMENTS

The effectiveness of advertising generally revolves around how the product advertised relates to the consumer personally, and how it is relevant to them. Generally, the most effective advertisements are those which communicate the strategies of the advertisement and how the concept relates to the people personally. Hence, effectiveness of advertisements generally depends upon the brand’s personal relevance to the consumer more than anything else (Mehta, A., & Purvis, S. C. 1997).

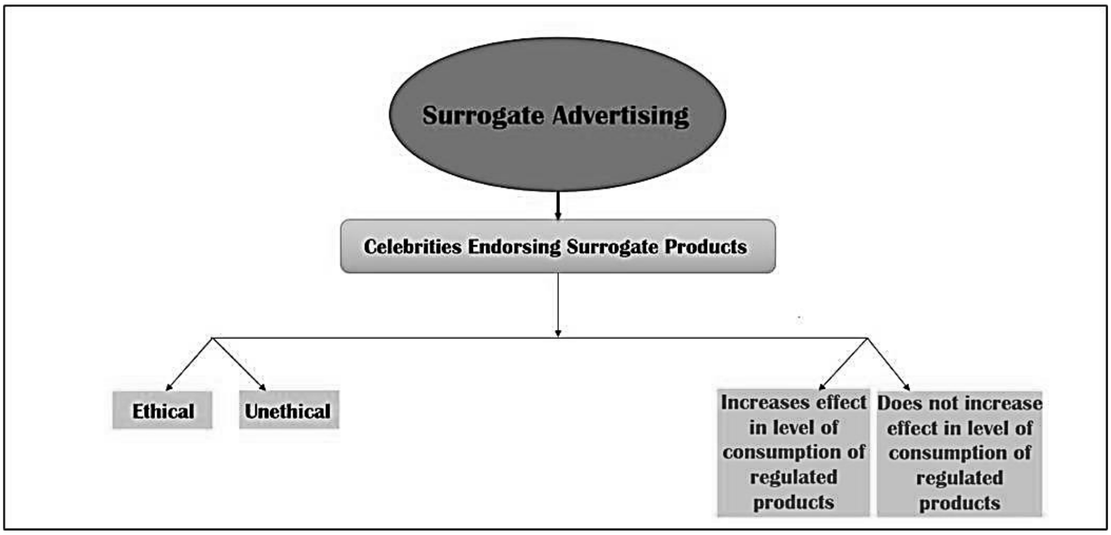
Celebrity Endorsements are used a lot today by a variety of brands, and the effect they have on the publicis indeed vast. However, there are two sets to the population – one who is easily influenced by the celebrity and the other who judges a brand not worrying about who is endorsing the product. Celebrity endorsements are indeed risky and come with problems attached. However, companies must grow their brands so that there is no association with the celebrity per se, but just brand recall when thought about among the consumers (Dhotre, M. P., & Bhola, S. S. 2009). Surrogate Advertising is said to be more effective among the men than the women, and this could be due tothe societal norms, as well as their personal beliefs and values (Prakash, G., & Binod Kumar, S. 2013). Most audiences want to feel a connection with the celebrity, and hence they do whatever their celebrities recommend (Zipporah, M. M., & Mberia, H. K. 2014).

H4: There is a significant difference on effectiveness of surrogate advertisements based on age

H5: There is a significant relationship between relating regulated products with surrogate advertising and the effectiveness of celebrity endorsements

5 CONCEPTUAL FRAMEWORK

The following conceptual framework was developed for the research based on the proposed hypotheses:



6. RESEARCH METHODOLOGY

The type of research conducted is descriptive research. For this research, the structured questionnaire was prepared through google forms and it was circulated among friends, family and their acquaintances. It was also posted on various social media platforms. The questionnaire includes first-hand information as it was filled by each of the individuals by themselves, and therefore can be classified as primary data. A total of 309 respondents were collected and used for this research's data analysis. Once the data collection was completed, the analysis of the data began. This began by feeding the data into an excel sheet, and a coded sheet for the data was prepared. The main reason behind coding the data is so that the software can understand and interpret the data, and thereby give the answers so required. The coded data is then opened in the SPSS for the analysis of the same. The analysis is done by using the various statistical tools and charts that SPSS provides.

The data so analyzed was in a quantitative manner using descriptive analysis, regression, chi- square test, etc. Under this descriptive analysis, the demographic profile of the respondents and certain nominal questions answered by the respondents were represented in the form of charts. Apart from the descriptives, other analysis was also used. Chi-Square tests were used to measure the association between two nominal variables in the research, while Regression was used to measure the relationship between two continuous variables. To measure the difference between one nominal and one continuous variable, ANOVA and T-Test was used in the data analysis.

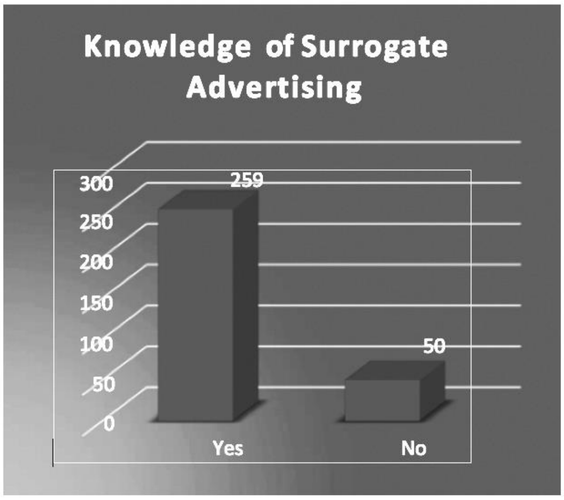
6. DATA ANALYSIS AND HYPOTHESIS TESTING

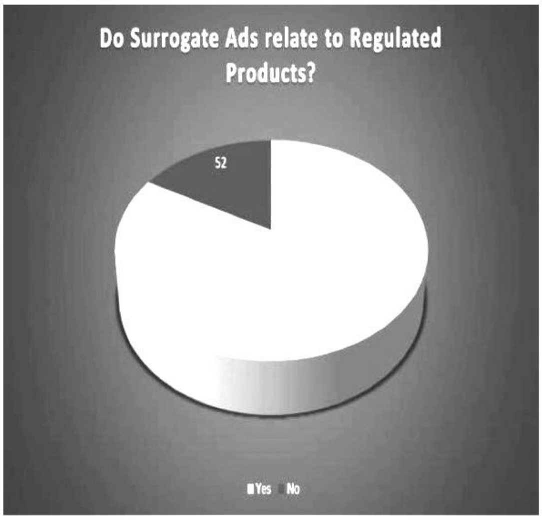
The data was analyzed using a number of statistical methods. Some of these include mean, Chi- Square, ANOVA, T-Test and Regression. The results are as follows:

RESULTS

7.1 DESCRIPTIVES

- **Respondents' knowledge of Surrogate Advertising and whether they can relatesurrogate advertisements to regulated products**

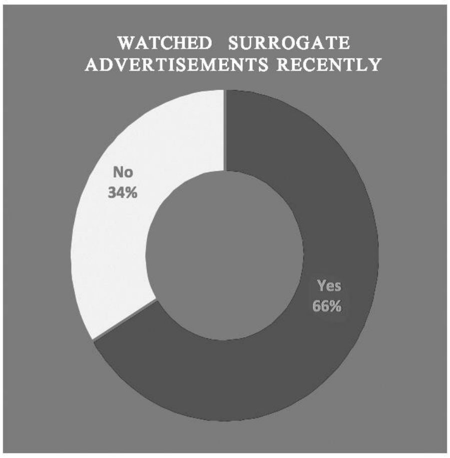


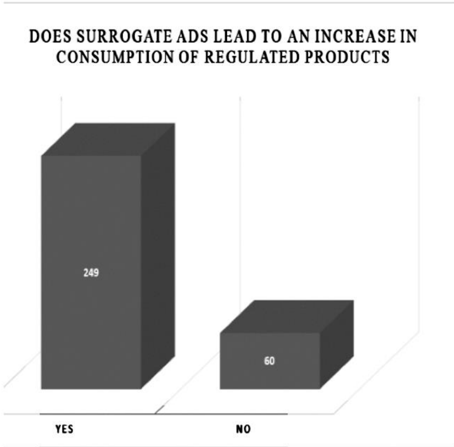


According to the bar graph, it can be inferred that 259 out of the 309 respondents are aware of surrogate advertising, which means that about 83.8% of the respondents are well aware of what surrogate advertising is. This implies that about 16.2% aren't aware of surrogate advertising.

According to the chart, it can be understood that 83.2% of the respondents are able to understandthe association between surrogate advertisements and regulated products. The remaining 16.8% aren't able to make the association between surrogate advertisements and regulated products.

- **Whether respondents' have watched surrogate advertisements recently and whether watching surrogate advertisements will lead to an increase in consumption of regulated products**





b. Computed only for a 2x2 table

From the above charts it can be inferred that in the past 3 months, 66.3% of the respondents have watched surrogate advertisements while 33.7% of the respondents haven't and for the society at large, surrogate advertisements do lead to an increase in consumption of regulated products- about 80.6% believe so. The remaining 19.4% don't believe that these advertisements can lead to an overall increase in regulated products consumption.

7.2 RELIABILITY ANALYSIS

Variable	Cronbach's Alpha	Consistency
General Awareness of Surrogate Advertising	0.611	Acceptable
Channel of Awareness of Surrogate Advertising	0.829	Good
Association between regulated products and surrogate advertising	0.902	Excellent
Effectiveness of Surrogate Advertising	0.718	Good
Ethicality of Celebrity Endorsements	0.795	Good
Effectiveness of Celebrity Endorsements	0.703	Good

If Cronbach's Alpha is greater than 0.7, it is considered reliable and good. From the analysis done, it can be inferred that the General Awareness of Surrogate Advertising likert scale is acceptable, but not as reliable as the other scales. The reliability testing done proves that the Channel of Awareness, Effectiveness of Surrogate Advertising, Association, the Ethicality and Effectiveness of Celebrity Endorsements are all considered reliable scales.

7.3 HYPOTHESIS TESTING

- **H1: There is a significant association between knowledge of surrogate advertising and whether its message connects to regulated products (Chi-Square Test)**

From the above table, it is known that there is a significant association between knowledge of surrogate advertising and whether its message connects to regulated products, as it is statistically significant at $p < 0.05$. Thus, the findings support the hypothesis and the table shows a chi square value of 22.883[a] and it is significant at p = 0.000.

H2: There is a significant relationship between general awareness of surrogate advertising and the advertising channel (Regression)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	**.496[a]**	**.246**	.243	.65565	.246	99.923	1	307	.000

a. Predictors: (Constant), Channel of Awareness

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.955	1	42.955	**99.923**	**.000[b]**
	Residual	131.973	307	.430		
	Total	174.928	308			

a. Dependent Variable: General Awareness of Surrogate Ads

b. Predictors: (Constant), Channel of Awareness

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.180	.138		15.833	.000
	Channel of Awareness	.362	.036	**.496**	**9.996**	**.000**

a. Dependent Variable: General Awareness of Surrogate Ads

The above table shows that the hypothesis was tested under linear regression method and it was significant at $p < 0.05$. The first table shows R= 0.496[a] which is the correlation between general awareness of surrogate advertising and the advertising channel. In the model summary table, R^2=

0.246 which means 24% of variability in the general awareness of surrogate advertising are determined by the advertising channel viewed. The ANOVA table shows the F= 99.923 is significant at p= 0.000[b] and the t= 9.996 is significant.

H3: There is a significant difference on ethicality of celebrity endorsements based on their knowledge of surrogate advertisements (T-Test)

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Equal variances assumed	8.156	.005	3.245	307	.001	.40006	.12328	.15748	.64264
Equal variances not assumed			**2.706**	60.47	**.009**	.40006	.14782	.10442	.69570

From the above table, it is known that there is a significant difference on ethicality of celebrity endorsements based on their knowledge of surrogate advertisements, as it is statistically significant at $p < 0.05$. Thus, the findings support the hypothesis and the table shows a t value of 2.706 and it is significant at $p = 0.009$.

H4: There is a significant difference on effectiveness of surrogate advertisements basedonage (ANOVA)

Effectiveness

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.529	4	2.632	**4.214**	**.002**
Within Groups	189.882	304	.625		
Total	200.410	308			

The result in the above table shows that there is a significant difference on effectiveness of surrogate advertisements based on age at $p < 0.05$ Thus, the findings support the hypothesis and there is a significant difference on effectiveness of surrogate advertisements based on age at $F= 4.214$ and$p = 0.002$.

H5: There is a significant relationship between relating regulated products with surrogate advertising and the effectiveness of celebrity endorsements (Regression)

Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	**.435[a]**	**.190**	.187	.80416	.190	71.779	1	307	.000

a. Predictors: (Constant), Effectiveness of Celebrity Endorsements

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.417	1	46.417	**71.779**	**.000[b]**
	Residual	198.527	307	.647		
	Total	244.945	308			

a. Dependent Variable: Association

b. Predictors: (Constant), Effectiveness of Celebrity Endorsements

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.950	.214		9.107	.000
	Effectiveness of Celebrity Endorsements	.517	.061	**.435**	**8.472**	**.000**

a. Dependent Variable: Association

The above table shows that the hypothesis was tested under linear regression method and it was significant at $p < 0.05$. The first table shows R= .435[a] which is the correlation between relating regulated products with surrogate advertising and the effectiveness of celebrity endorsements. In the model summary table, R^2= 0.190 which means 19% of variability in the relation of regulated products with surrogate advertising and the effectiveness of celebrity endorsements. The ANOVA table shows the F= 71.779 is significant at p= 0.000[b] and the t= 8.472 is significant.

6 DISCUSSIONS

In the research, it was revealed that the respondents are easily able to relate the regulated and surrogate products. This shows that even though it isn't direct, it is different and catches the eye of the viewer. This proves that the regulations set by the government are pointless and need to be more stringent in order to ensure that the loopholes exploited by the advertisers are stopped. Thus, the entire purpose of the regulations set by the government is defeated, since the association between the regulated product and the surrogate product is clear, for people of all ages, occupation and gender. It was observed that the consumption of regulated products does not increase just because the population views the surrogate advertisement. So, even though the association can be easily made, it does not result in an increase in the consumption of the regulated product. This can be inferred in two manners. One, is that the population's morals are strong and they don't get influenced by such advertisements. Even if the advertisement makes the product look very attractive and it gathers the interest of the population, they have the willpower to not give into trying the wrong habits. However, there is a flipside to this, which is the more likely conclusion in today's society. The second inference is that the population is already consuming regulated products and hence the advertisements do not really make a difference in the habits they already have. These advertisements would just be another advertisement to them, and they would not be bothered by it since it will not affect their behaviour at all. Even so, the advertisements tend to remain in the sub-conscious minds of the viewers. Hence, using indirect messages, or different advertising styles, like in surrogate advertising, should be applied to products that actually can help with sustainable growth of the people and society in general. It can be understood that the more a person is aware of surrogate advertising, and what exactly the goal of the advertisement is, the more likely they are to believe that the advertisements are not ethical and should not be allowed by the government. This helps us to conclude that there is indeed a sense of morality among the population, and that the people believe that celebrities should not be using their fame in order to promote the wrong things. The respondents are well aware of the effect that the celebrities have on the common people and believe that it is ethically wrong for them to endorse surrogate products since it may result in the inculcation of wrongful habits among the fans of said celebrities.

7 CONCLUSION

The study reveals that Celebrity Endorsements do indeed play a role in the effectiveness of surrogate advertising, and often result in increased consumption of the product. This enables us to understand the power celebrities have on the society. Surrogate advertising is indeed one of the most innovative ways of advertising, but it in the end, it can also be inferred that the respondents believe that using celebrities for endorsing such product is unethical and should be stopped. Hence, it is important that innovative means of advertising is done for good. Celebrities should look at the values of the company before advertising for them, and more importantly choose a good product to promote - something which is innovative, promotes sustainability and helps with the overall growth of the company. It is important for celebrities to do what is right, especially since they are well aware of the effect they have on their fans. And finally, it can be concluded that the government must come up with stricter rules in order to prevent loopholes when it comes to advertising regulated products.

8 IMPLICATIONS

A) THEORETICAL IMPLICATIONS

This research has its significance of study to academia as it adds to the existing research papers and conclusions drawn on surrogate advertising. Another factor that was brought in this paper that many papers did not shed light on was the celebrity endorsements of the products. Most of the papers reviewed only talked about surrogate advertising and the ethicality of that, not the celebrities and that effectiveness. This research has bridged the research gap between the effectiveness and ethicality of celebrity endorsements with respect to surrogate advertising as a whole. The independent and dependent variables can be easily determined under the study, the dependent variables being ethicality and effectiveness of celebrity endorsements and the independent variable being surrogate advertising. Furthermore, the research done can help provide a newer piece of knowledge, and also link newer variables with the already studied ones. Ultimately, it can be concluded that the celebrity endorsements do play a major role in the effectiveness of surrogate advertising, while it is also agreed upon that the practice is unethical and should not be allowed. The study implies that celebrity endorsements do indeed affect the consumption of the regulated product, and it shouldn’t be allowed to do so.

B) MANAGERIAL AND PRACTICAL IMPLICATIONS

Companies are finding their own ways to get what they want, since their ultimate goal is to earn a profit, and isn’t the well-being of the consumers. They will do whatever it takes to advertise their product so that the sales are not affected and the advertisements somehow create a sense of curiosity among the viewers. However, this research will assist companies in understanding that majority of the population don’t believe that surrogate advertising is right, not to mention using their favourite celebrities to promote and endorse such products. These companies and advertisers can then try to lower their overall surrogate advertising, especially through event sponsorships, etc. The government is also coming to the realization that the ban of advertising regulated products isn’t fulfilling the intention of the same. In the recent time, the Central Consumer Protection Authority (CCPA) have issued 83 violations for misleading advertisements. The Ministry of Information and Broadcasting has issued an advisory to all private satellite channels to refrain from broadcasting such advertisements. Therefore, when marketers want to create surrogate advertisements, they will take into account the opinion of the public at large, along with the government regulations, and thereby and act accordingly, prioritizing the ethical nature and the well-being of the consumers above the monetary gains they get from it.

SUGGESTIONS FOR FUTURE RESEARCH

For future research, it would be advisable to the use a much bigger sample size, more than 500 respondents in order to get more accurate results. Celebrity Endorsements for surrogate advertising can be studied in a more detailed manner, and more conclusions can be drawn. Larger Questionnaires, interviews or schedules can be used to determine the attitude and awareness of the respondents to interpret the results in a better manner.

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YOUTH PERCEPTION AND AWARENESS OF GREEN HOMES

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ABSTRACT

This study aims to identify youth perceptions and awareness of green homes as well as the motivations, barriers, and demographic factors influencing them. Perception, awareness, psychological motivations, economic motivations, social and environmental motivations, and barriers were identified as the key variables of the study. The sample size was 300 and the data was collected using a structured questionnaire. The collected data was analyzed using the SPSSsoftware. The study revealed that youth have a positive perception of green homes, exhibitinga high awareness of green home features and concepts. Consequently, they do not view the potential barriers as obstacles to the uptake of green residences. Youth perceptions are positively associated with the motivations (psychological, economic, and environmental & social) and their awareness of green homes. Further, educational attainment and occupation arefound to have a significant influence on the youth's awareness levels.

Key Words

Green homes, Youth perception, Awareness level, Psychological motivations, Economicmotivations, Environmental & Social motivations, Barriers, Demographic factors

INTRODUCTION

India is one of the most densely populated countries in the world, with a population of approximately 141 crores as of 2023 (Source: Worldometers). Consequently, the demand for residential buildings is high and is expected to increase in the upcoming years. According to Building Material Promotion Council (BMPTC), the nation produces 150 million tonnes of construction waste on a yearly basis (Source: https://www.iasparliament.com/). Many environmental issues are arising as a result of massive construction activities. As a result, shifting to a green home is essential to create a sustainable environment by preserving and minimizing the use of natural resources (Gupta, 2017).

Green homes are residential buildings that use environmentally friendly materials throughout the plan, construction, performance, restoration, renovation, and demolition process of the building (Adzmi, 2018). They also entail ecologically sustainable site planning, HVAC (heating, ventilation, and air conditioning) building system design, energy-efficient appliances, natural lighting systems, integration of renewable energy sources like solar panels, indoor environmental quality, grey-water recycling, water & waste management, and so on. Green homes aim for zero carbon as well as have a positive impact on both environment and resident'slifestyles by reducing pollution, the expense of living, and preserving energy & natural resources. In India, the Indian Green Construction Council (IGBC), Green Rating for IntegratedHabitat Assessment (GRIHA) Council, and Leadership in Energy and Environment Design (LEED) aid in the development of green buildings by offering rating programs, certification, training services, and quantifying the social and economic benefits of going green (source: https://in.saint-gobain-glass.com/). This is critical in today's world, where there is a high demand for residential housing as well as a concern for health and environmental well-being.

However, awareness of the green homes concept is limited (Komolafe et al.,2018). This is a major concern as green home awareness is critical to lessen the ecological footprint of construction activities (Agyekum et al.,2019). Ultimately there has been a significant evolutionof perceptions on green homes in recent years as more people become aware of the environmental concerns of conventional housing and seek to make more earth-friendly choices. According to (Kota, 2022), perceptions of green homes are influenced by several motivations and barriers. A positive perception of the benefits of green homes increases demand for green homes (Shafiei M W M et al.,2013). Therefore, the research framework was developed to study the motivations (psychological, environmental & social, and economic) and barriers that influence youth perceptions in India as well as their awareness of green homes. National Youth Policy referred to all those between the ages of 15 to 29 as "youth". Hence, the target population of the study is youth ranging between the age group of 15 to 29.

RESEARCH PURPOSE

This study aims to identify youth perceptions and awareness of green homes in relation to the motivations (psychological, economic, and social & environmental), barriers, and demographiccharacteristics.

RESEARCH OBJECTIVES

- RO1- To Determine youth perceptions and awareness of green homes and to establish the relationship between them.
- RO2- To Identify the youth's awareness of green homes based on their demographic characteristics.
- RO3- To ascertain the effects of psychological, Economic, Social, and Environmental motivations on youth's perceptions towards green homes.
- RO4- To study the barriers to green homes in relation to youth perceptions and awareness.

LITERATURE REVIEW

AWARENESS AND PERCEPTIONS

The level of knowledge and awareness of green homes among people is inadequate (Ting et al.,2021). A strong association between consumer awareness and consumer perception is observed by (Rana et al.,2022). Thus, in relation to the aforementioned literature, a hypothesis is formed:

H1: There is a significant relationship between youth perceptions and their level of awareness of green homes.

AWARENESS AND DEMOGRAPHIC FACTORS

According to (Njo A, 2014), people's buying interest in green homes differs with their occupations. **(**Sichali M et al.,2017) stated that participation in sustainability projects and knowledge gained at educational institutions influenced their level of awareness and resulted in a favorable perception. Thus, it is obvious that demographic variables impact individual's perceptions and awareness of green homes and thus, the following hypotheses are established:

H2.1: There is a significant difference in Youth's awareness based on their occupation.

H2.2: There is a significant difference in the youth's level of awareness based on their level of education.

PSYCHOLOGICAL MOTIVATIONS AND PERCEPTIONS

Psychological motivations are psychological factors that influence an individual's behavior or decision-making process such as personality, attitude, beliefs, values, social norms, and emotions. Psycho-social factors like environmental attitude, social referents, perceived behavioral control, perceived self-identity, and purchase intention are the significant factors that affect an individual's intention toward green homes (Tan et al., 2012). Here, an individual'sperception of how easy or difficult it is to perform a particular behavior is known as perceived behavior control (Ajzen et al., 1991), while perceived self-identity refers to one's self-image (Rise et al., 2010). Self-perception of being a part of society influences their decision to green homes (Maccioni et al.,2019). (Rana et al.,2022) substantiates this idea by stating that there is a strong association between perception, awareness, environmental concerns, and green buyingpractices. *(*Ajzen et al.,1991) also found that social referents like spouses, friends, or family tend to influence people's beliefs and behavior. From the literature reviewed earlier, the following hypothesis is constructed:

H3.1: There is a significant relationship between youth perceptions and psychological motivations.

ECONOMIC MOTIVATIONS AND PERCEPTIONS

Economic motivations are economic factors such as cost minimization, profit maximization, incentives, higher returns, and so on that positively influence people's perceptions and behavior towards green homes. Financial Incentives such as cost savings on electricity & water bills, prospective growth in home value and capability to fetch higher rentals motivate individual's interest in green homes (Tan et al.,2014). (Bradshaw et al.,2005) indicated that the operating costs of green homes are lesser than conventional buildings and it provides a net benefit over a property's life. Thus, the literature review highlights that economic motivations influence individual's perceptions about green homes and the hypothesis is created:

H3.2: There is a significant relationship between Economic motivations and Youth perceptions towards green homes.

ENVIRONMENTAL & SOCIAL MOTIVATIONS AND PERCEPTIONS

Environmental and social motivations are driven by a desire to mitigate the adverse effects of human actions on the environment and enhance the standard of living for all members of society. An environmentally sound and stable habitat, energy optimization, and comfortable residence (Tan et al.,2014) along with environmental degradation, and social and environmental benefits (Chuweni et al.,2022) are the major motivators that influence people's belief about green homes thereby increasing market demand for green homes and encourages more sustainable development. (Rashid et al., 2017) indicated that people's purchase intention toward green homes is influenced by environmental concerns and knowledge. The existing research makes it evident that individual's interest in personal as well as societal well-being affects their decisions on green homes as indicated by (Maccioni et al.,2019). As a result, the following hypothesis is formed:

H3.3: There is a significant association between Social and environmental motivations and youth perceptions towards green homes.

BARRIERS TO GREEN HOMES

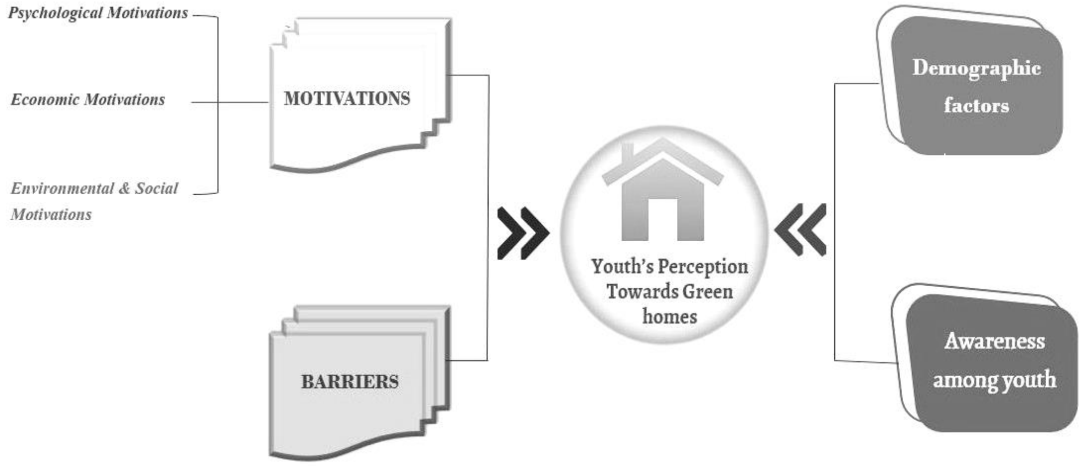
Regardless of the motivations, there are several barriers that negatively influence youth perceptions of green homes, stifling their development. The cost factor is identified as the greatest challenge for green homes (Nordin et al., 2017). Additionally (Alias et al., 2010) found that the main concern with green homes is the limited knowledge of its concept, designs, and benefits as well as their acceptance of green homes. Perceptions of green homes are influenced by constraints like lack of choice in selecting Green Home Features, lack of information about Green Home Features, and perceived effort to analyze (Kota, 2022). Thus, the barriers to green homes are price, lack of green building information, lack of market options, concerns about thereliability of renewable sources, the uncertainty of returns, fear of the unknown, and lack of interest (Mwero et al., 2019). In accordance with the above literature, the following hypothesesare developed:

H4.1: There is a significant relationship between Barriers and Youth perceptions towards green homes.

H4.2: There is a significant relationship between Awareness level and barriers.

CONCEPTUAL FRAMEWORK

Based on the hypotheses framed, the following conceptual framework is developed.



RESEARCH METHODOLOGY

Data was collected from 300 participants aged 15 to 29 years using a structured questionnaire containing seven Likert scales and thirteen nominal scales. The sampling method employed was convenience sampling. The data collected was coded in Excel and analyzed using SPSS software. The scales for motivations and awareness were assigned the following codes: Strongly disagree – 1, Disagree – 2, Neutral – 3, Agree- 4, and Strongly agree -5. Whereas thebarriers Likert scale was reverse coded ranging from Strongly agree (1) to Strongly disagree (5). The Likert scale variables were computed together for analysis purposes. A range of statistical tests, including descriptives, t-tests, ANOVA, regression, and chi-square wereemployed to test hypotheses. Additionally, a reliability test was conducted to assess the consistency of the Likert scales used in the questionnaire.

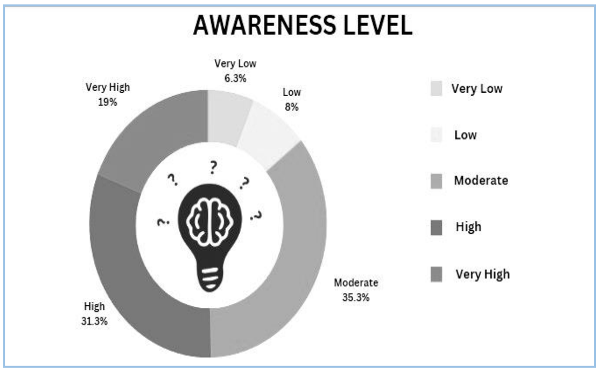
DATA ANALYSIS

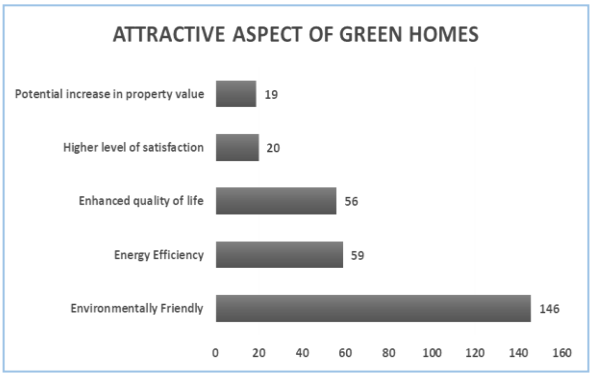
Reliability Testing

Variable	Number of Items	Cronbach's Alpha	Consistency
Awareness	5	0.909	Good
Psychological Motivations	5	0.889	Good
Economic Motivations	5	0.897	Good
Social & Environmental Motivations	6	0.933	Good
Barriers	7	0.917	Good
Perceptions	6	0.902	Good

Cronbach's alpha score greater than 0.7 is deemed to be good and reliable (Nunally, 1978). According to the results of the analysis, all of the Likert scales are considered good and reliable.

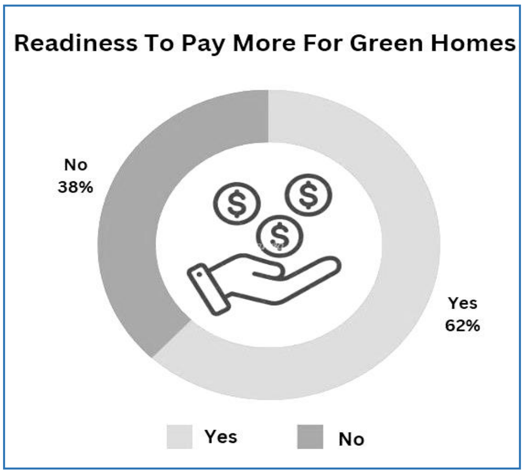
Awareness and Attractive Aspect of Green Homes

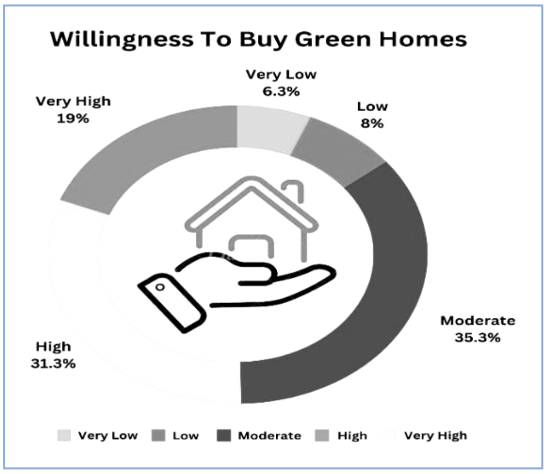




- The above charts show that the majority of the respondents are aware of green homes and found to be inclined towards green homes because of environmental friendliness followed by energy efficiency.

Acceptable Initial Cost Difference and Youth's Willingness to Buy Green Homes





- The above charts show that most of the respondents have a high willingness to purchase green homes and agree to pay more for them. This clearly shows that the youth have to buy an interest in green homes despite the high initial cost.

DESCRIPTIVES FOR LIKERT SCALES

Awareness About Green Homes	**Mean**	**Std. Deviation**
Aware about the concept & meaning of green homes	3.5	1.2034
Aware of the features of green homes	3.573	1.1586
Aware of the environmental, cost & health benefits of green homes	3.653	1.1449
Aware of Information sources (Reliable builders/developers, Suppliers of materials etc...) of green homes	3.483	1.2335
Aware of various certification programmes for green homes	3.29	1.2825
Awareness Overall Mean	**3.5**	**1.033**

- The results indicate that respondents are aware of green homes, their features, and their benefits since the mean scores of all statements are above 3

Perceptions About Green Homes	Mean	Std. Deviation
Green home features are easy to use and saves money	3.34	1.087
Green homes are important to preserve resources for future	3.813	1.0338
Green homes provide good financial returns	3.733	1.042
Green homes have positive impact on the environment	3.883	1.0164
and human health		
Green homes are durable and are of high quality	3.717	1.052
It is good & safe to use recycled or reuse materials and resources	3.817	1.0584
Perceptions Overall Mean	**3.717**	**0.859**

- The results indicate that youth hold a positive perception of green homes as the mean score of all the statements is above 3.

Barriers	Mean	Std. Deviation
Lack of awareness and information about green homes & its benefits	3.48	1.225
Green homes incur high initial cost compared to normal homes	2.83	1.351
Green House are time consuming or difficult to obtain	3.63	1.053
Green products are not promoted properly	2.94	1.479
Lack of choice i.e., Designs & customizability are limited	2.99	1.376
Unwilling to adapt new practices	2.95	1.365
Lack of interest	3.59	1.143
Barriers Overall Mean	**3.2024**	**0.76334**

- According to the results, youth do not view the potential barriers as a hindrance to the adoption of green homes since the mean score is not less than 3. However, the respondents agreed that Lack of proper promotion, high initial cost, lack of choice, and unwillingness to adopt new practices are identified as the barriers to green homes since their mean scores are less than 3.

HYPOTHESIS TESTING

RO1 - Regression analysis showing the relationship between youth perceptions and their level of awareness of green homes

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.281	.153		14.910	.000
Awareness	.410	.042	.493	9.789	.000
R			0.493		
R Square			.243		
Significance			.000		

In accordance with the above table, it is clear that there is a significant relationship between awareness of green homes and youth perceptions since ($p<0.05$). R = 0.493 indicates that awareness and youth perceptions of green homes are strongly correlated. R^2 value denotes that 24.3% of the variance in youth perceptions of green homes is explained by their awareness ongreen homes.

RO2- Anova analysis showing differences in Youth awareness based on their occupation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.366	4	3.091	2.976	.020
Within Groups	306.474	295	1.039		
Total	318.840	299			

According to the table above, it is inferred that there is a considerable difference in the youth's awareness level based on their occupation at F=2.976 and p=0.020. This finding supports the hypothesis since $p<0.05$ and thus it is evident that youth's awareness of green homes differs with their occupation.

RO2- Anova analysis shows differences in the youth's awareness level based on their educational qualification

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15.329	5	3.066	2.970	.012
Within Groups	303.511	294	1.032		
Total	318.840	299			

According to the table above, it is inferred that there is a significant difference in the youth's awareness level based on their educational qualification at F=2.970 and p=0.012. This findingsupports the hypothesis since $p<0.05$ and thus it is evident that youth's awareness on green homes differs with their level of education.

RO3- Regression analysis showing the relationship between psychological motivations and youth's perceptions of green homes

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.699	.156		10.881	.000
	Psychological Motivations	.545	.041	.612	13.357	.000
R				.612		
R Square				.374		
Significance				.000		

According to the above table, there is a strong connection between awareness of psychological motivations and youth perceptions ($p<0.05$). R = 0.612 indicates a high correlation between psychological motivations and youth perceptions of green homes. R^2 value denotes that 37.4%of the variance in youth perceptions of green homes is explained by psychological motivations.

RO3- Regression analysis showing the relationship between Economic motivations and youth's perceptions of green homes

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.702	.170		10.005	.000
Economic Motivations	.548	.045	.577	12.192	.000
R					.577
R Square					.333
Significance					.000

As shown in the table above, it is inferred that there is a significant relationship between economic motivations and youth perceptions since ($p<0.05$). R = 0.577 indicates that economicmotivations and youth perceptions of green homes are strongly correlated. R^2 value denotes that 33.3% of the variance in youth perceptions of green homes is explained by economic motivations.

RO3- Regression analysis showing the relationship between Environmental & Social motivations and youth's perceptions of green homes

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.368	.171		7.997	.000
Environmental and Social Motivations	.602	.043	.632	14.092	.000
R					.632
R Square					.400
Significance					.000

In accordance with the data in the above table, there is a significant association between environmental & social motivations and youth perceptions ($p<0.05$). R = 0.632 indicates that environmental & social motivations and youth perceptions of green homes are stronglycorrelated. R^2 value denotes that 40% of the variance in youth perceptions of green homes is explained by environmental & social motivations.

RO4- Regression analysis showing the relationship between Barriers and youth's perceptions of green homes

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.209	.195		11.331	.000
Barriers	.471	.059	.419	7.956	.000
		R	.419		
		R Square	.175		
		Significance	.000		

The results in the aforementioned table make it evident that there is a significant association between barriers and youth perceptions ($p<0.05$). R = 0.419 indicates the strength of the relationship between barriers and youth perceptions of green homes. R^2 value denotes that 17.5% of the variance in youth perceptions of green homes is explained by the barriers to greenhomes.

RO4- Regression analysis showing the relationship between Awareness level and barriers

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.433	.149		16.311	.000
Awareness	.220	.041	.297	5.375	.000
		R	.297		
		R Square	.088		
		Significance	.000		

The Regression analysis results establish that there is a notable link between awareness level and barriers ($p<0.05$). R = 0.297 indicates the strength of the relationship between awareness and barriers. R^2 value denotes that 8.8% of the variance in youth's opinion on barriers is explained by their awareness levels.

DISCUSSION

The study found that the youth have a strong positive perception of green homes which is mainly due to the strong influence of motivations, increased awareness, and disagreement to barriers. The youth perception of a green home is that it is expensive yet saves money in the long run, is durable, preserves resources, and provides environmental & health benefits. It is also found that youth are more attracted by the environmentally friendly and energy-efficient nature of green homes. Further, it is inferred that the youth are well aware of the green home concept, its benefits, and common green home features whereas they are comparatively less aware of green building certification programs.

Since the youth are well aware of green home benefits, they are ready to pay the high initial cost to procure green homes. It is found that increased awareness favorably influences youth perceptions towards green homes. Psychological, Economic, Environmental & social motivations have a strong positive relationship with youth perceptions.

Youth hardly endorsed the prevalence of barriers to green homes but they tentatively agreed tothe barriers of lack of proper promotion, high initial cost, unwillingness to adopt new practicesand lack of choice. Moreover, a strong association is observed between barriers and awareness levels. This means that their disagreement with the barriers is because of their enhanced awareness of green homes. Similarly, barriers and youth perceptions have a significant linkage. Thus, the youth's strong positive perception of green homes is a result of their bare acceptance of barriers. The findings also indicate that youth awareness of green homes is influenced by their occupation and educational attainment. Educational attainment is found to have a substantial positive effect on youth awareness. As youth gain more knowledge of green home concepts and benefits, they are more inclined to have positive perceptions.

SIGNIFICANCE TO ACADEMIA

This study adds new knowledge about the youth's perception and awareness of green homes. It also confirmed previously established relationships and improved the existing knowledge ofgreen homes.

MANAGERIAL AND PRACTICAL IMPLICATIONS

The study identified the major motivations, barriers, and awareness levels of green homes. The study found high initial cost, lack of choice, lack of proper promotion, and unwillingness to adopt new practices as barriers. Hence, the government must take the necessary steps to effectively promote green buildings and policymakers must draft policies that provide incentives & other financial benefits to offset the high initial cost of green homes. On the otherhand, the construction players should ensure a reduction in the high initial costs and offer wide choices of green home features whilst also maintaining their durability and quality. Thus, the study would aid the builders, the government, and the policymakers to gain insights into youth's choices and preferences for living in green homes so as to take necessary actions to boost sustainable housing practices.

DIRECTIONS FOR FUTURE RESEARCH

Subsequent research could be conducted to address the study's limitations by increasing the sample size, incorporating a broader range of respondents, and widening the variables under study. Further studies can also focus on the perceptions and awareness of green homes among rural people and include factors like emerging green home technologies, respondents' technicalknow-how, green home performance, and resident satisfaction.

CONCLUSION

The study found that youth hold a positive perception of green homes, exhibiting a high awareness of green home features and concepts. Consequently, they do not view the potential barriers as obstacles to the uptake of green residences. Youth perceptions are positively associated with the motivations (psychological, economic, and environmental & social) and their awareness of green homes. Although youth tentatively acknowledged certain barriers, such as high initial cost, limited choice, inadequate promotion, and reluctance to adopt new practices, they did not view these as major hindrances to green homes. Furthermore, the study identified a significant impact of demographic variables particularly educational attainment and occupation on the youth's awareness levels. Thus, it can be affirmed that youth are drivento adopt environmentally and socially sustainable green homes that encompass efficient waste& resource management and ecological conservation, thereby contributing to a healthy environment as well as responsible way of living, benefiting both individuals and the planet atlarge.

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CONSUMER AWARENESS AND SOCIAL IMPACT OF STONE PAPER

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ABSTRACT

The potential effects of stone paper on consumer awareness and the environment are explored in this study area. A sustainable substitute for conventional paper created from wood pulp, which is frequently linked to deforestation and other environmental issues, is stone paper, also referred to as mineral paper. The study intends to investigate consumer acceptability levels, consumer awareness of stone paper, positive social benefits, product features, price's impact on consumer purchasing intention, and consumer environmental concerns. The study will also look at how widely utilizing stone paper as a sustainable replacement for conventional paper might benefit society.

Keywords: Stone Paper, Consumer Awareness, Positive Social Effects, Product Attributes, Priceof the Product, Acceptability Level, Consumer's Environmental Concern

1. INTRODUCTION

A new invention that hasn't had much of an influence on India's green industry is stone paper. China was the first civilization to discover paper-making technology roughly 2,000 years ago. China made yet another breakthrough in papermaking in the twenty-first century, but this time it differs significantly from earlier discoveries. This novel paper's production requires no water at all and does not begin with cellulose fibers as a raw material. Since it is made of inorganic materials derived from calcite rock along with non-toxic resin, such as HDPE (High-Density Polyethylene), and other processes, this paper is also referred to as "rock paper" or "stone paper." These materials are then melted at high temperatures and formed into sheets that resemble paper. Stone paper is recognized for its unique characteristics, which include its durability and ability to tolerate tearing and moisture. It is a more environmentally friendly alternative because it doesn't use trees in the manufacturing process and has a lower carbon footprint than conventional paper products. There are several uses for stone paper, including labels, outdoor signage, and packaging. It is a well-liked option for individuals seeking greener substitutes for common paper products due to its durability and adaptability. In order to generate a material that resembles stone paper and can be folded into sheets, the limestone must be crushed into a fine powder and combined with resin. **(Ma, 2020)** The sustainability of stone paper is one of its main advantages. The usageof trees in traditional paper manufacture can result in deforestation and a high carbon footprint. The creation of stone paper, in comparison, uses less water and energy and doesn't require any trees. The stone paper also reduces waste and the demand for new resources because it is recyclable and may be used in a variety of applications **(Royte, 2018).** The lack of information onconsumer knowledge of stone paper and its societal impact constitutes the study's main research gap. There is also a knowledge gap about the aspects that influence consumer acceptance and adoption of stone paper as a replacement for traditional paper goods. There is a need for greater research in the areas of price, availability, and customer impression of the quality of stone paper, all of which have not been fully examined. As well, there is a knowledge gap on the potential social advantages that could result from the widespread use of stone paper because the social impact of stone paper has not been thoroughly studied.

2. PURPOSE OF THE RESEARCH

The use of tree paper has significantly increased by 400% in the past four decades, leading to the annual destruction of four billion trees or over two million trees per day to meet global paper demand. This has resulted in deforestation, forest fires, harm to wildlife and birds, and poses a threat to humanity. To address this issue, the adoption of stone paper is proposed as an alternative. Stone paper is made from additives, powdered inorganic minerals, and HDPE plastic (High- Density Polyethylene). It offers several environmental benefits compared to traditional tree paper. This project aims to raise consumer awareness about stone paper and highlight its positive social impact. The lack of knowledge and understanding among customers regarding stone paper and its potential social benefits is identified as the research problem. Despite its durability and eco- friendly nature, many customers may be unaware of these advantages or the detrimental environmental effects associated with conventional paper production. Although stone paper has the potential for positive social impact, it is not widely used as a substitute for traditional paper products. To promote the wider adoption of stone paper, several factors need to be considered, including cost and consumer acceptance levels. To address this problem, the research will investigate consumer acceptance levels and understanding of stone paper's characteristics, societal benefits, and cost. The findings of the research can help increase consumer awareness, encourage the widespread use of stone paper, and mitigate the negative environmental impacts of traditionalpaper production.

3. OBJECTIVES OF THE RESEARCH

The study's following research goals are listed

- **RO1:** To create awareness about stone paper among consumers.
- **RO2:** To highlight the positive social effects of stone paper.
- **RO3:** To analyze the product attributes toward the needs and desires of buyers.
- **RO4:** To determine whether the price of the product influences the purchase intention ofconsumers.

- **RO5:** To analyze the level of acceptability among consumers.
- **RO6:** To examine the influence of consumers' environmental concerns.
- **RO7:** To study the demographic profile of consumers of stone paper.

4. LITERATURE REVIEW

4.1 CONSUMER AWARENESS (CA)

The development of a sustainable future requires consumer education and awareness, according to a study that was published in the Journal of Consumer Research. The study found that when people are informed and pushed to adopt more sustainable behaviors, consumer behavior can change considerably. The authors concluded that "educational interventions that inform and raise awareness about sustainable behavior can lead to behavior change, particularly among those who are unaware or not motivated to act" **(Vermeir, 2006).** According to a Forbes article, the rise in popularity of stone paper is being driven by consumers' environmental concerns. According to the article, consumers are becoming more interested in buying things that are environmentally friendly and manufactured from sustainable materials. Stone paper meets this requirement because it is created from a substance that is both plentiful and non-toxic **(Tabor, 2020).** Thus, the following hypothesis is developed in the context of the literature.

H1: Awareness among consumers of stone paper and consumer environmental concerns aresignificantly correlated.

4.2 POSITIVE SOCIAL EFFECTS (PSE)

According to a study by **Haws (2014),** people are more likely to buy environmentally friendly products when they think doing so will benefit others, such as the environment or those in need. This implies that highlighting the social advantages of green products might be a successful marketing tactic. According to a study by **Puhakka (2018)**, using stone paper can positively influence a big positive influence on the environment because it uses less energy and less deforestation to produce paper. The authors argue that although stone paper costs more than regular paper, the advantages may outweigh the drawbacks. A key factor in the adoption of stone paper as a sustainable alternative is consumer acceptability. In a 2019 study, Kuo looked into the effects of eco-consciousness and perceived value on consumers' intentions to buy sustainable goods, notably stone paper notebooks **(Kuo, 2019)**. The scientists discovered that stone paper's advantageous social consequences, such as its sustainability and eco-friendliness, significantly influenced consumers' propensity to buy and use the product. As a result, the following hypothesisis developed in light of the literature.

H2: There is a substantial correlation between favorable social effects and consumer acceptance of stone paper.

4.3 PRODUCT ATTRIBUTES (PA)

Consumers are said to exhibit environmental concerns based on product features, the veracity of green product claims, the information given on the products, and the advantages of the products. **(Forkink, 2010) (Luchs M. G., 2010).** In addition, an analysis by **(Research., 2021)** predicts that the need for environmentally friendly and sustainable paper products would spur significant growth in the worldwide stone paper market in the ensuing years. The article highlights the important product qualities of stone paper, such as its recyclability, water resistance, and tear resistance. The product attributes of stone paper have contributed to its increasing global use as amore sustainable alternative to traditional paper. Stone paper is water-resistant, and tear-resistant, and does not require bleaching or chemicals during the manufacturing process. It also has a lower carbon footprint and requires less water and energy to produce compared to traditional paper **(Chae, 2017).** As a result, the hypothesis that follows is developed in light of the literature.

H3: There is a considerable correlation between consumer environmental awareness and stone paper's product features.

4.4 PRICE OF THE PRODUCT (P)

Consumers are more inclined to buy a product when they believe it to be a good value for the money, according to a study published in the Journal of Consumer Research. Consumers are more likely to spend a premium for a product when they believe it to be of good quality, the survey alsorevealed **(Gourville, 2002).** According to a study published in the Journal of Cleaner Production, stone paper is more expensive than conventional paper, which may deter some consumers from using it. The study concludes that the high cost of raw materials and the relatively limited scale of manufacturing, which hinders economies of scale, are to blame for the high price of stone paper**(Song, 2019)**. The same study does, however, suggest that customers who care about the environment and are prepared to pay extra for environmentally friendly goods may be more likely to use stone paper. A poll by Two Sides North America, which indicated that 66% of consumers were willing to pay more for ecologically friendly items, lends weight to this conclusion **(America, 2018).** As a result, a hypothesis is developed in light of the literature.

H4: There is a substantial variance in how much people prefer using stone paper based on productpricing.

4.5 ACCEPTANCE LEVEL OF CONSUMERS (AL)

According to a study that appeared in the Journal of Consumer Research, customers' views towards sustainability and eco-friendliness greatly impacted the things they bought. The study revealed that consumers were more inclined to choose eco-friendly products when they saw themselves as being ecologically responsible **(Chen M.-F. &.-T., 2010)**. Stone paper is a form of environmentally friendly paper created from calcium carbonate, a mineral that occurs naturally. According to numerous research papers, several product factors affect how accepting consumers are of stone paper. One study published in the Journal of Cleaner Production found that consumers' willingness to use stone paper was positively influenced by its eco-friendliness, recyclability, and durability **(Qian, 2020)**. Consumers perceived stone paper as more sustainable than traditional paper, as it does not require deforestation or the use of water in the production process. Another study published in the Journal of Environmental Management found that consumers' acceptance of stone paper was influenced by the paper's texture and writing experience **(Chen X. M., 2019)**. Consumers preferred the smooth texture of stone paper, which was perceived as high-quality, butsome consumers found it difficult to write on the paper due to its slippery surface. Thus, the following hypothesis is formulated in the context of literature.

H5: The characteristics of stone paper's product and the degree of consumer acceptability of the product are significantly correlated.

4.6 CONSUMERS' ENVIRONMENTAL CONCERNS (EC)

Researchers discovered that consumers' environmental concerns positively influenced their propensity to buy eco-friendly products in a study that was published in the Journal of Business Ethics **(Tarkiainen, 2005)**. The study also discovered that consumer perceptions of their own behavioral control and societal norms affected their desire to buy green goods. According to studies, people are more likely to select environmentally friendly products over conventional onesbecause they are concerned about the environment **(Klöckner, 2013).** Consumers, including thosewho buy stone paper, have been found to be prepared to pay more for environmentally friendly goods **(Boulstridge, 2000)**. This demonstrates how consumer environmental concerns may have a substantial impact on the adoption of stone paper as a sustainable alternative to conventional paper. Consumers' environmental concerns were discovered to be the main reason for their purchasing recycled paper products in a survey **(Sörqvist, 2019).** In light of the literature, the following hypothesis is consequently developed.

H6: There are substantial differences in the environmental concerns of consumers depending on how similar they are to the use of stone paper.

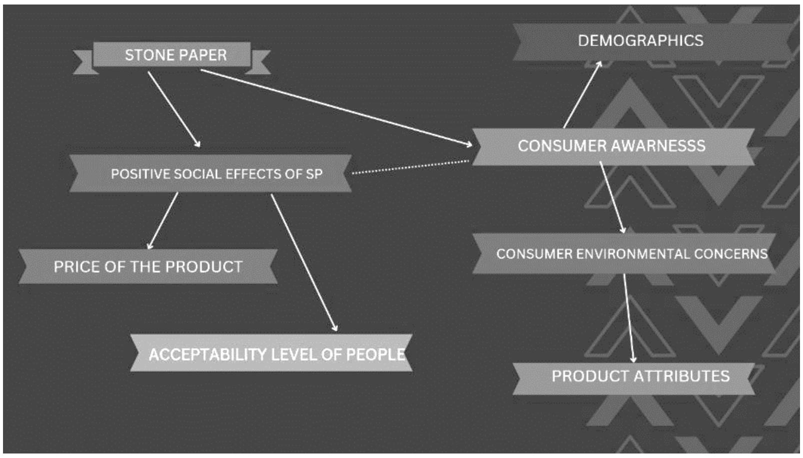
4.7 DEMOGRAPHIC PROFILE OF CONSUMERS

Research published in the Journal of Consumer Marketing found that women were more knowledgeable about green products than men. The study also found that women were more likely to purchase eco-friendly goods and to base their decisions on environmental factors **(De Pelsmacker, 2005).** A study published in the Journal of Consumer Behaviour found that men weremore likely to be skeptical of green marketing claims and were more likely to believe that green products were not worth the extra cost. The study also found that men were more likely to prioritize product performance over environmental concerns when making purchasing decisions **(Luchs M. N., 2010).** Thus, the following hypothesis is formed in context with the literature.

H7: There is a significant difference in consumer awareness about stone paper based on the genderof the respondents.

5. CONCEPTUAL FRAMEWORK

The following Conceptual Framework was developed for this investigation based on the aforementioned Hypothesis:



6. RESEARCH METHODOLOGY

This study employed a descriptive research methodology to gather information from a sample of 300 respondents from Tamil Nadu, India, in order to provide a full understanding of the subject.

The technique of gathering the data, which included a questionnaire, included both primary and secondary sources. The data were analyzed---- using a number of statistical methods, such as mean, T-Test, ANOVA, Chi-Square, and Regression. These innovations allowed for a complete analysis of the data and the provision of illuminating information on the subject.

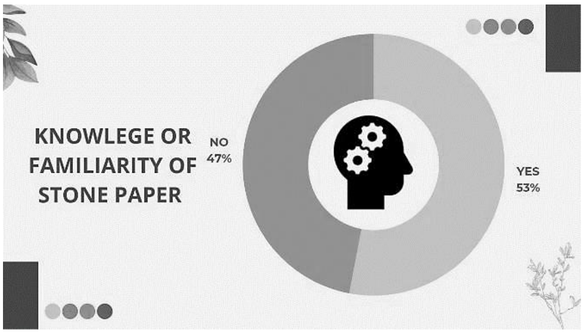
The data was well-organized and manageable thanks to Excel's coding method. The data was thenput into SPSS version 29.0, a powerful statistical software program, for further analysis. As an outcome, the data could potentially be looked at in greater depth, enabling a deeper understandingof the outcomes.

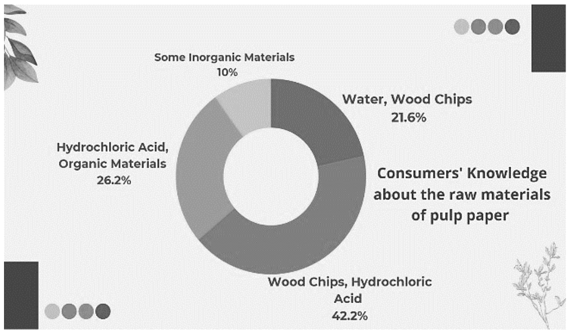
7. DATA ANALYSIS AND HYPOTHESIS TESTING

Several statistical techniques, including Mean, T-Test, ANOVA, Chi-Square, and Regression, were used to analyze the data. These tools made it possible to fully analyze the data and provide up-to-day information. These are the outcomes:

7.1 DESCRIPTIVES OF THE STUDY

[a] Consumers' familiarity with stone paper and their knowledge about raw materials ofpulp paper

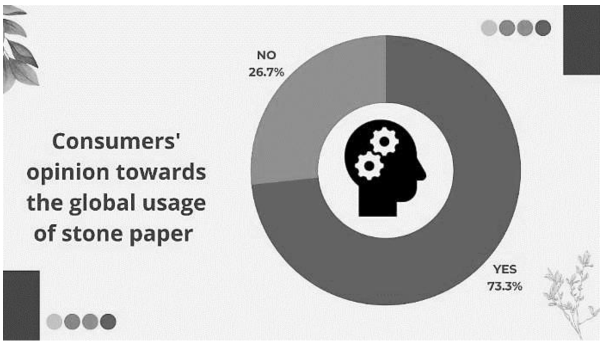




According to the graph above, 53% of the respondents were aware of the stone paper, while 47% were unaware of it. After giving the respondents a quick explanation concerning stone paper, theseresponses were gathered.

We can infer from the above figure that the majority of consumers are unaware of the ingredientsrequired to make pulp paper. Only 21.6% of the buyers knew that the major raw ingredients werewater and wood chips.

[b] Consumers' opinion towards the global usage of stone paper



According to the chart above, 73.3% of the respondents have a favorable opinion of the globalusage of stone paper whereas the rest of the population thinks otherwise.

7.2 RELIABILITY ANALYSIS

VARIABLES OF THE STUDY	NO. OF ITEMS	CRONBACH'S ALPHA	CONSISTENCY OF VARIABLES
CONSUMER AWARENESS	5	0.902	GOOD
ENVIRONMENTAL CONCERNS	5	0.913	GOOD
PRODUCT ATTRIBUTES	5	0.924	GOOD
PRICE OF THE PRODUCT	5	0.925	GOOD
POSITIVE SOCIAL EFFECTS	5	0.897	GOOD
ACCEPTANCE LEVEL	5	0.916	GOOD

According to Cronbach's alpha, the internal consistency reliability increases with the coefficient alpha's proximity to 1.0. More than 0.7 Cronbach's Alpha is regarded as a good and reliable value. According to the analysis, reliability testing for all Likert scales is regarded as being good and dependable.

7.3 HYPOTHESIS TESTING

The hypotheses have been tested using independent samples t-test, regression, and ANOVA. Theresults are as follows.

H1: Awareness among consumers of stone paper and consumer environmental concerns are significantly related. (**RESEARCH OBJECTIVE 1)**

Regression: Relationship between Environmental Concern and Awareness				
β	**R Square**	**F Value**	**t Value**	**Significance**
0.774	.600	446.254	21.125	0.000

There is a substantial relationship between consumer awareness of stone paper and consumerenvironmental concerns because the significance threshold is less than 0.05. We could infer that Consumer awareness of stone paper products is influenced by consumer awareness of theenvironment as a whole.

H2: There is a significant relationship between favorable social effects and consumer acceptance of stone paper. **(RESEARCH OBJECTIVE 2)**

Regression: Relationship between Positive Social Effects and Acceptance				
β	**R Square**	**F Value**	**t Value**	**Significance**
0.89	.670	605.642	24.610	0.000

Positive social effects and consumer acceptance are significantly related because the significance threshold reached is less than 0.05. We could draw the conclusion that there is significant relationship between favorable social effects and consumer acceptance of stone paper.

H3: There is a considerable relationship between stone paper's product features and consumer environmental awareness. (**RESEARCH OBJECTIVE 3)**

Regression: Relationship between Product Attributes and Environmental Concerns				
β	**R Square**	**F Value**	**t Value**	**Significance**
0.869	.755	919.584	30.325	0.000

There is a substantial relationship between consumer environmental concern and stone paper product features because the significance standard is less than 0.05. We can conclude that the stone paper's product characteristics have a favorable impact on consumers' environmental concerns.

H4: There is a substantial variance in how much people prefer using stone paper based on productpricing. (**RESEARCH OBJECTIVE 4)**

Group Statistics					
Likeness to use		N	Mean	Std. Deviation	Std. Error Mean
Price	1	238	4.0353	0.76314	0.04947
	2	62	4.0419	1.09193	0.13868

Independent Samples Test											
Product Pricing & Consumers' Likeness to use the product											
		F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						One-Sided p	Two-Sided p			Lower	Upper
Price	Equal variances assumed	28.533	0.000	-0.055	298	0.478	0.956	-0.00664	0.11991	-0.24262	0.22934
	Equal variances not assumed			-0.045	77.189	0.482	0.964	-0.00664	0.14723	-0.29981	0.28653

There is not a significant difference in consumers' preferences for using stone paper depending onproduct pricing because the p-value is greater than 0.05. Given that this t-test chart's F value is less than 0.05, the significance of this hypothesis is viewed as not assuming equal variances.

H5: The characteristics of stone paper's product and the degree of consumer acceptability of theproduct are significantly related. (**RESEARCH OBJECTIVE 5)**

Regression: Relationship between Product Attributes and Acceptance Level				
β	**R Square**	**F Value**	**t Value**	**Significance**
0.791	.625	497.564	22.306	0.000

Given that the significance level is 0.05, there is a substantial relationship between the stone paper'sproduct features and consumer acceptability of the product. We may conclude that consumer approval of the stone paper is influenced by its product features.

H6: There are substantial differences in the environmental concerns of consumers depending on how similar they are to the use of stone paper. (**RESEARCH OBJECTIVE 6)**

Descriptives								
Environment								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	238	4.1025	0.76632	0.04967	4.0047	4.2004	1.00	5.00
2	62	3.9806	1.16152	0.14751	3.6857	4.2756	1.00	5.00
Total	300	4.0773	0.86207	0.04977	3.9794	4.1753	1.00	5.00

ANOVA					
Environment					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.731	1	0.731	0.983	0.322
Within Groups	221.475	298	0.743		
Total	222.206	299			

Consumers' environmental concerns are not significantly how similar they are to the use of stone paper, as the significance threshold is greater than 0.05. We can draw the conclusion that consumers' concerns about the environment are unaffected by their resemblance to the use of stonepaper.

H7: There is a significant difference in consumer awareness about stone paper based on the genderof the respondents. (**RESEARCH OBJECTIVE 7)**

Group Statistics					
Gender		N	Mean	Std. Deviation	Std. Error Mean
Awareness	1	162	3.8815	0.72628	0.05706
	2	138	4.1978	0.97076	0.08264

Independent Samples Test											
Consumer Awareness & Gender of the Respondents											
		F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						One-Sided p	Two-Sided p			Lower	Upper
Awareness	Equal variances assumed	31.308	0.000	-3.222	298	0.001	0.001	-0.31634	0.09817	-0.50954	-0.12314
	Equal variances not assumed			-3.150	250.360	0.001	0.002	-0.31634	0.10042	-0.51413	-0.11856

Given that the p-value is less than 0.05, there is a significant gender difference in the respondents' responses regarding consumer awareness of stone paper. Given that this t-test chart's F value is less than 0.05, the significance of this hypothesis is viewed as not assuming equal variances.

8. DISCUSSIONS

The research examines various aspects of stone paper, including consumer awareness, positive social effects, product features, purchase intention, and consumer acceptability. Findings reveal that while some consumers are aware of stone paper and its environmental benefits, many are not.Cost is identified as a potential barrier to adoption. The study suggests that increased education and awareness efforts are needed to improve consumer awareness and promote stone paper adoption. The environmental benefits of stone paper, such as reducing deforestation and carbon emissions, have positive social impacts. However, more research is needed to understand the full extent of its social impacts. Stone paper's qualities, such as water resistance and durability, make it appealing to some consumers but can pose challenges for recycling and composting. The environmental effects of stone paper production require further investigation. Pricing may becomemore competitive as production costs decrease and demand for sustainable goods grows. Consumer acceptability of stone paper is increasing with growing environmental awareness, despite its higher price. More awareness and education initiatives may be necessary to accelerate its adoption. Overall, the study highlights the potential benefits and challenges of stone paper as a sustainable alternative, emphasizing the need for further research and education for widespreadadoption.

9. CONCLUSIONS

In conclusion, the market adoption of stone paper is greatly influenced by consumer awareness of the product. Stone paper is a greener option than conventional paper products because of its beneficial social effects on reducing deforestation and greenhouse gas emissions. Stone paper's distinctive qualities, such as its toughness, waterproofness, and recyclable nature, further increase the value of the final product. However, as stone paper can be more expensive than conventional paper products, the cost issue might be a deterrent to adoption. The acceptability of stone paper is significantly influenced by customer environmental concerns since ecologically aware consumers are more willing to investigate sustainable alternatives. Hence, raising consumer awareness of and education about the advantages of stone paper could raise the level of market acceptance for it. All things considered, stone paper has the potential to be a strong substantial substitute for conventional paper goods, with favorable social and environmental effects. However, the cost issue and customer acceptance level must be solved to improve its market penetration.

10. IMPLICATIONS

[A] THEORETICAL IMPLICATIONS

The research on stone paper has significantly contributed to the understanding of sustainable consumption. It has expanded on previously overlooked elements and topics, providing theoretical foundations for effective marketing campaigns and benefiting the literature on innovation acceptance and diffusion. The study has introduced new fields of study, including environmental psychology, and established multiple independent and dependent variables. The findings indicate that consumer knowledge of stone paper is limited, and environmental concern influences their intention to purchase. Moreover, the study has revealed connections between various factors, such as consumer awareness, product characteristics, price impact, consumer acceptance, environmental concerns, and demographic profile. Overall, this research has made a noteworthy contribution to sustainable consumption and holds value for researchers, policymakers, and marketers.

[B] MANAGERIAL IMPLICATIONS

The study on stone paper has important implications for businesses that produce and sell sustainable products. Firstly, it can help companies understand the factors that influence customer acceptance of sustainable products and develop marketing plans that align with consumer preferences. Secondly, the research can guide product development and innovation by identifying key product characteristics that impact consumer acceptance of stone paper. Thirdly, the study can support corporate social responsibility initiatives and sustainability reporting by highlighting the environmental benefits of stone paper and its positive social impact. Overall, the research provides valuable insights into consumer behavior, product qualities, and social and environmental impact, which can aid businesses in creating effective marketing strategies, informing product development and innovation, and enhancing sustainability reporting and corporate social responsibility programs.

[C] SOCIETAL IMPLICATIONS

The study of stone paper has a number of societal repercussions. First of all, it can aid in a better comprehension of the negative effects that traditional paper manufacturing has on the environment and the advantages of utilizing sustainable alternatives like stone paper, thereby influencing regulatory and policy-making frameworks for sustainable goods and materials. Secondly, the research can promote more sustainable lifestyles and consumer behavior by highlighting the benefits of using sustainable products like stone paper and encouraging environmentally responsible choices in daily life. Overall, the research on stone paper can advance knowledge of the environmental effects of conventional paper manufacturing, guide the development of legislative and regulatory frameworks, and encourage consumers to adopt more sustainable practices, ultimately contributing to efforts to safeguard the environment and build a more sustainable future for everyone.

11. SUGGESTIONS FOR FURTHER STUDIES

Due to time and budget limitations, the research was only undertaken by using a questionnaire to collect data. A number of fields are still under evaluation. The study's findings are generic and based solely on a sample of residents of Chennai, India. Future research ideas include gathering data from a considerably larger sample size of 500–1000 participants. Studies can be done on a number of topics, including consumer buying habits, the desire to switch from traditional paper to stone paper, support for stone paper as a Chinese product, and availability. To better understand the findings, more interviews, observations, and schedules might be utilized to document consumer opinions and perceptions

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PERCEPTION AND FUTURE ACCEPTANCE ON METAVERSE

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ABSTACT

The purpose of this research topic is to investigate how people perceive and accept the concept of the Metaverse in the future. Based on perception, awareness, and interest in technology, this paper investigates the future acceptance of the metaverse. This study was carried out with the guidance of a conceptual framework. This study reveals that the perception of the metaverse and its impact on future acceptance has several implications for individuals, organizations, and game developers to consider. It is essential to approach the development and adoption of this technology in an ethical and responsible manner to maximize its benefits while minimizing any negative effects.

Key words: Perception, Future acceptance, Awareness on benefits of metaverse, Level of interest towards technology.

1. INTRODUCTION

The application of technological advancements in a variety of fields significantly raises people's standard of living. It has evolved into a crucial necessity ever since the beginning of the technology era. There have been three major technological advancement waves (Aburbeian, 2022). The world was getting ready to recover from the effects of COVID-19. Mark Zuckerberg, founder, and CEO of Facebook announced the change of the company's name to Meta since October 28, 2021. He announced that business would operate under this new name to assist in creating the Metaverse, a virtual world where anyone may meet whomever they choose (Al-gnbri, 2022). The introduction of metaverse is very helpful in sustainable growth; this study helps in analyzing the economic possibilitiesarising from the metaverse, such as the creation of virtual jobs, digital economies, and new business models. Discussing on the potentials for sustainable economic growth by leveraging the metaverse for remote work, virtual collaboration, and reduced carbon emissions associated with commuting. Metaverse is a new innovative technology in the new world of web 3. It is a high-tech technology that isfull of fresh and creative concepts. It is a platform where people from all over the world can learn, communicate, and socialize. It is a digital platform where virtual streets, malls, study rooms, and so on will be created. It is a hybrid of AR, VR, and MR. It is a virtual interaction with people, but in a very advanced manner using avatars. Avatars play an important role in the metaverse.

For the Metaverse to be successfully developed and implemented, it is important to understand how people view it and if people are interested in this recent technology. It is evident that many previous research papers have concentrated more on the experience of metaverse, its use in one sector and price comparisons etc.…there are very few papers relating to future acceptance, so this study mainly focuses on the people's perception towards metaverse also making people understand its benefits in various sectors. This study also concentrates on how well people can adapt this new technology in their future.

2. RESEARCH PURPOSE

The goal of this study is to analyze how users understand about the metaverse and whether they would be willing to accept it in the future. This article also aims to obtain a deeper understanding of Metaverse's potential benefits as well as to identify strategies for promoting the Metaverse's successful development and implementation.

3. RESEARCH OBJECTIVES

- To study the awareness, perception and future acceptance of metaverse.
- To analyze the level of interest towards technology.
- To study the influence of demographic factors on the awareness, perception and acceptance of metaverse

4. LITERATURE REVIEW

4.1 PERCEPTION

The metaverse is presently becoming increasingly popular in a variety of fields, it is not a new concept,and the significance of the metaverse in the educational area is interpreted using perceptions of the metaverse, which has recently attracted a lot of interest in a variety of fields. These perceptions also actas a compass to provide the academic direction of future domestic metaverse research. Perceptions of the educational use of the metaverse in a digital environment are not only more interactive and active than existing e-learning forms, but also positive in terms of effectiveness, interest, involvement, and sense of presence (Hyungjong Han, 2022).

The perception of the digital reality while the real environment is separating from the reality can be used to define the sense of reality (Demir, 2023). According to studies, customized education is required for each college major because there may be a significant difference in perception of the Metaverse relying on the major (Mustafa, 2022).

This is consistent with the idea that more involvement and funding in the Metaverse would promote the creation of new, related technologies. The degree to which users comprehend and utilize virtual reality, augmented reality, and other social media platforms is a key factor in how they perceive the metaverse (Al-gnbri, 2022). Similarly, how people perceive their own avatar characters may influence the perception of metaverse (Kristine L. Nowak, 2005). Perception positively influences the future acceptance on metaverse.

4.2 FUTURE ACCEPTANCE

The future target market will get contributions from Metaverse. It is believed that after sports companies enter the metaverse field early, providing positive user and target audience experiences will have a significant long-term impact on brand awareness and image but there may be a change of realityin the future. If good projects are developed in the future, they can be much more fun and interesting in metaverse, and the user's acceptance level may reach high (Demir, 2023).

Metaverse will come closer us very soon, Metaverse is helpful in fostering brand loyalty among consumers as well as in the process of growing a community of customers and supporters (Bushell, 2022). Metaverse is a three-dimensional digital reality simulation that replicates real life. It might be considered the next evolution of the internet. Overall, it has a favorable viewpoint towards this technology, which is going to influence the behavior intentions (Aburbeian, 2022).

Users preferred to utilize AR assistance in their future jobs, according to researchers that analyzed user adoption of AR, in large part due to the technology's usability (Bale, 2022). The adoption of the metaverse could be improved in the future by creating relevant teaching and learning techniques or by incorporating it into classes at institutions and teaching and learning development facilities (Mustafa, 2022).

By 2040, according to 54% of the experts, the metaverse will be a considerably more developed, completely immersive, and functional element of daily life for at least a half billion people worldwide (Misirlis, 2023). Based on the previous research papers it is been proven that the future acceptance of metaverse is mostly accepted by many people from various fields.

4.3 AWARENESS ON BENEFITS

Platforms in the metaverse offer possibilities for people to improve their social skills, boost their self-confidence, and maintain relationships. Young users' social self-efficacy is increased when they actively engage in supportive interactions in the metaverse, which helps them feel less lonely (Lee H. O., 2023).

The investigation into the usage of the metaverse in the online environment for elementary education highlighted the significance of teachers' understanding and acceptance of this technology. The degree to which teachers are familiar with resources like the metaverse can have a big impact on how prepared they are to use them in the classroom (Hyungjong Han, 2022).

The metaverse presents both advantages and disadvantages for businesses, especially start-ups. However, companies can leverage 3D worlds to create immersive brand experiences and educate users about complex processes. They can also gather data on target demographics and provide early warnings about potential benefits and drawbacks of future building projects (Bushell, 2022).

VR, AR, and MR technologies are gaining more and more attention in the healthcare. Other than improving the inconvenience of medical and it can also increase the job of the nursing and medical health care services (Hsieh MC, 2018). In 96 percent of the publications, it was said that AR is beneficial for enhancing healthcare education and that by giving students real-world simulation experiences, it boosts students' subjective value (Zhu, 2014).

More marketing and educational efforts are needed to raise public awareness about the potential of the metaverse. As people become more informed about its benefits, excitement about this new form of virtual communication is likely to grow. While several major corporations have already expressed interest in the concept, businesses should exercise caution to avoid mistakes when developing their virtual worlds (Bale, 2022).

The previous papers discussed more about the benefits of metaverse in various sectors and about its awareness.

As a result of the review, the following hypotheses are developed:

H1.1: There is a significant relationship between the perception and awareness on benefits of metaverse

H1.2: There is a significant relationship between the awareness on benefits of metaverse and the level of future acceptance on metaverse

4.4 INTEREST TOWARDS TECHNOLOGY

All students, both genders, must learn the skills required to become users capable of critically analyzing the technologies they use, allowing them to make more informed decisions (Weber, 2005). The arrival of the metaverse era has greatly enriched the network behavior of all types of college students. College students' thoughts and behaviors will naturally change as they grow up in the digital age and are exposed to various digital technologies (Ge, 2022).

The goal of social networks is to connect people who have similar interests and needs. The tag cloud will encourage users to play an active role in their own cultural climate and to incorporate culture into their daily lives (de los Ríos, 2014). When discussing people's interest in technology, the focus is primarily on digital and online environments. Virtual reality technology is critical to the future development of museums. The audience can understand better the ancient buildings in a virtual environment, and it stimulates people's desire to explore ancient buildings (Liu B. W., 2019).

Virtual worlds are also increasingly being used for the purpose of engaging in social networking. Celebrities like Paris Hilton and Justin Bieber have used the Metaverse to connect with their fans and promote their brand they have conducted metaverse concerts and interacted with their fans. Here the people interest towards technology is boosting up (Bushell, 2022). Metaverse introduces VR, AR, and MR in medical and education aims to help health professionals know more about these and becoming interested to improve the quality of medical care via the technology (Hsieh MC, 2018).

A new type of money-making game known as "Play to Earn" has emerged as a result of blockchain technology and rising interest in cryptocurrency (PTE). Since 2017, PTE, the most well-liked type of internet gaming, has attracted a lot of public enthusiasm (Delic, 2022).

The above review papers were discussed more about the various technologies and people interest towards it and, how well technologies are improving to seek the consumers attention even more.

As a result of the review, the following hypotheses are developed:

H2.1: There is a significant relationship between the level of interest towards technology and the futureacceptance on metaverse

4.5 DEMOGRAPHIC FACTORS

Meta Education technologies, believe that education is dependent on that technology, even if there are still wary about Metaverse and Meta Education in general (Misirlis, 2023). Men are typically considered to be more technically minded than women, so gender has a huge impact on whether people will be open to adopting new technology but, in this study, when compared to males, females are more interested in utilizing technological topics (Weber, 2005). Younger generations, such as Generation Z and millennials1, spend more time on social media platforms and online (Lee H. O., 2023). When the price of the technology matches the consumers' expectations, the cost of the Metaverse equipment used to communicate over Metaverse platforms. The only people eager to purchase VR, MR, and AR spectacles are those with high family incomes (Aburbeian, 2022). The commerce student is demonstrated as lack of understanding in metaverse. People who do not take computer-related courses have an average perception of the metaverse (Lee J., 2022).

As a result of the review, the following hypotheses are developed:

H3.1: There is a significant difference in the perception of metaverse based on the majors

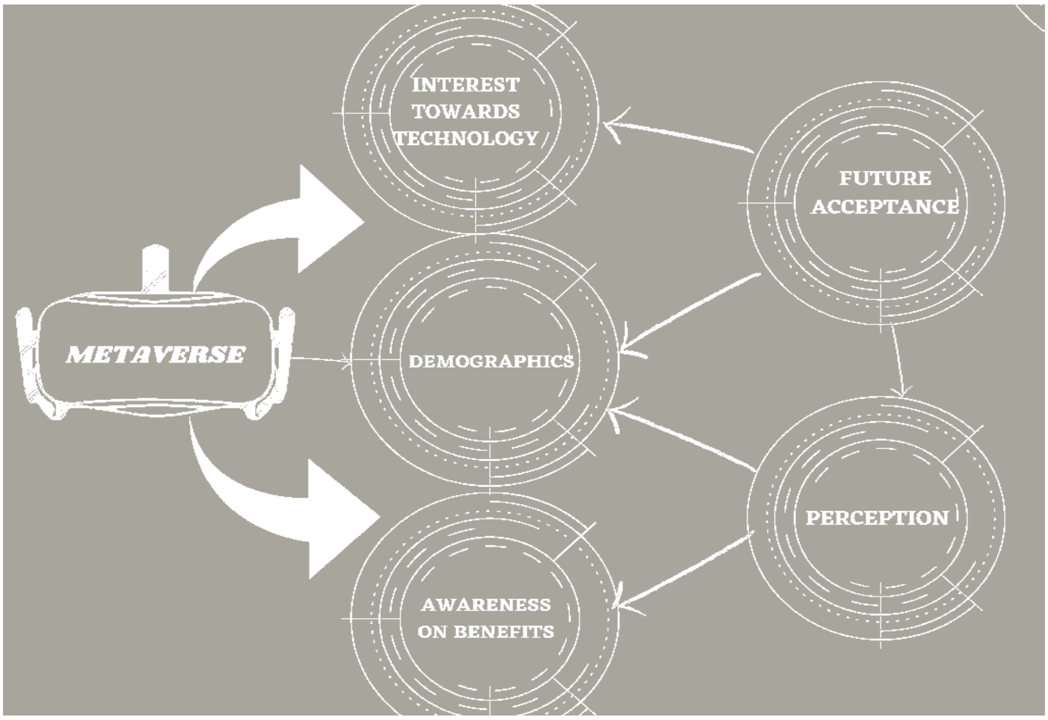
H3.2: There is a significant difference in the future acceptance of metaverse based on the household income

H3.3: There is a significant association between the age and purpose of using metaverse

H3.4: There is a significant difference in the awareness on benefits of metaverse based on the gender.

Based on the hypotheses, the conceptual framework for the research is formulated

5. CONCEPTUAL FRAMEWORK



6. RESEARCH METHODOLOGY

The research purpose for this study is descriptive research, it seeks to identify the connections between the relevant variables. In this study the relationship between the independent variable (perception) and the dependent variable (future acceptance on metaverse) are the main variables. This study collected data through a questionnaire distributed via email and social media to 300 respondents over a two- month period. The questionnaire focused on four main variables: perception of the metaverse, future acceptance of the metaverse, awareness of its benefits, and level of interest in technology. The collected data was analyzed quantitatively, including the calculation of mean scores and the use of statistical tools such as regression, ANOVA, Chi-square, and t-test using SPSS 16.0 software. The demographic profiles of the respondents were also considered during the analysis. The questionnaire consisted of multiple-choice questions and 5-point Likert scales ranging from "strongly disagree" to "strongly agree".

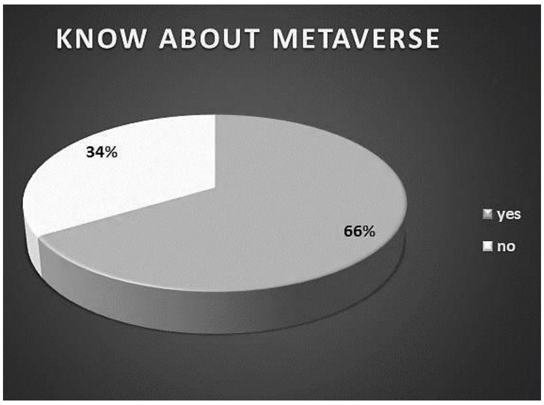
7. RESULTS

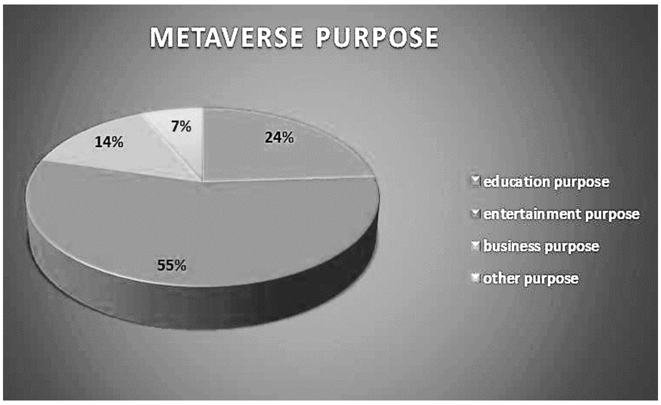
7.1 RELIABILITY TESTING

VARIABLE	NUMBER OF ITEMS	CRONBACH'S ALPHA	CONSISTENSY
Perception	**5**	**0.94**	**GOOD**
Future acceptance	**5**	**0.949**	**GOOD**
awareness on benefits	**5**	**0.947**	**GOOD**
technology interest	**5**	**0.939**	**GOOD**

Reliability and validity were assessed using composite reliability and Cronbach's alpha, with (α) greaterthan 0.7. The dependability of the test variables and testing instruments determines the quality of any research (Joo-Eon, 2021). The alpha coefficient ranges from 0 to 1, and when the coefficient value exceeds 0.7, the scale is said to be reliable. In this study, Cronbach’s alpha is greater than 0.9 it is said that all the scales have good reliability testing.

7.2 DESCRIPTIVES





From the above chart it is evident that 66% of the respondents got to know about metaverse and 34% ofthe respondents were not known about metaverse among those 55% of the respondents were willing to use metaverse for entertainment purpose.

7.3 HYPOTHESIS TESTING

H1.1 Regression analysis showing relationship between the level of perception and awareness on benefits of metaverse.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.428	.105		4.091	.000
	PER_MV	.908	.026	.899	35.520	.000
R		.899				
R Square		.809				
Adjusted R Square		.808				
F		1261.651				
Significance		.000				

A linear regression analysis was conducted to examine the relationship between perception and awareness of the benefits of the metaverse. The hypothesis was found to be significant at p = 0.000, indicating a strong relationship between the variables. The correlation coefficient (R) was determined to be 0.899, suggesting a high positive correlation between perception and awareness of metaverse benefits.

Furthermore, the model summary revealed an R-squared value (R^2) of 0.809, indicating that approximately 81% of the variance in awareness of metaverse benefits can be explained by perception. The beta coefficient (β) was estimated at 0.9, and the associated t-value was 4.091, both of which were significant at p = 0.000.

Given the high correlation coefficients approaching 0.9, it is recommended that multicollinearity be assessed to ensure the validity of the findings. Multicollinearity, one of the five assumptions for linear regression analysis, should be tested to enhance the credibility of the research results.

H1.2 Regression analysis showing relationship between the awareness on benefits of metaverse and the level of future acceptance on metaverse

<table>
<tr><th rowspan="2" colspan="2">Model</th><th colspan="2">Unstandardized Coefficients</th><th>Standardized Coefficients</th><th rowspan="2">t</th><th rowspan="2">Sig.</th></tr>
<tr><th>B</th><th>Std. Error</th><th>Beta</th></tr>
<tr><td>1</td><td>(Constant)</td><td>.578</td><td>0.97</td><td rowspan="2">.908</td><td>5.983</td><td>.000</td></tr>
<tr><td></td><td>AWARE_BEN_MV</td><td>.869</td><td>.023</td><td>37.410</td><td>.000</td></tr>
<tr><td colspan="2">R</td><td colspan="5">.908</td></tr>
<tr><td colspan="2">R Square</td><td colspan="5">.824</td></tr>
<tr><td colspan="2">Adjusted R Square</td><td colspan="5">.824</td></tr>
<tr><td colspan="2">F</td><td colspan="5">1399.483</td></tr>
<tr><td colspan="2">Significance</td><td colspan="5">.000</td></tr>
</table>

A linear regression analysis was conducted to investigate the relationship between the level of awareness of the metaverse and future acceptance of the metaverse. The hypothesis was found to be significant at p = 0.000, indicating a strong relationship between the variables. The correlation coefficient (R) was determined to be 0.908, suggesting a high positive correlation between awareness of metaverse benefits and future acceptance.

Furthermore, the model summary revealed an R-squared value (R^2) of 0.824, indicating that approximately 82% of the variance in future acceptance of the metaverse can be explained by awareness of metaverse benefits. The beta coefficient (β) was estimated at 0.9, and the associated t-value was 5.983, both of which were significant at p = 0.000.

Given the high correlation coefficients approaching 0.9, it is recommended that multicollinearity be assessed to ensure the validity of the findings. Multicollinearity, one of the five assumptions for linear regression analysis, should be tested to enhance the credibility of the research results.

H2.1 Regression analysis showing relationship between the level of interest towards technology and the future acceptance on metaverse

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.508	.101	.903	5.003	**.000**
	TEC_INT	.879	.024		36.258	.000
R		.903				
R Square		.815				
Adjusted R Square		.815				
F		1314.678				
Significance		.000				

A significant linear regression analysis was performed to examine the hypothesis regarding the relationship between the level of interest towards technology and future acceptance of the metaverse ($p = 0.000$). The correlation coefficient (R) was calculated as 0.903, indicating a strong positive correlation between interest in technology and future acceptance of the metaverse.

Moreover, the model summary displayed an R-squared value (R^2) of 0.815, indicating that approximately 82% of the variance in future acceptance of the metaverse can be explained by the level of interest towards technology. The beta coefficient (β) was found to be 0.9, which was statistically significant at $p = 0.000$. Additionally, the associated t-value of 5.003 was also significant.

Given the high correlation coefficient close to 0.9, it is recommended to test for the absence of multicollinearity, one of the essential assumptions for linear regression analysis, to ensure the validity of the findings. Addressing multicollinearity would further enhance the credibility of the research results.

H3.1 ANOVA showing difference in the level of perception based on the major

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	84.127	2	42.064	49.812	**.000**
Within Groups	250.802	297	.844		
Total	**334.929**	**299**			

An analysis of variance (ANOVA) was performed to investigate the differences in the perception of the metaverse based on majors. The results revealed a significant difference among majors, with an F-value of 49.812 ($p < 0.05$). This finding supports the hypothesis that there is a significant difference in the perception of the metaverse based on majors.

H3.2 ANOVA showing difference in the level of future acceptance of metaverse based on the household income

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.304	3	3.768	3.698	**.012**
Within Groups	301.641	296	1.019		
Total	**312.945**	**299**			

An analysis of variance (ANOVA) was conducted to assess the differences in future acceptance of the metaverse based on household income. The results indicated a significant difference among income levels, with an F-value of 3.698 ($p < 0.05$). This finding supports the hypothesis that there is a significant difference in the level of future acceptance of the metaverse based on household income.

H3.3 Chi-square showing association between the age and purpose of using metaverse

	Value	df	Asymp. Sig.(2-sided)
Pearson Chi-Square	33.218[a]	12	**.001**
Likelihood Ratio	31.826	12	.001
Linear-by-Linear Association	15.181	1	.000
N of Valid Cases	300		

An analysis of the association between age and the purpose of using the metaverse was performed using a chi-square test. The results revealed a statistically significant association between age and purpose of using the metaverse ($\chi^2 = 33.218$, $p = 0.001$, $\alpha < 0.05$). These findings support the hypothesis that there is a significant association between age and the purpose of using the metaverse.

H3.4 T-Test showing difference in the level of awareness on benefits of metaverse based on the gender

		Levene's Test forEquality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95%Confidence Interval of the Difference Lower	Upper
AWARE_BEN_MV	Equal variances assumed	.854	.356	3.130	298	**.002**	.38082	.12166	.14139	.62024
	Equal variances not assumed			3.126	295.088	.002	.38082	.12181	.14110	.62054

An analysis of the difference in the level of awareness of the benefits of the metaverse based on gender was conducted. The results indicated a statistically significant difference between genders ($p < 0.05$, $p = 0.002$). These findings support the hypothesis that there is a significant difference in the level of awareness of the benefits of the metaverse based on gender.

8. DISCUSSIONS

The metaverse has gained a lot of attention recently, and while some people have a good understanding of it, others are still unaware of its potential benefits. People who are interested in using social media and other modern technologies are more willing to accept the metaverse in the future. However, lack of awareness is one of the major reasons why people are not ready to accept it. The results of the study showed that most people see the metaverse as a platform for entertainment and gaming, but there is potential for it to be used in education and other sectors as well. Middle-aged people who are not involved in technology may need more education about the benefits of the metaverse to understand its potential for its sustainable growth in the future.

Most respondents utilize online technologies and platforms regularly, and those that do so to communicate with people and make purchases are more interested in using the metaverse. In the future, respondents expressed willingness in using cutting-edge technology like chat GPT, metaverse, etc…

The level of awareness on benefits of metaverse various based on the gender. Engineering students have more knowledge about metaverse than the commerce and science students. So, knowledge among those students is must to gain more educational and employment opportunities. Individuals who earn between 50,000 and 1Lakh and 2 Lakhs per year were open to accepting metaverse in the future. Students and employees in the age group of 18 to 25 were willing to use metaverse for shopping and travelling with friends. Based on results of the entire demographics millennials and Gen Z people have understood more about metaverse and ready to use it and ready to accept it in the future.

9. IMPLICATIONS

The metaverse perception and future acceptance research has three major implications: theoretical, managerial, and technical. It has defined and expanded on components and topics that were and weren't previously highlighted in the studies. The measurement of the metaverse's potential future acceptance has been accomplished due to this study. This theory also states that users may only accept metaverse technology if they understand it to be beneficial and simple to use. Secondly, Managers can design more effective training program and virtual meetings by understanding how individuals understand and communicate with virtual environments. Also, managers can use this research findings to develop marketing strategies that increase metaverse adoption. Third, this study has several technical implications that game developers must consider. Developers can design more immersive and interesting experiences by having a better grasp on how people perceive and engage with virtual environments.

10. FUTURE RESEARCH

Future studies can concentrate on all the Indian states with a sample size of 800-1200. Although respondents' points of view may evolve over time, longitudinal research may be done in the future. This paper discusses more about the advantages of metaverse and its acceptability level in the future. Due to time constraints the negative sides were not discussed in this study. The impact of the metaverse on mental health and development strategies to mitigate any negative effects can be the subject of future studies. To get further information regarding the results, observations, interviews may be undertaken.

10. CONCLUSIONS

This research focuses on analyzing the perception and future acceptance on metaverse. Various review of literature was made to get a clear idea about the variables under study like perception, future acceptance on metaverse, awareness on benefits of metaverse and level of interest towards technology.

In terms of future acceptance, it is likely that the metaverse will become more mainstream in the coming years. Adoption rates are expected to rise as more people become acquainted with the technology and its potential applications. The study of perception and its impact on future acceptance of the metaverse has several implications that must be considered. It is important to approach the creation and adoption of this technology in an ethical and responsible way to maximize its benefits while minimizing any negative effects. So that metaverse can have a sustainable growth in future.

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REVERSE VENDING MACHINE - AWARENESS, ACCEPTABILITY AND IMPACT ON PLASTIC POLLUTION

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ABSTRACT

This research examines the awareness and acceptance level of reverse vending machine and its overall impact on plastic pollution is also assessed. Results revealed that people were aware of RVM's existence and there is good level of acceptance in society. All factors considered correlated with acceptance. Further, its relationship with impact level is also validated under this study. It recommends that government should educate the community and support organizations to install RVM to enhance recycling which successively supports the descendingeconomy.

INTRODUCTION

Recession is predicted to head towards our global economy. On account of war and pandemic, there is a shortfall in productivity rate and subsequent consequences and actions taken therebycreates a threat towards forthcoming growth. Hence, countries around the globe are coming upwith plan of action to shield their economies from plunging position and also to bring down the expected repercussions. Apart from other sectors, waste management also acts as a key tool in economic sustenance. Present price hikes and resource shortage necessitates this function asit could support future supply with resources with cost cutting benefit thereby balancing the demand-supply cycle.

This study primarily focusses on reverse vending machine, a recent innovation propounded towards waste management. It is a recycling mechanism that accepts bottles of any kind in return offers rewards to recycler. It came into existence in 1920 and in India got its first reversevending machine accepting plastic bottles in 2016. RVM was named as "Swachh Bharat Recycle Machine". Currently it is placed at stores, organizations, educational institutions and other public places so that people could manage their wastes in an efficient manner. As per the(CPCB 2015-16) report, Maharashtra stands first in plastic wastes followed by Tamil Nādu andGujarat. They are used at a higher rate in specific single use plastics due to its significant properties. Improper disposal makes it worse and negatively impacts the environment. Among all, bottle waste are the leading generators of plastics. Considering the impact of managing plastics now countries around globe have installed reverse vending machine which helps in controlling pollution and thereby brings in resource optimization.

According to **Ajzen,** positive attitude accelerates individual's interest to undertake a specific activity (Ajzen 1991). Hence, it is important to understand public attitude towards reverse vending machine. But not many studies have been undertaken to explore people's perspective after installation of RVM. This research addresses this gap by investigating awareness and acceptance level and also brings out the factors of acceptance. In addition, its effectiveness over pollution is also covered under this study.

PURPOSE OF RESEARCH

The purpose of this research is to assess the awareness and acceptance level towards reverse vending machine. It also brings out the factors determining acceptability rate and its overall impact on plastic pollution is analyzed.

RESEARCH OBJECTIVES

1. To assess the level of awareness towards the existence of reverse vending machines.
2. To explore the factors influencing the level of acceptability towards reverse vending machines.
3. To examine the reverse vending machine's impact over plastic pollution.
4. To study the demographic profile of Respondents.

REVIEW OF LITERATURE

AWARENESS TOWARDS RVM's EXISTENCE

Level of awareness differs among individuals. Recent generation tend to remain more aware about technological tools. Their percentage is higher in both male and female population (Meena, G.P., Meena, R.L, 2019). (Amantayeva, 2021) has found that awareness level differsbased on one's educational qualification. Increase in level of education elevates awareness. Hypothesis developed under this context are as follows:

H1: Level of awareness towards existence of reverse vending machine in Tamilnadu is positively related with demographic factors.

- **H1 (a)** There is significant association between age and awareness level towards the existence of Reverse Vending Machine in Tamilnadu.
- **H1 (b)** There is significant. association between educational qualification and awareness level towards the existence of Reverse Vending Machine in Tamilnadu.

ACCEPTABILITY AND INFLUENCIAL FACTORS

Maki et al., (2016) has suggested that incentives influence behaviour towards protecting environment. Study by Al Shamsi, S. O. (2021) states that awareness towards plastic pollutionand alternatives to recycle significantly impacts the acceptance level towards reverse vending machines. Further, attitudes play an essential role in user acceptance (Lee, J.D., & See, (2004).The above literature brings out the factors that could impact or influence one's acceptability to adopt a recycling initiative. On the basis of articles reviewed, the following hypothesis has been devised:

H2: Influential factors significantly impact level of acceptability towards reverse vending machine.

- H2 (a) There is a significant relationship between environmental awareness towards plastic pollution and level of acceptability towards reverse vending machine.
- H2 (b) There is a significant relationship between recycling attitude and level of acceptability towards reverse vending machine.
- H2 (c) There is a significant difference in level of acceptability towards reverse vending machine based on the awareness level towards its existence.
- H2 (d) There is a significant relationship between rewards and level of acceptability towards reverse vending machine.
- H2 (e) There is a significant difference in level of acceptability towards reverse vending machine based on availability.

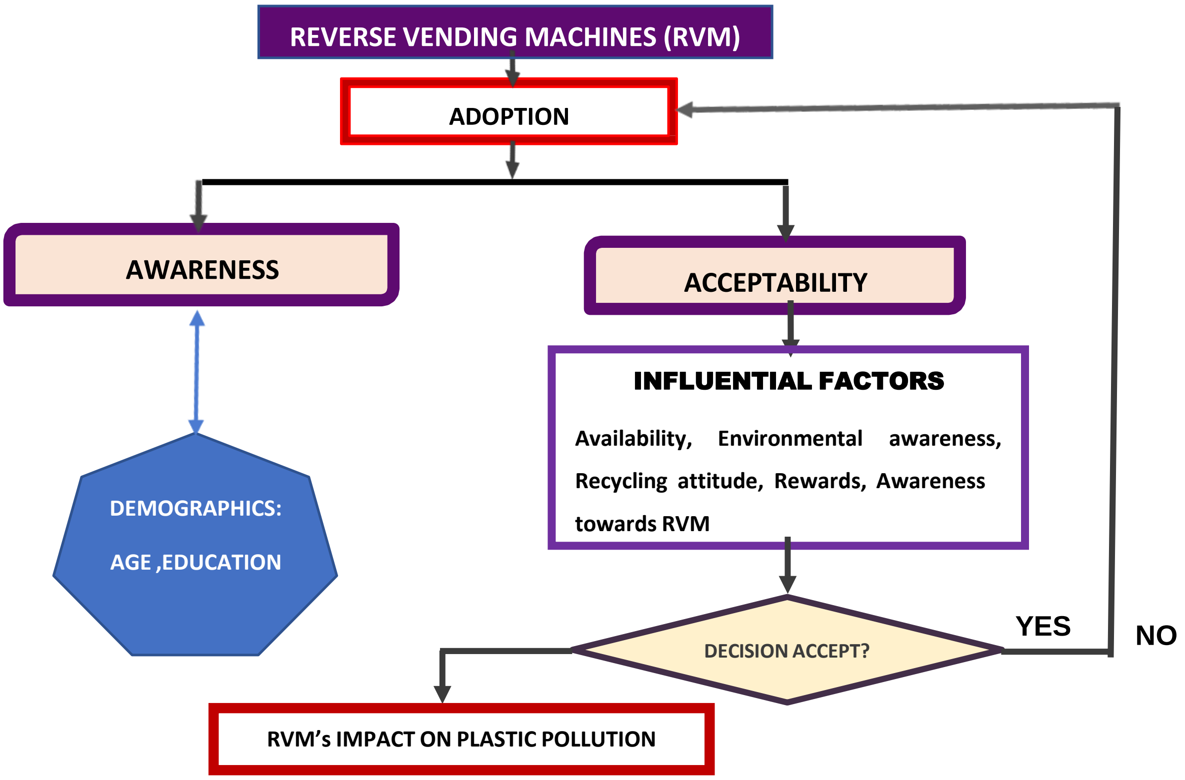
RVM'S IMPACT ON PLASTIC POLLUTION

Reverse vending machine is an effective mechanism that encourages people to manage wastes efficiently (Tomari, R et al., 2017). Mechanical recycling is the key to recycling plastics (Schyns and Shaver 2021). Benefit from investment in this initiative depends upon the user rate and acceptance of the same (Lanseng and Andreassen, 2007).

Based on this the following hypothesis have been developed:

H3: Level of acceptability towards reverse vending machine significantly influences its impact on plastic pollution.

Based on the proposed hypothesis, conceptual framework for the research have beenconstructed.



RESEARCH METHODOLOGY

This study adopts descriptive and analytical design and for selecting sample convenience sampling technique was utilised. Data was collected from 301 respondents within Tamilnadu with the help of a questionnaire which was built using categorical questions and likert scales Recycling attitude scale was taken from Latif, S.A and Omar, M.S (2012). SPSS 21 was used to analyze data and charts were created with the help of MS. Excel.

DATA ANALYSIS

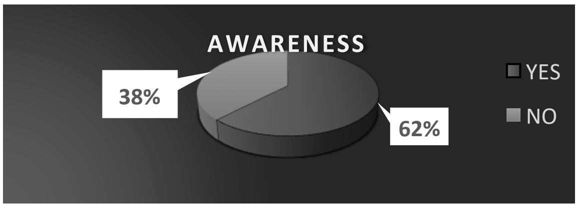
➢ RELIABILITY TESTING

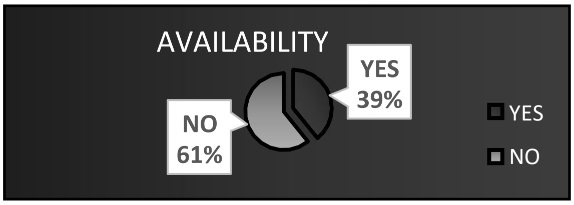
VARIABLE	NUMBER OF ITEMS	CRONBACH'S ALPHA	CONSISTENCY
Environmental awareness	6	0.926	**Excellent**
Rewards	5	0.826	**Good**
Acceptability	4	0.857	**Good**
Convenience	5	0.858	**Good**
Recycling attitude	10	0.734	**Good**
RVM's impact on pollution	6	0.786	**Good**

Cronbach's alpha assess the internal consistency of a group of items. Reliability score of 0.7 or above is acceptable i.e., there is consistency among items. From the above analysis we couldconclude that all likert scales are good and reliable.

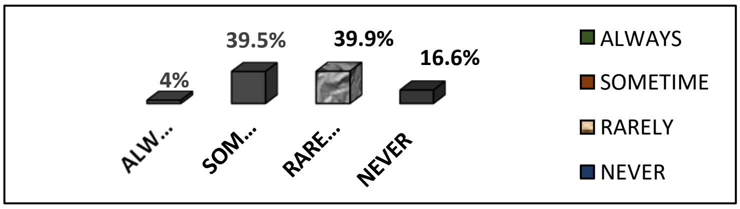
- **DESCRIPTIVES**

AWARENESS TOWARDS RVM's EXISTENCE AND ITS AVAILABILITY





It depicts that out of 301 respondents, 62% of them were aware of reverse vending machine's existence in Tamilnadu and 38% of the respondents were unaware of reverse vending machine existence. It is also clear that for major proportion of population reverse vending machine is not available for their disposal purpose.



FREQUENCY OF RECYCLING

4% of them frequently recycle, 39.5% of respondents recycle occasionally, 39.9% of respondents rarely recycle their wastes and 16.6% of respondents have never tried to recycle their wastes. On comparison, proportion of people who frequently recycle their wastes is at a lower rate.

ACCEPTANCE TOWARDS RVM AND ITS IMPACT OVER PLASTIC POLLUTION

	N	MEAN
Acceptance	301	4.33
Impact	301	4.37

Acceptability and impact level has acquired an acceptable mean score which indicates that people are willing to utilize RVM and it is effective over pollution control.

- **HYPOTHESIS TESTING**

H1: Level of awareness towards existence of reverse vending machine in Tamilnadu is positively related with demographic factors.

- **H1 (a):** Chi square analysis explaining association between age and awareness level towards the existence of Reverse Vending Machine in Tamilnadu.

	VALUE	DF	ASYMP. SIG. (2-SIDED)
Pearson Chi-Square	6.718[a]	3	**.081**
Likelihood Ratio	6.847	3	**.077**
Linear-by-Linear Association	3.575	1	.059
N of Valid Cases	301		

There is no significant association between age and awareness level towards the existence of Reverse Vending Machine in Tamilnadu as it is insignificant at p≥0.05.

- **H1 (b):** Chi square analysis explaining association between educational qualification and awareness level towards the existence of Reverse Vending Machine in Tamilnadu.

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.983[a]	3	**.001**
Likelihood Ratio	17.194	3	.001
Linear-by-Linear Association	3.742	1	.053
N of Valid Cases	301		

There is a significant association between educational qualification and awareness level towards the existence of Reverse Vending Machine in Tamilnadu as it is significant at p≥0.05.

H2: Influential factors significantly impact level of acceptability towards reversevending machine.

- **H2 (a):** Regression analysis explaining relationship between level of environmental awareness and level of acceptability towards reverse vending machine.

MODEL		UNSTANDARDIZED COEFFICIENTS		STANDARDIZED COEFFICIENTS	t	SIG.
		B	STD. ERROR	BETA		
1	(Constant)	1.543	.305		5.066	.000
	ENVAWR	.587	.064	.470	9.207	**.000**
	R					**0.470**
	R SQUARE					**0.221**
	F					**84.765**

22.1% variance in acceptance is explained by environmental awareness. There is a relationship between level of environmental awareness towards plastic pollution and level of acceptability towards reverse vending machine as it is significant at p≥0.05.

- **H2 (b):** Regression analysis elucidating relationship between recycling attitude andlevel of acceptability towards reverse vending machine.

MODEL		UNSTANDARDIZED COEFFICIENTS		STANDARDIZED COEFFICIENTS	t	SIG.
		B	STD. ERROR	BETA		
1	(Constant)	2.843	.290		9.812	.000
	RECYCLING	.352	.068	.287	5.175	**.000**
	R					**0.287**
	R SQUARE					**0.082**
	F					**26.776**

The above analysis displays R value which indicates the strength of relationship whereas R^2value tells us that there is 8.2% variance in acceptance is explained by recycling attitude. Since the obtained p value is lesser than 0.05, there is a relationship between recycling attitude and level of acceptability towards reverse vending machine.

H2 (c): T- test analysis explaining difference in level of acceptability towards reversevending machine based on the awareness level towards its existence.

		F	Sig	t	DF	Sig (2 tailed)
ACCEPTANCE	EQUAL VARIANCES ASSUMED	.001	.981	4.517	299	**.000**
	EQUAL VARIANCES NOT ASSUMED			4.477	242.299	.000

On conducting the t test analysis, it has been proved there is a difference in level of acceptability towards reverse vending machine based on the awareness level as it is significant at $p \geq 0.05$.

- **H2 (d):** Regression analysis explaining relationship between rewards and level of acceptability towards reverse vending machine.

Model		Unstandardized coefficients		Standardized coefficients	t	Sig
		B	S.Error	Beta		
1	(CONSTANT)	3.181	.189		16.793	0.000
	REWARD	.277	.045	.336	6.176	**.000**
	R					**0.336**
	R SQUARE					**0.113**
	F					**38.414**

11.3% variance in acceptance is explained by rewards. There is a relationship between level of reward and level of acceptability towards reverse vending machine as it is significant at $p \geq 0.05$. Hence the hypothesis is accepted.

- **H2 (e):** T -test analysis explaining difference in level of acceptability towards reverse vending machine based on its availability.

		F	Sig	t	DF	SIG (2 TAILED)
ACCEPTANCE	Equal variances assumed	6.780	.010	3.969	299	.000
	Equal variances not assumed			4.060	256.045	.000

On analyzing the result, we could interpret that level of acceptability towards reverse vending machine differs based on its availability as it is significant at $p \geq 0.05$.

H3: Level of acceptability towards reverse vending machine significantly influences its impact on plastic pollution.

MODEL		UNSTANDARDIZED COEFFICIENTS		STANDARDIZED COEFFICIENTS	t	SIG.
		B	STD. ERROR	BETA		
1	(Constant)	2.469	.206		11.982	.000
	ACCEPTANCE	.439	.047	.474	9.314	.000
	R					**0.474**
	R SQUARE					**0.225**
	F					**86.754**

The above regression analysis displays R value which indicates the strength of relationship whereas R^2 value tells us that there is 22.5% variance in impact level is explained by acceptance. There is a relationship between level of acceptability and RVM's impact on plastic pollution as it is significant at $p \geq 0.05$. Hence the hypothesis is accepted.

DISCUSSION

It is explicit from the above research that people are aware of RVM's existence and there is a good level of acceptance towards its utilization. On linking the demographics with awareness, educational qualification was found to have good association whereas age didn't correlate with the above variable. The statistical analysis has also revealed that all factors taken under study possess good relationship with acceptance level Further, it has been proved that RVM is an effective mechanism to address plastic issue and thereby it was strongly related with acceptancerate. As level of acceptance increase, impact level is also increased. This indicates that consistent usage of RVM helps in stimulating recycling rate which in turn aids pollution control and optimize resource management. Additionally, enhancing the recycle practice could steer the economy to a sustainable position.

CONCLUSION

On the basis of results acquired we could conclude that, public attitude i.e., awareness and acceptance play a crucial role towards utilisation of RVM. Awareness towards its existence influences one's intention to accept RVM. Hence, awareness, acceptance and its overall effect on pollution are interlinked. This study also brings out factors which influences acceptance rate. Even though people are cognizant of RVM still they remain reluctant to this recycling practice. So, beyond awareness, equal emphasis needs to be placed over all these factors to enhance public acceptance. Surveys have proved that the concept of offering rewards to recycler stimulates recycling rate which thereby brings in resource optimization. This is significant especially during this current period where economies are heading a downtrend position due to demand-supply crisis. Hence, RVM is an effective initiative not only for addressing environmental issues but also supports the economy to sustain and thrive back from recession. It may be a small step towards waste management but consistent usage of this initiative could bring in extensive benefits for the global economy.

IMPLICATIONS

This research adds value to existing study on exploring people's attitudes and potential impact after implementation of RVM. Not many studies have been put forward under this context hence, it lays foundation for upcoming research. In addition, it provides a new insight on its impact over pollution. Data acquired through this study aids government to comprehend public behaviour and unveiled factors would also guide their efforts in enhancing the acceptance rate Findings have justified that RVM is effective over pollution and it also correlates with acceptance level. But also highlighted its insufficiency for disposal purpose. Availability plays an essential role in improving people's willingness to utilize the initiative offered (Domina and Koch 2002). Hence, reasonable investment and organizational support should be enhanced for expansion of RVM. Further, appropriate efforts persuading acceptance is essential for minimizing pollution. Lastly. business organizations are also benefitted since it directs their decisions in relation to implementation of RVM.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

There are few limitations related to this study. Convenience sampling has been utilized in the research process and limited time was available to carry over this research. Future research could be undertaken on a larger scale that it could be conducted across various states. Time frame of research could be increased to assess changes in behaviour over time. Upcoming studies could attempt to do a comparative analysis of recycling practice before and after implementation of RVM

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ESG (ENVIRONMENTAL, SOCIAL AND GOVERNANCE) AWARENESS AND ITS EFFECT ON THE INVESTMENT PATTERNS OF MILLENNIALS (GEN Y) AND GEN Z IN A RECESSION FORECAST

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ABSTRACT

This study examines the impact of ESG awareness on Millennials and Gen Z investment patterns during recession forecasts. Findings show increased ESG consciousness affects investments, emphasizing environmental and social benefits, and aligning financial goals with personal values. Company type and regulatory framework awareness shape ESG disclosures, while recession predictions and ESG significance influence ESG investing adoption.

INTRODUCTION

ESG criteria are a set of standards that socially responsible investors use to evaluate companies based on their environmental, social, and corporate governance practices. It is a framework that considers environmental, social and governance factors alongside financial factors in the investment decision-making process. Millennials and Gen Z are driving growth in ESG investing as they increasingly prioritize sustainability, social responsibility, and ethical corporate governance in their investment decisions. These younger generations are more inclined to invest in companies that align with their personal values and demonstrate a commitment to addressing pressing global issues such as climate change, social inequality, and fair labour practices. As a result, ESG-focused investment products have gained significant traction, and companies are adapting their strategies to meet the growing demand for transparent and responsible business practices. This generational shift in investor priorities is reshaping the investment landscape and pushing ESG investing into the mainstream. (Nasdaq, 2021)

LITERATURE REVIEW

Pelikánová and Hála (2021) highlight that Gen Z consumers value sustainability and social responsibility but may not actively prioritize CSR activities. Zizys (2021) discusses the limited knowledge on Gen Z and Millennials' socially responsible investments (SRI) habits. Ballester et al. (2019) find that women and managers are more likely to invest in companies with strong ESG performance.

Doni and Johannsdottir (2020) emphasize the importance of ESG ratings for investors to evaluate companies' sustainability and environmental and social impacts. Fan and

Michalski (2020) argue that sustainable factor investing can provide financial returns and positive societal outcomes. Veleva and Bodkin (2018) explore corporate-entrepreneur collaborations for a circular economy.

Amel-Zadeh (2018) suggests that higher-quality ESG disclosures lead to better investment perceptions. Kaiser (2020) explores ESG integration in asset performance and its potential to enhance investment strategies by reducing risk and increasing alpha. Geczy et al. (2020) focus on impact investing, popular among Gen Y and Gen Z, aiming to generate financial returns and positive social or environmental impacts.

Mishra (2020) emphasizes ESG factors' importance during economic downturns, highlighting their role in bolstering resilience, managing risks, and preserving stakeholder trust.

PURPOSE OF RESEARCH

Existing literature primarily focuses on ESG ratings, metrics, and firm performance, with limited research on Millennials and Gen Z investment patterns during recession forecasts. This study, titled "ESG Awareness and its Effect on Investment Patterns of Millennials and Gen Z in a Recession Forecast," addresses the research gap in understanding how these generations incorporate ESG factors into their investment strategies during economic downturns. Previous studies have explored ESG's influence on investor decision-making (Amel-Zadeh & Serafeim, 2018; Ballester et al., 2019), but have given less attention to Gen Z's ESG integration (Mishra, 2020).

This study investigates the relationship between generational identification, demographic factors, ESG regulatory frameworks, and disclosure practices in publicly listed Indian companies, as well as how Millennials and Gen Z balance financial objectives and personal values in ESG investing during recession forecasts. By addressing research gaps, the study provides crucial insights into the changing investment priorities of younger generations, benefiting policymakers, financial institutions, and businesses in understanding and accommodating their ESG investment needs and expectations.

RESEARCH OBJECTIVES

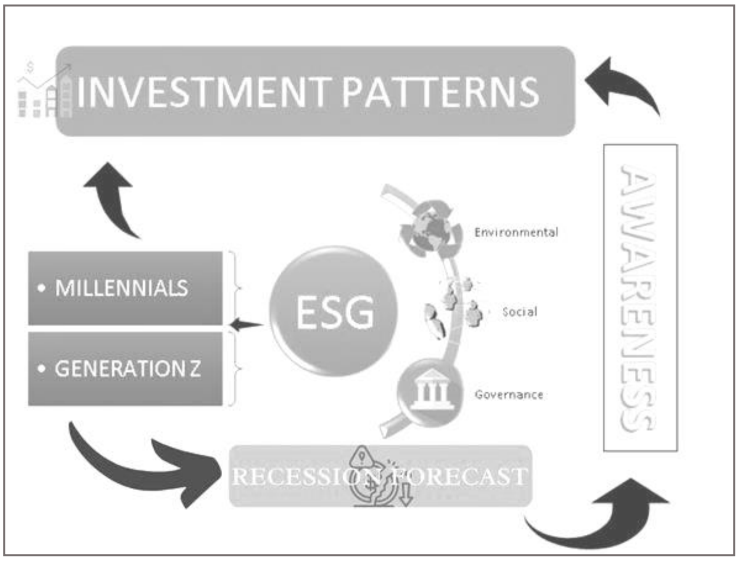
The research objectives of this study are developed as follows:

1. To measure ESG awareness based on generational identification (Gen Y and Gen Z) and demographics.
2. To examine the impact and influence of ESG awareness on the investment patterns and decisions of Millennials and Generation Z.
3. To explore the association between awareness of ESG regulatory frameworks and ESG disclosure practices in publicly listed Indian companies.
4. To investigate the relationship between balancing financial goals with personal concerns and ESG investing.

5. To find the relationship between the importance of ESG in recession forecasts and the adoption of or inclination to ESG

CONCEPTUAL FRAMEWORK

Based on the research study the conceptual framework for the research is charted:



RESEARCH METHODOLOGY

This study utilized an electronic questionnaire via Google Forms, distributed on social media, targeting Gen Z and Millennials. A convenience sampling of 330 respondents, mainly from Tamilnadu, was used to gather data. The questionnaire was designed for clarity, comprehensiveness, and ease of use based on the literature review (Taherdoost, 2022; Saunders et al., 2012). Data reliability and validity were ensured using Cronbach's Alpha, with results above 0.7 considered acceptable. The coded data was analyzed using SPSS, employing Chi-square, ANOVA, regression, and correlation tests.

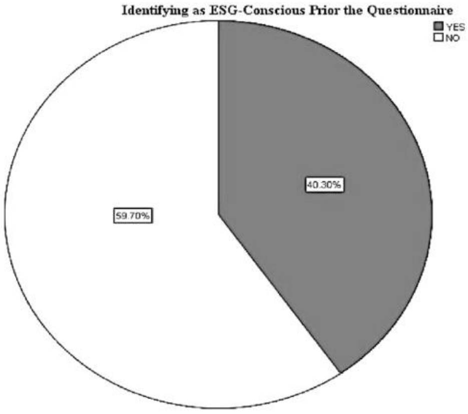
DATA ANALYSIS

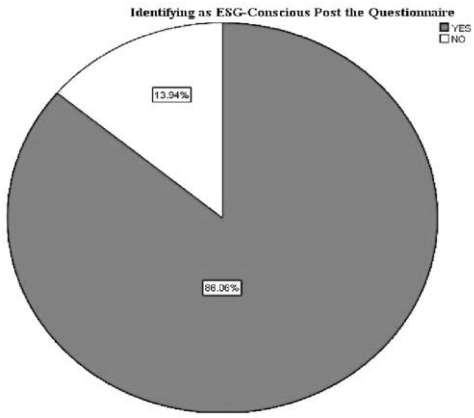
Reliability Testing

VARIABLE - SCALE	CRONBACH'S ALPHA	CONSISTENCY
Awareness of ESG'S Environmental Benefits	.899	Excellent
Awareness of ESG'S Social and Governance Benefits	.927	Excellent
Awareness of the Importance of ESG in Recession Forecast	.894	Excellent
Importance of Balancing Financial Goals with Personal Concerns (Social & Ethical)	.781	Good
Agreement to being ESG-conscious Post Awareness	.905	Excellent

The study exhibited excellent internal consistency for variables related to ESG awareness and recession forecasts, with Cronbach's Alpha values ranging from .781 to .905, indicating the reliability of the measures used.

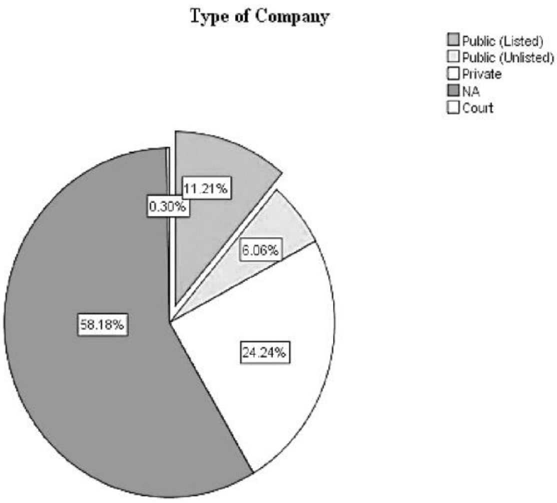
Identifying as ESG-Conscious Prior and Post the Questionnaire

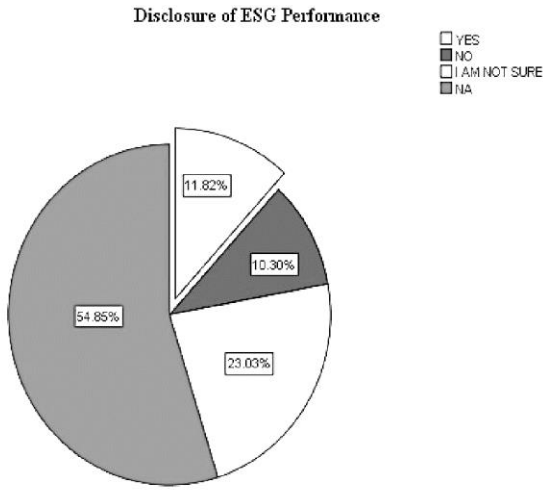




The questionnaire had a significant impact on respondents' ESG-consciousness. Initially, 40.3% were ESG-conscious, which increased to 86.1% after the questionnaire. This demonstrates a positive influence of 45.8% on respondents' ESG awareness.

Type of Company and ESG Disclosure





Among the respondents, 11.2% were from listed public companies, and of those, a similar percentage (11.8%) confirmed ESG performance disclosure, suggesting a possible link between publicly listed companies and ESG disclosure.

Hypotheses Testing

Based on the literature review the following hypothesis have been formulated:

Demographics and Generational Identification:

- H1.1: There is a significant association between ESG awareness and the identification of self-such as Gen Y & Gen Z

- H1.2: There is a significant association between pre-questionnaire ESG consciousness and post ESG-consciousness
- H1.3: There is a significant association between being ESG-conscious post creating awareness and admission of change in the investment patterns of Gen Y and Gen Z
- H1.4: There is a significant association between investment decisions and identification of self, such as Gen Y and Gen Z
- H1.5: There is a significant association between investment decisions and the occupation of the respondents

CHI-SQUARE TESTS			
Pearson Chi-Square	**Value**	**df**	**Asymp. Sig. (2-sided)**
Hypothesis 1.1	11.664[a]	2	.003
Hypothesis 1.2	11.662[a]	1	.001
Hypothesis 1.3	110.542[a]	1	.000
Hypothesis 1.4	70.522[a]	2	.000
Hypothesis 1.5	96.863[a]	10	.000

1. ESG awareness among Millennials and Gen Z is significantly associated ($\chi 2 = 11.664$, $p = .003$).
2. Pre-questionnaire ESG consciousness is significantly linked to post-questionnaire ESG consciousness ($\chi 2 = 11.662$, $p = .001$).
3. ESG-consciousness post-awareness significantly affects Gen Y and Gen Z investment patterns ($\chi 2 = 110.542$, $p < .001$).
4. A significant association exists between investment decisions and Gen Y and Gen Z self-identification ($\chi 2 = 70.522$, $p < .001$).
5. Investment decisions are significantly associated with respondents' occupations ($\chi 2 = 96.863$, $p < .001$).

ESG Awareness and Investment Patterns:

- H2.1: There is a significant difference in the Likert scale under study
- Awareness of ESG'S Environmental Benefits,
- Awareness of ESG'S Social and Governance Benefits,
- Awareness of the Importance of ESG in Recession Forecast,
- Importance of Balancing Financial Goals with Personal Concerns (Social & Ethical) and
- Agreement to being ESG-conscious Post Awareness based on the admission of change in investment patterns post-awareness of ESG

- H2.2: There is a significant difference in the Likert scales under study based on investing in companies whose core activity is to find solutions to major social or environmental challenges

ANOVA					
Likert Scales Under Study	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Hypothesis 2.1	Admission of Change in Investment Patterns Post-Awareness Of ESG				
Awareness of ESG'S Environmental Benefits	43.131	2	21.566	32.918	.000
Awareness of ESG'S Environmental Benefits	49.697	2	24.848	40.618	.000
Awareness of the Importance of ESG in Recession Forecast	31.559	2	15.780	27.277	.000
Importance of Balancing Financial Goals with Personal Concerns (Social & Ethical)	10.167	2	5.084	7.411	.001
Agreement to being ESG-conscious Post Awareness	10.534	2	5.267	8.857	.000
Hypothesis 2.2	Investing in Companies Whose Core Activity Is to Find Solutions to Major Social or Environmental Challenges				
Awareness of ESG'S Environmental Benefits	10.205	2	5.102	6.751	.001
Awareness of ESG'S Environmental Benefits	9.809	2	4.905	6.684	.001
Importance of Balancing Financial Goals with Personal Concerns (Social & Ethical)	22.926	2	11.463	17.718	.000

1. There is a significant difference in all Likert scales under study based on the admission of change in investment patterns post-awareness of ESG (all $p < .001$).
2. A significant difference exists in the Likert scales under study based on investing in companies whose core activity is to find solutions to major social or environmental challenges (all $p < .001$).

ESG Disclosure and Regulatory Framework:

- H3.1: There is a significant association between the type of company and disclosing ESG reports
- H3.2: There is an association between knowing that there exists a regulatory framework for ESG and ESG- disclosures in companies

CHI-SQUARE TESTS			
Pearson Chi-Square	Value	df	Asymp. Sig. (2-sided)
Hypothesis 3.1	238.223[a]	12	.000
Hypothesis 3.2	28.311[a]	3	.000

1. There is a significant association between the type of company and disclosing ESG reports ($p < .001$).
2. A significant association exists between knowing that there is a regulatory framework for ESG and ESG-disclosures in companies ($p < .001$).

Balancing Financial Goals and Personal Concerns:

- H4.1: There is a significant relationship between balancing financial goals with personal concerns and an inclination towards choosing ESG for investments
- H4.2: There is a significant difference in contribution or inclination towards ESG based on income

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
4.1	(Constant)	.860	.167		5.142	.000
	Agreement towards being ESG-Conscious	.696	.045	.651	15.523	.000
R		.651				
R Square		.424				
Adjusted R Square		.422				
F		240.964				
Significance		.000				

There is a significant positive relationship between balancing financial goals with personal concerns and an inclination towards choosing ESG for investments ($R^2 = .424$, $p < .001$).

ANOVA					
Hypothesis 4.2	Sum of Squares	df	Mean Square	F	Sig.
Income	11.488	2	5.744	9.706	.000

There is a significant difference in inclination towards ESG investing based on income levels ($F = 9.706$, $p < .001$).

Recession Forecasts and ESG Adoption:

- H5.1: There is a significant difference in ESG inclination based on the forecast of a recession and the effect on investment
- H5.2: There is a significant relationship between the importance of ESG in a recession forecast and agreement to adopt ESG practices.

ANOVA					
Hypothesis 5.1	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Forecast of A Recession and The Effect on Investment	11.488	2	5.744	9.706	.000

There is a significant difference in ESG inclination based on the forecast of a recession and its effect on investment (F = 9.706, p < .001).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
5.2	(Constant)	2.799	.144		19.417	.000
	Awareness of the Importance of Recession in ESG	.309	.050	.321	6.133	.000
R		.321				
R Square		.103				
Adjusted R Square		.100				
F		37.608				
Significance		.000				

There is a significant relationship between the importance of ESG in a recession forecast and agreement to adopt ESG practices (β = .321, t = 6.133, p < .001).

CONCLUSION

The study found significant associations and differences across various factors related to ESG awareness, investment patterns, and demographic characteristics. ESG awareness among Millennials and Gen Z was significantly associated, as well as pre and post-questionnaire ESG consciousness. ESG-consciousness post-awareness affected Gen Y and Gen Z investment patterns, and a significant association was found between investment decisions and both self- identification and occupation.

Furthermore, significant differences were observed in Likert scales based on the admission of change in investment patterns post-awareness of ESG and investing in companies focused on social and environmental challenges. A significant association was identified between the type of company and ESG disclosures, as well as knowing about the existence of a regulatory framework for ESG and ESG disclosures in companies.

There was a significant positive relationship between balancing financial goals with personal concerns and inclination towards ESG investing. Income levels also significantly influenced the inclination towards ESG investing. Additionally, ESG inclination was significantly affected by the forecast of a recession and its effect on investment, and a significant relationship was found between the importance of ESG in a recession forecast and agreement to adopt ESG practices.

Managerial Implications

This study's findings reveal several implications for managers, financial advisors, and policymakers. Financial service providers should prioritize ESG education and marketing for Millennials and Gen Z (Amel-Zadeh & Serafeim, 2018) to meet their responsible investment preferences (Fernando et al., 2018). Financial advisors should incorporate clients' ethical and social values in investment strategies (Richardson, 2009), enhancing satisfaction and ESG commitment. Policymakers should enforce comprehensive ESG reporting standards (Eccles & Serafeim, 2013), promoting transparency, responsible investing, and sustainable growth.

Theoretical Implications

The results of this study contribute to the growing body of literature on ESG investing and its relationship with demographics, investment patterns, and regulatory frameworks. By examining the various factors that influence ESG awareness and investment preferences, this study advances our understanding of the underlying drivers of ESG adoption (Sulkowski & White, 2020). The significant associations found in this study also support the notion that ESG investing is not solely driven by financial considerations but is also influenced by personal values and ethical concerns (Bauer et al., 2007). This insight can help future researchers develop more comprehensive theories on ESG investing that incorporate both financial and non-financial factors.

Directions for Future Research

Future research could build upon this study by exploring the following areas:

- Investigate the long-term impact of ESG education and awareness initiatives on investment patterns and ESG adoption (Dyck et al., 2019).
- Examine the role of financial advisors in promoting ESG investing and how their recommendations influence client decisions (Cortez et al., 2012).
- Assess the effectiveness of different ESG reporting standards and their influence on investor behavior (Eccles et al., 2012).
- Explore the impact of ESG investing on financial performance and risk management, particularly during periods of economic uncertainty or recession (Lins et al., 2017).

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CONSUMER’S PERCEPTION IN USING ONLINE RIDE BOOKING SERVICES IN CHENNAI

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ABSTRACT

The taxi industry in India has undergone a major breakthrough from being an unorganized sector to the present condition where rides can be booked from anywhere and anytime at the comfort of our own. Due to rapid technological improvements, the needs of consumers can now be met with only a few taps on their mobile phones. The concept of online ride-booking services has eased the lives of consumer’s and has now become a staple. The main purpose of this study is to evaluate the perception of the consumer’s, issues faced by them, and their satisfaction level with regard to the services provided. The results showcase that the perception of the consumer’s vary according to the consumer satisfaction level and the fulfillment of their expectation in the services provided. The major issue being faced by the consumer’s in using ride-booking services relate to the unavailability of rides during peak hours.

Keywords: Ride booking, perception, consumers, issues, satisfaction level.

1. INTRODUCTION

Consumers' lives have been completely changed by smartphone applications. Due to the growth of mobile apps, smartphones have become one of the most important aspects of our life. Our lives are now busier due to the development of technology, making it challenging for us to multitask while being structured. The rise of smartphone applications has improved the organization and eased our daily lives. These applications are widely used, and they include everything from leisure to business. This has transformed our lives to be more condensed, accessible, and time-efficient. In different areas of life, these applications have become quite important. Among these applications, ride-sharing or taxi-booking applications are rapidly emerging and rising.

Ride booking can be simply referred to as calling or booking a vehicle for a journey that could be short or long. The demand for transportation is derived from the need for people and goods to be at a particular place. In satisfying this need, transportation gives people and goods greater value and place utility. In order to avail transportation services, people tend to look for vehicles nearby or around them to travel from one place to another.

It is due to this, there arises the necessity for online ride-booking services through which rides could be booked from the comfort of our own. A person no longer has to run and search for different modes of transportation to reach at a particular destination at the right time.

Online ride-booking services has made it easy for every individual, to book ride services from their mobile phones using dedicated applications such as Uber, Ola, Rapido, etc.

2. RIDE BOOKING SERVICES AND IT'S WORKING

The Oxford Dictionary defines ride booking as "the practice of arranging for travel in a private vehicle driven by its owner for a fee, by means of a website or app".

Ride-sharing platforms connect drivers and vehicles with consumers who want rides at an agreed price. Typically, a customer uses an app on her smartphone to request a ride at a particular time and place. The app on the phone then walks the customer through a series of steps, including the actual or expected price of the ride, the location of the driver, and the likely wait time. It also allows the customer or the driver to contact each other without giving out personal information. These platforms take advantage of GPS to arrange for the ride and help determine a driver's best route. They also provide other benefits for riders and drivers, including measures of rider and driver quality to foster trust, and an efficient payment system, frequently using a credit card that is entered into the platform's database. The platforms also can help balance demand and supply by adjusting prices in real-time to accommodate shortfalls in the supply of drivers or surges in demand.

To get started, users must first create an account with the app provider. Once finished, customers can use the adjacent taxis that are readily available. Once the request is generated, the closest person around will be contacted. In the meantime, passengers can check traffic information, follow the driver's location, and learn the projected time of arrival. Users who open a taxi booking app are shown the availability of cabs in the neighborhood. The GPS is turned on as soon as the application is loaded to track the user's current location.

The concept of offering a distinctive user interface that manages to make users' activities easier is at the heart of taxi app development. The request for a cab is made by the passenger through an online taxi app. When a user opens an app, nearby cabs are displayed to them. them inside the actual map. Once there, consumers need only tap the "book a ride" tab. This causes a ride notification to be sent to the closest taxi driver. Users are informed of the taxi's location and anticipated arrival time after accepting. Users are informed about their ride and are expected to prepare for it once the driver accepts the booking. Users are once more informed of the arrival of their car once the cab arrives at the pickup location. It serves as a notification to the user that the cab is available and that the driver is waiting for the passenger. The user must tell the One Time Password (OTP) shown in the application to the driver, in order to verify the ride and for the journey to begin.

Users have the obligation to rate the ride and the driver as a sign of their Consumer satisfaction when the ride is over. This could indicate if the vehicle, the driver's conduct, the driver's familiarity with the city's roadways, or anything else that a passenger interacts with needs to be improved. These reviews then enable other potential travelers to learn more.

3. OBJECTIVES

- To evaluate the perception of the consumer's with respect to online ride-booking platforms
- To analyze the issues faced by consumer's using online ride-booking apps
- To identify the consumer's level of satisfaction among major online ride-booking apps

4. REVIEW OF LITERATURE

Gupta, A et al. (2022) studied on individuals preference about online ride booking services to examine the various challenges faced by customers using online rides. A structured questionnaire was used to collect data from respondents. Percentage analysis method was used to interpret the data. Gender and age has no bearing in the use of online ride booking services, whereas income plays a significant role.

Paul, P (2021) studied the factors affecting consumers choice in online ride booking services in Banglore. The objective of the research is to give recommendations to the marketing team of online cab service providers targeting the same demographics.\ Regression analysis was used to find the preference of users in different online cab services and Multiple linear regression was used to test the model. It was found that people prefer private cab services over carpooling services. Factors such as price factor, privacy, comfort, environmental friendliness, weather, travel duration, waiting time, ease of booking, offers and cashback don't have an impact on consumer's choice.

Ramasamy, A et al. (2021) observed customer priorities for selection of call taxi in Bhubaneshwar. The major objective of the study was to find the socio-economic and service attribute factors that influence people's choice based on Consumer satisfaction levels in selecting a particular taxi service like Ola and Uber. Descriptive survey was used to collect data which was then analysed using SPSS software, factor analysis method. It was found that socioeconomic and service attribute factors were important in determining the choice of taxi service and people were more sensitive to the reliability of taxi service and cost in comparison to the quality of service and driver's behavior.

Hayder, NB (2020) observed the factors affecting customer satisfaction of Online taxi services in Dhaka. Data was collected through a structured questionnaire and it was analysed using SPSS. From correlation analysis, it was found that price has a positive relationship with customer satisfaction among the other independent variables. Quality and reliability have first and second positive relationship consecutively with customer satisfaction, whereas, comfort has no significant relationship with customer satisfaction.

Justitia, A et al. (2019) identified the level of customer satisfaction and customer satisfaction factors in the online taxi mobile app services in Indonesia. This study is quantitative in nature, using questionnaires and purposive sampling method. The Customer satisfaction Index (CSI) and Important- Performance Analysis (IPA) were used to determine the customer satisfaction factors, with the variables being route detection, connection, interaction, content, and service quality; as well as customer satisfaction, customer's complaint, and customer loyalty. The data was processed using SPSS software and the results showed that the level of customer satisfaction was 76.117% and fell into Cause of Concern category which means that the system performance did not meet customer expectations

5. RESEARCH METHODOLOGY

This study uses primary data gathered through a structured questionnaire distributed online using Google forms. The sample size is limited to 220 respondents, engaging the convenient sampling technique. The data collected was analyzed by percentage analysis and regression using SPSS 29.0.

6. ANALYSIS AND DISCUSSION

Table 1 Demographic profile of the respondents

PROFILE	FREQUENCY	PERCENTAGE
Age:		
Below 18 years	9	4.1
19-25 years	70	31.8
26-49 years	82	37.3
Above 50 years	59	26.8
Total	**220**	**100.0**
Gender:		
Male	131	59.5
Female	89	40.5
Total	**220**	**100.0**
Marital status:		
Single	86	39.1
Married	134	60.9
Total	**220**	**100.0**
Occupation:		
Student	62	28.2
Private employee	112	50.9
Government employee	4	1.8
Others	42	19.1
Total	**220**	**100.0**

Area of residence:		
North	46	20.9
Central	55	25.0
South	119	54.1
Total	**220**	**100.0**
Source: Primary data		

Table 1 shows the demographic profile of the respondents out of which, majority belong to the age group of 26-49 years as they constitute 37.3% and the minority belong to the age group of below 18 years, constituting 4.1%. 31.8% are 19-25 years old and 26.8% are above 50 years of age. 59.5% are male (Majority) and 40.5% are female (Minority). Majority of 60.9% are married and 39.1% are single. Private employees constitute to 50.9% (Majority), students are 28.2%, Government employees 1.8% (Minority) and 19.1% belong to other occupations. 54.1% reside in the southern region of Chennai (Majority), 20.9% in the north, 25% in the central region.

Table 2 Major online ride booking app usage

App usage	Frequency	Percent
Uber	80	36.4
Ola	108	49.1
Rapido	25	11.4
Others	7	3.1
Total	220	100.0
Source: Primary data		

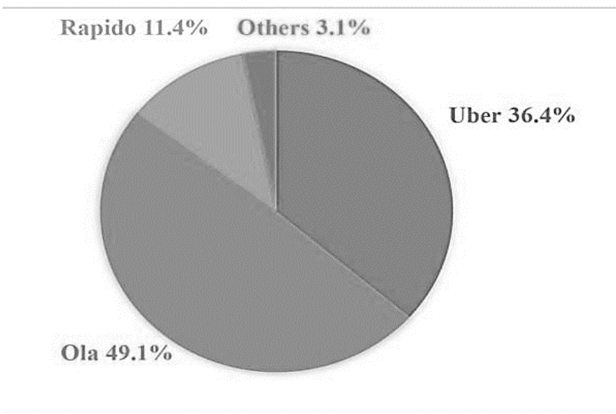

Figure 1 Major online ride booking app usage

From above Table 2, Figure 2 we can observe that the majority of the respondents use Ola to book their rides, as it constitutes 49.1% of the total responses. Whereas, the minority of the respondents (3.1%) use other modes of transport such as the metro, buses, private transport, etc.

App usage frequency	Frequency	Percent
Always	32	14.5
Often	57	25.9
Sometimes	93	42.3
Rarely	32	14.5
Never	6	2.7
Total	220	100.0
Source: Primary data		

Table 3 Frequency of app usage

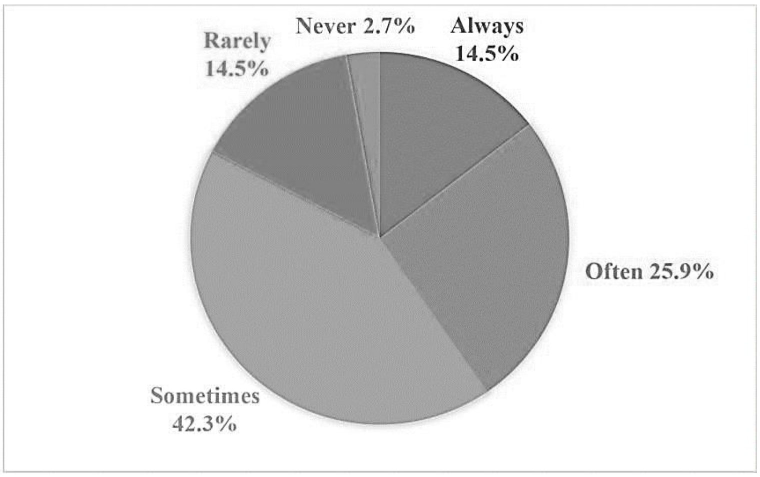

Figure 3 Frequency of app usage

Table 3 and Figure 3 we can analyze that the majority of the respondents comprising 42.3% of the total responses, use online ride-booking services only sometimes. On the other hand, a minority of the respondents (2.7%) never use online ride-booking services.

Pricing	Frequency	Percent
Highly affordable	11	5.0
Affordable	84	38.2
Moderate	93	42.3
Expensive	27	12.3
Highly expensive	5	2.3
Total	220	100.0
Source: Primary data		

Table 4 Pricing of apps

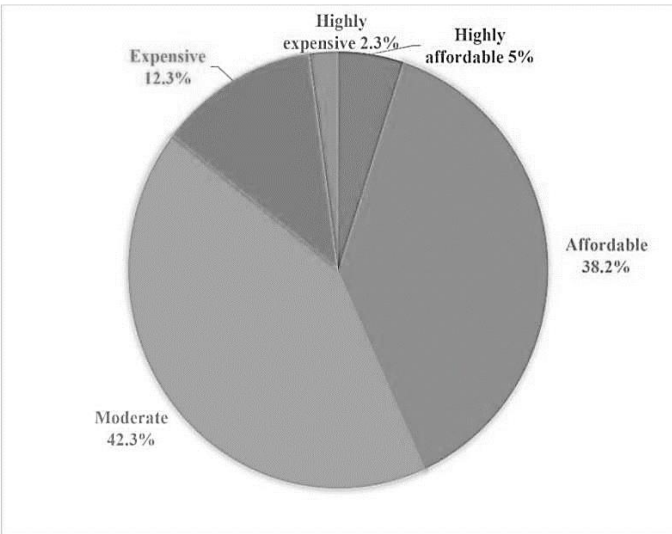

Figure 4 Pricing of apps

From the above Table 4 and Figure 4, we get to know that the majority of the respondents constituting 42.3% of the total responses, find the pricing of online ride-booking services to be moderate. Whereas, a minority of 2.3% find the pricing of online ride-booking services, highly expensive.

Regression analysis

H_{01} There is no significant impact of consumer satisfaction over factors pertaining to the adoption of online ride-booking services

H_{a1}: There is a significant impact of consumer satisfaction over factors pertaining to the adoption of online ride-booking services

Table 5 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.455[a]	.207	.203	4.42457
2	.472[b]	.223	.216	4.38859
a. Predictors: (Constant), CR b. Predictors: (Constant), CR, CRI c. Dependent Variable: Consumer satisfaction				
Source: Primary data **(CR** - Consumer Requirement; **CRI** - Consumer Ride Intention)				

Table 6 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	25.801	1.026		25.138	<.001
	CR	.313	.042	.455	7.535	<.001
2	(Constant)	24.771	1.126		22.005	<.001
	CR	.238	.054	.345	4.386	<.001
	CRI	.165	.077	.169	2.142	.033
a. Dependent Variable: Consumer satisfaction						
Source: Primary data						

It is observed from Tables 5 and 6 that the satisfaction level of the consumers in using online ride-booking services has a significant impact on the consumer's requirement of services and their intention in booking or availing online ride services. The linear regression coefficient R= 0.472, indicates that there is a strong correlation between Consumer requirement of services and consumer ride intention and their satisfaction levels. In terms of variability, R2 = 0.223 or 22.3% of the variation in satisfaction level is due to consumer requirement and consumer ride intention. The coefficient β value implies that there is a positive relationship between the dependent variable. It is revealed that consumer requirement and consumer ride intention have $P < 0.001$, thus rejecting the null hypothesis and accepting the alternate hypothesis. We can say that consumer satisfaction plays a major role in achieving the requirements of the consumer's expectations with regard to online ride-booking services. The level of consumer satisfaction also has a huge part in fulfilling the consumer's intention to choose a certain online ride-booking platform, as it is necessary to accomplish the basic demands of the consumers such as convenience, affordability, reliability, etc. The other factors such as service barriers and service inadequacy have an insignificant impact on consumer satisfaction as they include irrelevant variables such as the issues faced by the consumers in using online ride booking platforms and the inadequate services provided such as unavailability of rides during peak hours or lack of central customer care.

7. CONCLUSION

Online ride-booking services have eased the lives of consumer's with regard to its numerous benefits such as easy and quick access of ride-booking through mobile applications.

Consumer’s using online ride-booking applications can avail their services and transact the charges effectively without the hassle of searching places for a mode of transport.

This study aims in providing an overall perception of the consumer’s using online ride booking services, analyzing the issues being faced by them, and understanding their satisfaction level.

It can be concluded from the analysis and interpretation that most of the consumer’s are quite satisfied with the services provided by online ride-booking applications. Though there are certain trivial issues that are faced as consumer’s in utilizing these services, there is still a lot of scope for improvisation and fulfilling the requirements or expectations of the consumer’s. The perception of the consumer’s plays a key role in the upliftment of ride-booking services, as consumer’s refer to their family and friends through word of mouth which help in creating a bigger target market. In case the consumer’s develop a wrong perception regarding the ride- booking services, it could lead to the downfall of the whole industry that backs by it.

The consumer perception includes two major factors which are consumer requirement and consumer ride intention. Both these factors affecting the perception of consumer’s vary from one age group to another. Young adults would expect the services to be cheap and best, whereas older people would give importance to safety and convenience. Thus, it is necessary to have an all-inclusive plan or offer to satisfy the needs of different sets of people as a whole. Pricing plays a major role in determining service barriers. Since the drivers ask for extra charges over the base rate as they aren't fairly remunerated, consumer’s develop a wrong perception towards ride-booking services as a whole itself, without knowing the insights of the problem. Moreover, cancellation fees being charged when accidentally cancelling a ride or due to other circumstances, disrupt the consumer perception. Pricing proves to be a significant determinant, as it also affects the satisfaction of a consumer. One of the major reasons why consumer’s opt online ride booking services is because of it’s affordability, compared to other conventional methods of travel which indirectly promotes the satisfaction level of the consumer’s. Thus, by resolving the issues faced by consumer’s in adoption of online ride booking services and including different methods to increase the satisfaction of consumer’s would help in the development of an overall positive perception of consumer’s with regard to online ride booking services.

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A STUDY ON WORKPLACE DISCRIMINATION OF CORPORATE WORKING WOMEN

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ABSTRACT

Gender discrimination can present itself in a variety of ways, including lower pay, less opportunities for growth, and exclusion from crucial decision-making processes. Additionally, it may involve harassment, such as unwelcome comments or advances, which makes the workplace inhospitable for women. Discrimination against women has been battled for decades, but it still exists in many professions and organisations. It's critical to establish a secure, welcoming workplace where everyone is valued and respected, regardless of gender. The main purpose of this study is to examine the prevalence of gender discrimination in the workplace and its impact on the efficiency of organisations. The research explores various forms of discrimination, including unequal pay, limited opportunities for career advancement, and ignorance of women at workplace. It also discusses the detrimental impact that workplace discrimination can have on individuals' well-being and organisational effectiveness. Descriptive statistics, factor analysis, and regression analysis were used to analyse the obtained data using SPSS version 29.0. The study concludes that organizations should prioritize Employment Support, Satisfaction, and Parity Level in their efforts to reduce ignorance.

Keywords: Gender discrimination, workplace discrimination, wage difference, glass ceiling, and organisational efficiency.

1. INTRODUCTION

Workplace discrimination refers to unfair treatment or negative behaviour towards an individual or group of individuals in the workplace based on their race, gender, age, religion, sexual orientation, or other protected characteristics. This type of discrimination can manifest in various forms, including unequal pay, limited opportunities for career advancement, exclusion from decision-making processes, harassment, or a hostile work environment. Workplace discrimination can have a detrimental impact on individuals' well-being, organisational effectiveness, and broader social and economic progress. The persistent problem of workplace discrimination against corporate working women has received a lot of attention recently and presents a barrier to the advancement of gender equality and diversity. Women still experience a variety of kinds of discrimination in the workplace, such as unequal pay, few possibilities for professional progression, and a hostile work environment, despite progress being made towards gender parity in many fields. These issues have a significant negative influence on women's wellbeing as well as on the efficiency and productivity of organisations. Research has shown that gender stereotypes and unfair performance reviews are two major reasons why women experience considerable impediments to career advancement across a wide range of professions. Given the pervasive gender norms and biases in the workplace, women frequently find that their access to leadership positions is constrained. Despite major advancements, these preconceptions have been around for a long time and are still prevalent in many companies. As a result, women frequently hold positions with little room for progress and are passed over for leadership positions as well as promotions. In addition to the financial benefits, creating a safe and inclusive workplace is the right thing to do. As stated by the EEOC, "preventing employment discrimination is essential for ensuring equal opportunities in the workplace and fostering a productive and diverse workforce." It is crucial for organisations to prioritize diversity, equity, and inclusion in order to create a workplace culture where all employees feel valued and supported. Women face discrimination in terms of pay, receiving less money for jobs and duties that are similar to those of males. Research shows that the pay gap exists throughout a wide range of 2industries and sectors, making it a substantial problem that has an impact on many women. The disparity in wage has wider socio-economic repercussions for women's families and communities in addition to its personal effects. It can significantly affect a household's capacity to maintain its financial stability and restrict women's ability to move up the socioeconomic ladder. Sexual harassment and gender-based violence are examples of the hostile work environment that is a part of the problem of workplace discrimination against women. These incidents shave a negative influence on women's performance at work as well as their general well-being. This kind of prejudice can produce a negative workplace culture that hinders collaboration and efficiency. The core causes of gender inequality in the workplace must therefore be addressed in order to effectively combat workplace discrimination against corporate working women. To that end, it is important to advance equitable compensation and career possibilities, foster a secure and welcoming workplace, and do away with gender biases and stereotypes in recruiting, promotion, and performance reviews. Organisations can do this to increase their overall efficacy and performance while also ensuring gender equality. Also, fostering a more welcoming workplace environment can benefit organisational outcomes including productivity, innovation, and employee retention. Teams with diversity and inclusivity are more inventive and creative, which improves problem-solving and decision-making, according to research. However, fostering a safe and inclusive workplace is not just the moral thing to do, but it also has major financial advantages for businesses. Moreover, it should be noted that workplace discrimination against corporate workingwomen is a widespread problem that continues to provide a serious obstacle to the advancement of diversity and gender equality. In order to fully address the core causes of gender disparity in the workplace, firms must make a serious effort to develop a more inclusive workplace culture that supports equal pay and career possibilities and does away with gender biases and preconceptions. Organisations can do this to increase their overall efficacy and performance while also ensuring gender equality.

2. OBJECTIVES

1. To determine the workplace discrimination of corporate working women
2. To analyse the in-equal treatment given to working women
3. To assess the impacts of work place discrimination on the overall efficiency of organisations

3. REVIEW OF LITERATURE

Gupta, N (2017) has done a study on private research organisations regarding gender inequality in the work environment. The paper aimed to analyse how and to what extent gender inequalities are reproduced in the organisations employing educated professionals. This paper analyzed gender inequality in Indian organisations through semi-structured interviews of men and women scientists in two private pharmaceutical laboratories. The findings showed reproduction of a gendered normative order through two types of norms and practices: one, norms and practices that favour men and second, socio-cultural norms that devalue women in public spaces which help to maintain masculinity in the workplace.

Arulampalam, W et al (2007) has examined the prevalence of glass ceiling over Europe and has also explored the gender pay gap across the wages distribution. This research found that gender pay gaps are typically bigger at the top of the wage distribution, a finding that is consistent with the existence of glass ceilings and the gender pay gap is typically higher at thetop than the bottom end of the wage distribution, suggesting that glass ceilings are more prevalent than sticky floors. Fourth, the gender pay gap differed significantly across the publicand the private sector wages distribution for each of our EU countries.

Laer, K and Janssens, M (2011) has examined the subtle workplace discrimination experiencedby the ethnic minority professionals. This qualitative study argued that subtle 9 discrimination in the workplace is characterised by three important elements. First, subtle discrimination is ambiguous, and often involves disempowerment through apparent empowering behaviour. Second, subtle discrimination is based on processes of power. Third, subtle discrimination in the workplace is linked to societal structures and discourses, which permeate the workplace through, and are reproduced by, workplace encounters.

Haq, R (2013) has examined the challenges facing women in India due to the intersectionality of gender and other forms of identities impacting on their personal and professional lives by exploring the intersection of gender, colour, caste, ethnicity, religion, marital status, and class as sources of discrimination against women in Indian society and workplaces. The approach discussed the sociocultural traditions that lead up to the complexities of multiple intersections of identity for women living and working in India, offering a paradigm shift from Western issues of gender equality towards understanding women's empowerment issues within the Indian context.

Stamarski and Son Hing (2015) have done an analysis on the effects of organisational structures, processes, practices, and decision makers’ sexism caused by gender inequalities in the workplace. In this paper, they have delineated the nature of discrimination within HR policies, decisions, and their enactment, as well as explore the causes of such discrimination in the workplace.

1. RESEARCH METHODOLOGY

The primary data for this study was collected by distributing structured questionnaires throughgoogle forms. A sample size of **211 respondents** was acquired for this study by using the convenience sampling technique. Percentage analysis and regression analysis were used to analyse the obtained data using SPSS version 29.0.

2. ANALYSIS AND DISCUSSIONPercentage Analysis

Table 1 Classification of the total number of respondents based on Age

Age	Frequency	Percentage
21-30 years	154	73.0
31-40 years	29	13.7
41-50 years	20	9.5
Above 50 years	8	3.8
Total	**211**	**100.0**
Source: Primary Data		

The above table portrays the respondent's age who agreed to participate in the study. We can conclude that the maximum data collected is from the age group of 21-30 which is 73% of thetotal data collected.

Table 2 Classification of the total number of respondents based on Educational Qualification

Educational Qualification	Frequency	Percentage
UG	115	54.5
PG	71	33.6
Diploma	4	1.9
Professional	18	8.5
Others	3	1.4
Total	**211**	**100.0**
Source: Primary Data		

The above table portrays the respondent's educational qualification category who agreed to participate in the study. We can conclude that the maximum data collected is from the 'under graduate' category of which is 54.5% of the total data collected.

Table 3 Classification of the total number of respondents based on Designation

Educational Qualification	**Frequency**	**Percentage**
Top Level Management	26	12.3
Middle LevelManagement	121	57.3
Lower LevelManagement	64	30.3
Total	**211**	**100.0**
Source: Primary Data		

The above table and portrays the respondent's designation category who agreed to participate in the study. We can conclude that the maximum data collected is from the 'middle level management' category of which is 57.3% of the total data collected.

Table 4 Classification of the total number of respondents based on Work Experience

Work Experience	**Frequency**	**Percentage**
1-5 years	140	66.4
5-10 years	23	10.9
11-15 years	9	4.3
15-20 years	16	7.6
20 and above	23	10.9
Total	**211**	**100.0**
Source: Primary Data		

The above table portrays the respondent's work experience category who agreed to participate in the study. We can conclude that the maximum data collected is from the work experience category of 1-5 which is 66.4% of the total data collected.

Table 5 Classification of the total number of respondents based on Income Level

Income Level	Frequency	Percentage
Below 6L	103	48.8
6L - 12L	71	33.6
12L - 18L	17	8.1
18L - 24L	11	5.2
Above 24L	9	4.3
Total	**211**	**100.0**
Source: Primary Data		

Regression Analysis

HO = 0; There is no significant impact of Ignorance of Women at Workplace over Employment Support, Satisfaction Level, Parity Level.

H1 ≠ 0; There is a significant impact of impact of Ignorance of Women at Workplace over Employment Support, Satisfaction Level, Parity Level.

Table 6 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.634[a]	.402	.399	4.21037	.402	140.699	1	209	<.001
2	.695[b]	.483	.478	3.92717	.080	32.230	1	208	<.001
3	.706[c]	.499	.492	3.87319	.017	6.837	1	207	.010
a. Predictors: (Constant), Employment Support									
b. Predictors: (Constant), Employment Support, Satisfaction									
c. Predictors: (Constant), Employment Support, Satisfaction, Parity Level									
d. Dependent Variable: Ignorance									

Table 7 Co-efficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.705	1.096		.643	.521
	EmploymentSupport	.595	.050	.634	11.862	<.001
2	(Constant)	11.046	2.089		5.288	<.001
	EmploymentSupport	.504	.049	.538	10.198	<.001
	Satisfaction	-.439	.077	-.299	-5.677	<.001
3	(Constant)	14.400	2.427		5.934	<.001
	EmploymentSupport	.476	.050	.508	9.536	<.001
	Satisfaction	-.397	.078	-.270	-5.089	<.001
	Parity Level	-.482	.184	-.137	-2.615	.010
a. Dependent Variable: Ignorance						

The above table 5.5.1 and 5.5.2 shows that there is a significant relationship between the independent variables (Employment Support, Satisfaction, and Parity Level) and the dependent variable (Ignorance). The overall model fit, as indicated by the R-squared values, increases as more independent variables are added to the model, from 0.402 in Model 1 to 0.499 in Model 3. The adjusted R-squared also shows that the addition of independent variables improves the model fit.

In Model 1, Employment Support has a positive and significant effect on Ignorance, with a beta coefficient of 0.634, indicating that higher levels of Employment Support are associated with higher levels of Ignorance. In Model 2, the effect of Employment Support on Ignorance remains positive and significant, with a slightly lower beta coefficient of 0.538. Additionally, Satisfaction has a negative and significant effect on Ignorance, with a beta coefficient of - 0.299, indicating that higher levels of Satisfaction are associated with lower levels of Ignorance. In Model 3, the effect of Employment Support on Ignorance remains positive and significant, with a beta coefficient of 0.508, while the effect of Satisfaction remains negative and significant, with a slightly lower beta coefficient of -0.270. The inclusion of Parity Levelas an independent variable shows a negative and significant effect on Ignorance, with a beta coefficient of -0.137.

Overall, the results suggest that organisations can reduce levels of Ignorance by improving Employment Support, Satisfaction, and Parity Level in the workplace.

6. CONCLUSION

In summary, the research was conducted to investigate the factors contributing to ignorance inthe workplace, with a focus on the experiences of women employees. The study utilized a quantitative approach with a survey questionnaire, collecting data from employees working invarious organizations. The results indicated that Employment Support, Satisfaction, and ParityLevel significantly influence Ignorance towards disability in the workplace.

The findings of the research indicated that ignorance in the workplace is prevalent and has a negative impact on organizational outcomes, including employee well-being and organizational performance. The causes of ignorance were found to be multifaceted, including individual and organizational factors. Individual factors included lack of awareness, lack of training and education, and biases and stereotypes. Organizational factors included a lack of diversity and inclusion, inadequate communication, and ineffective policies and procedures.

The results of the multiple regression analysis showed that three factors, namely EmploymentSupport, Satisfaction, and Parity Level, significantly influenced Ignorance. The inclusion of these factors in the model improved its predictive power and explained a significant proportion of the variance in Ignorance. The regression analysis revealed that higher levels of Satisfactionand Parity Level were associated with lower levels of Ignorance.

Based on the findings of the research, several strategies were suggested to address the issue of ignorance in the workplace. These suggestions included increasing diversity and inclusion, providing training and education, improving communication, and implementing effective policies and procedures. The implementation of these strategies would require the support andcommitment of both employees and management.

In conclusion, the findings of this research highlight the importance of addressing ignorance in the workplace to promote employee well-being and organizational performance. The research suggests that individual and organizational factors contribute to the prevalence of ignorance and that the implementation of specific strategies can help reduce its prevalence.

The findings of the regression analysis indicate that Employment Support, Satisfaction, and Parity Level significantly influence Ignorance, suggesting that organizations should prioritizethese factors in their efforts to reduce ignorance.

Overall, this research provides a contribution to the literature on ignorance in the workplace and provides practical recommendations for addressing this issue. It is recommended that future research investigate the effectiveness of specific strategies in reducing ignorance in the workplace and explore the impact of ignorance on other organizational outcomes, such as turnover and job satisfaction. By addressing ignorance in the workplace, organizations can create a more inclusive and productive work environment that benefits both employees and the organization as a whole.

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A STUDY ON THE INFLUENCE OF YOUTUBEADVERTISING ON CONSUMER'S COGNITIVE BEHAVIOUR

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ABSTRACT

Companies can use digital media in promoting their business on social media like YouTube, Facebook, Instagram. With the rise of digital platforms, effectiveness of advertisements has become an important area of study for marketers to determine the most efficient and appropriate medium of communication to place their advertisements. The constructs like emotional appeal, interactivity, informativeness, brand awareness, creativity, irritation, were considered to affect the attitude, which in turn influenced the behavioural intention of consumers. This study investigated the factors that affect the YouTube advertising value and its effect on purchasing intention and brand awareness. This study attempted to inspect the exposure to YouTube advertisements among general audience on their cognitive attitudes (brand knowledge, purchase intention, recall of advertising message), behavioural intentions and to examine the relationships among these variables as well. Primary data from consumersand secondary data from journals and books were used to do this analysis. For this study, 220 sample were collected from general customers to analysis of data. This research employed a non-probability convenience sampling approach for its data collection. The statistical tools carried out in this research are Descriptive statistics Analysis, Factor Analysis, Pearson's Correlation, and Regression analysis to know the relationship between the variables and its impact on consumer buying behaviour. The results show that informativeness, interactivity, effectiveness, brand knowledge are the strongest positive drivers in creating brand awareness and consumer buying behaviour, whereas consumer buying behaviour isn't influenced by irritation while watching ad and also effectiveness and irritation didn't impact in creating brand awareness. This study will certainly help in gaining better insights into the consumers' perception towards YouTube advertisements and will assist the marketers in framing effectiveadvertisement strategies.

Keywords:

YouTube advertising, brand awareness, feedback, advertising effectiveness, purchase intention

1. INTRODUCTION

Nowadays, we have been faced with an increasing number of people who are spending tremendous amounts of time all around the world on YouTube. YouTube is a content community that was founded in 2005 which allows users to post, view, comment and link to videos on the site. It is the third most visited website in worldwide, with recording over one billion monthly visitors who watch more than six billion hours of video monthly, and are highlyengaged in liking, sharing, and commenting on videos on YouTube. It is the second largest search engine in the world and a great way to build trust and brand awareness by highly influencing the consumers. On YouTube, people can discover videos in various ways (for example, by searching on the YouTube search page, clicking suggested videos on the watch page, or choosing a video from the homepage feed). YouTube ads are one of the most effective ways of getting engaging video content in front of a targeted, engaged audience. A company'smessage is carried by advertising media to reach the unknown group. YouTube can facilitate discovery of and engagement (shares, comments, and likes) with advertisements by promotingthe brands using YouTube advertising and hosting them on a YouTube curated profile page. When choosing YouTube as an advertising platform, viewers' attention usually needs to be captured in the first 5 seconds of the ad. An advertising campaign takes the latest items to the consumer's attention and allows them to meet their needs, saving customers' time, commitment, and resources when seeking appropriate information for their needed products. YouTube is a powerful platform that can educate consumers, increase purchase intent and drive sales. Also, advertising increases the consumer's living standard by enhancing their appetite for a selectionof high-quality goods, since branded items generally have to be subjected to a rigorous qualitycheck before making its way to the market. This study will certainly help in gaining better insights into the consumers' perception towards YouTube advertisements and their buying intention and brand awareness as well.

2. EFFECT OF YOUTUBE ADS ON CONSUMERS

YouTube ads can have several effects on consumers, both positive and negative. Some of the positive effects include: YouTube ads can increase awareness of products or services, especially for new or lesser-known brands. They can also help to build brand recognition and familiarity. It encourages engagement with the brand and its offerings, leading to increased interest, consideration and ultimately, sales. YouTube ads can have a persuasive influence on consumers' attitudes and behavior towards the brand or product/service being advertised. It isthe world's largest video sharing platform with over 2 billion monthly active users. Advertisingon this platform can help brands expand their reach and connect with a wider audience. However, there are also potential negative effects of YouTube ads on consumers, including: YouTube ads can be intrusive and disrupt the viewing experience for users, potentially causing annoyance and frustration. Some users may view YouTube ads with skepticism and distrust, especially if they feel that the ads are not being honest or transparent. Constant exposure to adson YouTube can lead to ad fatigue and make consumers less receptive to messaging. Collectingpersonal data from consumers for targeted advertising purposes can raise privacy concerns among some consumers. Overall, the impact of YouTube ads on consumers will depend on various factors such as the quality of the ad, the relevance of the ad to the viewer, and the brandor product being advertised.

3. BRAND AWARENESS

Brand awareness is related to the functions of brand identities in consumers' memory and can be measured by how well the consumers can identify the brand under various conditions. The consumer's ability to recognize or recall a brand is central to purchasing decision-making. Purchasing cannot proceed unless a consumer is first aware of a product category and a brand within that category. Awareness does not necessarily mean that the consumer must be able to recall a specific brand name, but they must be able to recall enough distinguishing features forpurchasing to proceed. Creating brand awareness is the main step in advertising a new product or bringing back the older brand in light. Brand awareness plays an important role in the consumer's purchasing decision-making process. Strong brand awareness can be a predictor ofbrand success. Brand awareness is strengthened by its brand-related associations such as the consumers' evaluation of the brand and their perceived quality of the brand. Consequently, brands focus on improving customer satisfaction and invest in advertising to increase consumers' brand awareness. Brand awareness is a key indicator of a brand's market performance. Brands competing in a highly globalized market invest in global advertising and distribution to compete for consumers' attention and awareness. As the capitalism and global transport contribute to consumer behavior, many marketers regularly monitor brand awarenesslevels. If these levels fall below a predetermined threshold, the advertising and promotional effort is intensified until awareness returns to the desired level. In marketing planning and brand management, it is important to set objectives to promote brand awareness to motivate consumers to purchase a given brand's products. Brand awareness is one of the major brand assets that adds value to the product, service or company. Investing in building brand awareness can lead to sustainable competitive advantages, thus, leading to long-term value. The consumer's ability to recognize or recall a brand is central to purchasing decision-making. Purchasing cannot proceed unless a consumer is first aware of a product category and a brand within that category. Awareness does not necessarily mean that the consumer must be able to recall a specific brand name, but they must be able to recall enough distinguishing features for purchasing to proceed. Creating brand awareness is the main step in advertising a new product or bringing back the older brand in light.

4. INFLUENCE OF ADVERTISEMENTS ON PURCHASE INTENTION

The effectiveness of advertisement depends on attention, interest, desire, and action model, where action is the desire leading to purchase. Also, the number of views could determine howfar the ad gained attention on YouTube and the likes it gained validate interest (audio, video, content, and message appeals) based upon the characters persuading the viewers. Effectivenessof advertisements on YouTube was explained as a set of multimodal frameworks where framework stands for a joint representation of auditory, visual as well as textual patterns whichis developed with the help of multimedia signal processing and natural language processing tools by using the extracts of temporal patterns forming the content of the advertisements. Entertainment, informativeness, customization (viewer can customize the information as it suits them) was found to have a positive, and irritation had a negative effect where effect on advertising value advertising value was defined as a subjective evaluation of value attached tothe advertisement. YouTube advertisements can have a significant impact on consumers' purchase intentions. The constant exposure to ads while watching videos can create brand awareness and familiarity, which can lead to a greater desire to make purchases from the advertised brands. Furthermore, YouTube ads can be tailored to specific audiences based on demographics, interests, and behaviours, making them more relevant and appealing to potential customers. This can increase the likelihood of consumers clicking on the ad and making a purchase. The quality of the video or the gear used for video making doesn't matter in marketing a product online, but the authenticity of the advertisement and the way it is presenteddoes. For the proper marketing of a product through any social media, the strategy is to providewhat the viewer is interested to watch. In conclusion, YouTube advertisements can be a powerful tool for businesses to influence purchase intention by creating brand awareness, targeting specific audiences, and using influencers or celebrities to endorse their products.

5. OBJECTIVES OF THE STUDY

- To study the perception of consumers towards YouTube advertisements
- To identify the impact of YouTube advertisements on consumer buying behaviour
- To analyse the brand awareness through YouTube marketing

6. RESEARCH METHODOLOGY

The primary data for the study was collected through distributing questionnaires as a research instrument to acquire and explore data relevant to the topic. The sample size of this study is 220 respondents. This research employed a non-probability convenience sampling approach for its data collection. The data collected was analyzed by percentage analysis, correlation andregression analysis using SPSS.

7. ANALYSIS AND DISCUSSION

Table 1 Demographic profile of the respondents

PROFILE	FREQUENCY	PERCENTAGE
Gender		
Male	68	30.90%
Female	152	69.10%
Total	220	100.00%
Age		
Below 20 years	26	11.80%
20-30 years	157	71.40%
31-40 years	25	11.40%
Above 41 years	12	5.50%
Total	220	100.00%

Occupation		
Student	153	69.50%
Employed	48	21.80%
Self-employed	10	4.50%
Unemployed	9	4.10%
Total	220	100.00%
Educational qualification		
Schooling	26	11.80%
UG	141	64.10%
PG	52	23.60%
Qualified Professionals	1	0.50%
Total	220	100.00%
Marital status		
Married	53	24.10%
Unmarried	167	75.90%
Total	220	100.00%
Source: Primary Data		

Table 1 illustrates the demographic profile of the respondents in which female respondents were in majority with 69.10% as compared to males who made up only 30.90%; majority 71.40% of respondents fall under the category of 20-30 years of age, 11.80% of were under 20years old, 11.40% constitute the 31-40 years old group and the remaining 5.50%, over 41 years old; majority of the participants, 69.50%, were students followed by employed individuals at 21.80%. Self-employed and unemployed people made up a smaller percentage of 4.50% and 4.10%, respectively; majority 64.10% of respondents were undergraduates, 1.80% of the respondents were school students, 23.60% were post graduates and 0.50% were Qualified Professionals; majority 75.90% of the respondents were unmarried and remaining 24.10% of the respondents were married.

Table 2 Purchase decision based on YouTube Reviews

Particulars	**Frequency**	**Percentage %**
Yes	150	68.20%
Maybe	44	20.00%
No	26	11.80%
Total	220	100.00%
Source: Primary Data		

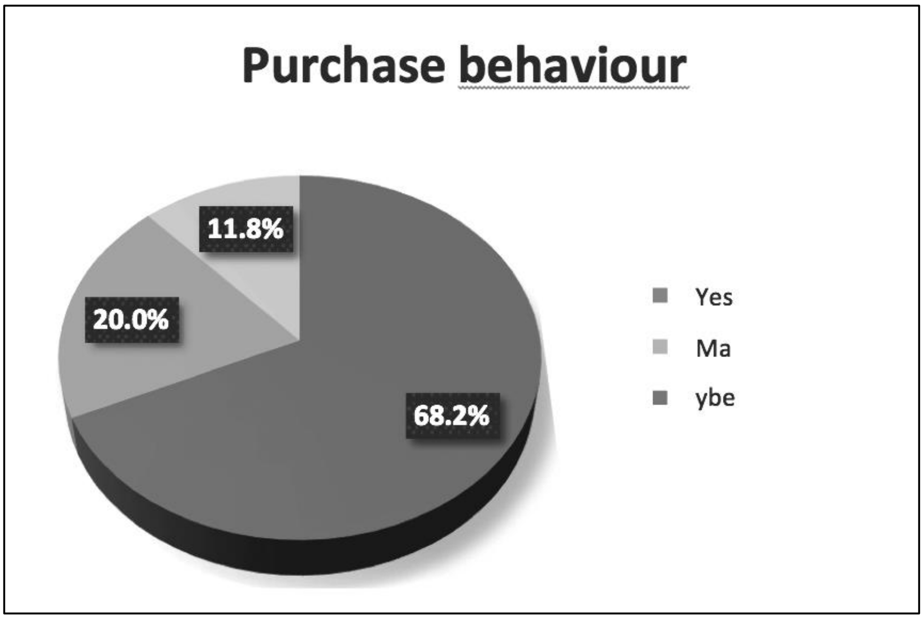

Figure 1 Purchase behaviour

From the table 2 and figure 1 above express that 68.2% of people claimed that YouTube reviews affected their purchase decisions significantly, 20% thought it had some impact on their buying behaviour whereas 11.8% said it had no bearing on their decision-making process. It is evident that many people turn to YouTube reviews before making a purchasedecision.

Table 3 Visual content with monetary rewards (coupons, discounts) attract attention instantly

Particulars	Frequency N	Percentage %
Yes	129	58.6%
Maybe	53	24.1%
No	38	17.3%
Total	220	100.0%
Source: Primary Data		

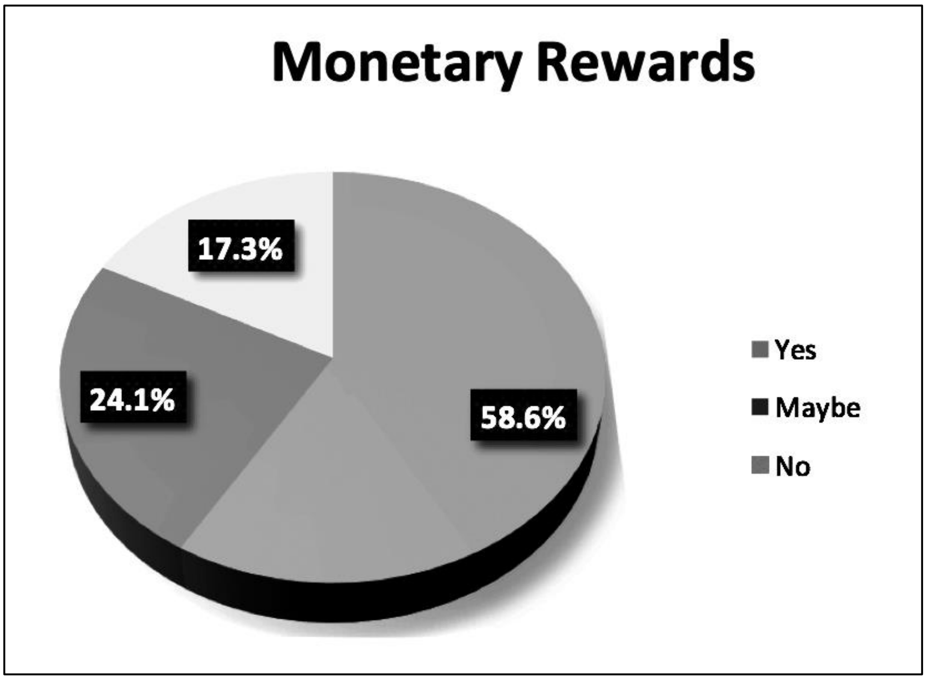

Figure 2 Monetary Rewards

From the table 3 and figure 2 indicate that 58.6% of respondents being driven by monetary rewards in advertisements, 24.1% partially influenced, and 17.3% not at all swayed by the rewards. Therefore, it is clear that incentives like discounts and coupons are highly effective inmotivating individuals to purchase products.

Table 4 Preference to buy products based on YouTube advertisements

Particulars	Frequency N	Percentage %
Definitely	88	40.0%
Probably	86	39.1%
Definitely not	46	20.9%
Total	220	100.0%

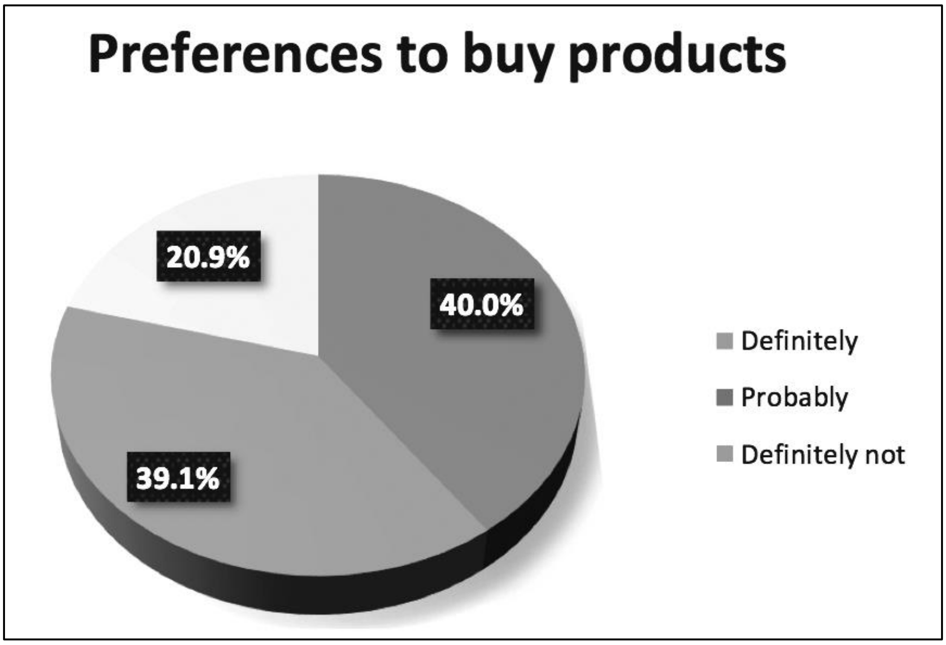

Figure 3 Preferences to buy products

Table 4 and Figure 3 above, indicates a substantial majority of respondents 40.0% are definite to buy products based on social media advertisements, 39.1% are likely to buy products. Only 20.9% said there is no possibility for them to make such purchases. It is clear from the evidence that when people are exposed to ads, they are more likely to purchase products.

Correlation analysis

H_0: There is no significant relationship between demographic variables and YouTube advertising value on consumers cognitive behaviour

H_1: There is significant relationship between demographic variables and YouTube advertisingvalue on consumers cognitive behaviour

Table 5 Karl Pearson correlation coefficient between the demographic variables and YouTube advertising value on consumers cognitive behavior

		G	A	O	E	M	IN	CB	INT	EF	BA	IR
G	Pearson Correlation	1										
	Sig. (2-tailed)											
A	Pearson Correlation	-0.1	1									
	Sig. (2-tailed)	0.08										
O	Pearson Correlation	-0	.639 **	1								
	Sig. (2-tailed)	0.7 6	.000									

E	Pearson Correlation	0.09	-0.1	-.220**	1							
	Sig. (2-tailed)	0.17	0.13	.000								
M	Pearson Correlation	0.06	-.665**	-.740**	.191**	1						
	Sig. (2-tailed)	0.37	.000	.000	.000							
IN	Pearson Correlation	-.151*	.174**	.198**	-.193**	-.271**	1					
	Sig. (2-tailed)	0.03	0.01	.000	.000	.000						
CB	Pearson Correlation	-.145*	.217**	.200**	-.194**	-.257**	.881**	1				
	Sig. (2-tailed)	0.03	.000	.000	.000	.000	.000					
IN T	Pearson Correlation	-0.1	.174**	.143*	-0.1	-.176**	.558**	.576**	1			
	Sig. (2-tailed)	0.28	0.01	0.03	0.2	0.01	.000	.000				
EF	Pearson Correlation	-0	.165*	.154*	-.143*	-.180**	.682**	.688**	.426**	1		
	Sig. (2-tailed)	0.51	0.01	0.02	0.03	0.01	.000	.000	.000			
BA	Pearson Correlation	-0.1	.155*	.147*	0.12	-.142*	.445**	.431**	.450**	.322**	1	
	Sig. (2-tailed)	0.34	0.02	0.03	0.08	0.04	.000	.000	.000	.000		
IR	Pearson Correlation	-0.1	.139*	0.1	-0.1	-.156*	.592**	.563**	.428**	.469**	.252**	1
	Sig. (2-tailed)	0.3	0.04	0.16	0.33	0.02	.000	.000	.000	.000	.000	

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

(G- Gender, A – Age, O – Occupation, E – Educational Qualification, M – Marital status, IN – Informativeness, CB – Consumer Behaviour, INT – Interactivity, EF – Effectiveness, BA – Brand awareness, IR – Irritability)

The above table 5 shows that (p<0.01) age of the respondents has a positive relationship with informativeness, consumer behaviour, interactivity and (p<0.05) age of the respondents has a positive relationship with effectiveness, brand awareness and irritation. The (p<0.01) occupation of respondents has a positive relationship with informativeness, consumer behaviour and (p<0.05) occupation of respondents has a positive relationship with interactivity, effectiveness, brand awareness. Informativeness had a positive relationship with consumer behaviour, interactivity, effectiveness, brand awareness and irritation (P<0.01). consumer behaviour had a positive relationship with interactivity, effectiveness, brand awareness and irritation (P<0.01). Interactivity had a positive relationship with effectiveness, brand awareness and irritation (P<0.01). Effectiveness had a positive relationship with brand awareness and irritation (P<0.01). Brand awareness had a positive relationship with irritability (P<0.01).

Whereas, P< 0.05 gender of the respondents had a negative relationship with informativeness and consumer behaviour. P <0.01 Educational qualification has a negative relationship with informativeness, consumer behaviour and effectiveness (P <0.05).

Regression Analysis

H_0: There is no significant effect of YouTube advertising value on consumer buying behaviour

H_1: There is a significant effect of YouTube advertising value on consumer buying behaviour

Table 6 Regression table on the influence of YouTube advertising value on consumer buyingbehaviour

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	**Std. Error**	**Beta**		
1	**(Constant)**	0.997	2.383		0.418	0.676
	Informativeness	0.518	0.036	0.698	14.349	0
	Interactivity	0.378	0.13	0.109	2.914	0.004
	Effectiveness	0.571	0.159	0.151	3.584	0
	Irritation	0.154	0.178	0.033	0.862	0.39
a. Dependent Variable: Consumer Behaviour						

It is observed that consumer behaviour is a strong indicator of the perceived information, interactivity and efficacy of YouTube ads in assessing effectiveness. This was evidenced by the significance value P<0.01, indicating a clear connection between consumer behaviour and YouTube advertising value on cognitive behaviour whereas the consumer buying behaviour isn't influenced by irritation (P>0.05)

Regression analysis

H_0: There is no significant effect of YouTube advertising value on brand awareness

H_1: There is a significant effect of YouTube advertising value on brand awareness

Table 7 Regression table on the influence of YouTube advertising value on brand awareness

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	**(Constant)**	3.999	1.187		3.369	0.001
	Informativeness	0.058	0.018	0.303	3.243	0.001
	Interactivity	0.271	0.065	0.3	4.193	0
	Effectiveness	0.017	0.079	0.017	0.21	0.834
	Irritation	-0.076	0.089	-0.064	-0.859	0.391
a. Dependent Variable: Brand awareness						

It is demonstrated that brand awareness is a key indicator for YouTube advertising information and interactivity. This association is highly statistically significant, with a significance value $p<0.01$. Therefore, it can be inferred that brand awareness has a considerable effect on the perception of informativeness and interactivity**.**

The effectiveness and irritation are determined that neither of them had an impact on creatingbrand awareness ($p>0.05$).

8. CONCLUSION

With the growth of digital media, YouTube has become an important platform for advertisers to reach out the potential customers. Marketers had to find ways to engage their customers remotely. The ultimate purpose underlying all advertising is increased awareness, which sooneror later turns the mind to buy the said product. The result showed that information, interactivity, brand recognition, consumer behaviour and effectiveness through advertising on YouTube had influenced the advertising value. The results show that the YouTube Advertising dimension influence consumer buying behaviour and brand awareness whereas consumer buying behaviour isn’t influenced by irritation while watching ad and also effectiveness and irritation didn’t impact in creating brand awareness. From these results, it can be seen that the role of YouTube Ads in giving information regarding YouTube advertising which influences the customer and the amount of understanding derived from YouTube advertisements is evident. In conclusion, YouTube advertising plays a significant role in creating brand awareness and purchase intention among consumers. Furthermore, YouTube's visual and interactive format allows for a more engaging and memorable advertising experience, which has been shown to positively influence consumers' purchase behavior. As such, YouTube advertising is a powerful tool for brands looking to establish and expand their presence in today's digital landscape.

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A STUDY ON CONSUMER'S PERCEPTION TOWARDS INFLUENCER MARKETING IN CHENNAI

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ABSTRACT

In recent years, influencer marketing has become an increasingly popular marketing strategy. By collaborating with social media influencers, brands can reach large and highly engaged audiences through authentic and relatable content. The purpose of this study is to explore consumer's perception towards influencer marketing, their level of trust in influencers, and their purchase intentions. A structured questionnaire was designed and distributed to individuals who use social media and engage with influencers. A total of 214 responses were collected and analyzed using various statistical tools such as Descriptive statistics, Factor analysis, Chi-square test and Pearson's correlation analysis using SPSS version 23.0. The study found that the credibility and approachability of influencers have a significant impact onconsumer's trust in them. Moreover, external factors such as the quality of the product, price, and brand reputation have a greater impact on consumer's purchase intentions than internal factors such as the influencer's popularity or personal values. The study also revealed that consumer's level of trust in influencers varies depending on the type of content they share. Consumers are more likely to trust influencers when they share personal experiences or opinions about a product or service rather than simply endorsing it. This study provides valuable insights into the perception of consumers towards influencer marketing and can help brands and influencers develop effective marketing strategies that drive engagement.

Keywords: Influencer Marketing**,** Influencers, Trust level, Purchase Intention

INTRODUCTION

Influencer marketing is a type of social media marketing that involves product placement andendorsements from influencers, or persons and organizations that are thought to be experts in their industry or to have significant social impact. It is the process through which a brand hiresinfluencers with high social media following and established credibility to talk about or reference the brand in a post. Influencer marketing may be presented as testimonial marketing.

Due to the growth of social media, influencer marketing has become more and more popular in recent years. Brands work with influencers to connect with their target audience in a more genuine way and also followers are more inclined to trust and interact with information coming from an influencer they follow and appreciate. Many influencer marketing tactics, including sponsored content, product reviews, social media takeovers, and affiliate marketing, are available for companies to use. For example, in a sponsored content campaign, an influencer might produce material centered around the good or service of a company and publish it on their social media networks in return for payment. An influencer would promote a brand's product or service in an affiliate marketing campaign in exchange for a commission on any sales generated by their special affiliate link. Businesses consider aspects like including the influencer's audience demographics, engagement rate, content quality, and brand fit when choosing influencers to collaborate with.

An influencer is an individual who has established credibility and a significant following on social media platforms such as Instagram, YouTube, Twitter, and TikTok, among others. They create and share content related to a specific niche, such as beauty, fashion, lifestyle, fitness, travel, or technology, and their followers often look to them for advice, recommendations, andinspiration.

Influencers can be categorized into different tiers based on the size of their following, engagement rate, and level of influence. Micro-influencers typically have a smaller following of around 10,000 to 100,000 followers, while macro-influencers have a larger following of over 100,000 to a few million followers. Celebrities and mega-influencers have even larger followings of over several million followers.

INTRODUCTION TO INFLUENCER MARKETING IN INDIA

As per an article by Tanushree Basuroy , 2023 The majority of social media users in India are youths, tech aware, and follow at least one social media influencer. Furthermore, a large fraction of these consumers extensively relies on social networks for their online brand research. In addition, the coronavirus pandemic's negative effects compelled businesses to exclusively sell their goods online. The value of working with influencers who actively engage in building their audiences by creating original content was also recognized by marketing experts. Due to a combination of these reasons, experts forecast that the Indian influencer marketing sector would develop at a compound annual growth rate of 25% until 2026. Influencers have assisted niche brands like Blue Tokai Coffee in accelerating the launch of their companies, in addition to well-known companies like Netflix and Dabur investing in influencer relations to engage better with consumers. Besides this, influencer marketing has entered the advocacy sector, with influencers promoting sustainable products and addressing social issues.

OBJECTIVES OF THE STUDY

1. To examine consumers perception towards influencer marketing
2. To find the trust level of consumers on influencers
3. To identify the purchase intention of consumers in influencer marketing

RESEARCH METHODOLOGY

The primary data for the study was collected through distributing structured questionnaires among the consumers. The sample size is 214 respondents. The study was conducted based on the convenient sampling technique. The data collected was analysed by Percentage analysis, Factor analysis, Chi-Square analysis and Correlation analysis using SPSS 23.0.

ANALYSIS AND INTERPRETATION

Percentage analysis

Table 1 Classification of the total number of respondents based on age

Age	Frequency	Percent
Below 18	33	15.4
18-25	145	67.8
26-49	31	14.5
50 and above	5	2.3
Total	214	100.0

The table portrays the respondent's age who agreed to participate in the study. We can conclude that the maximum data collected is from the age group of 18-25 which is 67.8% of the total data collected.

Table 2 Classification of the total number of respondents based on Gender

Gender	Frequency	Percent
Female	109	50.9
Male	99	46.3
Prefer not to say	6	2.8
Total	214	100.0
Source: Primary data		

The above pie chart and table portrays the Gender of the respondents who participated in the study. The inference drawn is that 50.9% of the survey respondents are female, 46.3% are male and the rest 2.8% were not comfortable in revealing their gender. It is also evident that most respondents are female.

Table 3 Classification of the total number of respondents based on which social media platform they use regularly

Social media platform	Frequency	Percent
Instagram	143	66.8
Facebook	14	6.5
YouTube	53	24.8
Twitter	4	1.9
Total	214	100.0
Source: Primary data		

The above chart and table demonstrate the no. of respondents who use different social media platforms. The inference drawn is that most of the respondents (66.8%) use Instagram regularly, while Facebook is used by only 6.5% of respondents. YouTube is the second most popular platform, with 24.8% of respondents reporting regular use, followed by Twitter at 1.9%.

Table 5.2.4 Classification of the total number of respondents based on which social mediaplatform they have seen the most Influencers

Social Media platforms	Frequency	Percent
Instagram	132	61.7
Facebook	13	6.1
YouTube	66	30.8
Twitter	3	1.4
Total	214	100.0
Source: Primary data		

The above chart and table demonstrate the no. of respondents based on which social media platform they have seen the most Influencers. The inference drawn is that 61.7% respondents have seen the most influencers on Instagram. Twitter is the least popular platform for seeing influencers, with only 1.4% of respondents.

Table 5 Classification of the total number of respondents based on the frequency at whichrespondents claim to see influencers promoting brands on social media.

Particulars	Frequency	Percent
Daily	129	60.3
Once a week	46	21.5
Thrice a week	18	8.4
Rarely	21	9.8
Total	214	100.0
Source: Primary data		

The above table shows the frequency at which respondents claim to see influencers promotingbrands on social media. The data shows that 60.3% of respondents see influencers promoting daily, while 21.5% of respondents see them once a week. About 8.4% of respondents claimed to see influencers promoting three times a week, while 9.8% of respondents reported seeing them rarely.

Table 5.2.6 Classification of the total number of respondents based on the kind of influencers that the respondents prefer.

Questions	Frequency	Percent
Only Indian Influencers	61	28.5
Only Foreign influencers	15	7.0
Foreign and Indian Influencers	138	64.5
Total	214	100.0
Source: Primary data		

The above table shows the kind of influencers that the respondents prefer. From the table, we can see that the majority of respondents, which is 64.5%, prefer a combination of both foreignand Indian influencers. On the other hand, 28.5% of respondents only prefer Indian influencers,while only 7% prefer only foreign influencers.

Table 5.2.7 Classification of the total number of respondents based on the type of contentthey are interested in seeing

Questions	Frequency	Percent
Health and Nutrition	46	21.5
Foods and Beverage	36	16.8
Beauty and Lifestyle	37	17.3
Entertainment	95	44.4
Total	214	100.0
Source: Primary data		

The above table shows the types of content that the respondents are interested in, based on the influencers they follow. The results indicate that a large proportion of the respondents which is 44.4% are interested in Entertainment content. This is followed by Health and Nutrition content, which was chosen by 21.5% of the respondents. Beauty and Lifestyle content was chosen by 17.3% of the respondents, while Foods and Beverage content was chosen by 16.8%of the respondents.

Table 8 Classification of the total number of respondents based on the different ways in which they try to approach influencers

Questions	Frequency	Percent
Direct message	103	48.1
Live Interaction	29	13.6
Story reply	53	24.8
E-mail	29	13.6
Total	214	100.0
Source: Primary data		

The above data shows the different ways in which the respondents try to approach their favoriteinfluencers. The most common approach is through direct messaging, with 48.1% of respondents reporting this method. The second most common method is through story reply, with 24.8% of respondents using this approach. Live interaction is used by 13.6% of respondents, while email is the least popular method, used by 13.6% of respondents.

Table 9 Classification of the total number of respondents based on the problems that influencer marketing can solve

Questions	Frequency	Percent
Lack of knowledge about products	92	43.0
Wasting time on searching suitable products	54	25.2
Not knowing where to purchase the products	38	17.8
Not knowing the method of application/preparation	30	14.0
Total	214	100.0
Source: Primary data		

The table shows the problems that influencer marketing can solve, as identified by the respondents.43% of respondents reported that the lack of knowledge about products is a problem that influencer marketing can solve.

Table 10 Classification of the total number of respondents based on the effect of Influencer marketing on them.

Questions	Frequency	Percent
Be aware of a product or service	93	43.5
Purchase a product	39	18.2
Consider a product to be better than before	33	15.4
Not affected me in any way	49	22.9
Total	214	100.0
Source: Primary data		

Out of 214 respondents, 43.5% agreed that influencer marketing has made them aware of a product or service. 18.2% of respondents agreed that influencer marketing has influenced themto purchase a product. 15.4% of respondents agreed that influencer marketing has influenced them to consider a product to be better than before. On the other hand, 22.9% of respondents stated that influencer marketing has not affected them in any way.

Table 11 Classification of the total number of respondents based on the reasons why influencers promote products or services

Questions	Frequency	Percent
For Money	104	48.6
For social identity	50	23.4
To create awareness	45	21.0
Other	15	7.0
Total	214	100.0
Source: Primary data		

The above table depicts the reasons why influencers promote products or services. The majority of the respondents that is 48.6% said that Influencers promote products for money, while 23.4% do it for social identity, and 21.0% do it to create awareness. Only 7.0% had other reasons forpromoting products. These results suggest that financial gain is a significant motivator for influencers to promote products, but some are also motivated by social identity and the desireto raise awareness about products or causes.

Table 12 Classification of the total number of respondents based on effectiveness of influence marketing compared to traditional marketing

Questions	Frequency	Percent
Yes	170	79.4
No	44	20.6
Total	214	100.0
Source: Primary data		

The above table shows the responses of 214 participants on the effectiveness of influencer marketing compared to traditional marketing. Out of the total respondents, 79.4% or 170 participants said that influencer marketing is effective, while the remaining 20.6% or 44 participants said that it is not effective.

Hence the results suggest that the majority of the participants believe that influencer marketingcan be an effective marketing strategy.

Table 13 Chi Square analysis based on the trust level and purchase intention of consumers on influencers.

Particulars	Gender	Age
Consumers' trust in the factor Credibility	.098	.639
Consumers' trust in the factor Approachability	.009	.789
Factor 'Influencer appeal' in influencing purchase intention	.000	.190
External Factors influencing purchase intention	.192	.108
Source: Primary Data		

Table 13 has $p<0.05$ significance level and infers that the trust level of consumers in the factorof Credibility is not significantly associated with gender or age, while the factor of Approachability shows a significant association with gender but not with age. 'Influencer appeal' in influencing purchase intention is significantly associated with gender, but not with age. External factors influencing purchase intention do not show significant associations with gender or age.

Table 14 Pearson's correlation table based on the relation with the demographic factors and factors relating to the perception of influencer marketing

Particulars		Age	Gender	KI	TOC	IC	A	IAl	EF
Age	Pearson Correlation	1							
	Sig.								
Gender	Pearson Correlation	.106	1						
	Sig.	.122							
KI	Pearson Correlation	-.116	-.188**	1					
	Sig.	.091	.006						
TOC	Pearson Correlation	-.179**	-.119	.108	1				
	Sig	.009	.084	.115					
IC	Pearson Correlation	-.106	-.082	.009	.087	1			
	Sig.	.121	.230	.892	.205				
A	Pearson Correlation	-.010	.001	-.129	.014	.520**	1		
	Sig	.888	.988	.059	.843	.000			
IAI	Pearson Correlation	-.058	-.012	-.195**	-.151*	.363**	.492**	1	
	Sig.	.397	.862	.004	.027	.000	.000		
EF	Pearson Correlation	.074	-.034	-.045	-.152*	.327**	.265**	.399**	1
	Sig.	.281	.626	.515	.027	.000	.000	.000	.000
Source: Primary data									

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

(KI- Kind of influencers**, TOC-** Type of content respondents like**, IC-** Influencer credibility**, A-** approachability**, IAI**- influencer appeal**, EF-** external factors**)**

The above table 5.6.1 presents the correlation matrix between the demographic variables and factors influencing consumer perception on influencer marketing. From the result of the analysis, it was found that the gender of the respondents has a negative relationship with the kind of influencers they follow (r=-0.188**; P <0.01). Similarly, the type of content respondents like, has a negative relationship with Age (r= -0.179**; P<0.01). Influencer appeal has a negative relationship with Kind of influencers (r=-0.195**; P<0.01) and Type of contents respondents like, (r=-0.151*; P<0.05). The external factors impacting consumers purchase intention has a negative relationship with Type of content respondents like (r= -0.152*; P<0.05). The relationship between the following demographic variables has a positive relationship with the factors influencing consumer perception on influencer marketing.

Influencer credibility has a positive relationship with approachability (r= 0.520**; P<0.01). Influencer appeal factor has positive impact on Influencer credibility and as well as on approachability (r= 0.363**, r= 0.492**; P<0.01). The external factors influencing purchase intention has a positive relationship with influencer credibility (r= 0.327**; P<0.05)., approachability (r= 0.265**; P<0.05), and influencer appeal (r= 0.399**; P<0.05).

CONCLUSION

The findings of the study highlight the effectiveness of influencer marketing in reaching customers, particularly among the age group of 18 to 25. Instagram emerges as the preferred platform for discovering and connecting with influencers, indicating its significance as a marketing channel for influencers. The study also reveals that entertainment content is the mostpopular type of material among consumers, suggesting that influencers should incorporate such content in their promotions. The study further emphasizes the importance of trust in influencermarketing. Consumers are more likely to trust influencers who provide authentic product evaluations and exhibit approachability and likability. This underscores the need for influencers to maintain transparency and authenticity in their content, as well as to establish a friendly and relatable persona to foster trust with their audience. Additionally, the study highlights the impact of demographic characteristics on consumer perception of influencer marketing. Influencers should take into consideration the demographics of their target audience, such as age, gender, and other relevant factors, to ensure that their content resonates with the intended audience and delivers desired results. This underscores the importance of audience segmentation and customization of content for effective influencer marketing campaigns. In conclusion, the study provides valuable insights for influencers seeking to optimize their strategies and engage with their target audience effectively. By considering factors such as platform preference, content type, trust-building, and demographic characteristics, influencers can tailor their approach to influencer marketing to better resonate with their audience and achieve desired outcomes.

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A STUDY ON CONSUMER’S ADOPTION TOWARDS FINTECH IN CHENNAI

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ABSTRACT

Fintech services is a compilation of all financial technological services such as crypto-currencies, bank transactions, de-mat a/c, block chain, etc. The goal of fintech services is to improve financial services and make the transactions easy and the services accessible. The idea of the study is to understand the consumer perspective towards fintech services in Chennai. It also examines the factors which affect the consumer’s adoption towards fintech and also analyses whether it has a positive or a negative effect towards the adoption of fintech services. The research uses quantitative method with the help of a structured questionnaire. The questionnaire received 211 respondents of all age groups residing in Chennai. The statistical tools used in this research are Chi-Square analysis and Linear Regression with the help of SPSS software. Some other statistical tools such as reliability analysis, factor analysis, percentage analysis and descriptive analysis were also conducted. The results of this research are that perceived usefulness, social influence and perceived ease of use has an influence towards consumer’s intention to adopt fintech services. The results also conclude that perceived risk does not possess much weightage in affecting the intention of consumer’s to adopt fintech. It also shows that few demographic variables also have an effect on some of the factors affecting fintech services.

INTRODUCTION

Fintech is a term which compiles all the financial technological services which is created to improve and automate traditional forms of financial services. Fintech is utilized to help consumers, businesses and companies to manage their financial transactions, operations and processes in a more effective manner. According to Bettinger in 1972, Fintech is an acronym which stands for technology, combining bank expertise with modern management science techniques and the computer. Fintech refers to the integration of technology into offerings by financial services companies to improve their use and delivery to consumers. Companies in the finance industry that use fintech have expanded financial inclusion and use technology to cut down on operational costs.

A few examples of fintech applications include robo-advisors, payment apps, peer-to-peer (P2P) lending apps, investment apps, and crypto apps, among others. Broadly, the term fintech can apply to any innovation in how people transact business, from the invention of digital money to double- entry book keeping. Fintech came into existence and is growing ever since because of the fast and innovative methods of technological transactions which have changed the way everyone manages their finances.

Tech- savvy consumers especially millennial expect money transfer, lending, loan management and investing to be effortless without wasting much time with even lesser public interaction.

They also expect transactions to be safe and secure without any assistance of a person or a visit to the bank. The aim of fintech is to support different companies and individuals in the effective management of financial transactions. Fintech-enabled tools have served feasible improvements in the approaches for tracking, managing and accessing financial services.

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The aim of fintech is to support different companies and individuals in the effective management of financial transactions. Fintech-enabled tools have served feasible improvements in the approaches for tracking, managing and accessing financial services. Consumer attitude as such can be defined as a feeling of favorableness or unfavorableness that an individual has towards and object. It is known that an individual can have a positive or negative attitude towards buying a product or using a service. Consumer attitude basically comprises of beliefs, feelings and behavioral intentions towards some objects. Consumer behavior things keep changing with time but it is even more difficult for a person to adapt to a new technology as soon as it is introduced.

REVIEW OF LITERATURE

Dieguez I, et al. (2023) studied the relationship between Subjective Norms, Attitudes, and Perceived Behavioral Control with the Intention to Use and Behavioral Use of the Fintech services by companies. Partial Least Squares Structural Equation Modeling methodology was used with data collected from a survey of 300 companies. The results show that satisfaction with traditional banking services is highly compatible with Fintech services.

Chan R, et al. (2022) examined the key factors driving consumers' adoption of Open Banking. It extends the Unified Theory of Acceptance and Use of Technology (UTAUT) by integrating perceived risk, initial trust and financial literacy into an overarching conceptual model. The research was conducted in Australia where they collected data from 456 Australian survey respondents. . Performance expectancy, effort expectancy, social influence and perceived risk are direct antecedents of consumers' usage intention of Open Banking. Social influence has a strong mediating effect on usage intention through performance expectancy. The effect of perceived risk is alleviated by effort expectancy and initial trust, while initial trust positively affects the effects of performance expectancy and effort expectancy on consumers' usage intention of Open Banking. Finally, financial literacy lowers initial trust towards Open Banking, possibly inducing consumer skepticism.

Haqqi F and Suzianti A (2020) have investigated the trust variables in the risk-benefit framework to determine user adoption intention on Fintech services in Indonesia. They collected data from 100 Fintech users. Partial Least Square (PLS-SEM) method is used to estimate the relationship between constructs. As a resulting trust, economic benefit and convenience are proven to significantly influence the user to adopt Fintech, while privacy awareness, financial risk, and legal risk are significantly affected by user trust. The hypothesis testing indicates that security risk has the biggest negative effect and convenience has the biggest positive effect on Fintech adoption intention.

Alwi S, et al. (2019) has evaluated the several factors affecting customer satisfaction in Malaysia where ease of use, Security & Privacy, Information Presentation, Convenience and Lastly Service Quality. The research was conducted in Malaysia where the survey was collected from approximately 300 people. The statistical tools used in this research are Reliability Test, Inferential analysis, Pearson Correlation Analysis and Multiple Linear Regression Analysis. The results of the Pearson correlation analysis have shown that Security and Privacy (SP) is the strong influential factor of customer satisfaction towards Fintech mobile payment services followed by Service Quality (SQ), Information Presentation (IP) and Ease of Use (EOU).

Meyliana, et al. (2019) has studied the adoption of financial technology (Fintech) services in the terms of trust and risk and also the relationship between trust, perceived risk and intention to use. The research was conducted in Jakarta, Indonesia where they collected responses from around 548 people. Data analysis in this study uses the Structural Equation Model (SEM) using Smart PLS V2.0. SEM. The authors conclude that the factor of users trusts influences perceived usefulness in the adoption to use FinTech services. However, the risk factor does not affect the use of FinTech services, which further does not influence the users' attitude.

Solarz M and Swacha-Lech M (2019) has evaluated the selected determinants of using the innovative FinTech services by Millennial in Poland. The research was collected from 1236 respondents. . The essential empirical data were obtained based on the research using the CAWI method and the C-Pearson method and Spearman's rank method were used to study the correlation. The result of this research provide information on the impact of broad-based determinants on Fintech adoption and also show that they appreciate technological novelties, including the possibility of using a smart watch, and when deciding on the choice of a financial institution, they do not care about the direct opinions of their relatives and friends, but take into account the opinions in social media.

Zhongqing Hu, et al. (2019) has investigated how user innovativeness, government support, brand image, and perceived risk acts as determinants of trust for users to adopt fintech services. The research took place in Hefei, China where they obtained around 387 eligible responses. The researchers analyzed the data with a structural equation model (SEM) to test the hypotheses, including the relationships of all latent variables. The results reveal that users' trust in Fintech services has a very significant influence on users' attitudes for adoption. In addition, perceived ease of use and perceived risk does not affect users' attitudes toward the adoption regarding Fintech services.

Chang Y, et al. (2016) investigated the consumer behavior in adopting the service. They conducted their research in China where they collected surveys from the users of Alipay and Tenpay in University in China. They adapted the Regulatory Focus Theory to conduct their research. Through their research they found that China sees an increasing number of Fintech users, but however they realized there is a dearth of relevant research in the area. The paper also addresses the gap by shedding lights on consumer behavior of FinTech.

Chuang L.M, et al. (2016) has studied on the consumer behavioral intentions in using Fintech Services while integrating brand and service trust to understand the influence on behavioral intention. The research was conducted in Tainan, Taiwan. The researchers collected 440 effective consumer's samples by using convenience sampling. This study used the Technology Acceptance Model (TAM) to conduct its research. The results showed that Brand and service trust has a significantly positive effect on attitudes toward using Fintech Service. Perceived usefulness has a significantly positive effect on attitudes toward using. Perceived ease of use has a significantly positive effect on attitudes toward using. Attitudes toward on using have a significantly positive effect on behavioral intention to use.

Kim Yonghee, et al. (2015) has conducted an analysis on the acceptance of payment-type Fintech services and it also analyzed the causal relationship between CFIP (Concern for Information Privacy) and Self-efficacy by adopting them as moderating variables. The research took place in Korea where they conducted the research based on the Elaboration Likelihood Model by Petty and Cacioppo and by applying variables associated with the Technology Acceptance Model. The research results show that the most critical factors in acceptance in this study were Usefulness and Ease of use, furthermore it also implies that swift registration, ease of use and a convenient UI/UX environment may act as the most significant factors in acceptance for potential users of payment-type Fintech services.

Research gap can be defined as a topic or area for which missing or inadequate information limits the ability of reviewers to reach a conclusion for a given question. It could also be stated as an unanswered question or unresolved problem in a field, which reflects a lack of existing research in that space. All the studies mentioned have done the study in various countries but none of the study took place in Chennai which is one of my research gaps. The studies also show the different factors which affect each other but there are very less research were they analyzing the adoption intention with demographic variables.

RESEARCH METHODOLOGY

The goal of this study is to analyze the willingness to adopt financial service. It also determines the factors that will affect the adoption level of fintech services by the public. Finally, it also checks what factors determine the adoption of fintech. The data was collected from 211 respondents through google forms, so the data was analysed with the help of primary data. The tool which is used in this research to obtain data is Likert Scale questionnaire. Therefore, this research consists of quantitative analysis of data which involves looking at hard data, the actual numbers. The analysis of the data was done with the help of the SPSS software. The different types of data analysis used in my research are as follows: Reliability Analysis, Factor Analysis, Percentage Analysis, Descriptive Statistics, Chi-Square Test, Linear Regression.

Hypothesis:-

H_{01}: There is no association between Demographic Variables and the Factors H_{a1}: There is association between Demographic Variables and the Factors

H_{02}: There is no association between Adoption of Fintech used and Ease of Use, Social Influence, Perceived usefulness

H_{a2}: There is association between Adoption of Fintech used and Ease of Use, Social Influence, Perceived usefulness

Table 5.1: Reliability Statistics

Cronbach's Alpha	N of Items
.900	34

The Table 5.1 shows that the Cronbach's Alpha 0.900 which shows that the analysis of questionnaire is reliable and could be used for conducting the analysis moving forward. It shows that all the questions are reliable in order to get the desired results for the analysis of this research. It states that questionnaire allows us to study the properties of measurement scales and the items that compose the scales.

Table 5.2: Factor Analysis

Table 5.2.1: KMO and Bartlett's Test of Consumer's Perspective of Fintech

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.899
Bartlett's Test of Sphericity	Approx. Chi-Square	4146.917
	Df	561
	Sig.	.000

Table 5.2.2: Exploratory Factor Analysis of Consumer's Perspective of Fintech

Factors	Statements	Factor Loading	Percent of Variance
Adoption	Most people surrounding with me are using fintech services	.602	16.771
	The government has introduced laws favoring the fintech services	.531	
	The government supports fintech services	.408	
	Fintech adoption could reduce energy consumption and increase protection of environment	.643	
	The availability of basic facilities in fintech services makes it easier to complete transactions.	.708	
	I use fintech services on a daily basis	.802	
	I believe using fintech services is a good idea	.784	
	I will suggest fintech services to my family and friends	.779	
	I will choose fintech services even if alternative options were available	.765	
Perceived Risk	People around me have faced financial fraud while using fintech services	.820	33.300
	I feel my financial information not secure when I use fintech services	.830	
	I think the cyber security risk is much higher using FinTech than traditional fintech service	.720	
	I am concerned that FinTech allows unauthorized persons to hack into my personal information	.861	
	The organizational responses are too slow when financial losses or leakage of data takes place	.824	
	The organizations are not willing to solve issues when financial loss or financial information has been leaked	.785	
	I know the legal risk involved in fintech services	.494	
	I am reluctant to use fintech services due to lack of proper privacy policy for consumers	.709	
	Slow internet connection causes financial losses	.560	
Perceived	I can control the process without any middlemen	.681	42.330
	I can use various financial services at the same time	.619	
	Using of fintech services makes financial services speedy	.664	

Ease of Use	Usage of fintech services would help me to manage and keep track of my transactions	.644	
	Usage of fintech services helps to obtain all the information under one technology	.494	
	Using of fintech services is effortless	.760	
Social Influence	People who are familiar with me think that I should use fintech services	.500	50.093
	I will use fintech services if it is endorsed by a third party (social influencers, you tubers, actors)	.695	
	I use Fintech services because the brand has an overall good image	.698	
	I am able to recognize fintech services in Chennai because of the branding carried forward by the brands	.565	
Perceived Usefulness	Using fintech services is cheaper than traditional financial services	.639	55.625
	I can save money when I use fintech services	.659	
	Various financial technologies can be used in low cost	.558	
	I am reluctant to approach banks due to repetitive server breakdowns	.433	
	I am subject to financial fraud while using public internet connection	.684	
Source: *Primary Data*			

The Table 4.3 shows that the likert scale statements have been divided into components which could suitable to be placed under the same head. The above factors have been placed under the statements after analyzing and understanding the questions. It is important to group the factors under the specific head to help in data reduction. By doing factor analysis, it helps us to study the interdependence of data and helps us to assume that complex variables can be reduced to a few important dimensions. In the above table, the statements have been divided under five factors, namely, Adoption, Perceived Risk, Perceived Ease of Use, Social Influence and Perceived Usefulness. The factor Adoption of fintech contains statements which have factor loading from .802 to 4.08 and the percent of variance is 16.771. The following factor Perceived Risk has factor loading from 8.61 to 4.94 and the percent of variance being 33.300. Perceived Ease of use has a factor loading where the values vary from .760 to .494 and the percent of variance being 32.330. Social Influence has a factor loading ranging from .500 to .698 and a percent of variance of 50.093. The last factor being Perceived Usefulness in factor analysis has a factor loading from .433 to .684 and a percent of variance being 55.625.

Table 5.3: Percentage Analysis

AGE	**FREQUENCY**	**PERCENT**
18-24 years	98	46.4
25-34 years	29	13.7
35-44 years	27	12.8
45-54 years	42	19.9
Above 54 years	15	7.1
Total	211	100.0
GENDER	**FREQUENCY**	**PERCENT**
Male	122	57.8
Female	89	42.2
Total	211	100.0
EUCATION QUALIFICATION	**FREQUENCY**	**PERCENT**
High School Graduate	44	20.9
Bachelor's Degree	133	63.0
Master's Degree	32	15.2
Doctoral Degree	2	.9
Total	211	100.0
EMPLOYMENT STATUS	**FREQUENCY**	**PERCENT**
Professional	21	10.0
Employed	49	23.2
Self- Employed	36	17.1
Student	88	41.7
Home Maker	7	3.3
Other	10	4.7
Total	211	100.0
INCOME LEVEL	**FREQUENCY**	**PERCENT**
Less than 10,000	79	37.4
Greater than 10,000 less than 50,000	53	25.1
Greater than 50,000 less than 3, 00,000	40	19.0
Greater than 3, 00,000 less than 7, 00,000	17	8.1
More than 7, 00,000	22	10.4
Total	211	100.0

GADJETS USED	**FREQUENCY**	**PERCENT**
Mobile Phone	98	46.4
Laptop	9	4.3
Desktop	1	.5
Mobile Phone, Laptop	51	24.2
Mobile Phone, Desktop	15	7.1
Mobile Phone, Tablet	3	1.4
Mobile Phone, Laptop, Desktop	23	10.9
Mobile Phone, Laptop, Tablet	6	2.8
Mobile Phone, Laptop, Desktop, Tablet	5	2.4
Total	211	100.0
Source: *Primary Data*		

The table 5.3 shows the statistical data of 211 respondents in different demographical conditions. The highest respondents are 46.4% from the age group of 18-24 years. The number of male respondents were more than female respondents with a 57.8%. The people who have acquired a bachelor's degree with 63% are the most respondents. AS the younger generation prefer to adapt to new technologies the respondents are mostly students with a 41.7%. The majority income level is less than 10,000 with a 37.4% and the majority of gadgets used while using fintech services are Mobile phones with a 46.4%.

Table 5.4: DESCRIPTIVE STATISTICS ON CONSUMER ADOPTION OF FINTECH SERVICE

STATEMENTS	N	MEAN	STD. DEVIATION
Usage of fintech services would help me to manage and keep track of my transactions	211	4.09	.764
Using of fintech services makes financial services speedy	211	4.05	.824
Usage of fintech services helps to obtain all the information under one technology	211	4.03	.777
I can use various financial services at the same time	211	4.03	.813
Using of fintech services is effortless	211	3.00	2.168
Using fintech services is cheaper than traditional financial services	211	3.99	.759
I can control the process without any middlemen	211	3.98	.822

I believe using fintech services is a good idea	211	3.98	.783
I will suggest fintech services to my family and friends	211	3.97	.801
The availability of basic facilities in fintech services makes it easier to complete transactions.	211	3.96	.745
People who are familiar with me think that I should use fintech services	211	3.91	2.198
The government supports fintech services	211	3.90	.742
I can save money when I use fintech services	211	3.89	.782
Monetary losses are possible to due to fluctuations in exchange rates	211	3.88	2.156
Various financial technologies can be used in low cost	211	3.87	.782
Fintech adoption could reduce energy consumption and increase protection of environment	211	3.84	.835
I will choose fintech services even if alternative options were available	211	3.82	.812
Most people surrounding with me are using fintech services	211	3.74	.836
I use Fintech services because the brand has an overall good image	211	3.73	.866
I am able to recognize fintech services in Chennai because of the branding carried forward by the brands	211	3.72	.796
The government has introduced laws favoring the fintech services	211	3.70	.818
The organizational responses are too slow when financial losses or leakage of data takes place	211	3.68	.895
I think the cyber security risk is much higher using FinTech than traditional fintech service	211	3.67	.982
I use fintech services on a daily basis	211	3.67	.942
Slow internet connection causes financial losses	211	3.66	.960
I know the legal risk involved in fintech services	211	3.65	.921
I am subject to financial fraud while using public internet connection	211	3.64	.973
The organizations are not willing to solve issues when financial loss or financial information has been leaked	211	3.62	.915
People around me have faced financial fraud while using fintech services	211	3.61	.957

I am concerned that FinTech allows unauthorized persons to hack into my personal information	211	3.60	.987
I am reluctant to approach banks due to repetitive server breakdowns	211	3.55	.937
I am reluctant to use fintech services due to lack of proper privacy policy for consumers	211	3.51	.891
I feel my financial information not secure when I use fintech services	211	3.49	1.002
I will use fintech services if it is endorsed by a third party (social influencers, you tubers, actors)	211	3.39	1.038
Source: *Primary Data*			

The table 5.10 shows descriptive statistics on consumer adoption of fintech service. The consumers rated relatively high mean value of 4.09 and the corresponding standard deviation of 0.764 for using fintech services to keep track of the transactions which makes it easier for the consumers. People adapt to fintech services in order to make their transactions easy and at the same time it also helps them to keep a track of their transactions. Followed by a mean of 4.05 and a standard deviation of .824 which states that fintech services makes it speedy for them to complete their transactions and all other financial decisions. Another statement which has a high mean value of 4.03 and a standard deviation of .777 is that all the information and services are available under one technology rather than using various technologies for each and every transaction and financial services which is used by them. Whereas, consumers rated relatively low mean value of 3.39 and a standard deviation of 1.038 which stated that they would be influenced by third parties such as social influencers and you tubers. They conclude that this influence does not affect their intention to adopt positively or negatively as much as compared to the other factors. The second lowest statement states that the consumer feels that their financial information is not safe while using fintech services which have a mean value of 3.49 and standard deviation of 1.002. It states that the consumers do not feel that their financial information is prone to risk which affects their intention to adapt towards fintech services.

Pearson Chi Square Hypothesis:-

H01: There is no association between Demographic Variables and the Factors

Ha1: There is association between Demographic Variables and the Factors

Table 5.5: Person Chi Square between Demographic variables and the Factors

PARTICULARS	AGE	GENDER	EDUCATIONAL QUALIFICATION	EMPLOYMENT STATUS	INCOME LEVEL	GADJETS USED
ADOPTION OF FINTECH	.133	.360	.522	.462	.291	.008
PERCEIVED RISK	.276	.382	.434	.012	.994	.968
EASE OF USE	.978	.404	.953	.867	.835	.935
SOCIAL INFLUENCE	.083	.826	.301	.100	.602	.826
PERCEIVED USEFULNESS	.057	.469	.813	.462	.554	.884
Source: Primary Data						

The Table 5.5 showcases that many demographic variables do not have an effect on the intention to adapt to fintech. But likely there were a few which shows that there is an association between the factor and the demographic variable. There is an association between Age and Perceived Usefulness with a value of .057. There is association between Employment Status and Perceived Risk with a value of .012. There is association between Gadgets used and Adoption of Fintech with a value of .008.

Linear Regression Hypothesis:-

H_{02}: There is no association between Adoption of Fintech used and Ease of Use, Social Influence, Perceived usefulness

H_{a2}: There is association between Adoption of Fintech used and Ease of Use, Social Influence, Perceived usefulness

Table 5.6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.618[a]	.382	.379	4.09313
2	.697[b]	.481	.481	3.74350
3	.516[c]	.509	.509	3.64002
Source: Primary Data				

a. Predictors: (Constant), Ease of Use
b. Predictors: (Constant), Ease of Use, Social Influence
c. Predictors: (Constant), Ease of Use, Social Influence, Perceived usefulness
d. Dependant Variable: Adoption

The Table 5.11 showcases that consumers are mostly influenced by the factors ease of use, social influence and perceived usefulness. The linear regression coefficient R=0.618, 0.697, 0.516 shows that there is a strong influence of ease of use, social influence and perceived usefulness on adoption of fintech. Hence, the research hypothesis can conclude that there is a significant relationship between the factors and adoption of fintech.

CONCLUSION

Fintech start-ups need to make their services easy to use as technology improves because they play a vital role for a consumer to adapt towards their service. If they want to sustain in the market for a long time, they need to improve their benefits by making them more easy to use as time process. The fintech start-ups also need to make sure that the services are useful for the consumers, keep in mind the needs and want of the consumers and strive towards that demand to make their service successful in the market. The demand of the consumer keeps changing with the advancement of technology, so the developers need to make sure that they keeping up with the advancement of technology and fulfilling the need of the consumer.

Even though, the analysis has concluded that there is no influence of perceived risk in the consumer’s intention to adapt fintech but still it plays a major role. If the consumers get more prone to risks then the consumers may feel that the service is more disadvantageous to them than being useful. So, fintech start-ups need to keep in mind to protect the consumers and keep their personal information safe. The companies also need to keep in mind to advertise their product as consumers also feel that social influence can have an effect on their intention to adapt towards fintech services. So, the company needs to make sure that they keep a good social brand image in order for the people to trust their company and use their services.

The conclusion for this research is that perceived usefulness, social influence and perceived ease of use play a vital role on consumer’s intention to adapt to fintech services. The survey also concludes that there is an association between age and perceived usefulness, employment status and perceived risk. It also states that Gadgets used by consumers play a vital role for the consumer’s intention to adapt to fintech. However, it states that Fintech services that will be used by users do not necessarily weigh the potential risks posed by their service. The consumers focus more on the usefulness and whether it is easy to use before adapting to fintech services. In a nutshell, the findings of this study suggest some points that might benefit fintech start-ups to enhance the consumer intention in adoption of Fintech. The results thus contribute in providing a view to determine the user’s intention in using Fintech services.

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A COMPREHENSIVE STUDY ON IDENTIFYING AND ADDRESSING THE CHALLENGES OF GOING GREEN

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ABSTRACT

The project named "A Comprehensive Study on Identifying and Addressing the Challenges of Going Green"

In recent years, environmental issues have gained significant importance, and the public awareness of these issues has been increasing, this contributes to the importance of the "Going Green" concept.

This research's primary objective is to examine a range of challenges that stop people from adopting eco-friendly practices. This study also explores how environmental awareness differs among various demographic groups.

The study utilized a combination of primary and secondary data to fulfil its objectives. Primary data were collected through the distribution of questionnaires among the public, while secondary data was derived from published research papers, journals, and articles. The conclusion was evaluated by systematically organizing, interpreting, and representing the collected data using pie diagrams and bar charts. The hypothesis was tested using the correlation statistical tool.

Keywords: Green Practices, Eco-friendly, Environmental challenges, Sustainable solutions, Environmental impact

INTRODUCTION

Public awareness of environmental issues is significantly increasing. In order to address these environmental problems, people are placing greater importance on adopting "green practices"

The term "green practices" means environmentally sustainable and eco-friendly actions that individuals, companies, and society implement to minimize their impact on the environment.

The goal of this study is to conduct a comprehensive investigation into the obstacles related to the adoption of eco-friendly practices, which is commonly referred to as “going green” and identify how these obstacles impact their decision-making on choosing green products. This study also investigates variations in environmental awareness among individuals in different age groups.

The core purpose of this study is to contribute to the more sustainable and environmentally conscious world by effectively identifying and addressing the challenges.

REVIEW OF LITERATURE

Sabah Ahmed, Abdul- Wahab and Jamil Adbo (April 2010) in their research “The Effects of Demographic Factors on the Environmental Awareness of Omani Citizens have concluded that Omanis’ knowledge and concern about the environment are linked to their age, gender, and education. Men are more aware and concerned about environmental issues than women. Young people and literates were more informed and cared more about the environment compared to the elderly people and illiterates

Mayank Bhatia and Amit Jain (January 2013) in their research “Green Marketing: A Stusy of Consumer Perception and Preferences in India have concluded that people know about environmentally friendly products, but they don’t know about government and non-profit efforts in this area. This means companies need to take the initiative to let people know about this. Newspapers are the most effective way to inform people about green initiatives. People like the idea of green products and care about the environment, so companies should make more green products. Companies should make sure green products are easy to find and not too expensive as people are willing to buy them”.

Nimesh Joshi, Parimal Hariom Vyas and Madhusudan Navnitlal Pandya (April 2014) in their research “Green Consumption Behaviour of Consumers: An Empirical Study with Specific Reference to Bharuch-Ankleshwar of Gujarat State have concluded that the literates and younger people exhibit higher awareness of green products to effectively reach this audience company should prioritize conveying the positive impact of their products on the natural environment. Additionally, there is a need to educate consumers on various aspects, such as pricing, acknowledging the significance of eco-certification, understanding individual advantages, and understanding the ways in which products contribute to the conservation of the environment”.

Yatish Joshi and Zillur Rahman (November 2015) in their research "Factors Affecting Green Purchase Behaviour and Future Research Directions have concluded that due to environmental concerns and awareness of environmental problems, consumers desire to buy environmentally friendly products but there are some factors that influence their purchase such as cost, product attributes, lack of awareness, limited availability and distrust in green products. Companies can address these issues by not focusing on making money by charging a higher price, instead, they should genuinely care about the environment and make eco-friendly products affordable for everyone also it suggests that companies should improve their product's quality, educate consumers about the environment and promoting green products effectively".

Sapna A. Narula and Anupriya Desore (March 2016) in their research "Framing Green Consumer Behaviour Research: Opportunities and Challenges have concluded that there are good opportunities for businesses in green marketing, but there are also significant challenges. Firms are motivated to go green because of factors like consumer demands, public authority influence, rivalry, and community duty. However, defining what "green" means and establishing standards for green products are major hurdles. Building trust among consumers is crucial and efforts should focus on creating standards that fit specific industries and collaborating with competitors. Convincing environmentally conscious consumers to buy green products is another challenge with barriers like price, reliability concerns, and accreditation obstacles. Effective communication and positioning strategies are essential to highlight the unique features of green products compared to what others offer. Researchers and business leaders must work together to overcome these challenges and ensure the effectiveness of green marketing.

Oliver Cronstam and Jacob Grönberg (May 2017) in their research "Factors Influencing the Implementation of Green Management have concluded that managerial engagement and goal orientation are the most influential factors driving green management implementation. Effective EMS, specifically ISO 14001, is more significant in facilitating green management practices, but its implementation should be balanced with organizational and monetary considerations. Also, green management depends critically on strong leadership, clearly defined and achievable goals, and fostering cooperative associations with customers and suppliers".

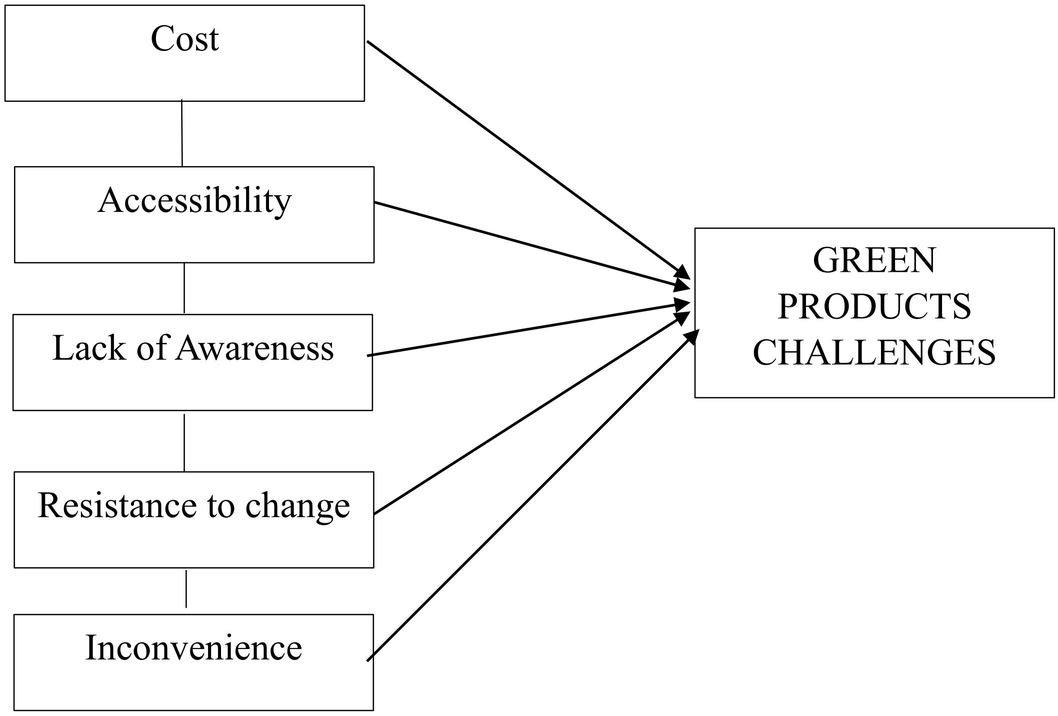
Osarodion Ogiemwonyi, Amran Harun, Bestoon Othman, and Darbaz Ismael (September 2019) in their research " Key Issues and Challenges of Green Consumer in Consuming Green Product an Insight from the Emerging Country: Malaysia have concluded that sustainable living involves continuous community engagement to protect our environment. Changeover to a greener setting is challenging, as several Malaysian consumers are uninformed of their environmental effects. Therefore, integrating greener practices into all aspects of life and strengthening policies are crucial to prevent further damage. Education and social media can promote environmental responsibility among all, especially young consumers. Companies should diligently execute greener practices, and Malaysian's younger generation can be agents of change in the green movement".

Wahyuningsih Santosa (January 2020) in their research "The Attitude of Young People Towards Environmental Issues and Green Products have concluded that both men and women have a similar level of understanding about the environment and environmentally friendly products. However, their inner principles and values are not sufficiently strong to consistently guide their choices and preferences. Also, it's crucial to give priority to environmental education programs, broaden the availability of educational materials, and promote the active involvement of young individuals in environmental initiatives

Osarodian Ogiemwonyi, Mohammad Nurul Alam, Rashed Alshareef, Majed Alsolamy, Noor Azlinna Azizan and Norazuwa Mat (June 2023) in their research "Environmental Factors Affecting Green Purchase Behaviors Of The Consumers: Mediating Role Of Environmental Attitude have concluded that Malaysia's unsustainable consumption habits contribute to the environmental crisis also bridging the gap between expressed aims and real-world consumption patterns is essential for achieving environmentally conscious purchasing behavior. In emerging markets, like Malaysia, extended TRA and TPB models provide valuable insights into the factors that shape consumer preferences for eco-friendly products. Factors like social networks, awareness, and environmental attitudes significantly influence green purchasing. Also, environmental responsibility and awareness significantly influence green purchasing. To promote sustainable consumption, it's crucial to shape a societal mindset and belief in environmental responsibility.

K. Pradeep Reddy, Venkateswarlu Chandra, Sambhana Srilakshmi, Elia Thagaram, Ch. Sahyaja and Bernard Osei (July 2023) in their research "Consumer Perception on Green Marketing Towards Eco-friendly Fast Moving Consumer Goods have concluded that environmental concerns are growing and many businesses are embracing "Green Marketing" to sell environmentally friendly products. The main advantage of Green Marketing is it benefits businesses by attracting environmentally conscious customers and further enhancing their reputation. Also, while consumers are aware of environmentally friendly products they may not be fully informed about the environmental efforts undertaken by companies, business should clearly communicate their green initiatives to attract customers who value sustainability. Newspapers can also play a significant role in educating consumers about environmentally friendly products"

CONCEPTUAL FRAMEWORK



OBJECTIVE

Primary Objective

1. To identify and address the challenges of going green.

Secondary Objective

1. To examine how these challenges impact their decision-making in choosing green products.
2. To identify how environmental awareness differs among different age groups.

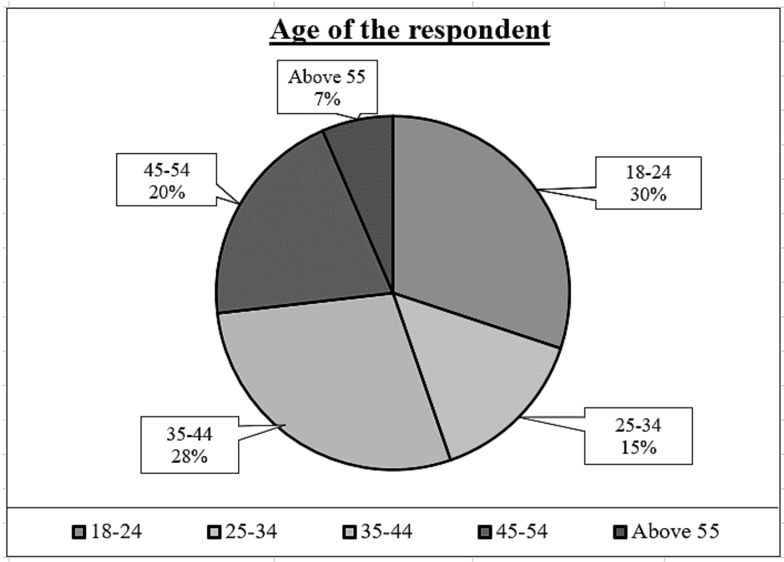
RESEARCH METHODOLOGY

The target audience for this research is general public across a diverse range of age groups. The sample size used in the study was 123. Descriptive research design is used in this research which focuses on gathering information about the characteristics of the samples. Convenient sampling is employed for this study where individuals were selected based on their availability and accessibility to the researcher. The questionnaire was circulated to the respondents to collect data, which included demographic questions, closed-ended questions, and yes or no questions.

DATA ANALYSIS & INTERPRETATION

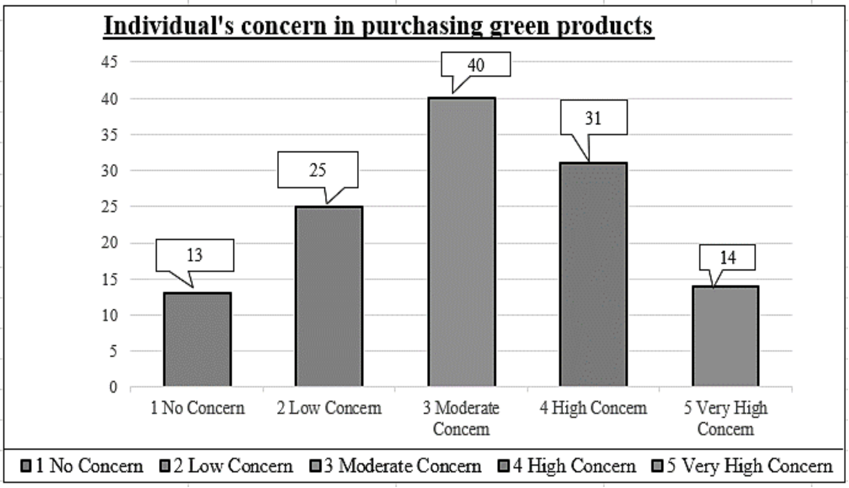
Respondent's Age

S.NO	OPTIONS	FREQUENCY	PERCENTAGE
1	18-24	37	30%
2	25-34	18	15%
3	35-44	35	28%
4	45-54	25	20%
5	Above 55	8	7%
	TOTAL	**123**	**100%**



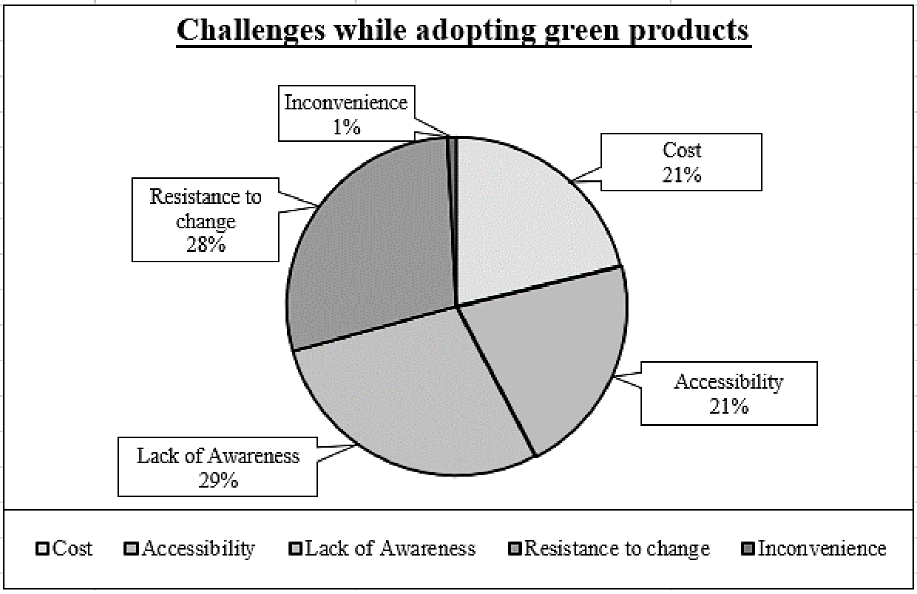
Individuals concern in purchasing green products

S.NO	OPTIONS	FREQUENCY	PERCENTAGE
1	1 No Concern	13	11%
2	2 Low Concern	25	20%
3	3 Moderate Concern	40	33%
4	4 High Concern	31	25%
5	5 Very High Concern	14	11%
	TOTAL	**123**	**100%**



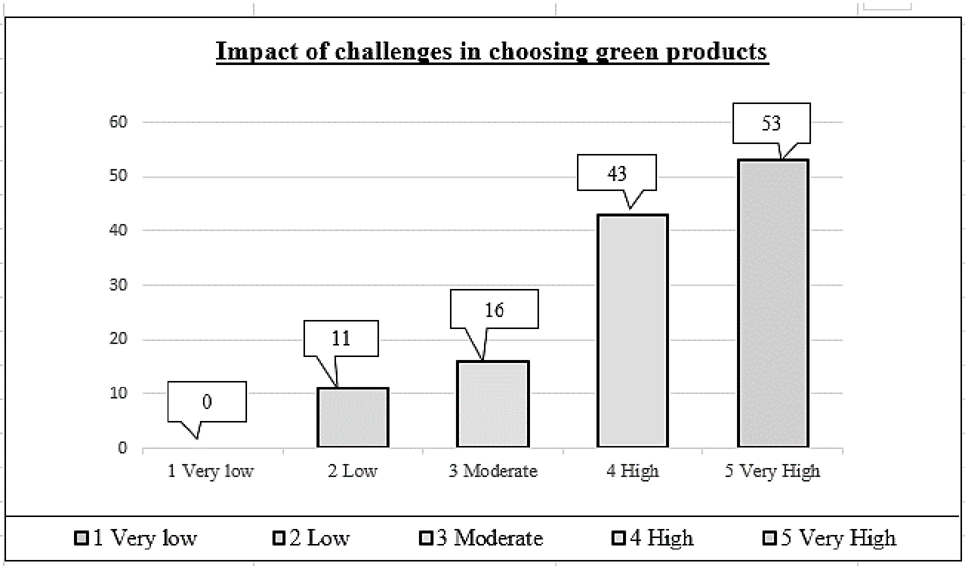
Challenges while adopting green products

S.NO	OPTIONS	FREQUENCY	PERCENTAGE
1	Cost	26	21%
2	Accessibility	26	21%
3	Lack of Awareness	35	29%
4	Resistance to change	35	28%
5	Inconvenience	1	1%
	TOTAL	**123**	**100%**



Impact of challenges in choosing green products

S.NO	OPTIONS	FREQUENCY	PERCENTAGE
1	1 Very low	0	0%
2	2 Low	11	9%
3	3 Moderate	16	13%
4	4 High	43	35%
5	5 Very High	53	43%
	TOTAL	**123**	**100%**



HYPOTHESIS

1. **H0:** There is no relationship between different age groups and their level of environmental awareness

   H1: There is a relationship between different age groups and their level of environmental awareness

Correlations

		Age_of_the_respondents	Concern_for_green_products
Age_of_the_respondents	Pearson Correlation	1	-.455**
	Sig. (2-tailed)		.000
	N	123	123
Concern_for_green_products	Pearson Correlation	-.455**	1
	Sig. (2-tailed)	.000	
	N	123	123

**. Correlation is significant at the 0.01 level (2-tailed).

RESULT

There is a moderate negative relation between age group and their level of environmental awareness. The value -.455 is negative and is between -0.3 and -0.7, indicating that there is a moderate negative correlation between the given two variables. Since the significance value is .000 is less than 0.01, the null hypothesis H0 is rejected, and the alternate hypothesis H1 is accepted. Hence there is a relationship between age group and their level of environmental awareness.

2. **H0:** There is no relationship between the challenges individuals face when adopting eco-friendly products and decision-making in choosing such products

   H1: There is a relationship between the challenges individuals face when adopting eco-friendly products and decision-making in choosing such products

Correlations

		Challenges_in_adopting_green_products	Impact_of_challenges_on_green_product_decision_making
Challenges_in_adopting_green_products	Pearson Correlation	1	.457**
	Sig. (2-tailed)		.000
	N	123	123
Impact_of_challenges_on_green_product_decision_making	Pearson Correlation	.457**	1
	Sig. (2-tailed)	.000	
	N	123	123

**. Correlation is significant at the 0.01 level (2-tailed).

RESULT

There is a moderate positive relationship between challenges in adopting green products and decision-making in choosing such products. The value .457 Is positive and is between 0.3 and 0.7, indicating that there is a morgue positive correlation between the given two variables. Since the significance value is .000 is less than 0.01, the null hypothesis H0 is rejected, and the alternate hypothesis H1 is accepted. Hence there is a relationship between challenges in adopting green products and decision-making in choosing such products

SUGGESTIONS AND FUTURE IMPLICATIONS

- The sample size is 123. So, in the future data can be collected from more samples, which helps in identifying and addressing the challenges even better.
- This research typically focused on challenges such as cost, accessibility, lack of awareness, inconvenience, and resistance to change; so, in the future, even more

areas can be explored to identify their impact on the decision-making on choosing green products.

- This research focused only on the public perspective not on the business perspective so in the future, the business perspective can also be taken into consideration.

CONCLUSION

This comprehensive study focused on identifying and addressing challenges associated with adopting environmentally friendly products. The primary challenge individuals face in promoting eco-friendly products is a lack of awareness. Many individuals were not aware of the benefits and the positive impacts of eco-friendly products. In addition to this, limited accessibility to green products higher cost, resistance to change, and inconvenience also add to the challenges.

Addressing these challenges comprehensively, by educating the public about the positive impact of using green products on the environment, enhancing accessibility, making it more affordable, and facilitating a smoother transition is essential for the successful accomplishment of the adoption of eco-friendly products.

This research also revealed that individuals aged between 18 to 24 exhibit a higher level of concern for environmentally friendly practices compared to those above the age of 55. Effective communication plays a significant role in influencing people to adopt environmentally friendly practices.

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A STUDY ON THE ENVIRONMENTAL CHALLENGES IN MEGHALAYA

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ABSTRACT

Northeastern India's Meghalaya state is beautiful, yet it faces several environmental challenges that threaten the ecosystem and the people's way of life. Using both legal and illicit methods, deforestation is one of the major and most visible issues. Excessive deforestation undermines the equilibrium of the terrain, causes landslides and soil erosion, and reduces the biodiversity of the state's rice crop. Coal mining is a significant concern as well because, despite its positive economic consequences on the state, it negatively impacts the environment. Mining operations endanger both plants and animals by destroying, contaminating water supplies, and degrading air quality. Additionally, the uncontrolled application of chemical pesticides and fertilizers in agriculture contaminates the water and soil, affecting both public health and agricultural output.

The lack of water makes Meghalaya's environmental challenges worse. The state still struggles to provide clean, safe drinking water because of pollution, poor management of its water resources, and increasing urbanization, even with an abundance of rainfall. Poor waste management infrastructure exacerbates the issue by causing waterways and soil to become contaminated, particularly with plastic garbage.

Recently, on October 9, 2023, a massive landslide in Pynthor Langtein village in Meghalaya resulted in the burial of four family members alive. On June 17, 2023, another massive landslide occurred in East Jaintia Hills, cutting down NH6, which connects Meghalaya with Silchar in eastern Assam, Mizoram, and Tripura. MegLIFE, or Community-based Forest Management and Livelihood Improvement in Meghalaya, is a project that will be carried out in the State of Meghalaya with assistance from the Japan International Cooperation Agency.

The project aims to improve livelihoods, preserve and restore natural resources in the villages through sustainable forest management. The purpose of this paper is to discuss Meghalaya's environmental challenges and the need for all encompassing solutions. Furthermore, educating people about the value of environmental preservation is a critical first step toward Meghalaya's sustainable future.

Keywords: *Environmental challenges, Biodiversity, Landslide, Environmental preservation, sustainable.*

INTRODUCTION

Meghalaya, a beautiful state in northeastern India, is known for its lavish green scenes, rolling slopes, and dynamic social legacy. In any case, like numerous locales around the world, Meghalaya faces various natural challenges that undermine its environments, biodiversity, and the well-being of its inhabitants.

In this research, we will study into key natural issues but most of the issues discussed below are man-made issues in Meghalaya, looking at their causes, impacts, and potential solutions.

DEFORESTATION AND WOODLAND DEGRADATION

One of the conspicuous natural challenges in Meghalaya is deforestation, driven essentially by variables such as logging, farming extension, and foundation advancement. The state's thick timberlands, which are pivotal for keeping up biodiversity and directing climate, are beneath danger. Deforestation not as it were leads to the misfortune of special greenery and fauna but moreover contributes to soil disintegration, affecting the employment of nearby communities.

IMPACTS OF MINING ACTIVITIES

Meghalaya is wealthy in mineral assets, especially coal. In any case, unregulated and unlawful mining practices have taken a toll on the environment. Open-cast coal mining, in specific, has brought about in arrival corruption, water contamination, and disturbance of biological systems. The coal mining exercises have too driven to security concerns, with occurrences of mine collapses posturing dangers to both the environment and human lives.

WATER CONTAMINATION AND WATERWAY DEGRADATION

Rivers play a vital part in Meghalaya's environment, supporting different sea-going life and serving as a source of water for farming and communities. Be that as it may, quick urbanization, mechanical exercises, and inappropriate squander transfer contribute to water contamination. The expanding release of poisons into streams influences water quality, posturing dangers to oceanic biological systems and human health.

LOSS OF BIODIVERSITY

Meghalaya's wealthy biodiversity is characterized by numerous endemic species, are under threat due to habitat loss, deforestation, and climate change. The decline of biodiversity not only disrupts or affects environmental balance but also affect traditional practices and cultural significance associated with many species. Conservation efforts are crucial to preserving the unique vegetation and fauna of the region.

CLIMATE CHANGE IMPACTS

Climate Change postures critical challenges for Meghalaya, showing in manifest in erratic weather patterns, changing precipitation, and temperature varieties. These changes affect farming, water assets, and the overall health of ecosystem. Vulnerable communities, especially those reliant on agriculture, confront challenges in adjusting to these changes, driving to potential security issues.

WASTE ADMINISTRATION CHALLENGES

Rapid urbanization and populace development in Meghalaya have driven an expanded era of strong waste. Insufficient squander administration framework and hones result in dishonorable transfer, driving to natural contamination. Actualizing successful squander administration techniques and advancing mindfulness around economical practices are vital for moderating this issue.

SOIL DISINTEGRATION AND AGRARIAN PRACTICES

Traditional rural practices, such as moving development, have been necessary to Meghalaya's social legacy. In any case, these practices, when not overseen economically, can contribute to soil disintegration and debasement. Receiving soil preservation methods and advancing maintainable horticulture practices are basic for protecting ripe soil and ensuring long-term rural productivity.

COMMUNITY INCLUSION AND MAINTAINABLE DEVELOPMENT

Addressing these natural challenges requires a multi-faceted approach that includes dynamic cooperation from nearby communities, government offices, and non-governmental organizations. Sustainable advancement practices, coupled with community-based preservation activities, can contribute to the conservation of Meghalaya's common assets while supporting the well-being of its residents.

IMPORTANT ENVIRONMENTAL PROJECTS IN MEGHALAYA

The Meghalaya Natural Projects are reforestation endeavors pointed at anticipating deforestation and advancing economic development. Given the region and its defenselessness to soil disintegration and avalanches, afforestation gets to be significant to preserve the environmental adjustment. The Meghalaya Forest Office in collaboration with local communities has been effectively involved in planting inborn trees and setting up nurseries to guarantee the preservation and development of these plantations.

The Nokrek Biosphere save may be a testament to Meghalaya's commitment to biodiversity preservation. Found within the Garo Slopes, this save is domestic to a few endemic and endangered species, counting the ruddy panda and the Hoolock gibbon. The nature reserve's preservation endeavors incorporate living space reclamation, anti-poaching activities, and community activities to strike an adjustment between human movement and territory security. Waste administration projects have picked up energy within the urban regions of Meghalaya, where population development and expanded financial movement have driven the expanded waste era. The state and the state capital Shillong have seen activities to improve waste sorting, reusing and waste-to energy arrangements. The point is not as it were to reply to quick waste administration issues, but also to instill a sense of duty for sustainable waste administration in inhabitants.

Community-led natural projects play a central part in Meghalaya, combining conventional information and practices with cutting edge preservation activities. Many nearby communities have taken activities to ensure their normal assets, including sacred timberlands, which are community-designated ranges secured by communities for their social and environmental significance. These forests act as centers of biodiversity and play a key part in keeping up the environmental adjustment of the locale.

Another center (focal point) of Meghalaya's environmental activities is water asset administration. Known for its abundant precipitation, the state faces challenges such as water shortage and contamination. Different activities point to promoting sustainable water use (promoting sustainable water use), water gathering and conduit security. In expansion, data campaigns advise around the significance of clean water and the effect of human action on water quality.

Within the field of renewable energy, Meghalaya has investigated the conceivable outcomes of utilizing clean energy sources. The sloping territory and plenteous daylight make the state appropriate for sun oriented vitality ventures. Activities including the establishment of sun powered boards in farther zones with community inclusion will not as it were to help reduce reliance on non-renewable vitality sources, but moreover improve vitality accessibility in underserved regions.

The Meghalaya Basin Development Authority (MBDA) plays an imperative part in advancing sustainable development practices within the state. Through coordinated watershed administration ventures, MBDA aims to make progress in rural efficiency, moderate soil disintegration and move forward water asset management. These ventures include collaboration with nearby communities and emphasize the significance of community cooperation in natural security. Generally, Meghalaya's natural ventures reflect a multifaceted approach that incorporates afforestation, biodiversity preservation, squander administration, community-led activities, water asset administration and renewable energy. These endeavors underline the country's commitment to accomplishing an agreeable adjustment between human activity and the conservation of its wealthy common legacy. As Meghalaya proceeds to explore the complexities of improvement, these natural ventures are proof of sustainable practices and guarantee a greener and more beneficial future for eras to come.

In conclusion, Meghalaya's natural challenges are interconnected and multifaceted, requiring collaborative endeavors to discover feasible arrangements. By tending to issues such as deforestation, mining practices, water contamination, misfortune of biodiversity, and climate alter impacts, the state can work towards a more flexible and biologically adjusted future. It is basic that partners come together to sanction approaches, actualize sustainable practices, and raise mindfulness to guarantee the long-term natural wellbeing of Meghalaya.

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A STUDY ON EXPLORING ADOPTION OF ENVIRONMENTALLY SUSTAINABLE PRACTICES OF INDIGENOUS COMMUNITIES

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ABSTRACT

Indigenous people are distinct social and cultural groups that share collective ancestral ties to the lands and natural resources where they live, occupy, or from which they have been displaced. Indigenous Communities make up only 5% of the world's population but they protect almost 80% of the planet's remaining biodiversity. The state of our environment is bleak and countries that have committed to meeting the goals proposed by the Paris Agreement are far behind. The statistics of extinct animals and plant species are only increasing at a large number. To prevent an impending environmental catastrophe, this research paper aims to analyze the notions of indigenous practices and how they can be implemented in today's time to address the issue. A new finding was highlighted by the UN in a landmark report 2020 from the Intergovernmental Science-policy Platform on Biodiversity and Ecosystems Services (IPBES) found that there are some areas held or managed by the Indigenous and the local communities where the ecological decline was less severe and in some cases which were avoided altogether. Through everyday experiences, the people from indigenous communities engage in long-term monitoring of noticeable declines, population numbers, and interactions between species. They are also known for creating diverse landscapes by combining wild and domestic species thus creating vital habitats. The Veps and Nenets, two indigenous communities from the Russian North have engaged in sustainable and creative practices of re-use and deal with the recurrent scarcity of goods respectively. The indigenous communities of India, comprising 8.6% of the nation's population have adopted various sustainable practices such as promoting sustainable fishing practices such as fish farming to conserve fish stocks in the region, as practiced by the Nyishi people of Arunachal Pradesh. Such undertakings by these indigenous groups showcase powerful examples of how traditional knowledge and sustainable practices can contribute to conserving nature and cultural heritage. This paper aims to address the importance of preserving and integrating indigenous knowledge and practices so that we can forge a path toward a more harmonious and sustainable future for both indigenous communities and the broader world.

Keywords : Indigenous Communities, Sustainable Practices, Environment, Traditional Knowledge, Sustainable Development.

INTRODUCTION

Indigenous people approximately make up about 370 million in the world representing varying cultures and traditions. They protect almost 80 percent of the planet's remaining biodiversity.[1] The advent of globalization, the industrial revolution, and other developments left a hefty impact on the environment thus leading to more and more international environmental conventions to address the severity of the existing and impending issues. In contrast to these models, the Indigenous people have practiced sustainability for centuries. Guardians of nature and agents of change are some of the roles that Indigenous people are known for so it's a greater concern to respect and promote their collective rights to their lands. Indigenous people have a strong reciprocal relationship with the environment and they hold unique knowledge systems and practices for sustainable management of natural resources. Their worldviews about the environment stand in stark contrast to the commodified and tradable manner of natural resources by the West. Since 1992 Indigenous people have been directly engaging in UN processes on sustainable development including in the Commission on Sustainable Development and its high-level political forum.[2]

Indigenous and local communities contribute consistently to biodiversity by, for example, mixing domestic and wild species in gardens, which have produced a greater variety of species than any normal agricultural area. Furthermore, it has been reported that in certain areas, such as Australia, a sizable number of local communities and indigenous people actively manage their lands through customary burning customs. They do restore damaged soils ecologically in places like the Pacific Northwest of the United States by restoring native plant species and shellfish populations[3]. Indigenous people have always kept a close eye on ecosystems over extended periods. Through their daily encounters, these communities gather data that allows them to report on species trends, population numbers over time, species interactions, and discernible decreases. Together, Native American and Canadian communities residing in semipolar regions have established the Local Environmental Observer network, which collects information on a range of subjects, such as temperatures and wildlife occurrences. Indigenous populations have traditionally had a close and direct relationship with their lands, contributing to their conservation success for several reasons. Due to their closeness to the environment and capacity to respond swiftly to threats or changes, community-based organizations typically enjoy greater success than government programs or institutions. Additionally, their comprehension of the local ecosystems and their processes is typically deeper, which might aid in the formulation of more sensible management choices. To preserve the biodiversity of the earth and the general health of our ecosystems, Indigenous communities' traditional knowledge systems and practices are essential, so it is high time that the government as well as scientists acknowledge and find ways to collaborate with the indigenous communities to bring out innovations that would be

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sustainably prevalent for the years to come. Respecting the human rights of indigenous people should be the first step towards integrating their worldviews and potential collaborations in the protection of biodiversity.

CASE STUDIES OF INDIGENOUS GROUPS FROM VARIOUS PARTS OF THE WORLD

The Veps and Nenets from Russian North

The Veps and Nenets, two indigenous communities from the Russian north have been long engaged in sustainable waste management. Waste is often taken for granted, which encompasses materials we no longer need. It has become a global ecological problem, which is most relevant in urban cities. Concepts such as quick-to-use and quick-to-discard suit consumer's habits resulting in what is commonly termed ‘waste generation’. The Veps are an indigenous group traditionally living in rural areas in northwest Russia, they have long engaged in creative and sustainable practices of re-use. The Veps usually give a new life and symbolism to materials or objects that have lost their initial purpose. Car tires are used to decorate the gardens, oil barrels to collect the rain to irrigate the soil, and textile leftovers are often used to make carpets, pillows, and dolls. The Indigenous nomadic and semi-nomadic Nenets in the high Russian Arctic have developed creative ways to deal with the recurrent ‘scarcity’ of goods. Along the seashores, the Nenets family collect driftwood- a natural waste of the Arctic Ocean to counterbalance the lack of firewood. Arctic seashores accumulate a significant amount of plastic waste. Nenets skilfully transforms the materials while maintaining well-established economic and social practices of reuse and exchange. The traditional practices of indigenous communities are often belittled in decision-making procedures and public debates. The state-of-the-art in waste management and sustainability perpetuates power imbalances by depicting so-called "western," "developed," and morally superior nations as compassionate, cutting edge, and morally superior, while their creative ideas and considerate attitudes frequently replicate long-standing customs among indigenous groups[4]. For progress to occur, it’s necessary to recognize and promote their practices.

THE TONGA COMMUNITY OF SOUTHERN ZAMBIA

The Tongas are well-known for their farming practices. For many centuries, they have coexisted peacefully with their biophysical surroundings. Numerous native fruit trees can be found in Tongaland. These trees are not only an important source of food but also offer shade for people when they take breaks from working in the fields. Additionally, by lessening the impact of storms on their crops, they act as windbreakers. The Tongas consider their clan's animals to be totemic. Any clan that regards their totem as sacred is not allowed to eat it. There exists a strong tie between the totem and the clan, so long as the clan does not devour, kill, or trap these creatures. There is evidence that totemism reduces hunting and gathering of

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[4]Siragusa, L., & Arzyutov, D. (2020). Nothing goes to waste: Sustainable practices of re-use among indigenous groups in the Russian North. *Current Opinion in Environmental Sustainability*, *43*, 41–48. https://doi.org/10.1016/j.cosust.2020.02.001

various edible plants and animals. Totemism essentially promotes harmonious interactions between indigenous populations and the environment. The Tonga people plant primarily maize, sunflower, groundnuts, soy, beans, and sweet potatoes as part of their crop rotation practice.

Due to the variation in crop nutrient requirements, this helps interrupt the cycle of crop disease, which is beneficial to the soil. It also reveals that Tonga engages in a significant amount of intercropping. Intercropping offers many benefits such as conserving the soil, reducing pests, and increasing crop yield. The use of livestock manure, agroforestry, organic farming, and fallowing are some of the agricultural strategies that the Tonga people have long been engaged in. Tonga views some water sources as gods' homes, just like it does with water sustainability. The Tongas believed that crop fields close to water courses would create increased siltation and eventually destroy these water supplies; therefore they banned farming near them. In addition to protecting the water catchment area, these techniques lessen soil erosion and flooding. Measures are made to preserve the sustainability of grass because it is a valuable resource in Tonga. When the grass reaches a mature enough stage to shade seeds, it is permissible to trim it down annually. In their rangelands, the Tonga people burn the grass every year because they think it promotes healthy pasture development and eliminates animal pests.[5] The environmental sustainability strategies of the Tongas have proved very practical; therefore, government and policymakers should integrate indigenous knowledge into environmental policies to minimize environmental degradation.

THE NYISHI TRIBE OF ARUNACHAL PRADESH

In Arunachal Pradesh, the Nyishi tribe represents the largest ethnic group. Their daily practices of sustainable agriculture and their spiritual beliefs of worshiping the sun and moon are the foundations of their intimate connection to nature. The Nyishi tribe's community-driven "Protect Hornbills Project" keeps them at the forefront of ecological conservation. The Nyishi village has partnered with conservation organizations to protect and conserve the great hornbill, which is in danger owing to habitat loss, poaching, and climate change. The following are a few of the initiatives: community-based nest adoption and monitoring, in which the nearby Nyishi villagers receive training and employment to watch over and guard hornbill nests, guaranteeing the survival of the hornbill population in the future. The project also encourages sustainable livelihood options such as ecotourism and handicrafts for the Nyishi people to reduce their dependence on forest resources and minimize the threats to the hornbill's habitat. The goal of this project is to raise public awareness of the value of hornbills and the need to protect them. A significant aspect of the initiative is habitat restoration, which aims to create wildlife corridors and restore degraded habitats so that species like the great hornbill can flourish in a healthy ecosystem. An example of a community-led project that combines traditional knowledge with contemporary conservation methods to significantly improve the protection of endangered species and their ecosystems is the "Protect Hornbills Project."

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CONCLUSION

The goal towards a sustainable future is a long road, a long road of hurdles. Overcoming these hurdles requires recognition and collaboration. This paper has aimed to address various initiatives and practices of indigenous communities around the world. It is incumbent upon policymakers, governments, and individuals like us to explore and implement alternative approaches in the present day policymakers, governments as well as us to find ways and alternatives that are to be applied in today's time. A perspective shift is necessary in society to move away from the capitalist mindset to encourage the practices of the indigenous communities. Reciprocity is a goal that everyone needs to strive for in our relationships with the environment at large. Indigenous communities are important contributors to the governance of biodiversity at local and global levels so it is high time to take action to adopt their practices and apply them in our external surroundings as well as the world at large for a sustainable tomorrow.

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GMOs IN FOOD AND THEIR IMPACT ON ENVIRONMENT

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ABSTRACT

A "genetically modified organism," or GMO for short, is a plant, animal, or microbe that has had one or more genome modifications made with the goal of changing the organism's properties. Usually, this is done through the use of sophisticated genetic engineering. Within a species, between species, or even between kingdoms, genes can be introduced, altered, or removed. Among the many uses for genetically modified organisms (GMOs) are the production of human insulin and the development of insecticide-resistant crop plants.

Genetically modified (GM) foods were first approved for human consumption in the United States in 1994. According to the report released by Genetic Engineering Approval Committee (GEAC), In 2002–2003, Indian farmers began growing Bt cotton. By 2014, the area had grown to 11.6 million hectares, with Bt cotton accounting for roughly 96% of the total cotton area. India rose to become the second-largest producer of cotton and the fourth-largest land farmer of genetically modified crops.

The Food and Agriculture Organisation (FAO), reports that more than 17 million farmers are growing genetically modified crops in 29 different nations today, increasing output while using fewer pesticides. Additional advantages include lower costs for producing food or drugs, improved food quality and nutrient content, resilience to pests and diseases, increased food security, and medicinal advantages for the world's expanding population.

Growing crops with less inputs can be one of the environmental benefits of genetically modified organisms. Over the past 25 years, GMOs have helped to increase agricultural productivity by 22% and reduce pesticide use by 7.2%. Here, genetically modified crops have a significantly positive environmental impact since, in the absence of GM technology, farmers would need to cultivate 57.8 million additional acres of land to produce the same amount of crops. However, certain GM crops may have adverse effects on non-target organisms including soil and water ecosystems. For example, the expansion of genetically engineered herbicide-tolerant soy and maize in North America has destroyed a significant section of the monarch butterfly's habitat.

This paper discusses the complex interplay between GMOs and environment, along with highlighting the importance of continued research, transparent labelling, and well-informed decision-making. It concludes by stating that a fair assessment of the advantages and disadvantages, with an emphasis on protecting environment is necessary.

Keywords*: Genetically modified organisms, environment, food security, agriculture*

INTRODUCTION

An organism that has had one or more genome modifications made, usually through advanced genetic engineering, with the goal of changing the organism's properties is known as a "genetically modified organism," or GMO for short. This can be a plant, animal, or microorganism. The addition, deletion, or modification of genes can occur within a species, between species, or even between kingdoms. The production of human insulin and the development of pesticide-resistant crop plants are just two uses for genetically modified organisms (GMOs).

The main purpose of the GMO crops grown nowadays is to help farmers reduce crop loss. The three most common traits found in genetically modified seeds are tolerance to herbicides, resistance to plant viruses, and resistance to insect damage.

Two scientific methods for creating genetically modified creatures are reproductive cloning and recombinant DNA technology. In 1996, Dolly, a sheep, was the first animal to be produced by cloning. On the other hand, recombinant DNA technology involves inserting one or more single genes from an organism belonging to one species into the DNA of another species.

Through a number of sectors, including agriculture, health, research, and environmental management, genetically modified organisms have been ingrained in society. But like all new technologies, this new technology on gene manipulation they also raise concerns such as ‘How is this going to affect the environment in future?’ ‘What are the health issue that needs to be brought to consumers' attention?’ and ‘Does recombinant technology actually have sustainable advantages?’

GMOS AND THEIR IMPACT ON ENVIRONMENT

The environment has improved due to the huge drop in the usage of herbicides and pesticides brought about by GM technology. Since 1996, there has been an 8.3% global decrease in the number of pesticides (herbicide and insecticide combined) used on genetically modified crops. This equates to an active ingredient savings of 775.4 million kg when compared to the predicted yield of traditional farming methods on the same agricultural area. (Chamberlin)

Since the advent of GM crops, the usage of herbicides has generally declined in a number of countries. For example, compared to the traditional equivalent, Canada's yearly herbicide consumption on GM HT soybeans dropped between 1997 and 2018. However, as compared to conventional crops, there is a net increase in some countries in the average amount of herbicide active ingredient sprayed on genetically modified crops. For example, Brazil's adoption of the GM HT soybean crop from 2007 to 2014 resulted in an average increase in herbicide use of 4,940,262 kg. On the other side, between 1997 and 2006 and between 2015 and 2018, Brazil's average usage of herbicides fell.

Changes in agricultural methods linked to the use of genetically modified crops have a significant environmental impact since they reduce fuel use and greenhouse gas emissions simultaneously. The primary reason of this effect is the reduction of spray runs by GM IR crops and the facilitation of the switch from traditional tillage to reduced or no tillage farming systems by GM HT crops. The slower decomposition of plant wastes brought on by less soil tilling is the cause of this impact. Greater amounts of carbon are stored in the soil rather than being released as carbon dioxide into the atmosphere because the decomposition process is slower. The reduced tillage methods help to prevent soil erosion.

The widespread use of one or two herbicides has resulted in the production of broad range herbicide-resistant weeds, even though the change in the type of herbicide used on GM crops is a net improvement. In particular, the usage of glyphosate-tolerant crops has led to the emergence of weeds that are resistant to the herbicide, which has seriously hampered agriculture in some areas. Herbicide resistance can develop in any weed, and hundreds of resistant weed species have been found.

Genetically modified crops might also harm the non-target species. Concerning species are agricultural plant arthropod predators and parasitoids. For instance, a 1999 research that was released revealed worries about the detrimental effects of a maize crop resistant to the Bacillus Thuringiensis (Bt) pest on the larvae of monarch butterflies in North America. (Emvironmental impacts, 2023)

GMO PRODUCING COUNTRIES

GM crops were cultivated on 179.7 million hectares of land in 28 countries in 2015, which is more than 10% of all arable land worldwide and seven times the size of the United Kingdom. The top producers are Argentina, Brazil, and the United States. (What GM crops are being grown and where?, 2016)

The following genetically modified crops were cultivated commercially: cotton (15 nations), soy beans (11 countries), maize (corn) (17 countries), aubergine (Bangladesh), sugar beetroot (USA, Canada), papaya (USA and China), potato (USA), squash/pumpkin (USA), alfalfa (USA) and aubergine (Canada).

The first genetically modified crop to be commercialised in the US was the Flavr Savr tomato, which was genetically engineered to stop ripening and delay softening and rotting in 1994.

Growing genetically modified crops has skyrocketed since the mid-1990s. Globally, GM crops were planted on barely 1.7 million hectares (MHa) in 1996; nevertheless, by 2015, 179.7 million hectares—or more than 10% of all arable land—had been planted with GM crops.

In 2015, soybeans accounted for 92.1 MHa of the total GM crop cultivated. Maize came in second with 53.6 Mha, followed by cotton with 24 Mha and oilseed rape (canola) with 8.5 Mha (Figure 4). This amounts to 83% of global soybean production and 75% of global cotton production. That year, about 25% of the world's oilseed rape and 29% of the world's maize harvest came from genetically modified crops.

The USA (70.9 Mha), Brazil (44.2 Mha), Argentina (24.5 Mha), India (11.6 Mha), and Canada (11 Mha) are the top users of GM crops among the nations cultivating them. Five EU nations—Spain, Portugal, the Czech Republic, Romania, and Slovakia—grow genetically modified maize. The top nation is Spain (0.1 Mha). GM cotton is the primary crop planted in GM crops in South Africa (2.3 MHa), Burkino Faso (0.4 Mha), and Sudan (0.1 Mha) in Africa. (What GM crops are being grown and where?, 2016)

In 2002–2003, Indian farmers began growing Bt cotton. By 2014, the acreage had grown to 11.6 million hectares, with Bt cotton accounting for roughly 96% of the cotton crop. India rose to the position of second in cotton production and fourth in land used for GM crop cultivation. (Hem kumar Pande)

The International Service for the Acquisition of Agri-Food Technical Assistance (ISAAA) estimates that 20.7 million farmers in 30 nations were cultivating GM crops on 191.7 million hectares of world land as of 2020. (Desjardins, 2019)

There are now 23 GM crops that have been authorised worldwide as of 2021. These crops include those that include features like herbicide tolerance, insect resistance, and viral resistance. (Desjardins, 2019)

CONCLUSION

In conclusion, there are many different facets to the complicated problem of GMOs effects on the environment. Although there are potential benefits to genetically modified crops, such as higher yields and enhanced resilience, their broad adoption requires a thorough knowledge of the environmental implications.

Despite its contribution towards eradicating the food insecurity, The Institute for Responsible Technology (IRT), revealed that after just 10 days of feeding a diet that contained GMO potato to rats, they experienced negative effects on almost every organ system. As to the IRT, genetic modification techniques were the source of the toxicity. They contended that there was a high probability of toxicity for all.

Even if there are several laws in place to stop genetically modified crops from endangering the environment, this technology might still have unfavourable effects. Scientists believe that rather than the technology itself, human error in the implementation of this technology is often to blame for the unfavourable outcomes. In order to create a sustainable food system, GM crops are necessary, and their benefits to the environment and higher agricultural yields support this use of technology.

To conclude, The ecosystem is impacted by genetically modified organisms (GMOs) in both beneficial and harmful ways. Positively, they can increase pest resistance, which lowers pesticide emissions and improves the environment for both people and animals. Furthermore, GMOs that provide higher food yields may lessen the need to expand land, which may lessen habitat loss and deforestation. Additionally, GMOs resistant to drought may lessen the strain on water resources by sustaining agricultural productivity in times of water shortage.

But there are drawbacks to take into account as well. Weed management may become more challenging as a result of superweeds developing resistance to particular herbicides, which might lead to an increase in the usage of chemicals. For farmers that prefer not to use genetically modified organisms, cross-pollination can result in genetic contamination of non-GMO crops. According to some research, GMOs may have a detrimental effect on microbial populations and soil health, which might have long-term effects on ecosystem services and agricultural output. Furthermore, the extensive use of GMOs may encourage monoculture farming methods, which may be detrimental to the resilience of agricultural systems, biodiversity, and soil health. Last but not least, the environmental presence of GMOs may result in unforeseen outcomes like the spread of genetically modified organisms to non-target species or ecosystems.

Scientists, decision-makers, and the agricultural community must work together to address issues pertaining to biodiversity, soil health, cross-breeding, and genetic contamination. GMOs can support sustainable agriculture while reducing unfavourable environmental consequences with prudent development, regulation, and application.

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RETHINKING PLASTIC FOR A BETTER TOMORROW: STRATEGIES FOR EFFECTIVE PLASTIC REDUCTION IN CAMPUS

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The environment is a shared global resource, known as global common, and safeguarding it is a responsibility that falls upon every individual. This study is an attempt to tackle the pressing global issue of Plastic Pollution, which seeks to initiate an assessment of plastic usage within Women's Christian College campus, particularly the canteen. This initiative aligns with the broader commitment to safeguard our global common, the environment, and reiterates the importance of beginning at the grassroot level to contribute to global environmental goals.

This research aims to quantify and analyze, through observation, the extent of plastic consumption in the canteen in terms of plastic cups, spoons and bags used on a daily basis. This is to be carried out through periodic monitoring, engaging in conversations with the vendors and interviewing the students. The study seeks to implement effective measures aimed at reducing single-use plastic and enhancing waste management practices. Central to this effort is the exploration of alternatives to plastic that are both environmentally friendly and economically viable.

This study serves as a call to action, encouraging a collective shift towards sustainable and green practices within the campus community. By fostering environmental sensitivity among students, the initiative strives to inculcate a culture of responsible consumption and waste reduction. This grassroots undertaking emphasizes the significance of individual responsibility in preserving our shared global environment, shaping a community that embraces and champions responsible environmental stewardship.

Keywords: *single-use plastic, green practices, sustainable, environmental-friendly, pollution*

INTRODUCTION

The 21st Century has seen an unparalleled increase in environmental issues, the most prominent of which is plastic pollution. Plastic pollution has emerged as a global environmental crisis, necessitating urgent attention and comprehensive strategies for mitigation. Plastic pollution is a pressing global issue affecting not only marine ecosystems but also terrestrial environments. The sheer volume of plastic waste, estimated to reach 11 million tons entering terrestrial ecosystems and 18 million tons in aquatic ecosystems annually by 2040, underscores the urgent need for action. Studies by Winnie W. Y. Lau et al. (2020)[1] and Matthew MacLeod et al. (2021)[2] highlight the severity of the issue, emphasizing that the threat from plastic pollution extends worldwide. Beyond environmental concerns, plastic pollution poses risks to human health. Studies have highlighted the potential health consequences of exposure to plastics, especially during sensitive periods like pregnancy. Stephanie B. Borrelle et al. (2020) predict a worrisome trajectory where the growth in plastic waste surpasses efforts to mitigate its impact[3]. Recognizing the campus as a microcosm of larger societal trends, this research focuses on the canteen, a crucial nexus where daily routines connect with environmental consequences.

According to a survey conducted by the National Center for Biotechnology Information, an average college student generates nearly 1.5 pounds of plastic waste every day. This is the case within Women’s Christian College as well - From the packaging of food to the utensils used in the canteen, plastic has seamlessly integrated into our routines. Through this endeavor, we not only contribute to a sustainable campus but also echo the broader call for environmental stewardship in shaping a better and more responsible tomorrow.

Efforts to tackle plastic pollution in the canteen can yield multifaceted benefits. Firstly, reducing plastic usage and adopting eco-friendly alternatives can significantly decrease the college's overall environmental impact. By transitioning to biodegradable packaging materials and reusable utensils, the college can mitigate its contribution to plastic pollution and set a positive example for students and staff. Moreover, embracing sustainable practices in the canteen can foster a culture of environmental consciousness among the college community, empowering individuals to make informed choices and adopt eco-friendly behaviors in their daily lives.

Addressing plastic pollution in the canteen aligns with broader sustainability goals and environmental stewardship initiatives. Recognizing the global nature of the issue, international bodies like the United Nations are spearheading efforts to prevent, reduce, and control plastic pollution through coordinated agreements. Over 120 countries have implemented bans on selected single-use plastics, reflecting a growing consensus on the need for collective action.

Women’s Christian College has a unique opportunity to lead by example and demonstrate its commitment to environmental responsibility. By implementing sustainable practices in the canteen, the college can showcase its dedication to creating a greener and more sustainable campus environment. This not only enhances the college's reputation as a socially responsible institution but also inspires students to become advocates for environmental conservation and sustainability in their future endeavors.

OBJECTIVES

a) Quantify and Analyze Plastic Consumption: This study's primary goal is to examine how much plastic is consumed on college campuses, especially in the cafeteria focusing on plastic bags, utensils, and cups,

b) Identify Alternatives: The study seeks to find alternatives to single-use plastics in the process of finding solutions.

c) Implement Reduction Measures: Provided with data and alternative solutions, the study seeks to put into effect practical steps that will lessen reliance on single-use plastics.

METHODOLOGY

Our research employs a robust observational methodology. The primary objective of this approach is to objectively quantify the extent of plastic usage and understand consumption patterns. This inclusive approach aims to provide a comprehensive understanding of the plastic landscape within the canteen premises.

RESEARCH QUESTIONS

a) What are the primary contributors to single-use plastic waste in the canteen?

b) What is the daily usage of these single use plastics?

c) How has the pattern of plastic consumption in the canteen changed over the specified time period?

d) What perspectives do canteen vendors hold regarding the use of plastic items?

e) What are the most effective measures to reduce plastic consumption in the canteen?

DATA COLLECTION

Observational Methodology

The research employs a comprehensive observational methodology to gather accurate and representative data on plastic consumption within the Women’s Christian College campus, focusing particularly on the canteen. We conducted regular, systematic observations during peak hours over a specified duration, ensuring the capture of representative data. The research actively engages with various stakeholders within the college community to garner support and participation in plastic pollution reduction efforts. This includes collaboration with canteen staff, students, faculty members, and administrative personnel to raise awareness about the environmental impact of plastic usage and solicit feedback on potential strategies for improvement. By involving stakeholders in the research process, the study lays the foundation for collaborative action towards a plastic-free campus environment. In our observational methodology, meticulous attention was paid to documenting the daily usage of single-use plastic spoons, cups, and polythene bags within the Women’s Christian College campus canteen. Through systematic observations conducted during peak hours over a specified duration, we aimed to capture a comprehensive understanding of plastic consumption patterns in real-world scenarios. Each instance of plastic usage was meticulously recorded, including the quantity used, the time of usage, and the context in which it occurred. By consistently monitoring and documenting these patterns over an extended period, our study ensures the generation of a robust dataset that accurately reflects the nuances of plastic consumption within the college community. This detailed dataset enables us to identify trends, analyze variations, and discern underlying factors influencing plastic usage behavior. Moreover, by documenting plastic consumption in real-time and in context, our methodology ensures the reliability and validity of the data collected, laying the groundwork for informed decision-making and targeted interventions aimed at reducing plastic pollution within the college campus.

QUANTITATIVE ANALYSIS

To quantify the extent of plastic usage, the study first assesses the various plastic items used and in what proportion. This analysis was visually depicted in a graph, showcasing the distribution of plastic spoons, cups, polythene bags, and bottles.

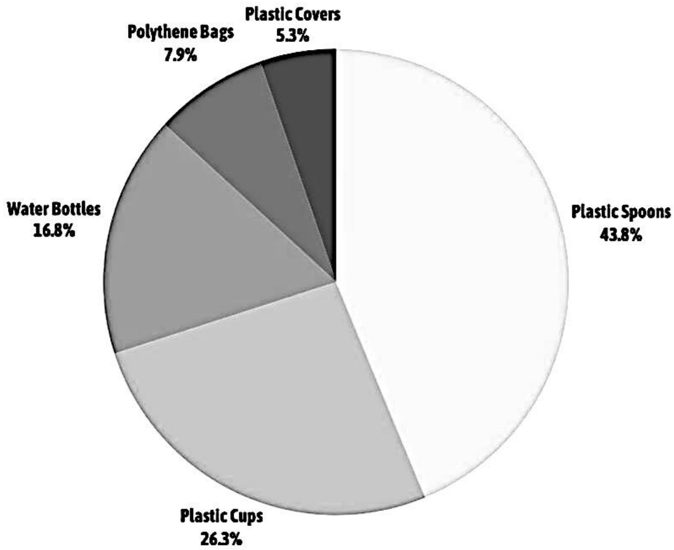

Fig 1: Distribution of plastic spoons, cups, polythene bags, and bottles. Author’s Compilation

Following this initial assessment, statistical analyses were employed to transform observational data into meaningful metrics. Monthly consumption figures were determined for each plastic item, with 2500 plastic spoons, 1350 plastic cups, 300 polythene bags, and 450 bottles identified as the baseline quantities. These quantitative metrics served as a foundation for evaluating the environmental impact of plastic usage within the canteen.

A comprehensive cost analysis was conducted, taking into account bulk purchase rates for plastic utensils and containers. Considering rates of Rs. 40 per 100 spoons, Rs. 100

per 100 bags, and Rs. 40 per 20 bottles, the cost analysis not only provided financial insights but also underscored the economic ramifications associated with plastic consumption. By quantifying both the environmental impact and economic costs of plastic usage, our study aimed to provide a holistic understanding of the implications of plastic consumption within the college campus. This data-driven approach facilitates informed decision-making and the development of targeted strategies for reducing plastic waste and promoting sustainability initiatives within the college community.

STAKEHOLDER ENGAGEMENT

Vendor Conversations

Interacting face-to-face with vendors provided insight into procurement procedures, costs, and possible challenges for shifting away from single-use plastics. Engaging with vendors provided us with firsthand knowledge of their procurement practices and supply chain dynamics. We were able to gather information about the availability of alternative eco-friendly products, their cost implications, and any operational constraints that vendors may encounter in sourcing and stocking sustainable alternatives. By actively involving vendors in the research process, we aimed to foster collaboration and mutual understanding, recognizing their role as key stakeholders in the transition toward a plastic-free campus environment. By building rapport and establishing open lines of communication with vendors, we sought to create a conducive environment for exploring innovative solutions and overcoming challenges collectively. These interactions served as a valuable platform for exchanging ideas, sharing best practices, and co-creating strategies for promoting sustainability within the college canteen.

STUDENT INTERVIEWS

The research aims to assess students' perspectives, preferences, and receptiveness to sustainable practices using structured interviews, since they are both the consumers and agent of change. Recognizing that students serve as both consumers and agents of change within the college community, these interviews were designed to provide a comprehensive understanding of their attitudes and behaviors toward plastic usage.

Structured interviews were employed as a qualitative research technique to systematically gather data on students' views and experiences related to sustainable practices. Through a series of predefined questions, we explored various aspects such as students' awareness of plastic pollution, their preferences for eco-friendly alternatives, and the factors influencing their consumption choices. By adopting a structured approach, we ensured consistency in data collection and facilitated comparison and analysis across different interviewees.

The interviews served as a platform for students to voice their opinions, concerns, and suggestions regarding plastic usage in the campus canteen. By actively engaging with students, we sought to empower them as stakeholders in the decision-making process and encourage their participation in sustainability initiatives. Moreover, the interviews provided valuable qualitative insights that complemented the quantitative data obtained through observational methodologies and vendor conversations.

PLASTIC ALTERNATIVES AND CHALLENGES

Steel Spoons

Steel spoons offer several advantages, including the potential for extended usage and durability, which can significantly reduce the overall environmental footprint associated with disposable plastic spoons. Unlike their plastic counterparts, steel spoons are reusable and can withstand repeated use, making them a sustainable alternative for daily use in the campus canteen. However, the transition to steel spoons is not without its challenges and considerations. One significant issue is the risk of theft associated with steel utensils. Unlike disposable plastic spoons, which are inexpensive and easily replaceable, steel spoons represent a higher investment cost for the canteen. This increases the likelihood of theft or loss, posing a potential barrier to the widespread adoption of steel spoons. The cleaning process for steel spoons may raise environmental concerns and health considerations. While steel utensils can be washed and sanitized for reuse, this process typically requires the use of water and cleaning agents. Depending on the disposal of wastewater and the chemicals used in the cleaning process, there may be environmental implications associated with water usage and wastewater treatment.

WOODEN SPOONS

While wooden spoons offer a promising alternative to conventional plastic cutlery due to their biodegradable nature, there are certain limitations associated with their current design. One notable drawback is the lack of a hollow space in wooden spoons, which is essential for properly holding and transporting food. While they may be suitable for certain types of dry or semi-solid foods, they may not be as effective for handling liquids or foods with a high moisture content.

By highlighting their eco-friendly attributes and encouraging mindful consumption practices, individuals can make informed choices that contribute to reducing plastic waste and supporting sustainable alternatives in the food industry.

SUGARCANE BAGASSE SPOONS

Spoons made from sugarcane bagasse are an innovative and sustainable substitute since they are repurposed to agricultural waste. Derived from the fibrous residue left behind after extracting juice from sugarcane, sugarcane bagasse is a renewable and abundant agricultural waste material. By repurposing this waste into spoons, manufacturers can mitigate the environmental impact associated with conventional plastic cutlery while simultaneously addressing sustainability concerns in the food industry.

The incorporation of sugarcane bagasse spoons into the canteen's inventory offers several potential advantages over alternatives made of steel and wood. Firstly, sugarcane bagasse spoons provide a biodegradable and compostable option that aligns with the college's commitment to sustainability. Unlike plastic cutlery, which persists in the environment for centuries, sugarcane bagasse spoons decompose naturally over time, minimizing their ecological footprint and reducing waste accumulation. Sugarcane bagasse spoons can withstand hot and cold temperatures, making them versatile for serving both hot and cold dishes in the canteen.

EDIBLE SPOONS – MILLET EDIBLE SPOONS

An innovative solution to the plastic waste problem emerges from within Women's Christian College itself, specifically from the Department of Biotechnology, which is pioneering the creation of millet-based edible spoons. Unlike traditional plastic or even biodegradable alternatives, millet edible spoons offer a unique combination of being both edible and biodegradable. This means that once they have served their purpose, there is no longer any need for disposal or waste management.

Millet edible spoons are crafted from a blend of millet flour and other natural ingredients, making them not only eco-friendly but also nutritious. These spoons provide a sustainable alternative to conventional plastic cutlery, as they are made from renewable agricultural resources and do not contribute to environmental pollution. Moreover, being edible, millet spoons offer a novel dining experience, adding a touch of innovation to the college's canteen offerings.

The development of millet-based edible spoons by the Department of Biotechnology showcases the college's commitment to promoting sustainable practices and fostering innovation in addressing environmental challenges. By harnessing the expertise and resources available within the college community, Women's Christian College demonstrates its proactive approach to sustainability and its dedication to making a positive impact on the environment.

ARECA LEAF BOWLS

Another environmentally friendly substitute for traditional plastic containers are bowls made of areca leaves. These bowls are crafted through a simple and natural process that involves cleaning, heat pressing, and shaping the leaves into functional containers. The resulting bowls are robust, durable, and capable of holding a variety of food items.

One of the key advantages of areca leaf bowls is their biodegradability. Unlike plastic containers that persist in the environment for hundreds of years, areca leaf bowls naturally decompose over time, leaving behind a minimal environmental footprint. When disposed of, these bowls break down into organic matter, enriching the soil and contributing to the natural nutrient cycle. This inherent biodegradability makes areca leaf bowls an environmentally responsible choice for food packaging and serving.

STRATEGIES FOR PLASTIC REDUCTION

Introducing Sustainable Alternatives

As part of this strategy, the Women's Christian College is actively exploring alternatives. These sustainable alternatives not only align with eco-friendly practices but also contribute to the circular economy by repurposing agricultural waste. Introducing sustainable alternatives provides valuable educational opportunities for students. By engaging in initiatives that prioritize environmental stewardship, students gain practical insights into sustainability practices and the importance of responsible consumption. Transitioning to sustainable alternatives can also yield cost savings in the long run. By reducing reliance on single-use plastics and adopting eco-friendly practices, the college not only contributes to a greener campus but also potentially lowers operational expenses over time. The adoption of sustainable alternatives by Women's Christian College sets a precedent for long-term environmental impact. By prioritizing eco-conscious choices today, the college paves the way for a more sustainable future, instilling values of environmental responsibility in current and future generations.

AWARENESS CAMPAIGNS

Empowering students to be proactive in reducing plastic waste, the college encourages the adoption of a 'Bring Your Own Bottle' (BYOB) policy. Providing reusable water bottles and promoting the use of personal utensils and bowls underscores the significance of individual responsibility. By normalizing sustainable habits, the college cultivates a mindset of conscious consumption and waste reduction among students.

Engaging with canteen vendors to encourage the use of eco-friendly packaging and utensils, fostering a shared commitment to sustainability. Recognizing vendors as key stakeholders in the plastic reduction initiative, the college actively engages with canteen vendors. By empowering students, collaborating with vendors, and promoting eco-friendly alternatives, the college sets a precedent for proactive environmental action, emphasizing the collective responsibility in combating plastic pollution and fostering a greener future for all.

LIMITATIONS & CHALLENGES

Owing to the limited sample space of the study, particularly the campus canteen of Women's Christian College, the findings may not be fully indicative of other campuses or a larger context. Variations in plastic usage patterns across different institutions or regions may impact the applicability of the study's recommendations beyond the specific setting. Likewise, the observation is limited to a given time range, hence, the study may not capture differences in plastic usage throughout specific seasons or events. The study's breadth may be constrained by available resources, limiting the depth of research and the variety of solutions that may be performed. Adequate resources are essential for conducting comprehensive research that delves into various aspects of plastic waste management and sustainability initiatives. The study focused primarily on consumption but does not go into depth on post-consumption trash disposal dynamics, preventing a comprehensive understanding of the plastic lifecycle. Understanding the complete lifecycle of plastic waste, including disposal practices and recycling mechanisms, is crucial for developing holistic strategies that address all stages of plastic management. To overcome these limitations, future research should adopt a more comprehensive approach that considers diverse factors influencing plastic waste generation and management. Incorporating post-consumption dynamics, exploring seasonal variations, and engaging multiple stakeholders can enrich the study's findings and enhance the effectiveness of plastic waste reduction initiatives at Women’s Christian College and beyond.

CONCLUSION

Women’s Christian College's journey towards becoming a plastic-free campus necessitates a holistic commitment to sustainability. The observational approaches employed in our research provided a comprehensive picture of the magnitude of plastic consumption within the campus community. By meticulously recording the daily usage of single-use plastics and analyzing the underlying reasons behind their preference, we were able to identify opportunities for alternatives, taking into consideration cost factors and practicality. The exploration of sustainable utensils yielded a myriad of options, offering potential solutions to the plastic pollution problem.

The suggestions outlined in our research serve as a starting point towards plastic reduction, acknowledging obstacles while presenting feasible answers. These measures seek to intertwine human responsibility, institutional commitment, and global environmental sustainability to achieve a greener campus. As a microcosm of society, our college campus can play a pivotal role in setting an example for responsible plastic usage and disposal, as well as fostering an environmentally conscious community. By embracing sustainable practices and prioritizing environmental stewardship, Women’s Christian College can lead by example and inspire positive change beyond its walls.

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FELICITOUS LABELING OF TRIANGULAR GRAPHS AND JEWEL GRAPH

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Abstract

A felicitous labeling of a graph G, with q edges is an injection $f : V(G) \rightarrow \{0, 1, ..., q\}$ so that the induced edge labels $f^*(xy) = f(x) + f(y)(mod\ q)$ is distinct. In this paper, we prove that the triangular ladder, triangular book and the jewel graph are felicitous.

Keywords: Felicitous labeling, triangular ladder, triangular book, jewel graph.

1 Introduction

Graph labeling is the process of assigning integers, usually non negative to the vertices or edges of a graph subject to certain conditions. The most well-known and fascinating graph labeling method is the graceful labeling of graphs proposed by Rosa [7] in the year 1967. Numerous other types of labelings and their variations were discovered following graceful labeling. One among them are harmonious labelings which was introduced by Graham and Sloane [2] in the year 1980. Felicitous labeling is a variation of harmonious labeling which was introduced by Lee *et al.* in the year 1991. A felicitous labeling of a graph G, with q edges is an injection $f : V(G) \rightarrow \{0, 1, ..., q\}$ so that the induced edge labels $f^*(xy) = f(x) + f(y)(mod\ q)$ is distinct [4].

Lee *et al.* [5] have proved the complete bipartite graph $K_{m,n}$ when $m, n > 1$, the graph $P_2 \cup C_{2n+1}$ and the generalized Petersen graph to be felicitous. Gomathi and Nagarajan [3] have proved a vertex switching of cycle $C_n(n \geq 4)$, a vertex duplication of the cycle C_n, and the square of the book $B_{n,n}(n \geq 2)$ to be felicitous. For more results on felicitous labeling, we refer to the Gallian's survey [1]. In this paper, we prove that the triangular ladder, triangular book and the jewel graph are felicitous.

2 Preliminaries

In this section, we state few definitions which are required for the theorem.

Definition 2.1 (2018) [8]

A **ladder graph** L_n is defined by $L_n = P_n \times K_2$ where P_n is a path with n vertices and $\times$ denotes the cartesian product and K_2 is a complete graph with two vertices.

Definition 2.2 (2018) [8]

A **triangular ladder** Tl_n , $n \geq 2$ is a graph obtained from L_n by adding the edges u_iv_{i+1}, $1 \leq i \leq n-1$. The vertices of L_n are u_i and v_i where u_i and v_i are the two paths in the graph L_n where $i = \{1, 2, ..., n\}$.

Definition 2.3 (2017) [6]

The **triangular book** $B(3, n)$ with n pages is defined as n copies of cycle C_3 sharing a common edge. The common edge is called the *spine* or *base* of the book.

Definition 2.4 (2017) [6]

The **Jewel graph** J_n is a graph with vertex set $V(J_n) = \{u, x, v, y, v_i : 1 \leq i \leq n\}$ and the edge set $E(J_n) = \{ux, vx, uy, vy, xy, uv_i, vv_i : 1 \leq i \leq n\}$.

3 Main Results

In this chapter, we prove few theorems.

Theorem 3.1. *The triangular ladder Tl_n is felicitous.*

Proof. Consider Tl_n to be the triangular ladder graph. Let u_i and v_i where $1 \leq i \leq n$ be the vertices of the two paths of Tl_n. Let the vertex set be defined as $V(Tl_n) = \{u_i : 1 \leq i \leq n\} \cup \{v_i : 1 \leq i \leq n\}$ and the edge set as $E(Tl_n) = \{(u_iv_i) : 1 \leq i \leq n\} \cup \{(u_iu_{i+1}) : 1 \leq i \leq n\} \cup \{(u_iv_{i+1}) : 1 \leq i \leq n\} \cup \{(v_iv_{i+1}) : 1 \leq i \leq n\}$. Let p and q denote the vertices and edges of Tl_n such that $p = 2n$ and $q = 4n - 3$. The generalized graph of Tl_n is shown in the Figure 1.

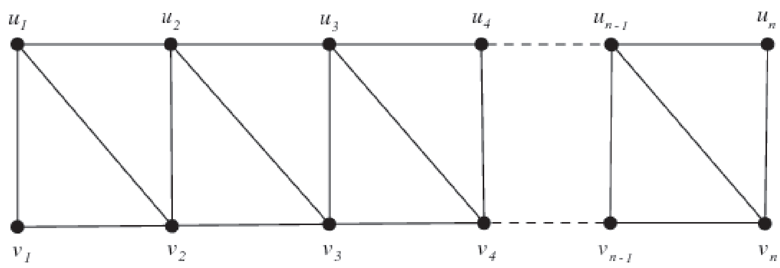

Figure 1: Triangular ladder graph Tl_n

Define the vertex labeling $f : V(Tl_n) \to \{0, 1, 2, ..., q = 4n - 3\}$

$$\begin{aligned} f(u_i) &= 2i - 2, \qquad \text{for} \quad 1 \leq i \leq n \\ f(v_i) &= 2i - 1, \qquad \text{for} \quad 1 \leq i \leq n \end{aligned} \tag{1}$$

Define the edge labeling $f^* : E(Tl_n) \to \{0, 1, \ldots, q - 1\}$

$$\begin{aligned} f^*(u_iv_i) &= 4i - 3, \qquad \text{for} \quad 1 \leq i \leq n \\ f^*(u_iu_{i+1}) &= 4i - 2, \qquad \text{for} \quad 1 \leq i \leq n - 1 \\ f^*(u_iv_{i+1}) &= 4i - 1, \qquad \text{for} \quad 1 \leq i \leq n - 1 \\ f^*(v_iv_{i+1}) &= 4i, \qquad \text{for} \quad 1 \leq i \leq n - 1 \end{aligned} \tag{2}$$

The edge set can be computed as follows:

$$\begin{aligned} f^*E(Tl_n) =& \{1, 5, 9, ..., 4n - 3\} \cup \{2, 6, 10, ..., 4n - 6\} \cup \{3, 7, 11, ..., 4n - 5\} \\ & \cup \{4, 8, 12, ..., 4n - 4\} \end{aligned}$$

From the above computed edge label set, the edge labels are distinct. Therefore, the triangular ladder graph Tl_n is felicitous. □

The illustration of the above theorem is shown in Figure 2.

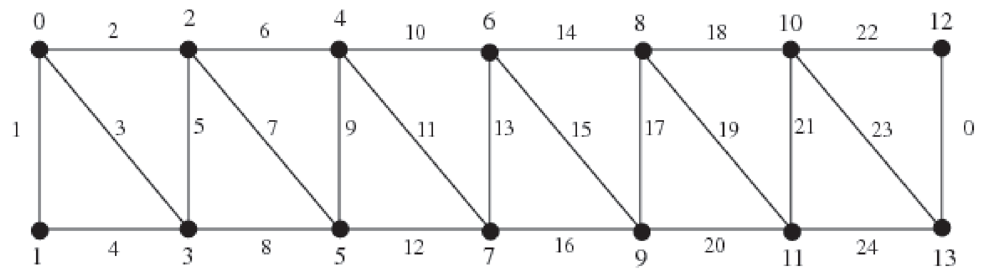

Figure 2: Felicitous labeling of Tl_7

Theorem 3.2. *The triangular book $B(3, n)$ with n pages is felicitous.*

Proof. Consider $B(3, n)$ to be the triangular book with n pages. Let u_i where $1 \le i \le n$ be the middle vertices and v and v' be the vertices common to the n copies of C_3 cycle of $B(3, n)$. Let the vertex set be defined as $V(B(3, n)) = \{u_i : 1 \le i \le n\} \cup \{v\} \cup \{v'\}$ and the edge set as $E(B(3, n))) = \{(vu_i) : 1 \le i \le n\} \cup \{(v'u_i) : 1 \le i \le n\} \cup \{(vv')\}$. Let p and q denote the vertices and edges of $B(3, n)$ such that $p = n + 2$ and $q = 2n + 1$. The generalized graph of $B(3, n)$ is shown in the Figure 3.

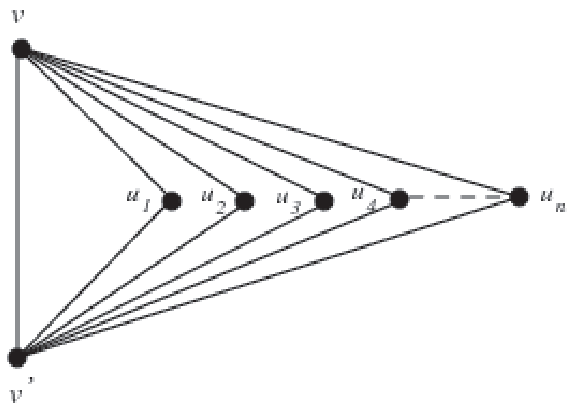

Figure 3: Triangular book graph $B(3, n)$

Define the vertex labeling $f : V(B(3,n)) \rightarrow \{0,1,2,...,q = 2n+1\}$

$$\begin{aligned} f(v) &= 0 \\ f(v') &= 1 \\ f(u_i) &= 2i, \qquad \text{for} \quad 1 \leq i \leq n \end{aligned} \tag{3}$$

Define the edge labeling $f^* : E(B(3,n)) \rightarrow \{0,1,\ldots,q-1\}$

$$\begin{aligned} f^*(vv') &= 1 \\ f^*(vu_i) &= 2i, \qquad \text{for} \quad 1 \leq i \leq n \\ f^*(v'u_i) &= 2i+1, \quad \text{for} \quad 1 \leq i \leq n \end{aligned} \tag{4}$$

The edge set can be computed as follows:

$$f^*E(B(3,n)) = \{1\} \cup \{2,4,6,...,2n\} \cup \{3,5,6,...,2n+1\}$$

The edge labels are distinct based on the above computed edge label set. Hence, the triangular book graph $B(3,n)$ is felicitous. $\square$

The above theorem is illustrated in Figure 4.

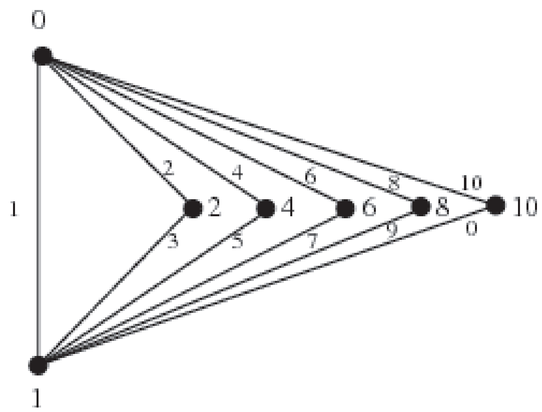

Figure 4: Felicitous labeling of $B(3,5)$

Theorem 3.3. *The Jewel graph J_n is felicitous.*

Proof. Consider J_n to be the Jewel graph. Let x, v, y and u be the vertices of the cycle C_4 in the clockwise direction. Let v_i be the vertices where $1 \leq i \leq n$ that represent the number of jewels in this graph. We define the vertex set as $V(J_n) = \{v_i : 1 \leq i \leq n\} \cup \{u\} \cup \{v\} \cup \{x\} \cup \{y\}$ and the edge set as $E(J_n) = \{ux\} \cup \{uy\} \cup \{vx\} \cup \{vy\} \cup \{xy\} \cup \{(uv_i) : 1 \leq i \leq n\} \cup \{(vv_i) : 1 \leq i \leq n\}$. Let p and q denote the vertices and edges of J_n such that $p = n + 4$ and $q = 2n + 5$. The generalized graph of J_n is shown in the Figure 5.

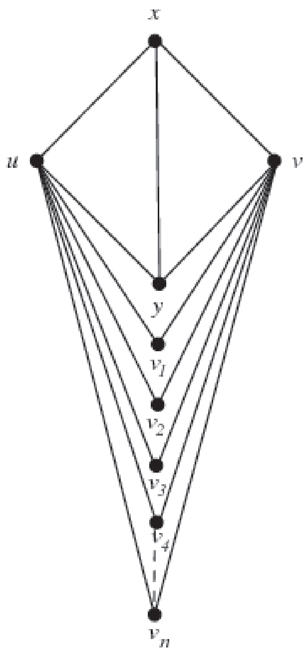

Figure 5: Jewel graph J_n

Define the vertex labeling $f : V(J_n) \to \{0, 1, 2, ..., q = 2n + 5\}$

$$
\begin{aligned}
f(u) &= 0 \\
f(v) &= 1 \\
f(x) &= 2 \\
f(y) &= 4 \\
f(v_i) &= 2i + 5, \quad \text{for} \quad 1 \leq i \leq n
\end{aligned} \tag{5}
$$

Define the edge labeling $f^* : E(J_n) \to \{0, 1, \dots, q-1\}$

$$\begin{aligned} f^*(ux) &= 2 \\ f^*(vx) &= 3 \\ f^*(uy) &= 4 \\ f^*(vy) &= 5 \\ f^*(xy) &= 6 \\ f^*(uv_i) &= 2i+5, \quad \text{for} \quad 1 \le i \le n \\ f^*(vv_i) &= 2i+6, \quad \text{for} \quad 1 \le i \le n \end{aligned} \tag{6}$$

The edge set can be computed as follows:

$$\begin{aligned} f^*E(J_n) =&\{2\} \cup \{3\} \cup \{4\} \cup \{5\} \cup \{6\} \cup \{7, 9, 11, ..., 2n+5\} \\ &\cup \{8, 10, 12, ..., 2n+6\} \end{aligned}$$

From the above computed edge label set, the edge labels are distinct. Therefore, the jewel graph J_n is felicitous. □

The illustration of the above theorem is shown in Figure 6.

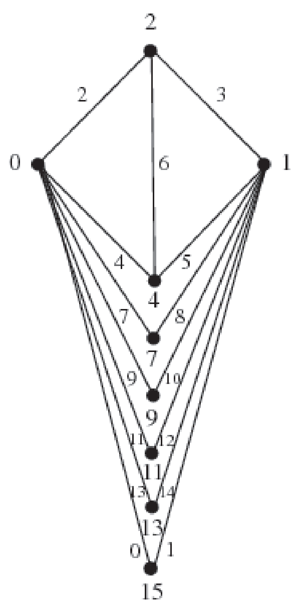

Figure 6: Felicitous labeling of J_5

4 Conclusion

We have proved that the triangular ladder Tl_n, triangular book $B(3, n)$ and the Jewel graph J_n admits felicitous labeling in this paper.

Acknowlegdement

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Future work

In future, the study can further be extended to different classes of graphs and networks to examine the properties of felicitous labeling. Investigation of similar results for families of graphs such as snarks, hypercubes on felicitous labeling is an open area of research.

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DISTANCE MAGIC LABELING OF MOLLUSC GRAPH

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Abstract

A Distance magic labeling of a graph G=(V, E) of order n is a bijection $f : V(G) \rightarrow \{1, 2, \ldots, n\}$ such that $\sum_{u \in N(v)} f(u) = k$, for all $v \in V(G)$ where $N(v)$ is the set of all vertices which are adjacent to v, called neighbourhood of the vertex $v \in V(G)$. The constant k is called magic constant of the distance magic labeling f. A graph which admits distance magic labeling is called Distance magic graph. In this paper we have considered the simple, finite, undirected graphs and discussed few theorems on Distance magic labeling of Mollusc Graph and disjoint union of Mollusc graph and Multipetal graph.

Keywords: *Distance magic labeling, Mollusc graph, Disjoint union of Mollusc graph and Multipetal graph*

1 INTRODUCTION

The study of graph labeling is a current topic in graph theory. An assignment of values to the vertices and edges of graphs under specific circumstances is known as labeling. Rosa [6] was the first to propose graph labeling methods in 1967 by introducing the concept of graceful labeling. Let G be a graph represented by $G = (V(G), E(G))$ where $V(G)$ is the vertex set of G and $E(G)$ is the edge set of G. [8] Magic labeling of a graph $G = (V, E)$ is defined as a bijection f from $E(G)$ to a set of positive integers such that

1) $f(e_i) \neq f(e_j)$, for all distinct e_i, $e_j \in E(G)$ and

2) $\sum_{e \in N(v)} f(e)$ is the same for every $v \in V(G)$, where $N(v)$ is the set of edges incident to v.

Sedlacek introduced the idea of magic labeling in 1963 [8]. Distance magic labeling of a graph G was first described by Vilfred [12] as sigma labeling. It was discussed and introduced by several authors using various terminologies.The terms "neighbourhood magic labeling", "1-vertex magic labeling" and "Distance magic labeling" were used by Miller *et al.* [4], Acharya *et al.* [1] and Sugeng *et al.* [10].

Distance magic labeling of a graph $G = (V, E)$ of order n is a bijection $f : V(G) \to \{1, 2, ..., n\}$ such that $\sum_{u \in N(v)} f(u) = k$, for all $v \in V(G)$, where $N(v)$ is the set of all vertices which are adjacent to v, called neighbourhood of the vertex $v \in V(G)$. The constant k is called magic constant of the distance magic labeling f. A graph which admits distance magic labeling is called Distance magic graph. For every vertex $v \in V(G)$, the neighbour sum $\sum_{u \in N(v)} f(u)$ is called the weight of the vertex $v \in V(G)$ and is denoted by $w(v)$ [7]. Magic square construction served as inspiration for this labeling's design. We cite the Gallian's Survey [3] for additional data on distance magic labeling.

Distance magic labeling is used to schedule tournaments [5]. Labeled graphs serve as a useful model in a wide range of disciplines, such as coding theory, x-ray crystallography, radar, astronomy, circuit design, communication network addressing, and database management. Rao *et al.* (2004) [1] have shown $C_m \times C_n$ has a distance magic labeling if and only if $m = n \equiv 2(\text{mod}4)$ and $K_m \times K_n$, $m \geq 2, n \geq 3$ does not have distance magic labeling.

Miller *et al.* (2003) [4] proved the only trees that have a distance magic labeling are P_1 and P_3, the cycle C_n has a distance magic labeling if and only if $n = 4$, the complete graph K_n has a distance magic labeling if and only if $n = 1$, the wheel $W_n = C_n + P_1$ has a distance magic labeling if and only if $n = 4$, the complete graph $K_{n,n,...,n}$ with p partite sets has a distance magic labeling if and only if n is even or both n and p are odd, an r-regular graph where n is odd does not have a distance magic labeling. They also gave necessary and suffcient conditions for complete tripartite graphs to have a distance magic labeling. Chris Rodger *et al.* [2] proved distance magic labeling for r-partite graphs, tetravalent circulant graphs have been shown to be distance magic by Stefko Miklavic and Primoz Sparl [9] and some disconnected graphs by Somasundaram *et al.* [11]. In this paper we analyse the Distance magic labeling of Mollusc graph Mc_p^q and disjoint union of Mollusc graph and t - Multipetal graph $Mc_p^q \cup t - Mp_n^m$.

2 PRELIMINARIES

Definition 2.1

A graph with p vertices and q edges where $q = 2p - 2$ is defined as a mollusc graph Mc_p^q in which the hub vertex is connected to v_2, v_3, v_{p-1}, and v_p. Each odd vertex is connected to every other even vertex to form a mollusc - like structure. For graph refer figure 1.

Definition 2.2

Multipetal graph Mp_n^m is a graph with n vertices $(n \geq 3)$ and m edges obtained with the condition that, the first set of edges are connected in a normal way and the second set of edges are defined by covering three vertices.

3 MAIN RESULTS

Theorem 3.1. *The Mollusc graph Mc_p^q admits Distance magic labeling when p is odd.*

Proof. Let G be a Mollusc graph Mc_p^q with p vertices and q edges. Let v_1, v_2,..., v_{p-1}, v_p be the vertices and e_1, e_2,..., e_q be the edges of the mollusc graph Mc_p^q. Let v_2, v_3, v_{p-1}, v_p be the vertices adjacent to v_1. The edges of the even vertices are given by $E_s = \{e_1^1, e_2^1, ..., e_s^1,\ 1 \leq s \leq a\}$ where $a = e_j/4$. The edges of the odd vertices are given by $E_t = \{e_1^2, e_2^2, ..., e_t^2,\ 1 \leq t \leq b\}$ where $b = e_j/4$. The path connecting the even and the odd vertices are given by $E_u = \{e_1^3, e_2^3, ..., e_u^3,\ 1 \leq u \leq d\}$ where $d = 2(e_s - 1)$. The edge between the hub vertex and v_p is denoted as $\tilde{E} = \{\tilde{e}\}$ and the edge between the hub vertex and v_{p-1} is denoted as $\tilde{E}^* = \{\tilde{e}^*\}$.

Set of vertices of Mollusc graph Mc_p^q is denoted by $V = \{v_1, v_2, ..., v_i,\ 1 \leq i \leq p,\ p \geq 5\}$. Total edge set Mollusc graph Mc_p^q is given by $E_j = \{e_j : 1 \leq j \leq q,\ q = 2p - 2\}$. It is clear that E_j is the union of E_s, E_t, E_u, $\tilde{E}$ and $\tilde{E}^*$. Clearly G has p vertices and q edges where $q = 2p - 2$.
The generalized Mollusc graph Mc_p^q is shown in Figure 1

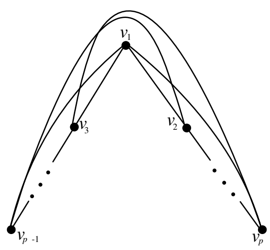

Figure 1: Mollusc Graph Mc_p^q

Define the vertices by $f : V \rightarrow \{1, 2, ..., p\}$ such that the vertices are labeled as follows:

For $p \geq 5$,

$$\begin{aligned}
f(v_1) &= p \qquad (1)\\
f(v_2) &= p-(p-1)\\
f(v_3) &= p-1\\
f(v_4) &= p-2\\
f(v_5) &= p-(p-2)\\
f(v_6) &= p-(p-3)\\
&.\\
&.\\
&.\\
f(v_{p-1}) &= p \mp 1/2\\
f(v_p) &= p \pm 1/2 \qquad (2)
\end{aligned}$$

The vertices v_1, v_2,..., v_{p-1}, v_p are distinct and the weight of every vertex is given by

$$w(v_i) = \sum_{y \in N(v_i)} f(y) = k \quad \text{where } 1 \leq i \leq p$$

It is found that the sum of neighbourhood of every vertex is with the same magic constant.

The weight of every vertex is given by

$$\begin{aligned}
w(v_1) &= v_2 + v_3 + v_{p-1} + v_p\\
w(v_2) &= v_1 + v_4 + v_5\\
w(v_3) &= v_1 + v_5 + v_4\\
w(v_4) &= v_2 + v_6 + v_3 + v_7\\
&.\\
&.\\
&.\\
w(v_{p-1}) &= v_{p-3} + v_1 + v_{p-2}\\
w(v_p) &= v_{p-2} + v_1 + v_{p-3}
\end{aligned}$$

Thus,

$$w(v_i) = \sum_{y \in N(v_i)} f(y) = 2p \quad \text{where } 1 \leq i \leq p$$

Hence the Mollusc graph Mc_p^q admits Distance magic labeling.

□

An Illustration for the above theorem is in Figure 2

Let $p = 7$, considering 7 vertices and 12 edges

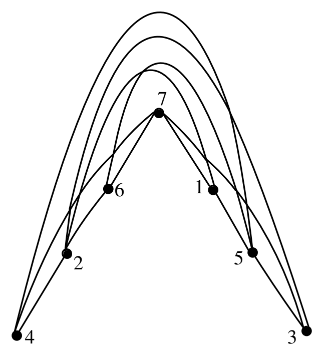

Figure 2: Mollusc Graph Mc_7^{12}

From this figure it is found that the weight of every vertex is

$$w(v_i) = \sum_{y \in N(v_i)} f(y) = 2p.$$

Theorem 3.2. *Disjoint union of Mollusc graph Mc_p^q and t - Multipetal graph $t - Mp_n^m$ has distance magic labeling if and only if p=7, n=6 and q=m=12.*

Proof. Let G be a Mollusc graph Mc_p^q with p=7 vertices and q=12 edges and let G' be a multipetal graphs $t - Mp_n^m$ with n=6 vertices and m=12 edges for all $1 \leq t \leq z$. Let v_i, $1 \leq i \leq p$ be the vertices and e_j, $1 \leq j \leq q$ be the edges of the Mollusc graph Mc_p^q.

The edges of the even vertices are given by $E_s = \{e_1^1, e_2^1, ..., e_s^1,\ 1 \leq s \leq 3\}$ and the edges of the odd vertices are given by $E_t = \{e_1^2, e_2^2, ..., e_t^2,\ 1 \leq t \leq 3\}$. The path connecting the even and the odd vertices are denoted as $E_u = \{e_1^3, e_2^3, ..., e_u^3,\ 1 \leq u \leq 4\}$. The edge between the hub vertex and v_p is denoted as $\tilde{E} = \{\tilde{e}\}$ and the edge between the hub vertex and v_{p-1} is denoted as $\tilde{E}^* = \{\tilde{e}^*\}$.

Let u_b, $1 \le b \le n$ be the total vertices and e_d, $1 \le d \le m$ be the total edges of the t - multipetal graph $t - Mp_n^m$. Let u_1^1, u_2^1,...,u_6^1 be the vertices of the first multipetal graph. Let u_1^2, u_2^2,...,u_6^2 be the vertices of the second multipetal graph. In general, u_1^t, u_2^t,...,u_6^t be the vertices of the t^{th} multipetal graph. Edges between two vertices of the Mp_n^m graph are defined by $E^\phi = e_j^\phi$ for all $j = 2n–1, 1 \le n \le 6$ and Edges between three vertices of the Mp_n^m graph are defined as $E^\psi = e_j^\psi$ for all $j = 2n, 1 \le n \le 6$.

The generalized disjoint union of mollusc graph Mc_p^q and t - multipetal graph $t - Mp_n^m$ is shown in Figure 3.

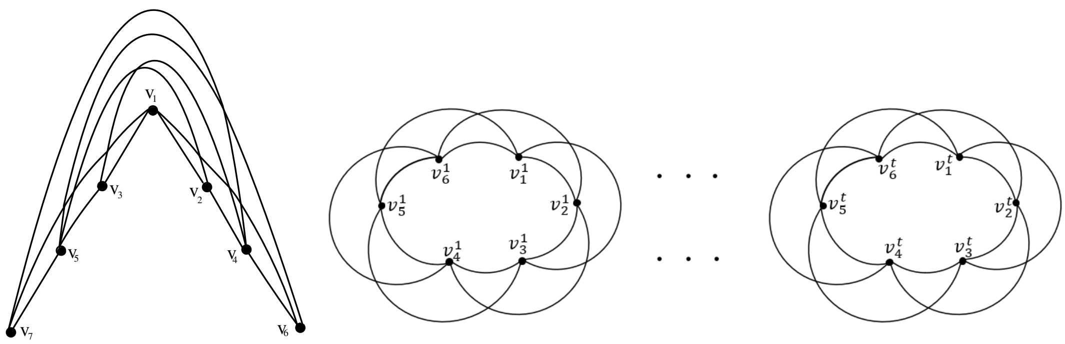

Figure 3: Disjoint union of Mc_p^q graph and $t - Mp_n^m$ graph

Define the vertices by $f : V \to \{1, 2, ..., p\}$, $p = 7$ such that the vertices of Mollusc graph Mc_p^q are labeled as follows:

$$\begin{aligned}
f(v_1) &= p + zn \\
f(v_2) &= p - (p - 1) \\
f(v_3) &= p + zn - 1 \\
f(v_4) &= p + zn - 2 \\
f(v_5) &= p - (p - 1) + 1 \\
f(v_6) &= p - 4 \\
f(v_7) &= p + zn - 3
\end{aligned}$$

The vertices of t - multipetal graph $t - Mp_n^m$ are labeled as follows:

$$\begin{aligned} f(u_1^t) &= t+a+3 \text{ for all } a \equiv 0 \bmod 2 \\ f(u_2^t) &= t+a+4 \text{ for all } a \equiv 0 \bmod 2 \\ f(u_3^t) &= t+a+5 \text{ for all } a \equiv 0 \bmod 2 \\ f(u_4^t) &= p+zn-h-4 \text{ for all } h \equiv 0 \bmod 3 \\ f(u_5^t) &= p+zn-h-5 \text{ for all } h \equiv 0 \bmod 3 \\ f(u_6^t) &= p+zn-h-6 \text{ for all } h \equiv 0 \bmod 3 \end{aligned} \tag{3}$$

The vertices $v_1, v_2, v_3, v_4, v_5, v_6$ of the mollusc graph Mc_p^q and the vertices of the t - multipetal graph $t - Mp_n^m$ are distinct.
The weight of every vertex is found to be

$$w(v_i) = w(u_b^t) = \sum_{y \in N(v_i)} f(y) = \sum_{y \in N(u_b^t)} f(y) = 2(p+zn) \quad \text{where } 1 \le i \le p,\ 1 \le b \le n.$$

From the above computed vertex label set we conclude that the sum of all neighbours of every vertex is with the same magic constant $k = 2(p+zn)$. □

An Illustration for the above theorem is in Figure 4.
Consider $p = 7$, $n = 6$ and $t = 1, 2, 3$, $z = 3$ the vertices are labeled as follows:

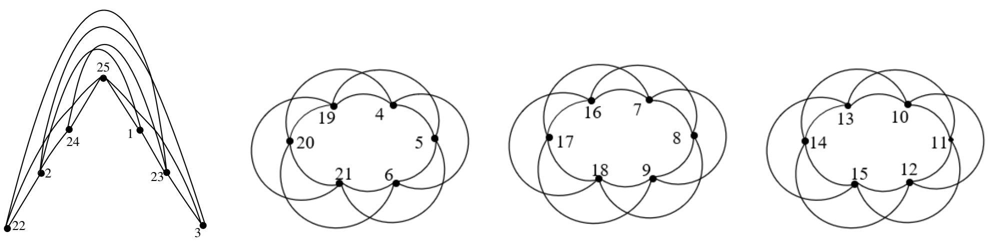

Figure 4: Disjoint union of Mc_7^{12} graph and $3 - Mp_6^{12}$ graph

Here the weight of every vertex is $k = 2(p+zn)$.

4 CONCLUSION

In this paper we have proved that Mollusc graph Mc_p^q and disjoint union of molllusc graph Mc_p^q and t - multipetal graph $t - Mp_n^m$ admits distance magic labeling. Establishing distance magic labeling of n - join graphs constructed with n - cycles of vertex four is still open for further research.

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AVD-TOTAL COLORING OF JAHANGIR GRAPH

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Abstract

A total coloring of a graph G is an assignment of colors to the vertices and the edges such that no two adjacent vertices receive same color, no two adjacent edges receive same color, and if an edge e is incident on a vertex v, then v and e receive different colors. The least number of colors sufficient for a total coloring of graph G is called its total chromatic number and denoted by $\chi^{''}(G)$. The total coloring conjecture which has been posed independently by Behzad[1] and Vizing[9] states that, $\chi^{''}(G) < \Delta(G)+2$. Let $G = (V, E)$ be a graph with a total coloring ϕ, and let $u \in V(G)$, then set of colors of u is denoted by $C(u) = \{\phi(u)\} \cup \{\phi(uv)|uv \in E(G)\}$. Total coloring is an adjacent-vertex-distinguishing total coloring (AVD-TC) if for all two adjacent vertices u, v of a graph G, their color sets are distinct from each other, $i.e., C(u) \neq C(v)$. The Jahangir graph $J_{m,n}$ is a graph with $(nm + 1)$ vertices and $(m(n + 1))$ edges, and for all $m \geq 3, i.e.,$ a graph consisting of a cycle C_{nm} with one addition vertex which is adjacent to m vertices C_{nm} at distance n to each other on C_{nm}. In this paper, we determine AVD-TCN of Jahangir graph and investigate total colouring conjecture.

Keywords: *AVD- total coloring, Total chromatic number, Jahangir graph.*

1 INTRODUCTION

Behzad[1] introduced the concept of Total Coloring in 1965, which gives that $\chi^{''}(G) > \Delta(G) + 1$. An allocation of colors to the elements of a graph is called a Total Coloring, denoted by $\phi : U \rightarrow \{1, 2, \cdots, k\}$, where $U = V \cup E$. The conditions for a Total Coloring include that adjacent vertices cannot have the same color and adjacent edges cannot have the same color and edge incident with vertex should not have same color.

The minimum number of colors required for a Total Coloring is denoted as the Total Chromatic Number (TCN) of the graph G, where $\chi^{''}(G) > \Delta(G) + 1$, and the upper bound is given by the Total Coloring Conjecture (TCC) as $\chi^{''}(G) < \Delta(G) + 2$. The graphs with TCN equals to $(\Delta(G) + 1)$ and $(\Delta(G)+2)$ are referred to as type 1 and 2 graphs, respectively, and thus $\Delta(G)+1 \leq \chi''(G) \leq \Delta(G)+2$.

Zhang et al.[12] have defined the concept of an AVD-TC, which stands for Adjacent Vertices Distinguishing Total Coloring. For a graph G with a TC $\phi : U \rightarrow \{1, 2, \cdots, k\}$, the color set of an element $x \in V(G)$ is defined as $C(x) = \{\phi(x)\} \cup \{\phi(xy)|xy \in E(G)\}$. Two elements x and y in $V(G)$ are considered distinguishable if $C(x) \neq C(y)$. An AVD-TC is a Total Coloring where all adjacent vertices are distinguishable

Zhang et al.[12] have studied AVD-TC for various graphs such as $C_n, K_n, K_{m,n}$, fan, wheel, and tree. Several researchers have investigated the AVD-TCN of different types of graphs, such as outerplanar graphs[11], planar graphs, Pan graph, Sunlet graph, Tadpole[6], Barbell graph, Lollipop graph, Windmill graph[5], line graphs, and splitting graph[8]. Xiang'en Chen[10] proved $\chi_a^{''}(G) \leq 6$ for graphs with $\Delta(G) = 3$.

Graph Coloring is used in diverse practical problems[7] such as FTP on computer networks, aircraft scheduling, match scheduling, and network task efficiency, among others. We now formaly give definitions of the Adjacent Vertices Distinguishing Total Coloring (AVD-TC) and the graphs studied in this research.

1.1 Definition[5]

A TC of graph is the method of assigning its vertices and edges different color assignments $\ni$ no two related (adjacent or incident) elements have the same color.

1.2 Definition[5]

The TCN is the least number of colors required for TC of G and it is denoted by $\chi^{''}(G)$

1.3 Definition[5]

Total coloring is an AVD-TC if $u, v \in V(G)$ where uv is adjacent, $C(u) \neq C(v)$, where $C(u) = \{\phi(u)\} \cup \{\phi(uv)|uv \in E(G)\}$.

1.4 Definition[5]

The least number colours for AVD total coloring is called AVD-TCN and is denoted by $\chi_a^{''}(G)$.

1.5 Definition[3]

The Gear graph G_n, also known as a bipartite wheel graph, is a wheel graph with a graph vertex added between each pair of adjacent graph vertices of the outer cycle.

1.6 Definition[4]

The Jahangir graph $J_{m,n}$ is a graph with $(nm+1)$ vertices and $(m(n+1))$ edges, and for all $m \geq 3, i.e.$, a graph consisting of a cycle C_{nm} with one addition vertex which is adjacent to m vertices C_{nm} at distance n to each other on C_{nm}.

1.7 Theorem[4]

Total chromatic number of Jahangir graph $J_{m,n}$ for all $n \geq 2$ and for all $m \geq 3$ is given by, $\chi_{tc}(J_{m,n}) = m+1$.

2 MAIN RESULTS

In this section, we find AVD-TCN for certain graphs

Theorem 1. *AVD-TCN of Gear graph G_n is $\chi_a^{''}(G_n) = \Delta(G_n)+1$.*

Proof. The $V(G_n)$ and $E(G_n)$ are now constructed as follows

$$\begin{aligned} V(G_n) &= \{u\} \cup \{u_i : 1 \leq i \leq n\} \cup \{u_i^{'} : 1 \leq i \leq n\} \\ E(G_n) &= \{uu_i : 1 \leq i \leq n\} \cup \{u_i^{'}u_i, : 1 \leq i \leq n\} \cup \\ & \quad \{u_i^{'}u_(i+1) : 1 \leq i \leq n-1\} \cup \{u_n^{'}u_1\} \end{aligned} \tag{1}$$

There are $2n+1$ vertices and $3n$ edges in Gear graph
The total coloring $\phi : U \to k, U = V(G_n) \cup E(G_n)$ and $k = \{1, 2, \ldots, n+1\}$
The following is the total coloring assignment

$$\begin{aligned} \phi(u) &= 1 \\ \phi(u_i) &= i+3 \text{ for } 1 \leq i \leq n-2 \\ \phi(u_{n-1}) &= 2 \\ \phi(u_n) &= 3 \end{aligned} \tag{2}$$

$$\begin{aligned}
\phi(u_i^{'}) &= 1 \text{ for } 1 \leq i \leq n \\
\phi(uu_i) &= i \\
\phi(u_2u_1^{'}) &= \phi(u_nu_n^{'}) = \phi(uu_1) \\
\phi(u_{i-1}u_{i-1}^{'}) &= \phi(u_{i+1}u_i^{'}) = \phi(uu_i) \text{ for } 2 \leq i \leq n-1 \\
\phi(u_{n-1}u_{n-1}^{'}) &= p\phi(u_1u_n^{'}) = \phi(uu_n)
\end{aligned}$$

$$V_1 = \{u\}; V_2 = \{u_i : 1 \leq i \leq n\}; V_3 = \{u_i^{'} : 1 \leq i \leq n\} \tag{3}$$

Let $C(V_i) = \{C(u) : u \in V_i\}$ denote the set of color set of elements of V_i. The edges of G_n is between the vertices of these disjoint vertex set. Since the degrees of elements of each vertex set is different. Hence their color set is also distinct. Therefore this total coloring is AVD-TC with $\chi_a^{''}(G_n) = \Delta(G_n)+1$.

□

Figure 1 illustrates AVD-TC of Gear graph G_8.

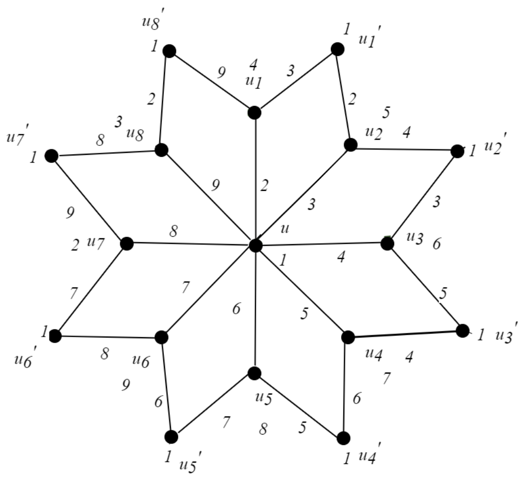

Figure 1: **Gear graph** (G_8)

Theorem 2. *AVD-TCN of Jahangir graph* $(J_{m,n})$ *is* $\chi_a^{''}(J_{m,n}) = \Delta(J_{m,n}) + 1$. *for* $m = 2\alpha, \alpha \in N$, $n \geq 4$.

Proof. The $V(J_{m,n})$ and $E(J_{m,n})$ are now constructed as follows

$$\begin{aligned}
V(J_{m,n}) &= \{u\} \cup \{u_i : 1 \leq i \leq n\} \cup \{u_{ij} : 1 \leq i \leq n, 1 \leq j \leq m-1\} \\
E(J_{m,n}) &= \{uu_i : 1 \leq i \leq n\} \cup \{u_iu_{ij} : 1 \leq i \leq n, 1 \leq j \leq m-1\} \cup \\
&\quad \{u_{ij}u_{ij+1} : 1 \leq i \leq n, 1 \leq j \leq m-1\}
\end{aligned} \tag{4}$$

There are $mn + 1$ vertices and $n(2m - 1)$ edges in Gear graph

The total coloring $\phi : U \to k, U = V(J_{m,n}) \cup E(J_{m,n})$ and $k = \{1, 2, \ldots, n + 1\}$

The following is the total coloring assignment

$$\begin{aligned}
\phi(u) &= 1 \\
\phi(u_i) &= i + 3 \text{ for } 1 \leq i \leq n - 2 \\
\phi(u_{n-1}) &= 2 \\
\phi(u_n) &= 3 \\
\phi(u_{i2}) &= 1 \text{ for } 1 \leq i \leq n \\
\phi(uu_i) &= i \\
\phi(u_{ij}) &= k \text{ for } 1 \leq k \leq n
\end{aligned}$$

$$C_i = uu_iu_{i1} \cdots u_{im-1}u_{i+1}u, \text{ follows 2 edge coloring with } \phi(uu_i) \text{ and } \phi(uu_{i+1})$$
$$V_1 = \{u\}; V_2 = \{u_{ij} : i = 1, \cdots, n, j = 1, \cdots, m - 1\}; V_3 = \{u_i : i = 1, \cdots, n\} \quad (5)$$

Figure 2 illustrates AVD-TC of Jahangir graph ($J_{4,4}$).

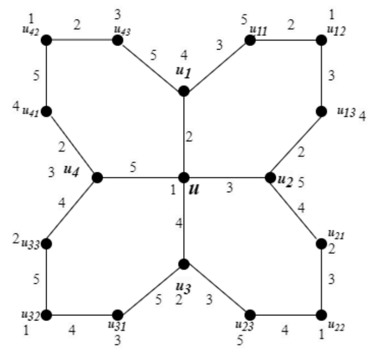

Figure 2: **Jahangir graph** ($J_{4,4}$)

Let $C(V_i) = \{C(u) : u \in V_i\}$ denote the set of color set of elements of V_i. The edges of $J_{m,n}$ is between the vertices of these disjoint vertex set and between the elements of V_2. Since the degrees of elements of each vertex set is different. Hence their color set is also distinct the elements of color set $C(V_2)$ are distinct. Therefore this total coloring is AVD-TC with $\chi''_a(J_{m,n}) = \Delta(J_{m,n}) + 1$.

□

3 CONCLUSION

In this paper we found AVD-TCN for Gear graph, and Jahangir graph. Also, verified TCC for the above-mentioned graphs. These results can be extended to other families of graphs such as Umbrella graph, Flower graph and middle graph of Comb graph.

4 ACKNOWLEDGEMENT

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EDGE ODD GRACEFUL LABELING OF 1-FAULT TOLERANT HAMILTONIAN GRAPH

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Abstract

A Graph G is said to be edge-odd graceful if there is a bijection $f : E(G) \to \{1, 3, 5, ...(2q–1)\}$ such that, the induced mapping $f^* : V(G) \to \{1, 2, \ldots, (2q–1)\}$ is given by $f^*(x) = \Sigma_{xy \in E(G)} f(x, y)(mod\ 2q)$ and the resulting vertex labels are distinct. The graph which admits edge odd graceful labeling is called an edge odd graceful graph. In this paper, we prove that the 1-Fault Tolerant Hamiltonian graph is edge odd graceful.

Keywords: *Edge-odd graceful labeling, 1- Fault Tolerant Hamiltonian Graph*

1 Introduction

Graph theory is the oldest branch of Mathematics that has numerous applications in wide variety of departments such as physics, chemistry, operations research and computer science. The first paper in graph theory was published in 1736 by Leonhard Euler [1], when he solved the Königsberg Bridge problem. Eventually, graph theory has been developed into existence and became essential part of mathematics thereby applied in solving problems of day-to-day life.

Graph labeling is the assignment of integers to the vertices or edges of a graph subject to certain conditions. Rosa [8] first proposed graph labeling methods in the year 1967, and Graham and Sloane [4] further improved them in the year 1980. Edge odd graceful Labeling was introduced by Solairaju and Chithra [11] in the year 2008. Let G be a graph with q edges. G is said to be edge-odd graceful if there is a bijection $f : E(G) \rightarrow \{1, 3, 5, ...(2q–1)\}$ such that, the induced mapping $f^* : V(G) \rightarrow \{1, 2, \ldots, (2q–1)\}$ is given by $f^*(x) = \Sigma_{xy \in E(G)} f(x, y)(mod 2q)$ and the resulting vertex labels are distinct. The graph which admits edge odd graceful labeling is called an Edge-odd Graceful Graph.

Joseph Gallian [4] has given a broad and a Dynamic survey on various graph labeling methods including edge odd graceful labeling. Solairaju and Chithra [11, 12] have proved the following graphs are edge-odd graceful: paths with atleast 3 vertices, odd cycles, cylinder and torus grid graphs, path and cycle related graphs, ladders $P_n * P_2$ (n $\geq$ 3), starts with an even number of edges and crowns $C_n \bigodot K_1$. P_n (n $>$ 1) with pendant edges attached to each vertex (Combs), the graph obtained by appending 2n+1 pendant edges to each end points $P_1 or P_3$, and the graph obtained by subdividing each edge of the star $K_{1,2n}$. Singhun [9] have proved that graphs $SF(n, m)$ and wheel graph $W_n + 1$ has Edge odd labeling. Jeba Jesintha and Ezhilarasi [6] Hilda proved that the shell butterfly graphs have edge odd graceful labeling. Jeba Jesintha and Yogalakshmi [7] proved the edge odd graceful labeling of Jahangir Graph.

Daoud [2] established the necessary and sufficient consitions for the edge odd gracefulness of a number of path and cycle-related graphs, including friendship graphs, wheel, helm, web, double wheel, gear, fan, double fan, and polar grid graphs. It was demonstrated by Daoud [3] that the torus grid graph $T_{m,n} = C_m \times C_n$ and the cylinder grid graph $C_{m,n} = P_m \times C_n$ are edge odd graceful. Singhun *et al.* [10] proved edge odd graceful labelings for graphs related to cycles, $(n,1)$-kite and $(n,2)$-kite where n is an integer such that $n \geq 3$, the graph $P_2 \cdot nK_1$ where n is a positive integer and the cartesian product $C_n \Box P_3$ and $C_3 \Box P_k$ where $n \geq 3$ and $k \geq 4$ are obtained. In this paper, we prove that the fault-tolerant graph are edge odd graceful.

2 Preliminaries

In this section, we state few definitions which are required for the theorem.

Definition 2.1

A Graph G is 1 - vertex Fault - Tolerant Hamiltonian [5] if $G - v$ is Hamiltonian for any $v \in V(G)$. Similarly, G is 1 - edge fault-tolerant Hamiltonian if G - e is Hamiltonian for any $e \in E(G)$.

Definition 2.2

The family of cubic 1-fault tolerant Hamiltonian graph [13] was denoted by $W(m)$. To define $W(m)$, we first define $MS(i,t)$, $1 \leq i \leq m$, t being a non-negative integer $V(MS(i,t)) = \{x^r_{i,j} | 1 \leq j \leq t\} \cup \{x^l_{i,j} | 1 \leq j \leq t\} \cup \{y_i, z_i\}$ and $E(MS(i,t)) = \{x^l_{i,j}, x^l_{i,j-1} | 1 \leq j \leq t\} \cup \{x^r_{i,j}, x^l_{i,j+1} | 1 \leq j \leq t-1\} \cup \{(x^l_{i,j}, x^r_{i,j}) | 1 \leq j \leq t\} \cup \{(x^l_{i,1}, y_i), (y_i, z_i), (y_i, x^r_{i,j})\}$. The Graph $MS(i,1)$ is shown in Figure 1.

Definition 2.3

The graph $W(m)$ [13], $m > 1$ is constructed from the graph $MS(i,1)$, $1 \leq i \leq m$ by joining all $\{z_i\}$ with a cycle $\{z_1, z_2, ..., z_m, z_1\}$ and joining

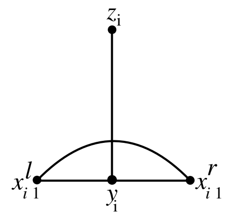

Figure 1: The Graph $MS(i,1)$

$x^r_{m,1}, x^l_{1,1}$ and $x^r_{i,1}, x^l_{i+1,1}$, $1 \leq i \leq m-1$. It has $4m$ vertices. We name the cycles as the inner cycle and the outer cycle respectively. The graph $W(m)$ is shown in Figure 2.

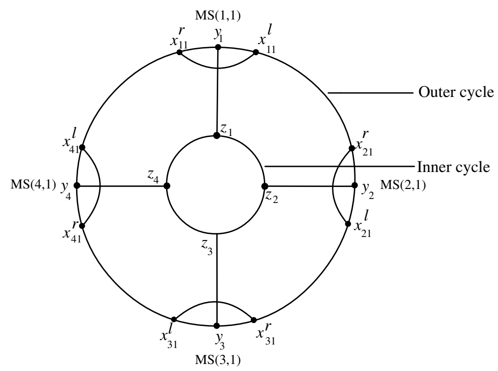

Figure 2: The graph $W(m)$

3 Main Results

In this chapter, we prove that the 1-Fault Tolerant Hamiltonian graph is Edge odd graceful.

3.1 1-Fault Tolerant Hamiltonian Graph

Theorem 3.1. *The* 1*-Fault Tolerant Hamiltonian Graph* $W(m)$ *for* $m \geq 4$ *is Edge Odd Graceful*

Proof. Let G be the 1-Fault Tolerant Hamiltonian graph $W(m)$ for $m \geq 4$. Let $|V(G)| = p = 4m$ and $|E(G)| = q = 6m$ denote the number of vertices and the number of edges respectively. Let the vertices in the inner cycle are labeled as $\{z_1, z_2, ..., z_m\}$. Let the vertices in the outer cycle are labeled as $\{y_1, y_2, ..., y_m\}$. The vertices corresponding to the right and left of the vertices in the outer cycle are labeled as $\{x^r_{11}, x^r_{21}, ..., x^r_{m1}\}$ and $\{x^l_{11}, x^l_{21}, ..., x^l_{m1}\}$ respectively.

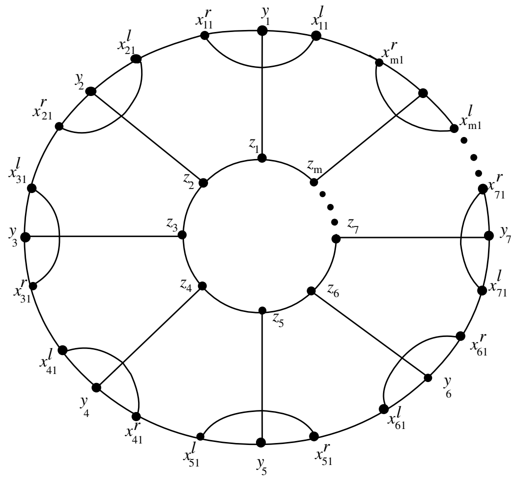

Figure 3: 1-Fault Tolerant Hamiltonian graph $W(m)$

Let $f : E(G) \to \{1, 3, 5, ...(2q–1)\}$ be defined by,

$$
\begin{aligned}
f(z_i z_{i+1}) &= 2i - 1 \\
f(z_m z_1) &= 2m - 1 \\
f(z_i y_i) &= p - n, && \text{for} \quad m \leq \ i \leq \ 2; \quad n \ is \ odd \\
f(z_1 y_1) &= 2m + 1, && \text{for} \quad m \leq \ i \leq \ 2 \\
f(x^r_{i1} x^l_{i1}) &= p + n, && \text{for} \quad 2 \leq \ i \leq \ m; \quad n \ is \ odd \\
f(x^r_{11} x^l_{11}) &= q - 1 \\
f(x^r_{11} y_1) &= q + 1 \\
f(x^r_{i1} y_i) &= q + n, && \text{for} \quad 2 \leq \ i \leq \ m; \quad n \ is \ odd; \quad n \neq \ 1 \\
f(y_i x^l_{i1}) &= 2p + n, && \text{for} \quad m \leq \ i \leq \ 2; \quad n \ is \ odd \\
f(y_1 x^l_{11}) &= 10m - 1 \\
f(x^l_{i1} x^r_{(i-1)1}) &= 10m + n, && \text{for} \quad 2 \leq \ i \leq \ m; \quad n \ is \ odd; \quad n \neq \ 1 \\
f(x^l_{11} x^r_{m1}) &= 10m + 1
\end{aligned}
\tag{1}
$$

The induced vertex labels are given below:

$$
\begin{aligned}
f^*(z_i) &= p+n, && \text{for} \quad n \; is \; odd \\
f^*(y_1) &= q+1 \\
f^*(y_i) &= 2p–n, && \text{for} \quad m \leq \; 2; \;\; n \; is \; odd \\
f^*(x^r_{i1}) &= 2q–n, && \text{for} \quad n \; is \; odd \\
f^*(x^l_{i1}) &= 2i–1, && \text{for} \quad m \leq \; 2 \\
f^*(x^l_{11}) &= 2m-1
\end{aligned} \tag{2}
$$

It is clear from equation (2) that all vertex labels are distinct. Hence, the 1-Fault Tolerant Hamiltonian Graph admits Edge Odd Graceful Labeling. □

The illustration of 1-Fault Tolerant Hamiltonian Graph is shown in Figure 4,

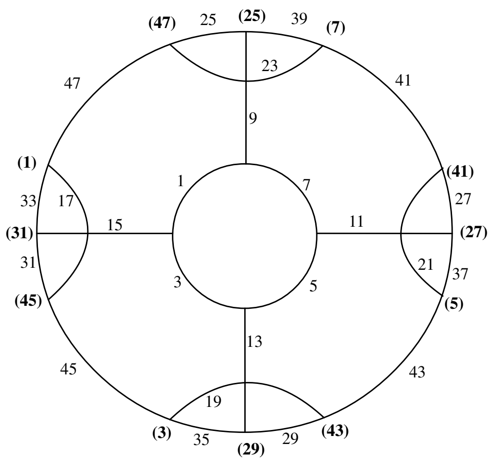

Figure 4: 1-Fault Tolerant Hamiltonian graph $W(4)$

4 Conclusion

In this paper, we have shown that 1-Fault tolerant Hamiltonian graph admits edge-odd graceful labeling. Efficiency for generating labeling for graph plays an important role to determine optimal circuit layouts for computers since it generates constant unique number patterns for a particular graph. It can be used in determining fault tolerant systems.Fault-tolerance or graceful degradation is the property that enables a system(often computer based) to continue operating properly in the event of the failure of some of its components.

5 Acknowledgement

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A REVIEW ON DIFFERENT ABSORBER MATERIALS USED IN GREENHOUSE SOLAR DRYER

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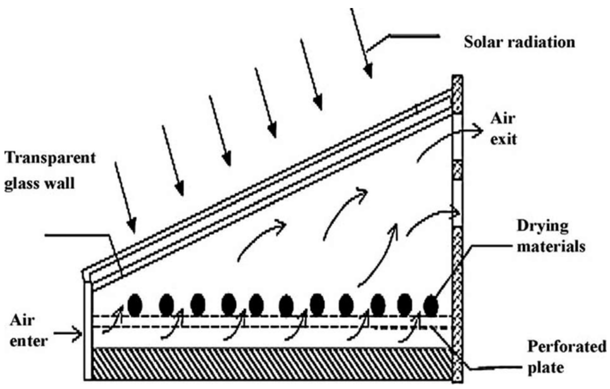
1. INTRODUCTION

A greenhouse solar dryer is a simple device that converts solar energy to heat energy to eliminate the moisture content from the food product. It is usually in the form of a cabinet inside which the food product to be dried is kept. A solar dryer consists of a transparent cover, mostly made of glass through which the solar radiations penetrate and fall on the absorber plate. The absorber plate is located at the base of the solar dryer. The food product to be dried is kept on the absorber plate. The absorber plate absorbs the solar radiation and through the process of convection, the heat energy is then transferred to the product.



Most agricultural products have a moisture content of around 70 percent. This moisture level is substantially higher than what is required for long-term storage. Bacterial and fungal growth in the crops is accelerated due to the high moisture content that causes the degradation of food and the reduction of nutritional value. To ensure long-term food preservation, the moisture content of foods must be reduced. In this regard, solar drying solutions are far more cost-effective than using fossil fuels to dry products. The most attractive advantage is that it is a pollution-free technology that makes use of renewable energy sources and reduces carbon particle emissions into the atmosphere.

2. NEED OF A GREENHOUSE SOLAR DRYER

Preserving food and agricultural crops by drying them under the open sky by the sun has been practiced since ancient times. This method, known as open solar drying is one of the oldest ways of using solar energy for preserving food. It involves exposing several agricultural products like fruits, vegetables, and fish to the sun and wind to remove moisture content. But open solar drying has its limitations such as poor quality and contamination of food. To overcome these problems, a greenhouse solar dryer is used. By using a greenhouse solar dryer, the original colour and taste of food are maintained, resulting in higher quality dried products than open sun drying. In a greenhouse solar dryer, the risk of contamination from pests, bacteria, viruses, and fungus, is reduced, leading to higher quality and safer food products. Also, greenhouse solar drying is at least 50% faster than open sun drying, which helps in preserving the freshness and nutritional content of the food. Food products dried by a greenhouse solar dryer can be stored for longer durations than those dried by the oven-drying method.

3. LITERATURE SURVEY

1. The research work reported by Abedin et al. [1] shows that powder from nickel oxide nanoparticles on the coating of flat-type aluminium plate increased the temperature of the solar dryer type by 20°C over the ambient temperature.

2. According to work reported by Sirin et al. [2] it was observed when copper oxide and zinc oxide nanoparticles embedded in matt black paint were used on a 1 mm thick aluminium sheet absorber plate the temperature was increased by 15° C over the ambient temperature.

3. Raj Sachin et al. [3] used a polymer composite of Nylon 66 and PJ (Prosopis Juliflora) wood fibre as absorber material. 5 kg of ginger may be dried at a time using the industrial-scale dryer cabinet design. The nylon had a melting point of 223°C and a specific gravity of 1.14 grams/cc. It was in the form of tiny granules. To remove moisture, PJ wood was dried for 48 hours at 80°C in a furnace. It was then produced by experimental methods in the form of a powder. PJ powder was first dry blended in weight fraction ratios of 80:20 with nylon granules. Then the dry mixed materials were blended and compressed. The solar dryer was experimented with ginger and it was inferred that there was no change in the aroma, no mould formation and the fat and ash content satisfied the range of their respective standard values.

4. Fatih et al. [4] reported that graphene nanoplatelets embedded in black paint as an absorber coating enhanced the extraction rate of specific moisture by 40% and the drying time was reduced by 90 minutes in comparison to open drying. However, graphene nanoplatelets absorber plate would not be an ideal choice because graphene is expensive and is not proven to be biocompatible.

Table 1: Comparative study of various materials used as absorber materials and their outcomes

Absorber coating	Base material	Outcome
Nickel oxide nanoparticle coating	Aluminium	Increase in air temperature by 20°C above ambient temperature
Zinc oxide nano and Copper oxide improved absorber coating	Aluminium	The extraction rate of specific moisture was found to be 0.80 and about 15°C increase in temperature.

Polymer composite- Nylon 66 fibre with PJ (Prosopis Juliflora) wood fibre	Copper	1000 grams of ginger soaked in water was effectively decreased to 369.77 grams. 200°C was the highest temperature of the material's thermal stability
Graphene nanoplatelets embedded in black paint	Stoned wall	90 minutes reduction in drying time

Conclusion

From all the materials studied, the polymer composite of Nylon 66 fibre with PJ wood fibre would be the optimum choice for solar absorber plate material. This material is 12 percent more thermally effective as compared to metal sheet-based absorbers which are costlier, heavier, and corrosive. The polymer composite is hygienic and eco-friendly. It was observed that no harmful gaseous reactions were emitted and that the material was biocompatible. For this reason, the polymer composite of Nylon 66 and PJ wood is suggested for drying agricultural food products. It was also observed that the drying time was reduced and heat loss, i.e., the transfer of heat from the inside to the outside of the solar dryer was also reduced. By the experiment with ginger, it was found that the nylon-PJ composite material thermal stability was stable up to 310°C beyond which degradation started. At 500°C, there was just a 5 percent residue remaining after complete degradation at 400°C. This indicates that the material is appropriate for food product drying.

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GREEN HOSPITAL: TOWARDS THE SUSTAINABLE LIFE FOR PEOPLE AND ENVIRONMENT - A REVIEW

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ABSTRACT

Green hospital is the hospital which plays a major role in the curative process of patients by using natural resources in an eco-friendly and sustainable manner. In India, mostly the hospitals are working towards the business but they have to take a step forward towards a sustainable environment. The main aim of this study is to analyse the sustainable performances of the green hospitals on the various areas such as hospital waste management, recycling of water, energy and resource conservation, sustainability of the patient's room and providing nutritious food. As how it renovates the idea of sustainability innovations in green hospitals and their therapeutic and curative efficiency in patients.

Key words: Green hospital, patient, recycling, conservation, curative efficiency.

INTRODUCTION

Hospitals should provide the greenest buildings to the patients. In India, about one million tons of hospital wastes were generated and consume about 8% of overall electricity per year. Green hospital is the hospital which plays a major role in the curative process of patients by using natural resources in an eco-friendly and sustainable manner. The aim of this study is to analyze the sustainable performances of the green hospitals on the various areas such as hospital pollution management, recycling of water, conservation of energy and resources, sustainability of the patient's room and providing nutritious food.

CONCEPT OF GREEN HOSPITAL

Green hospital movement was an initiative taken by US Green Building Council (USGBC)'s by releasing their Leadership In Energy & Environmental Design (LEED) to create a sustainable environment by building the buildings using eco-friendly materials.

HOSPITAL WASTE MANAGEMENT

Disastrous pollution was produced by hospitals everyday which includes instruments that were used during the surgery, and other bio-medical wastes that were used during the diagnosis process etc. In India, most of the hospitals are lacking proper waste disposal technique. The surgical wastes lead to the serious threats to both environment and living things especially to humans that may lead to the transmission of microbial and other serious diseases. So it is must to properly dispose the hazardous chemicals and other hospital wastes by clearing their harmful substances by a proper technique that helps to the sustainability of the environment and people.

RECYCLING OF WATER

In hospitals, large amount of water are being used for various purposes such as sanitation, cleaning and sterilizing the surgical instruments, cooking and cleaning in canteens and for other primary uses of patients and staffs. In most of the hospitals there is no proper management of water. As they may run off the water to wastage by leaving the taps open. In various circumstances, the staffs or patients may forget to close the tap that leads to the wastage of water. So by installing the motion-sensing faucets, electronic water heaters may lead to a sustainable usage of water. Rain water harvesting is an effective way to collect the rainwater in underground and this stored water can be used in gardening and also for sterilization purposes. The sewage water can be treated with chlorination treatment and UV treatment, as it can be recycled. It is a way towards the sustainable usage of water in hospitals. Most of the green hospitals are using this technique as an approach to sustainable environment.

CONSERVATION OF ENERGY

Hospitals consume more amount of electricity due to their infrastructure and for the diagnosis and surgery purpose. Even though there is no surgery in the hospital, an emergency Intensive Care Unit should always be ready for emergency situations. So the green hospitals can utilize the solar power and wind power for their basic necessities of electricity, as it may reduce their dependency of thermal electric energy. A case study on Gundersen Lutheran Health System La Crosse, Wisconsin had revealed that installation of photovoltaic solar panels on a parking garage roof generated about 73,000 kWh of electricity per year which assist in lighting the garage.

CONSERVATION OF RESOURCE

Green hospitals are giving priorities for collection and separation of dangerous and reusable wastes. The reusable wastes can be recycled. The dangerous wastes should be discarded properly. Buying the medical instruments and machineries from the locale helps to reduce the carbon emission. Green hospitals take an initiative to produce the medical instruments by using eco-friendly materials.

SUSTAINABILITY OF PATIENT ROOM

Hospital building are using heat resistant glasses in windows. In sick rooms, using eco-friendly materials for the basic necessities such as bed, tables and cup boards etc. Using the motion – sensing faucets, electronic water heaters, impulsive lights etc. leads to the sustainability of every resources in the green hospitals.

PROVIDING NUTRITIOUS FOOD

In this modern world, consumption of modern foods leads to various health problems. Now a days people are showing more interest towards the fast foods and junk foods which is very bad for health. Green hospitals provides a healthy as well as balanced diet that is very nutritious and at same time it is also tasty to encourage the patients to consume it. By providing healthy foods, the patients recover much faster.

THERAPEUTIC AND CURATIVE EFFICIENCY IN PATIENTS

Patients when have connectivity with nature their healing power increases tremendously. As the nature has its own healing efficiency. Sunlight, fresh and pure air that is devoid of pollution plays a major role in therapeutic and curative efficiency of patients which is also scientifically proven.

FEW GREEN HOSPITALS IN INDIA

- Asian healthcare, Mumbai
- Max Balaji Hospital, Delhi
- Kohinoor City Hospital, Mumbai
- ESI Hospital, Bangalore, etc.

CONCLUSION

Green hospitals work towards the sustainability of the environment and people by taking various initiatives that were mentioned above. Thus the green hospitals are the one that heals the patients in environment friendly manner.

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