TO FIND A SUITABLE LATERAL RESISTING SYSTEM FOR A STEEL STRUCTURE USING ETABS SOFTWARE

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ABSTRACT

In this paper, two lateral resisting system for a steel structure is studied and compared, they are x-braces and steel plate shear walls. Different types of model are prepared, low rise, moderate and high rise building, and in each model the lateral resisting system x-braces are provided and different cases are made. The first case is that all braces are provided in the building except for the ground floor, the second case, braces are provided in the alternate floors, third case, braces are provided in alternate vertical direction. In the same way the lateral resisting system steel plate shear walls are also provided. For each cases made, the lateral resisting system which is best suitable for each model is found out.

Keywords: *braces, shear walls, seismic zone factor, max story displacement, max story drift, story shear.*

Introduction

Buildings are one of the most highly affected when it comes to seismic action. Providing a proper lateral load resisting system in earthquake-prone areas is a must, to ensure safety for the people and for other structures nearby. Steel is one of the materials which is good at resisting earthquakes because of the flexibility and low weight. When an earthquake hits, heavier and stiffer structures experience more of that earthquake load. The cost of foundation and superstructure significantly reduces upon the reduction of design forces. Comparing to others materials steel structures are generally light in comparison. As we know the earthquake force is associated with the inertia and mass of the structure, so upon reducing the mass of the structure, it leads to lower seismic design force.

Bracing system is one of the methods for resisting earthquake loads, the advantages of braces are high strength, high stiffness, less weight, and more economical. Upon providing bracing on a structure, the stability and stiffness significantly improve under earthquake loads.Providing steel plate shear wall is another method to reduce the effect of earthquake loads. Steel plate shear wall as compared to reinforced concrete shear wall, it offers more floor area, lighter structure, more economical, a faster speed of construction, and better stability control.

Bracing system is a very common method used in construction, due to its ease to construct and being economical. The connection between beams and column is nominally pinned which then provides better stability and better resistance to lateral loads coming to the structure. In a braced multi-story building, two orthogonal bracing systems are provided in order to resist the lateral load.

- **Horizontal bracing:** The bracing is provided on each floor level, thus providing a load path transferring the load/forces to the plane of vertical bracing.
- **Vertical bracing:** The bracing is provided between two columns and it provides a load path transferring the load/forces to the ground thus making it more stable.

Steel plate shear wall helps in optimizing the component performance by using the advantages of the post-buckling behavior of the steel panels. It can be idealized as a vertical cantilever plate girder, where the column acts as a flange, the steel plate acts as a web, and the cross beam representing the transverse stiffness.

Methodology

The building that has to be design is for commercial automobile showroom. Now a days, the design of steel building have been used for constructing automobile showroom

instead of reinforced concrete buildings due to the following reasons:

1. They have high duticle strength and hence is applicable for sesmic design. because the strength and toughness of the steel is well suited for this kind of showroom.
2. It offers improved safety and resistance.
3. Steel building retains their value longer comparing to RCC.
4. It allows for the improved quality of construction and has less maintenance comparing to reinforced concrete building.
5. If any changes are required in the building, steel building can easily be disassemble in the future unlike the RCC.

Preparing a model for different heights in Etabs

Table 1: Different types of model

Models	Name of the model
A	Braces in all the floors except ground floor
B	Braces in alternate horizontal direction-1
C	Braces in alternate horizontal direction-2
D	Braces in alternate vertical direction
E	Standard model with no braces
F	Shear walls in all four sides of the wall

Three different heights are prepared

Low rise building: Six different cases are made for this particular model.

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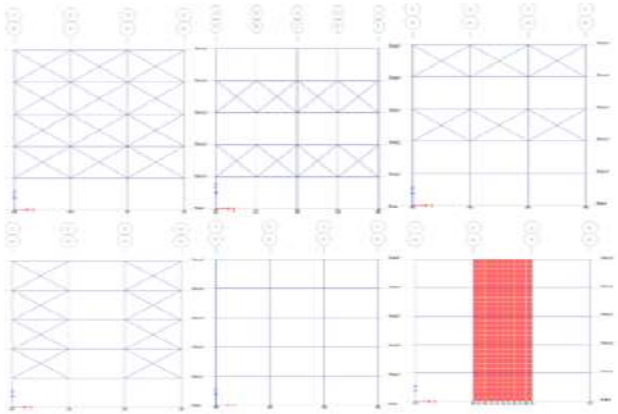

Fig 1: Low rise building

1. Moderate rise building: Six different cases are made for this particular model.

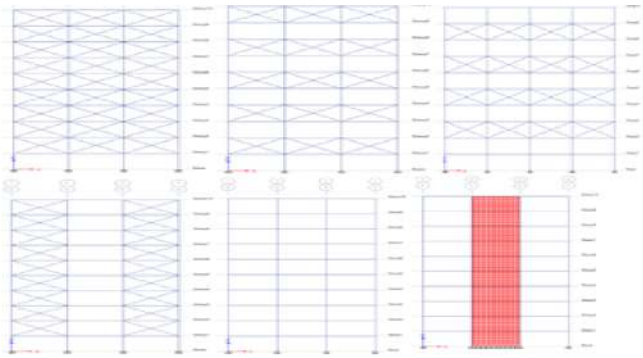

Fig 2: Moderate rise building

2. High rise building: Six different cases are made for this particular model.

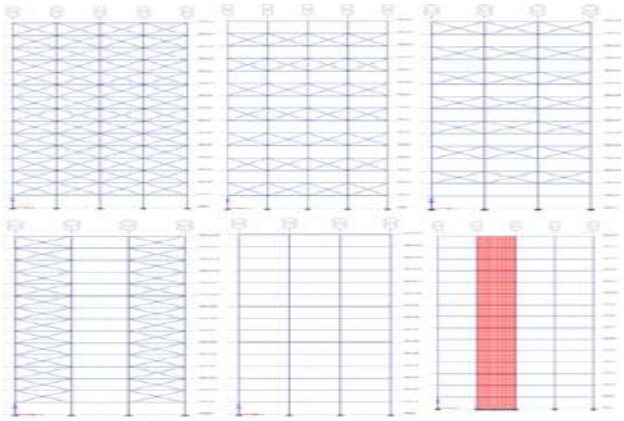

Fig 3: High rise building

Analysis of the model

Plan details

Given below are the plan details of the model

- Number of bays in X - direction: 4
- Distance between each bay in X-direction –5m
- Number of bays in Y-direction: 3
- Distance between each bay in Y - direction – 5m
- Number of floors in low rise building – 5 floors
- Number of floors in moderate rise building – 10 floors
- Number of floors in high rise building – 15 floors
- Height of each floor: 3m

Materials used

The materials and section that has been used in analyzing the models are given below:

- **Column:** ISHB 450-2
- **Beam:** ISMB 250
- **Braces:** ISLB 300
- **Steel plate:** 12 mm

Modelling steps

- Making a new model
- Defining material properties
- Defining section properties
- Drawing beams and columns
- Drawing the bracings
- Assigning loads
- Defining load patterns
- Load combinations
- Running the analysis
- Designing

Analysing all the models in different seismic zones:

- Low rise building (5 Story): 6 different models (Model A, B, C, D, E, F) are analysed and designed in different seismic zone (3, 4, 5) and making sure the structure is safe.
- Moderate rise building (10 story): 6 different models (Model A, B, C, D, E, F) are analysed and designed in different seismic zone (3, 4, 5) and making sure the structure is safe.
- High rise building (15 story): 6 different models (Model A, B, C, D, E, F) are analysed and designed in different seismic zone (3, 4, 5) and making sure the structure is safe.
- Results and discussions
- Click on display – story response plot – select max story displacement - copy the values to excel files then plot the graph.
- Click on display – story response plot – select max story drift – copy the values to excel files then plot the graph.

Click on display – story response plot – select story shear– copy the values to excel files then plot the graph

Max Story Displacement
Low rise building

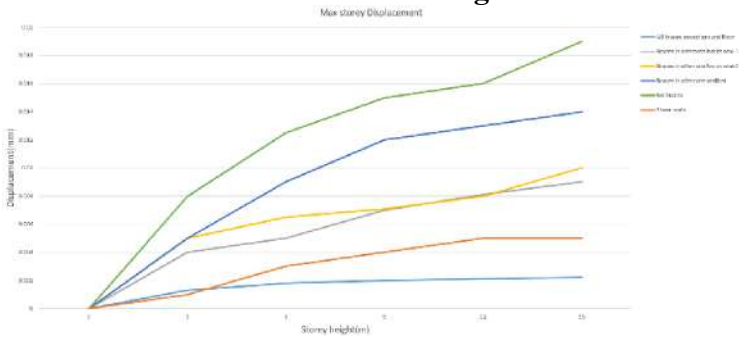

Fig 4: Zone-5

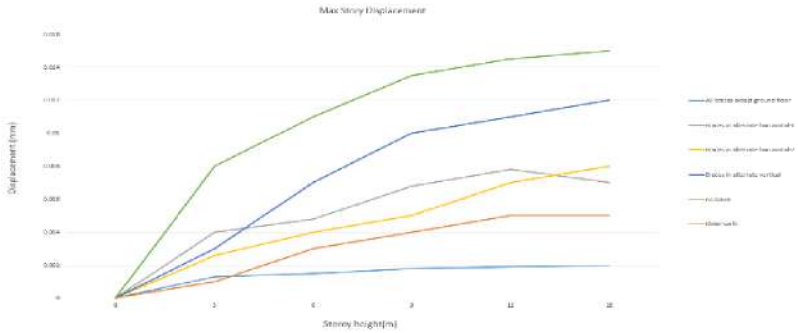

Fig 5: Zone-4

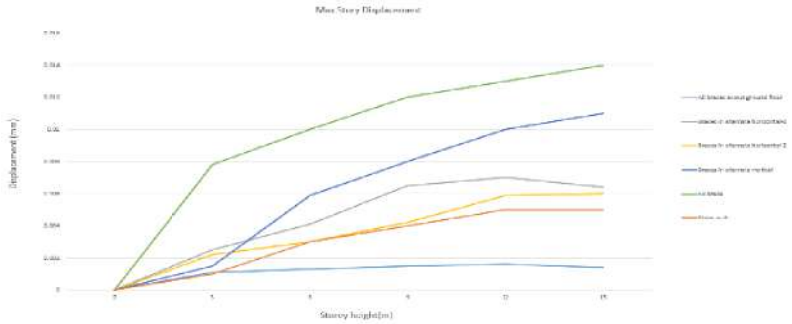

Fig 6: Zone-3

From the above graph we can see that Model A (braces on all the floors except ground floor) has least max story displacement as compared to other models.

Percentage Difference Calculation

Each model is compared with model E (Standard model) to know how much difference is there when braces or shear walls is provided

Table 2: Percentage difference calculation

MODELS	PERCENTAGES		
	ZONE-5	ZONE-4	ZONE-3
A	804.76%	781.3%	694%
B	162.5%	147.8%	126.1%
C	190%	165%	134%
D	267.3%	211%	197.9%
F	315.1%	295%	253%

Moderate rise building

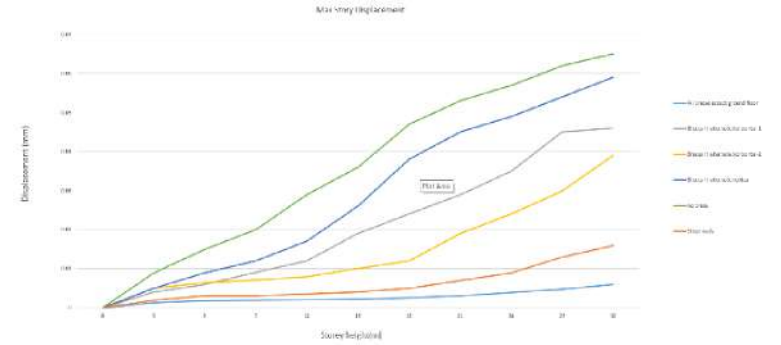

Fig 7: Zone-5

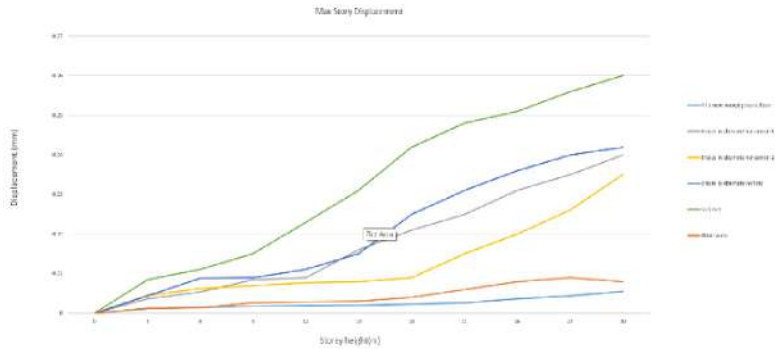

Fig 8: Zone-4

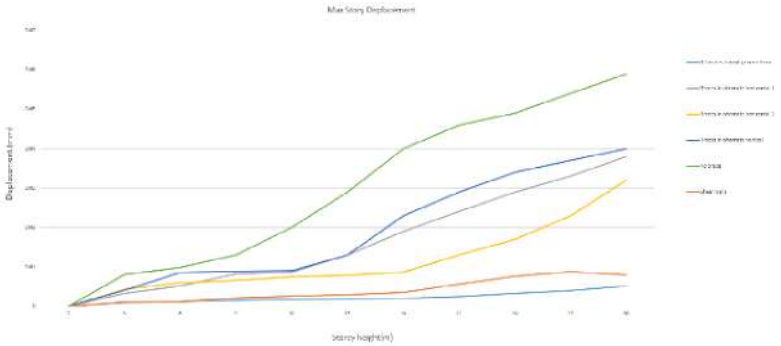

Fig 9: Zone-3

From the above graph we can see that Model A (braces on all the floors except ground floor) has least max story displacement as compared to other models.

Percentage Difference Calculation

Each model is compared with model E (Standard model) to know how much difference is there when braces or shear walls is provided.

Table 3: Percentage difference calculation

MODELS	PERCENTAGES		
	ZONE-5	ZONE-4	ZONE-3
A	712.5%	604%	553%
B	190%	149%	136%
C	250%	215%	191%
D	410%	356%	297%
F	650%	585%	519%

High rise building

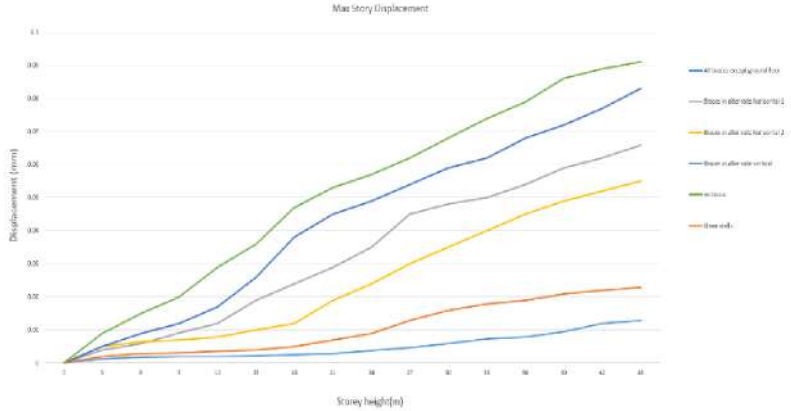

Fig 10: Zone-5

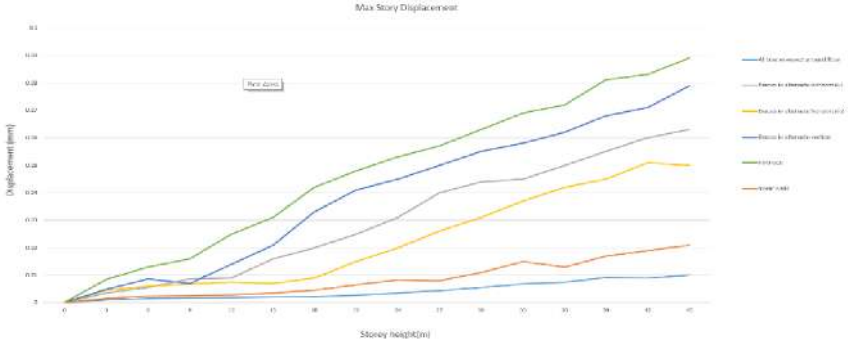

Fig 11: Zone-4

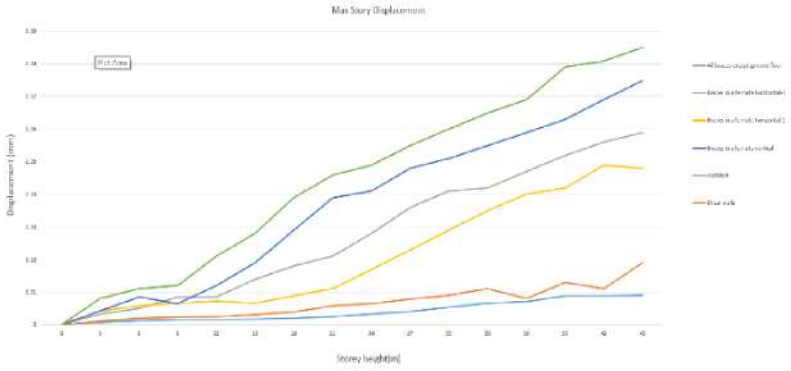

Fig 12: Zone-3

From the above graph we can see that Model A (braces on all the floors except ground floor) has least max story displacement as compared to other models.

Each model is compared with model E (Standard model) to know how much difference is there when braces or shear walls is provided.

Percentage Difference Calculation

Table 4: Percentage difference calculation

MODELS	PERCENTAGES		
	ZONE-5	ZONE-4	ZONE-3
A	600%	556%	516%
B	165%	134%	128%
C	121%	101%	98%
D	249%	197%	167%
F	496%	457%	447%

Max Story drift
Low rise building

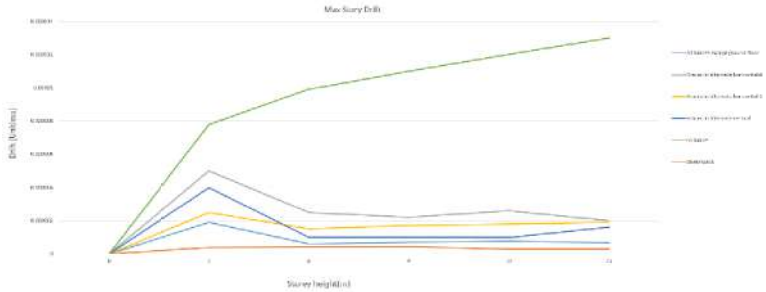

Fig 13: Zone-5

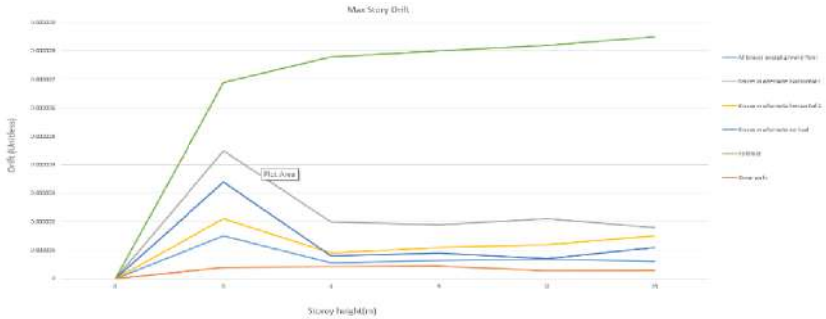

Fig 14: Zone-4

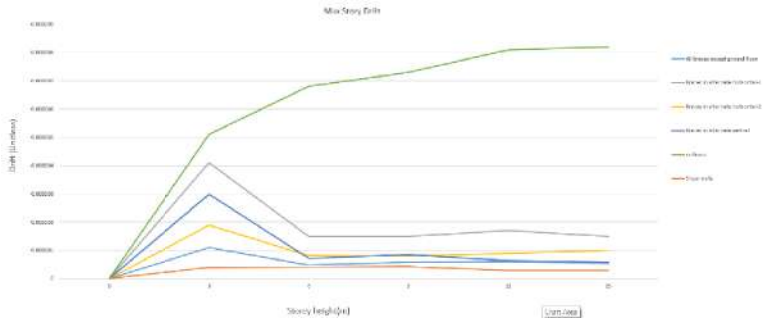

Fig 15: Zone-3

From the above figures 13, 14 and 15, we can see that model F (shear wall) has the lowest story drift followed by model A (braces in all the floors except ground floor) followed by model D (alternate vertical horizontal direction) followed by model C (braces in alternate horizontal direction-2) followed by model B (braces in alternate horizontal direction-1)

Moderate rise building

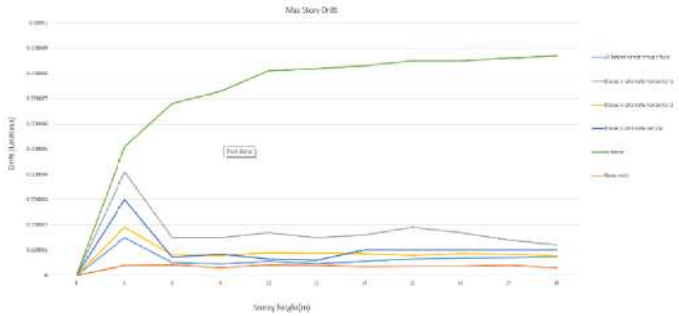

Fig 16: Zone-5

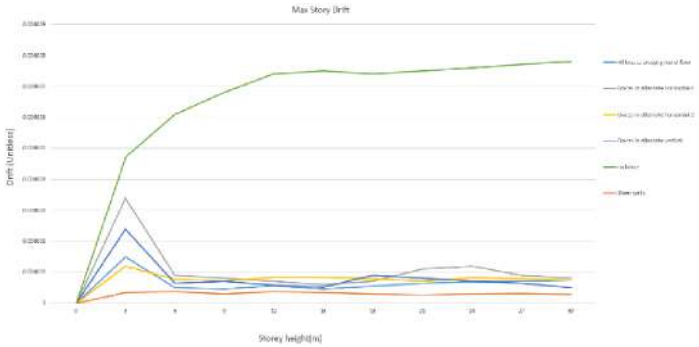

Fig 17: Zone-4

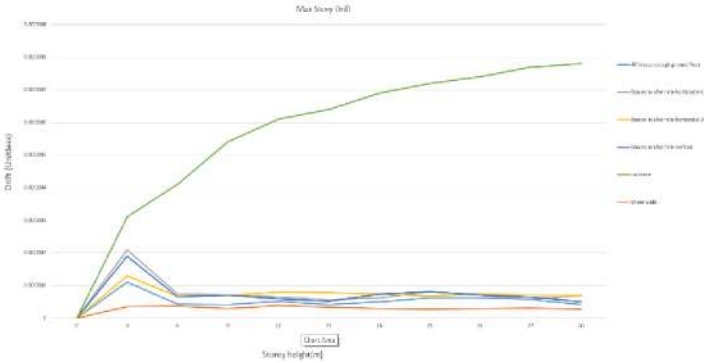

Fig 18: Zone-3

From the above figure 16 and 18, we can see that model F (shear wall) has the lowest story drift followed by model A (braces in all the floors except ground floor) followed by model C (braces in alternate horizontal direction-2) followed by model D (alternate vertical horizontal direction) followed by model B (braces in alternate horizontal direction-1)

And from the above figure 17, we can see that model F (shear wall) has the lowest story drift followed by model D (alternate vertical horizontal direction) followed by model C (braces in alternate horizontal direction-2) followed by model A (braces in all the floors except ground floor) followed by model B (braces in alternate horizontal direction-1)

High rise building

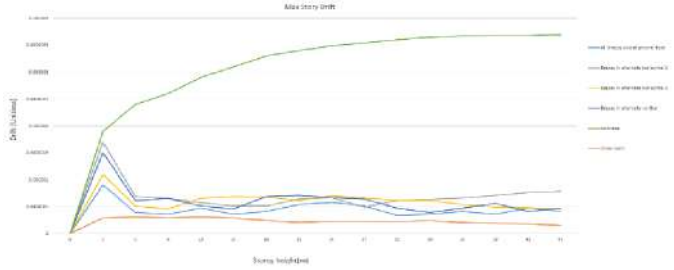

Fig 19: Zone-5

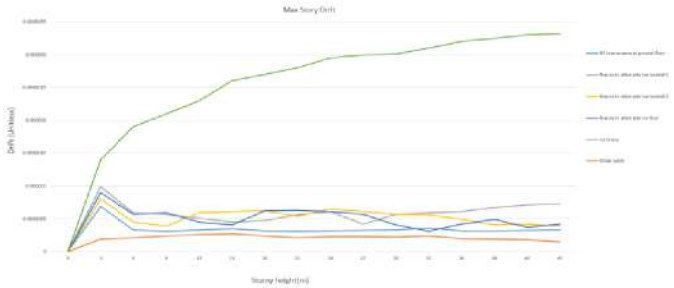

Fig 20: Zone-4

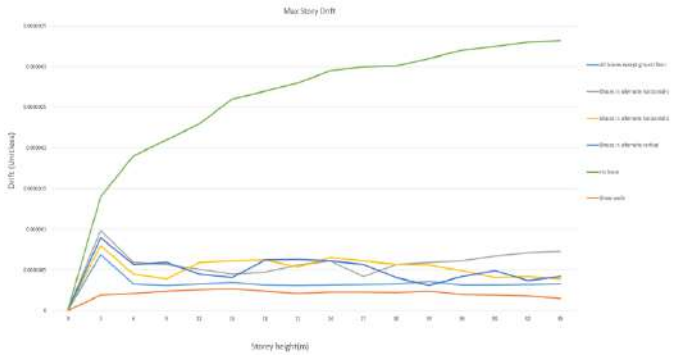

Fig 21: Zone-3

From the above figures 19, 20 and 21, we can see that model F (shear wall) has the lowest story drift followed by model A (braces in all the floors except ground floor) followed by model D (alternate vertical horizontal direction) followed by model C (braces in alternate horizontal direction-2) followed by model B (braces in alternate horizontal direction-1)

Story Shear
Low rise building

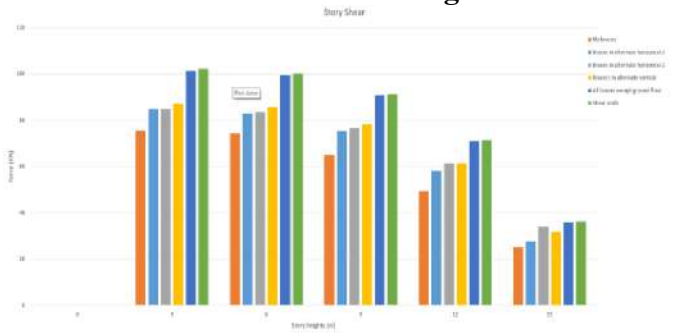

Fig 22: Zone-5

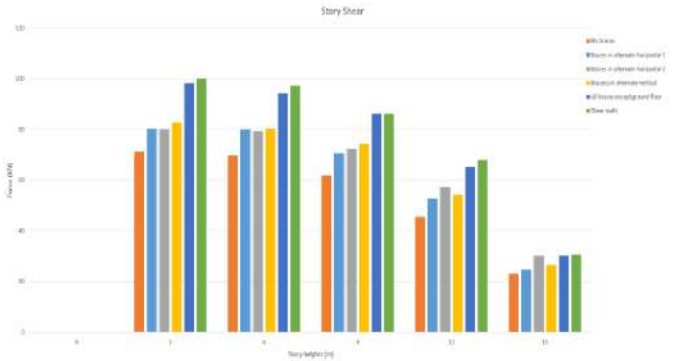

Fig 23: Zone-4

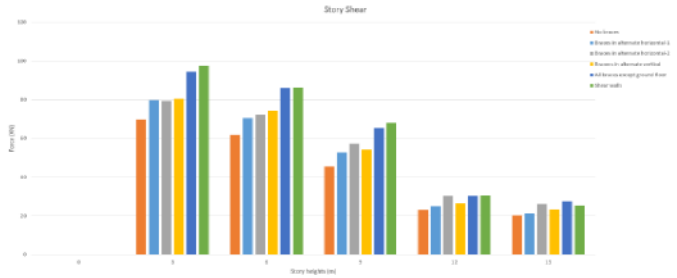

Fig 24: Zone-3

From the above bar graphs, Model F (shear walls) is having the highest force as comparing to other models and the lowest is the Model E (standard model with no bracings)

Moderate rise building

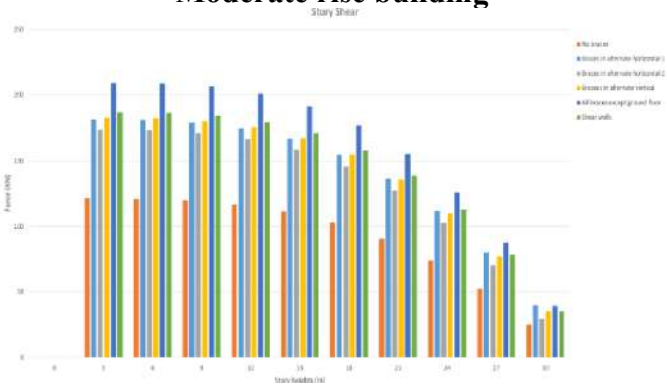

Fig 25: Zone-5

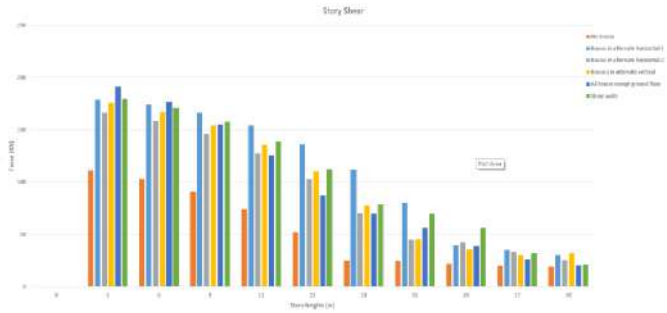

Fig 26: Zone-4

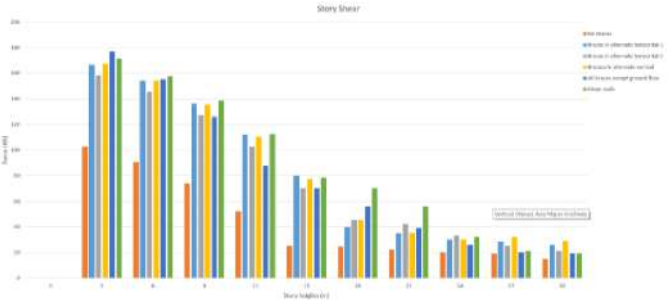

Fig 27: Zone-3

From the above graph, we can say that model A (Braces in all the floors except ground floor) has the highest value and model E (standard model without any bracing) has the lowest value

High rise building

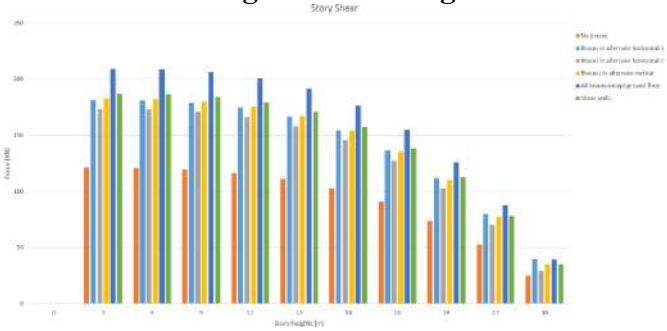

Fig 28: Zone-5

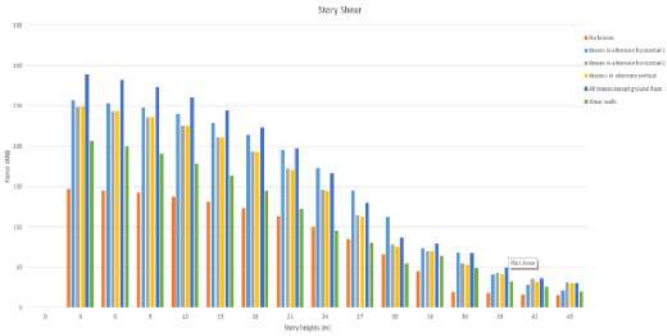

Fig 29: Zone-4

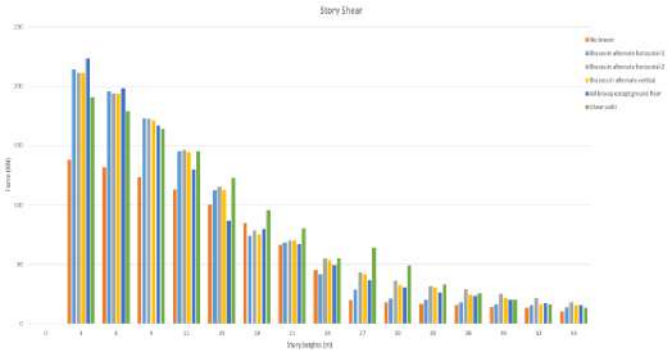

Fig 30: Zone-3

From the above graph, we can say that model A (Braces in all the floors except ground floor) has the highest value and model E (standard model without any bracing) has the lowest value.

Conclusion

The following conclusions are made after the completion of the work. Different models have been analysed using Etabs Software under different seismic conditions and under different lateral load resisting systems:

1) For seismic zone 5, 4 and 3 Model A (Braces on all the floors except ground floor) has the lowest displacement and story drift and its best suitable for all the seismic zone factor.
2) Model F (Shear walls) gives a very similar results when compared to model A, Model A can be replaced by model F, when bracing to be provided are not available.
3) Model B, C and D gives a similar results and be compared with one another.

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TRAVEL BEHAVIOUR OF REVA UNIVERSITY STUDENTS AND STAFF

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ABSTRACT

Education Institutions, especially those with huge number of student enrolments, establish a unique generator that gives in many ways to the travel demand in a region. Travel behaviour is one of main elements in transportation studies to distinguish and understand transportation needs. Therefore, in order to program suitable and sustainable transport system plans, the studies of travel pattern were usually carried out to understand the factor that stimulate a sustainable transportation system. In this paper it offers a detailed statistical investigation of Students and staff, they were requested to give their daily travel information and also their personal information. A Google form is created for survey and distributed through online. The survey was carried out at REVA University for students and staff. The study origin and destination study with travel time, mode of transportation such as public transport or private transport and its selection. From the survey, it concludes 87% of staff and students are interested to use public transportation but 57% are using private mode due to non-availability of convenient public transport. From Static, that high-income group preferred private transportation compared to low-income group. The survey helps in future transportation planning.

Keywords: *Origin and destination, Google form, Public, Private, Transport system, Travel behaviour.*

Introduction

University students and staff are an underrepresented masses being in travel behaviour studies. This underrepresentation is recognized by different test both with review system and respondent viewpoints. All around, university students and staff people groups are continuously youthful created and may not be totally connected with or according to urban methodologies. In that limit, they will in actuality disregard studies for which they don't at long last observe and see a brief or direct incredible circumstance to themselves. Also, university student's and staffs masses are as normally as possible shielded
separate from assessing outlines used in the structure and relationship of standard family unit travel survey.
As approved by university student masses those living for group quarters (living approaches, hostels) and such masses are as routinely as possible avoided looking at charts. University understudies will if all else fails be an adaptable social event, as much of the time as possible changing their private zones and private living arrangements. It is hard for source of investigating edges to stay current for such a versatile people and to be far reaching in their portrayal of the majority. Hence, testing outlines themselves are inadequate in representing to understudy people groups, and the subsequent investigation test will as anybody would expect be not set up to sufficiently reflect the region and characteristics of the university students area.

Objectives

Objectives of this work is to travel behaviour of REVA University Students and staff using Google form are as follows.

1. Selection of mode transportation such as public transport or private transport, and its effect on traffic problem
2. Factors influencing mode of transport based on income.

Reduce the traffic congestion and air pollution generated from REVA University.

Literature Review

IlginGokasar, et al. (2018) [1] Multinomial logit mode choice model of the decision making for travel and commuter responses to traffic information were estimated separately in two different commute modes, including private cars and public transit. The attributes that influence travellers' decision-making patterns were broadly categorized into three groups, which were socioeconomics, travel and technological characteristics.
DeeptyJaina, et al. (2019) [2] Travel behaviour analysis highlights that both the trip length and mode choice significantly varies with regard to the SEWS in Vishakhapatnam.

People belonging to the low and low middle SEWS group are more dependent on walking and travel shorter distances as compared to the middle high and very high SEWS group. Encouraging the middle high and very high SEWS group to travel short distances and use low carbon modes of transport will need interventions related to the development control regulations and infrastructure provision.

Taru Jain, et al. (2020) [3] This study explores the process of travel behaviour change associated with car share adoption and how it varies among individuals. Qualitative methods were used to investigate how lifestyle, mobility and travel choices change in response to car sharing. In most cases, availability of car share was reported to enable and facilitate changes in travel behaviour rather than causing or initiating them.

Cory M. Krause, et al. (2018) [4] This paper explores the base- line model followed by the inclusion of trip purpose. First, a baseline tiered time origin model was developed using the Markov Chain approach. This modelling structure allows for a short training period of current modelling techniques. Then, a machine learning technique derived the trip purpose on 5-, 15- and 30-trip learning sets, followed by results organized by purpose, time, and origin.

Stefan M. Knupfer, et al. (2018) [5] In this paper most of the cities studied introduce car usage barriers to avoid congestion, balancing car ownership, car usage, and congestion. When a city reaches an economic development level that makes car ownership affordable for a majority of residents it is rare to have low barriers and low congestion levels at the same time Cost of two hours of paid parking, as percentage of average income. Hence, cities deliberately increase the cost of owning a car by imposing tolls (e.g., paid parking, odd-even rationing, preventive taxation, toll roads, plate auctions)

Jonas De Vos, et al. (2018) [6]In this paper new residential context has the potential to disrupt previous travel choices and could potentially change people's attitudes. Results suggest that (i) travel attitudes often influence the residential location choice, and (ii) both travel attitudes and travel mode choice change after a relocation, albeit in different ways depending on the current and previous residential neighbourhood.

Ammar O. Abulibdehet. al (2018) [7] In this study examines the impact of cordon pricing on commuters' travel behaviour based on their socio-economic characteristics. Second, this study investigates commuters' willingness to pay to escape congestion on the roads of the city of Abu Dhabi. Multinomial logit modelling, chi-square test, and one-way ANOVA were used to assess the impact of cordon pricing on commuters.

Le Yu, et al. (2019) [8] this paper investigated how built environment affected transit travel in urban villages where low-income group resided, and they are all tenants. Structural equations modelling was employed to express the effects of socio-economic, public transit service related and built environment variables on travel mode choice, travel time and distance, with control for residential self-selection**.**

Study Area

The study area, REVA University situated in Bangalore city in the South Indian Territory of Karnataka, India. Due to increment in traffic volume in the major road adjoining REVA University, an elevated level of congestion is experienced inside the town's road network particularly during the peak hours. The fundamental explanation behind this congestion is the conflict between through traffic and local traffic. More than 18,000 student study various courses, the institute produces enormous number of trips and furthermore it attracts many, Figure 1 shows the guide of RU University. The university is running a university bus as transport for off-campus to satisfy the vehicle need of the university. Other significant mode of travel in the university are bikes and campus as well as BMTC, cab (shared taxi or without shared taxi), auto, to fill the demand of the university student (utilized by off-grounds inhabitants). The remainder of the transport request is secured by walk.

Online Survey

The entire study first was done on paper before doing modified in online by use of google forms developed. In the first set of questions asked about in google form was personal data

collected such as age, gender, students and staff status, parents' income, living arrangement, present location, mode of transport

Fig 1. REVA University Campus map (Satellite map)

Respondents were asked to identify their present location from where they are coming to university, how much kilometre is away from the university, total travel time for each trip (for both on-campus and off-campus students and staff). If they are using multiple mode such as (BMTC, walking, auto, metro, KSRTC, local train) respondents has to select multiple modes. Use of private transport with sharing or without sharing and also use of university bus. If the respondents are doing trip chaining, they have to select multiple options. All respondents were then asked using ICT in best way to reach the university and also asked how much travelling cost of per day to spend.

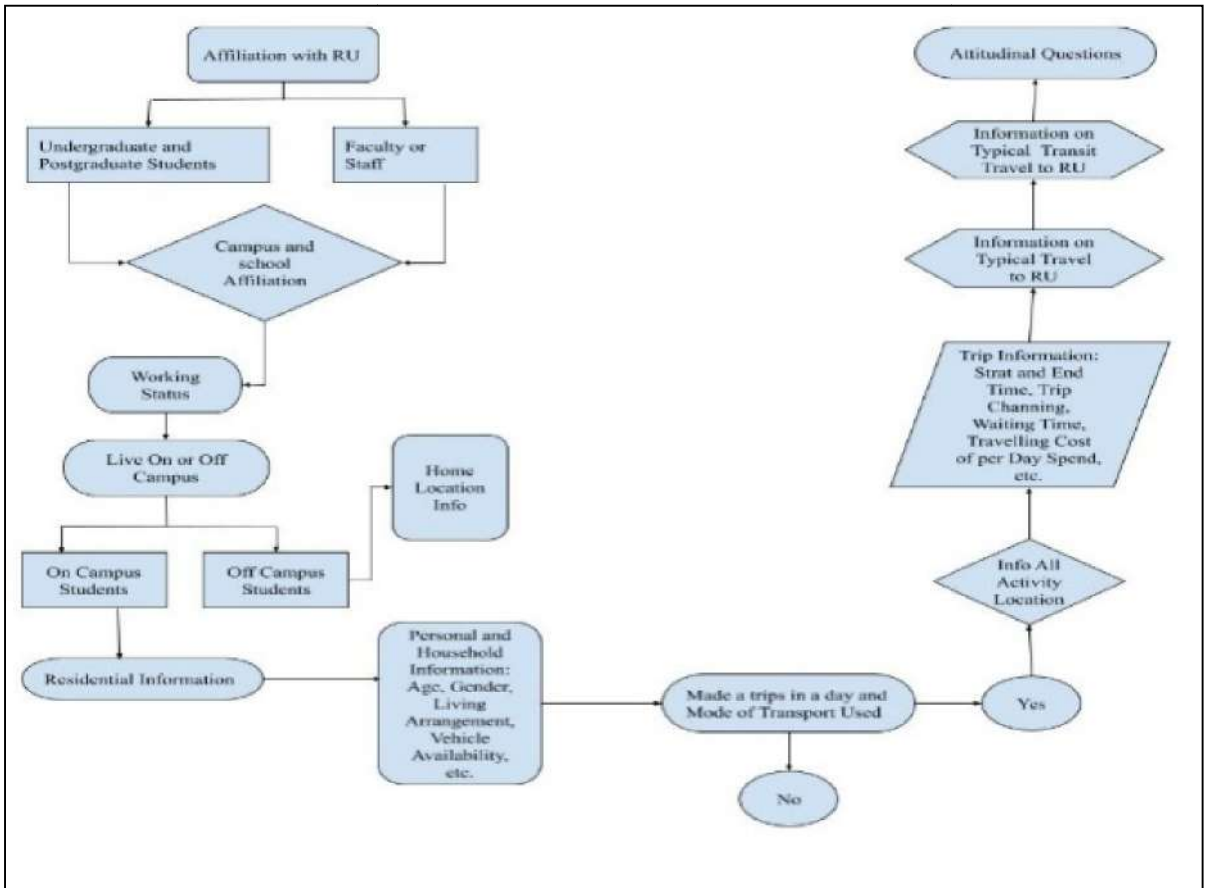

Fig 2. Flow of Survey Design Content

Data Analysis

The web-based questionnaire is circulated among the students through on the online. A random sampling technique was adopted and furthermore ensured that the gathered information separated equally in all the groups of people. From the data collection a sum of 868 reactions are considered for this pilot study. The age distribution shows that most of the observed travellers (50%) have a place with the age group less than 20. There were twice the same number of passengers travelling alone than in a group, while the distribution of the observed passenger by travel mode mirrors the sampling strategy. Table 1shows the descriptive statistics for the independent variables. There are somewhat a larger number of women in the sample than men which correspondent to the generally observed slight in gender orientation appropriation among public transport travellers in general.

Table1. Details of statistics of independent variables.

Variable	Value	Numbers	%
Gender	Male	618	51.85
	Female	574	48.15
Social group	UG	813	68.20
	PG	341	28.61
	Technical staff	38	3.19
Age	< 20	632	53.02
	20 - 30	539	45.22
	>30	24	2.01
Travel mode	Public Transport	560	46.98
	Private transport	428	35.91
	University Bus	122	10.23
	Public, Private, University Transport	79	6.63
Present location	Home	534	44.80
	REVA University hostel/PG/Staff Quarters	657	55.12
Feel safety when travelling in 2 - wheeler	Yes	407	34.14
	No	240	20.13
Parking the vehicle	Out-Side Campus	769	64.51
	In-side Campus	232	19.46
Public transport Safe	Yes	594	49.83
	No	693	58.14
Public transport Satisfy	Yes	909	76.26
	No	379	31.80
Use of Google Map	Yes	801	67.20
	No	487	40.86
Rental 2-wheeler	Yes	968	81.21
	No	319	26.76
Interested to reduce traffic jam and delay in travel time	Yes	1132	94.97
	No	60	5.03
Interested to keep Bangalore free from air pollution	Yes	1140	95.64
	No	59	4.95
Interested to use REVA sharing app	Yes	1167	97.90
	No	120	10.07

Figure 3 shows the mode choice characteristics of students in the university. It obviously shows that 50% of the students like to utilize public mode as their essential vehicle than private transport and university transport. After public transport, larger part of individuals utilizing private transport (35.8%) than university transport (10.25%) despite the fact that they have to go through cash from their pocket more than the public transport. This obviously shows the disposition of the students to give inclination to comfort.

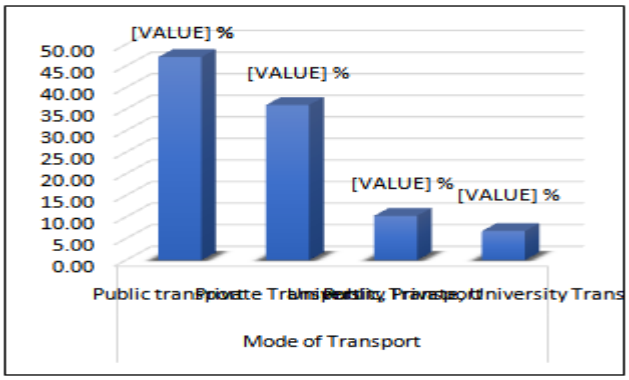

Fig 3. Percentage split of trips based on mode

Figure 4 presents the On-campus and Off-campus travel time of day for student trips and staff trips distribution. This chart explains percentage of each student and staff total trip happens inside per hour time bin. There is a high top at 7:00 AM speaking to make a trip to university from off-campus students, a moderate top at 1:30 PM says about lunch time, and another high top at 4:30 PM says to leaving the university from the classes and for staff also. An unimportant number of excursions happen between 5:50 AM and 6:20 AM. Student on-campus have an entirely different time of day conveyance than off-campus individuals. At last, in contrast to the off-campus distribution, the percent of on-campus trips happening between5:50 AM and 6:20 AM isn't immaterial, showing that on-campus regularly make trips late around evening time

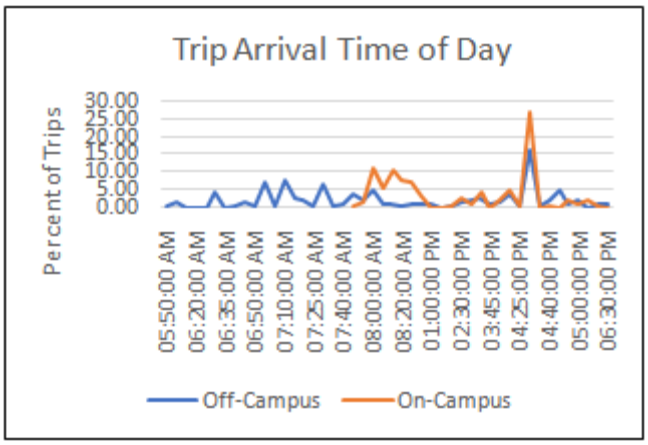

Fig 4. On-Campus and Off-Campus Time of Day Distributions.

Table 3 shows the average trip rates of on-campus residents and off-campus residents. The average trip rate of on-campus resident is significantly higher than the off-grounds residents. The distinction in trip rate may be because of the shorter trip of on-campus residents.

Table 3. Average trip rates of students

Students' category	Average trip rate per day		
	Male	Female	Average
On-campus residents	0.242	0.308	0.275
Off-campus residents	0.274	0.174	0.224

Table 4 shows the percentage user of Students and Staff based on mode of travel. The percentage of users of BMTC is significantly higher than the other mode of transport used by students and staff. The percentage of users may be reduce depending on the life style and comfort to reach the university within shorter time.

Table 4.Percentage of User Students and staff based on mode of travel

Variable	Value	Average trips/day
Mode of Transport	Auto	15.55%
	2-wheeler	6.80%
	BMTC	26.44%
	KSRTC	5.77%
	Metro	5.54%
	Cab	7.26%
	4-wheeler	17.27%
	walk	15.36%

Table 5. Shown the percentage of Namma Metro usage in future. In future Namma Metro line is coming to nearby University. More than 60% of Students and Staff agree to use the metro line. In these 544 homes are coming only 224 in that many are using public and private transport. In that 224 coming from home are having private vehicles are 180 respondents.

Table 5. Percentage of Namma Metro usage in future

Variable	Value	N	%
Namma Metro	Yes	544	63.40%
	No	314	36.06%

Table 6. Provided statistics for the percentage of parking made by UG students and PG students based on convince to out-side campus parking and inside campus parking. More than 70% of UG students and also more than 50% of PG students park the vehicle outside the campus. Very less students are parking inside the campus their own vehicle. University provides huge area to park the vehicle out-side the campus but still many are not parking.

Table 6. Percentage of parking on outside and inside campus based on Study

Variable	UG Students %	PG Students %
Out-side campus parking	79.18	54.30
In-side campus parking	20.82	45.70

Fig 5 provides the statistics related to the usage of Google map and UG and PG students. More than 60% of UG and PG students we will prefer to use google map so that they can come to know that shortest distance, travel time and as well as cost of trip. More than 40 % are not using the Google map

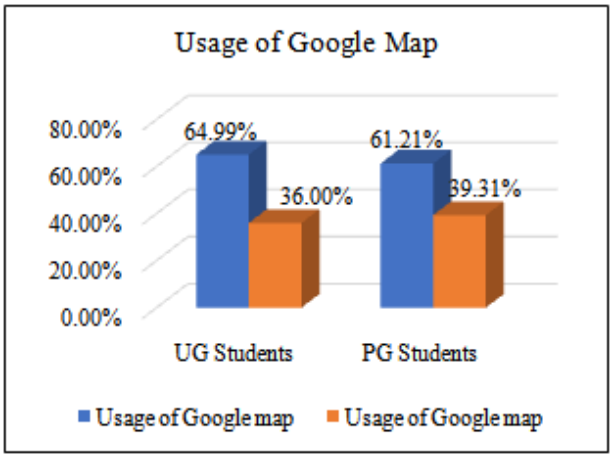

Fig 5. Usage of Google Map by UG and PG Students Distributions.

Fig 6 provides the statistics related to the usage of Sharing App by UG and PG students. More than 60% of UG students we will ready to use Sharing app and more than 80% of PG Students we will ready to use Sharing App. If we develop the sharing app of the REVA University of vehicle so we can reduce the traffic and air pollution.

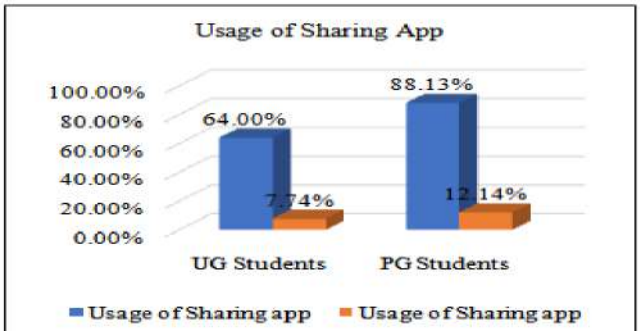

Fig 6. Usage of Sharing App by UG and PG Students Distributions

Fig7. Provided statistics for the annual income of parents and use of mode they select by students and staff. Annual income of parents has 20,000 – 35,000 they will prefer the public transport such as BMTC, Metro, Local train. More than 35,000-75,000 income they will use their own vehicle such as 2-wheeler. More than annual income 75,000 – 300000 they will use 4-wheeler. It shows that annual income of parents can be change the mode transport. High-income of parents student will use own vehicle and less-income of parents students will select the public transport.

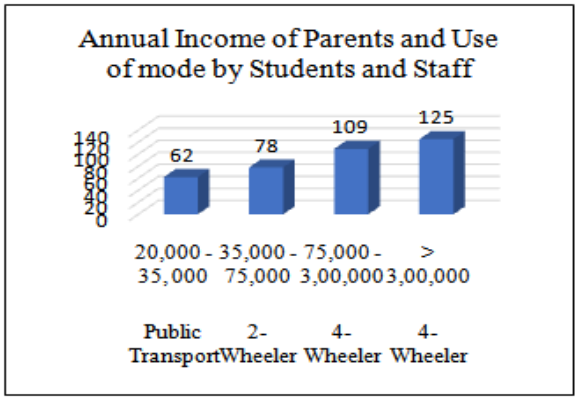

Fig 7. Annual Income of Parents and Use of mode by Students and Staff

Fig 8 provides the statistics related to the traffic jam and air pollution reduction distribution Student and staff. In Bangalore traffic jam and air pollution increase day by day so that 95% of RU students and staff are agree to reduce air pollution and traffic jam by use of sharing the cab or use of public transport.

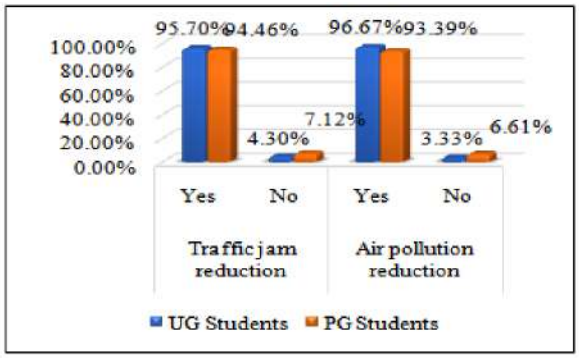

Fig 8. Traffic jam and Air pollution reduction Distributions.

Fig 9 provides the statistics related to the usage of Google map and UG and PG students. More than 60% of UG and PG students we will prefer to use google map so that they can come to now that shortest distance, travel time and as well as cost of trip. More than 40 % are not using the google map

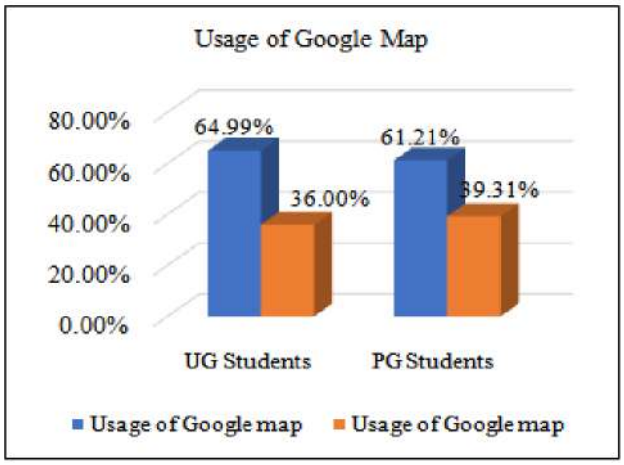

Fig 9. Usage of Google Map by UG and PG Students Distributions

Conclusion

Some specific results obtained from the study are:

- Use of public transport obtained from survey is 46.96%. As per the willingness from survey data, if Namma metro construction completes along airport road public transport may increase to 70%.
- High-income of parent's student will use own vehicle such as 2-wheeler and 4-wheeler and less-income of parent's students will select the public transport.
- Total respondents are 868 in that 20 % of students and staff will park the vehicle inside the campus and also use of rental 2-wheeler for shorter distance more than 70% of students are agree.
- Total travel time for off-campus is more they will start soon to reach the University. If they shift their home or PG near to university within 3 km area than they can reduce the travel time.
- Traffic jam and air pollution increase day by day in Bangalore so that 95% of RU students and staff are agree to reduce air pollution and traffic jam by use of sharing the cab or use of public transport. And also,more than 60% of UG and PG students we will prefer to use google map so that they can come to know that shortest distance, travel time and as well as cost of trip.
- More than 60% of UG students will ready to use REVA Sharing app and more than 80% of PG Students will ready to use REVA Sharing App if we develop.
- Another important result is related to the two-travel mode that has used frequently unlike using public transport who use transport for limited times in a day compare to the private transport do the several time a day are more likely to shift their fastest path through the travel time information they receive.

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VEHICLE ARRIVAL, TIME HEADWAY AND SPEED DISTRIBUTIONS UNDER MIXED TRAFFIC CONDITIONS ON MULTILANE HIGHWAYS

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ABSTRACT

Time headway and speed distribution studies provide an insight into the aggregate flow of vehicles which have important applications in capacity estimation, Level of Service analysis, safety analysis, etc. Field data for study was collected using video-graphic method at different mid-block sections of multilane divided highways. Analysis of vehicle arrival, time headway and speed data of vehicles carried out to obtain the distribution patterns in mixed traffic condition. From the results concluded that Poisson distribution is best fit for vehicle arrival data. Pearson6 and Generalized Extreme Value distribution (GEV) is found to be the best fit for headway data. Gamma and Weibull distributions are also found suitable to fit time headway distribution. The results of this paper can find direct applications in developing micro-simulation models.

Keywords: *Highways, speed, time headway, vehicle arrival*

Introduction

Knowledge of distribution of the vehicle arrival pattern or inter-arrival pattern (headways) of vehicles is very essential in order to understand the general traffic flow behavior on multilane highways. The arrival pattern of vehicles at a point (or) line on roadway defines the longitudinal distribution of vehicles in a traffic stream. The distribution of arrival time of vehicles enables the traffic engineers and planners to estimate the availability and magnitude of gaps and headways in traffic stream, which are the direct measure of the density and volume on the highway. Vehicle arrival is also used as an essential input in the simulation of traffic behavior. However, most of the researchers have studied the arrival characteristics of vehicles through headway distributions.

An understanding of traffic speed characteristics is an important requirement in the field of traffic engineering. IRC: 64 (1990) defines speed as the rate of motion of individual vehicles or of a traffic stream measured in meters per second (m/s), or more generally in kilometres per hour (km/hr). Speed indicates the quality of service experienced by the traffic stream. The knowledge of speed is an essential component of traffic engineering projects related to geometric design of roads, regulation and control of traffic operations, accident analysis, before and after studies of road improvement schemes, assessing journey times, and congestion on roads and in correlating capacity with speeds. It is one of the components of the fundamental relationships of traffic flow theory other than density and volume. The speed characteristics of a traffic facility serve as an essential input in simulating the traffic behavior on that facility. Complete knowledge of speed distribution pattern on multilane highways is essential to simulate the traffic flow behavior.

Minh et al. (2005) studied motorcycle behavior in Hanoi city of Vietnam. Authors reported average headway as 1.16s for all four locations and a standard deviation of 0.65s. It was observed that 50% of two-wheelers were found to travel in interval range of 0.5-1.0 s headways. In spite of differences in the geometric parameters, traffic composition and operations, all the four locations were reported to have same mean headway. Xue et al. (2009) analyzed time-headway distributions on expressways in Beijing, Shanghai, and Guangzhou cities, China. It is found that the sections having traffic volume less than 250 vph fits negative exponential distribution to headway data. For traffic volume ranging 250 to 750 vph, data follows a sifted negative

exponential distribution. And, for traffic volume ranging 750 to 1,500 vph, the time headways can be modeled with Cowan's M3 distribution model. Lognormal distribution was found to be the best distribution in modeling time headways in a steady state car-following situation as suggested by Dey and Chandra (2009). Riccardo and Massimiliano (2012) studied the vehicular time headways on two lane two way roads in the Province of Venice and found that Inverse Weibull distribution fitted well for most of the flow rates ranges and Log Logistic, Person 5 fitted well for high flow rates. Some mixture models like Weibull + Lognormal (WLN) and Weibull + Extreme value (WEV) were also tried to model time gaps at flows of 2300 veh/h and 1900 veh/h respectively under mixed traffic, Dubey et al. (2013). Panichpapiboon (2014) concluded that GEV distribution is most effective in modelling time headways. However, the exponential distribution was found to be the least effective distribution under heavy traffic volume.

Abraham (2001) analyzed speed data on Ontario highways and recommended increase the speed limit from existing 100 kmph to 110-130 kmph and 105-110 kmph on two different highways respectively. Due to undisciplined driving behaviour, left lane reserved for passing operations was found to be utilized as a regular lane leading to almost same average speeds in both left and middle lanes. Velmurugan et al. (2002) studied the change in operating speed characteristics vehicles on rural highways, based on the outcomes of Road User Cost Study (RUCS) -1982, 1992 and 2001. The comparison of results showed that there was significant increase in speeds of all vehicle categories on roads of different widths between 1982 and 2001 and also between 1982 and 1992. Basic Desired Speed (BDS) on four-lane divided highways with paved shoulders were similar to that on two-lane bi-directional roads with paved shoulders, representing insignificant impact of geographical factors on BDS. Free speed of new technology cars was observed to be 21 to 28 % higher than that of old ones on both two and four lane highways. Dixon et al. (1999a, b), Hastim and Ramli (2013) examined speed in rural multilane highway and found that the distribution of free flow speed was found to be normally distributed. Wang et al. (2012) introduced truncated normal and lognormal distribution for modeling speeds and travel time. Zou (2013) proposed that skew-t distribution can reasonably take into account the heterogeneity in vehicle speed data. It is seen from the background study that for homogeneous traffic situation speed values can be represented by normal distribution but for mixed traffic condition there is variability in observation, also there is not such study which has identified class wise vehicular speed behavior.

Maurya et al. (2016) found that Burr distribution is representing the time headway for all density ranges whereas for speed data, Beta distribution is best fit. Roy and Saha (2018) found that Log-logistic distribution is best fit to represent the moderate traffic whereas Pearson 5 is best fit for congested traffic. Prahara and Prasetya (2018) observed that negative exponential distribution is best fit for time headway of motorcycle. Yogeshwar et al. (2018) found that vehicles having headway of 5-25 s follow the log-normal distribution whereas, headway of 15-40 s follow GEV distribution. Boora et al. (2018) used Gap instead of time headway for mix traffic and found that exponential distribution is best fit. The present paper attempts to study the vehicular arrival, time headway and speed distributions for mixed vehicular flow on multilane highways.

1. Field Investigations And Data Collection

Field data for study was collected at different mid-block sections of multilane divided intercity highways. Location of highways where data was collected are parts of National Highway (NH) exists on plain terrain with straight alignment, some sections are access control and some are partially access controlled in both the directions of travel. Details of the study sections have been given in the Table 1. Section I, Section II and Section III are located on NH 163 near Madikonda village, Bibinagar village and Ghanpur village respectively. However, these sections are differs from the type of access control. Section-I has no access control and Section-II has fully control of access whereas Section-III is partially access controlled. Section IV is NH45A (NH332, as

per new numbering) connecting Chennai to Nagapatinam, near Viluppuram district, in Tamilnadu State. Section-Vis a part of NH 58 located in between Delhi and Meerut city near Modinagar. Section VI is located on NH24 connecting Delhi and Harpur cities.Section-VII and Section-XI are located on NH 16 between Guntur and Ongole cities respectively, which is a six-lane divided intercity highway having 1.8 m paved shoulders. Section-VIII is selected from NH 8 near Delhi, which is an eight-lane divided intercity highway having 1.8 m paved shoulders. Field data were extracted manually from the video recording playing videos on big screen monitor in traffic engineering laboratory.

Table 1. Details of the study sections

Sections	Highway No.	Location	Type of highway	Type of Shoulder	Properties	Posted speed limit (Kmph)
I	NH 163	Near Madikonda (Telangana)	Four lane Divided	Paved	CW: 7.0 SW: 1.5	80
II	NH 163	Near Bibinagar (Telangana)	Four lane Divided	Paved	CW: 7.0 SW: 1.5	80
III	NH 163	Near Ghanpur (Telangana)	Four lane Divided	Paved	CW: 7.0 SW: 1.5	80
IV	NH 332	Near Vilupparam (Tamilnadu)	Four lane Divided	Paved	CW: 7.0 SW: 1.5	80
V	NH 58	Meerut (Uttar Pradesh)	Four lane Divided	Un paved	CW: 7.0	80
VI	NH 24	Delhi-Hapur (Uttar Pradesh)	Four lane Divided	Unpaved	CW: 7.0	80
VII	NH 16	Near Guntur (Andhra Pradesh)	Six lane Divided	Paved	CW: 10.5 SW: 1.8	90
VIII	NH 8	Delhi-Gurgaon (Delhi)	Eight lane Divided	Paved	CW: 14.0 SW: 1.8	120
IX	NH 16	Ongole (Andhra Pradesh)	Six lane Divided	Paved	CW: 10.5 SW: 1.8	90

*CW-Carriageway width (in meters), SW-Shoulder width (in meters)

2. Vehicle Arrival Characteristics

Poisson distribution is considered to be an appropriate distribution for describing random occurrence of discrete events like arrival pattern of vehicles. However, it was observed that mean and variance are not equal in all the cases and hence Poisson does not always give a good fit for vehicle arrival pattern. In these cases, negative binomial distribution may be more suitable.

2.1. Analysis of Vehicle Arrival Pattern

Vehicle arrival data collected at two different mid-block sections of multilane highway was extracted in the laboratory. Time interval of extraction of data was chosen as 20s. The frequency tables were prepared as per the observed number of arrivals in a time interval of 20s for more than one hour of observation. These frequency tables were used to evaluate values of mean and variance of vehicle arrival rate. Then statistical analysis of data was performed. The statistical distributions are analysed to fit the observed vehicle arrival data on highway locations. Chi-square test of goodness of fit was applied for testing the hypothesis. Table 2 gives the data for fitting of Poisson distribution to vehicle arrival at Section-I. The calculated value of chi-square is obtained as 9.83, which found to be less than the tabulated value of Chi-Square as 12.59 obtained (at 6 degrees of freedom) at 5% level of significance. Hence, the null hypothesis (H_0) is accepted stating that the observed arrival pattern follows Poisson distribution on Section-I. Figure 1 shows the histogram of vehicles arrival pattern at Section-I. Similarly, Poisson distribution was also tried with the data obtained at other section. Figure 2 show the histogram of vehicle arrivals at Section-V.

Table 2. Fitting of Poisson distribution to arrival data at Section-I

Number of vehicles in 20 sec interval (x)	Observed frequency (O_f)	($x \times O_f$)	($(x-\mu)^2 \times O_f$)	Estimated frequency by Poisson distribution (E_f)	E_f (after Pooling)	O_f (after Pooling)	$\chi^2 = ((O_f - E_f)^2 / E_f)$
0	3	0	52.78	3	--	--	--
1	14	14	142.86	11	14	17	0.64
2	24	48	115.57	24	24	24	0.00
3	39	117	55.64	33	33	39	1.09
4	23	92	0.87	35	35	23	4.11
5	33	165	21.41	30	30	33	0.30
6	16	96	52.16	21	21	16	1.19
7	13	91	102.32	13	13	13	0.00
8	8	64	115.86	6	10	15	2.50
9	3	27	69.28	3	--	--	--
10	3	30	101.11	1	--	--	--
11	1	11	46.32	0	--	--	--
	180	755	876.19	180			9.83

Null hypothesis H_0: Arrival pattern observed at Section-I follow Poisson distribution.
Alternative hypothesis H_1: Arrival pattern observed at Section-I do not follow Poisson distribution.

Mean rate of arrival (μ)= $\frac{\sum(x * o_f)}{\sum o_f}$ =4.194 sec

Variance of arrivals (σ^2) from mean= $\frac{\sum((x-\mu)^2 * o_f}{\sum o_f - 1}$ = 4.895 sec

Degree of Freedom (υ) = 8-2 = 6
At, υ = 6 and α = 5% χ^2(tabulated)= 12.59
χ^2(calculated)< χ^2(tabulated)
Hence, null hypothesis H_0 is accepted.

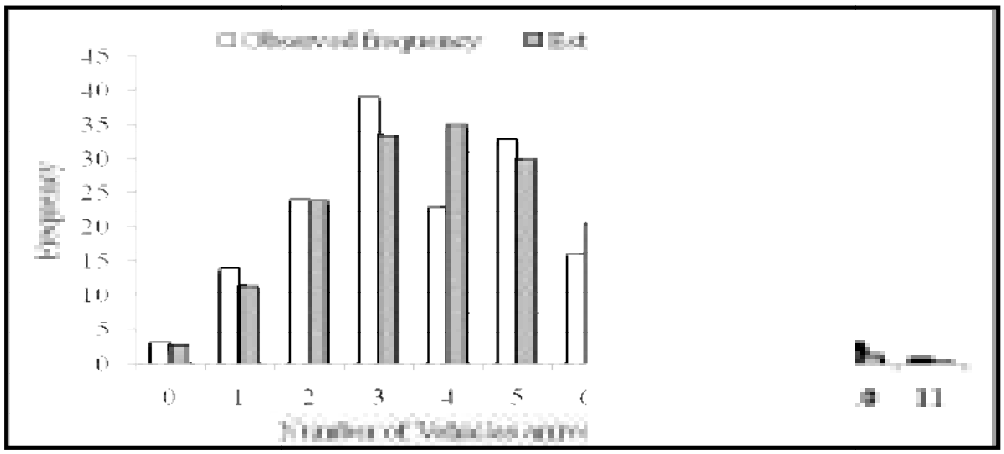

Figure 1. Comparison of histograms of vehicle arrivals at Section-I

Null hypothesis H0: The arrival pattern at Section-V follows Poisson distribution.
Alternative hypothesis H1: The arrival pattern at Section-V does not follow Poisson distribution

Mean rate of arrival (μ)= $\frac{\sum(x * o_f)}{\sum o_f}$ = 9.90 sec

Variance of arrivals (σ^2) from mean = $\frac{\sum((x-\mu)^2 * o_f}{\sum o_f - 1}$ = 13.65 sec

Degree of Freedom (υ) = 12-2 = 10
At, υ = 10 and α = 5% χ^2(tabulated) = 18.31
χ^2(calculated)< χ^2(tabulated)
Therefore, null hypothesis H0 is accepted.

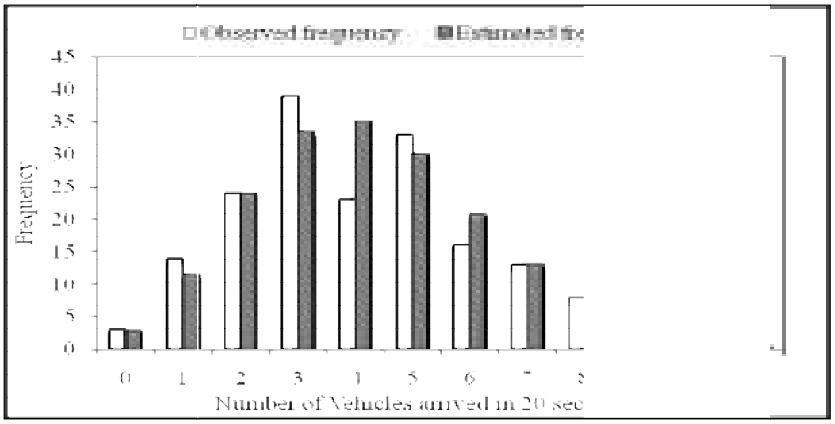

Figure 2. Comparison of histograms of vehicle arrivals at section-V

3. Time Headway Characteristics

The time headway data of each vehicle observed in recorded videos were extracted in 20 sec. interval. The descriptive analysis was performed with extracted data to understand its basic characteristics. The parameters those describe the basic characteristics such as mean and variance of data are given in the Table 3 for Section-I, Section-V and Section-VII respectively.

Table 3. Descriptive parameters of time headway data

	Section-I	Section-V	Section-VII
Mean (sec)	4.48	2.41	2.98
Median (sec)	3.71	1.71	2.21
Standard deviation (sec)	3.31	2.09	2.49
Sample size (N)	590	1400	1100

It is known that the time headway of vehicles is affected by the traffic volume observed on highway section. It has also been observed that the mean time headways, median values and standard deviation found to be decreased with increase in traffic volume ranges. The decreasing trend clearly indicates that the proportion of free-flowing vehicles is lesser in high volume a range which is resulted in smaller time headways. However, in all cases the median values of time headways are found to be smaller than the mean, infers more than 50% of drivers chose time headways lesser than their mean values

Table 4. Average time headway (sec) of vehicle types

Vehicle Type	Section-I	Section-V	Section-VII
CS	3.96	1.83	2.69
CB	4.04	1.73	2.72
LCV	4.10	1.83	2.78
HV	4.16	2.17	2.76
MAV	4.66	3.63	2.77
TW	4.48	2.07	2.68
3W	4.43	1.64	2.76
B	4.58	2.64	2.72

In order to fit different probability distribution functions to the time headway data, 5% of long time headways may be neglected and statistical results for different flow levels will be evaluated by considering 95% time headway values. In the present study, goodness of fit for each probability density function is tested by performing Kolmogorov-Smirnov (K-S) test at 5% significance level. The results of time headway distributions analysis for different study sections based on K-S test are given in Table 5.

Table 5. Estimated parameters of the best fitted distributions for Time headway data at different study sections

Sections	Best fit	Parameters	K-S Test Value	K-S Test Critical Value
I	Pearson6	α_1=1.53 α_2=89.8 β=26158.0	0.04166	0.05581
	Gamma	α=1.46 β=3.057	0.04429	
	Weibull	α=1.1238 β=5.0426	0.04470	
V	GEV	k=0.258 σ=1.096 μ=1.402	0.03587	0.03618
VII	GEV	k=0.159 σ=1.59 μ=1.76	0.03495	0.04096

From Table 5, it is observed that Pearson6 is found to be the best fit for headway data on Section-I whereas, GEV distribution is fitted best to the time headway data observed on Section-V and Section-VII. In addition, Gamma and Weibull distributions are also found suitable to fit time headway distribution at Section-I.

4. Speed Characteristics

Speed of vehicles on a traffic facility is expected to follow a normal distribution. Under the set of circumstances, where a normal distribution fails to provides a better fit to the speed data, gamma distribution or lognormal distribution are also used. Many researchers claim that the speed data on a section of highway follow the normal or gamma or log normal distribution.

For present study, the profiles of observed speed frequencies were developed and compared them with the above stated distributions for all the study sections. Chi-square test, K-S test and Anderson Darling test were applied at 5% level of significance and test of hypothesis was performed. The results from the goodness of fit tests conducted on speed data are summarized in Table 6

Table 6. Goodness of fit tests of the fitted distributions for different study sections

Distribution	Goodness of fit	Section I	Section II	Section III	Section IV	Section V	Section VI	Section VII	Section VIII
Normal	Chi-squared test	Not follow	Not follow	Not follow	Not follow	Follow	Not follow	Not follow	Not follow
	K -S test	Not follow	Not follow	Not follow	Not Follow	Follow	Follow	Not follow	Follow
	Anderson Darling test	Not follow	Not follow	Not follow	Not Follow	Follow	Follow	Not follow	Follow
Log-Normal	Chi-squared test	Not follow	Not follow	Follow	Not follow	Not follow	Follow	Not follow	Not follow
	K -S test	Follow	Not follow	Follow	Not Follow	Not Follow	Follow	Follow	Not follow
	Anderson Darling test	Follow	Not follow	Follow	Not follow	Not follow	Follow	Follow	Not follow
Gamma	Chi-squared test	Not follow	Not follow	Follow	Not follow	Follow	Follow	Not follow	Not follow
	K- S test	Not follow	Not follow	Follow	Not follow	Follow	Follow	Not follow	Not follow
	Anderson Darling test	Not follow	Not follow	Follow	Not follow	Not Follow	Follow	Not follow	Not follow

It is confirmed by the results obtained from different tests of goodness of fit that the observed speed frequencies at Section-I, Section-III, Section-VI and Section-VII follows lognormal distribution and at Section-V, Section-VI and Section-VIII it follows normal distribution. Moreover, the speed frequencies are observed to be followed gamma distribution at Section-III, Section-V and Section-VI. However, Speed data collected at Section-II and Section-VI does not follow any of these three distribution types.

Table 7 presents stated probabilistic distributions fitted to the speed data along with their estimated parameters. The results obtained from the various tests conducted to confirm the goodness of fit are also given in this table.

Table 7. Estimated parameters of the fitted distributions for speed data at different study sections

Section	Distribution	Parameters	K-S Test Value	Critical K-S Test Value
I	Log-Normal	σ=0.28418 μ=3.8661	0.02883	0.03223
III	Log-Normal	σ=0.28477 μ=3.8853	0.02512	0.04519
	Gamma	α=12.773 β=3.9654	0.0327	
V	Normal	σ=13.316 μ=63.266	0.07281	0.03123
	Gamma	α=22.572 β=2.8028	0.02633	
VI	Normal	σ=12.146 μ=50.818	0.01897	0.1182
	Log-Normal	σ=0.24165 μ=3.8995	0.08143	
	Gamma	α=17.505 β=2.903	0.07793	
VII	Log-Normal	σ=0.253 μ=4.1303	0.03101	0.03736
VIII	Normal	σ=14.616 μ=77.989	0.03441	0.03714

Conclusions

On the basis of Vehicle arrival, time headway and speed data collected from multilane highways were analyzed. Further, analysis of the collected field data was also conducted to obtain the distribution patterns for the entire traffic stream. Following conclusions are drawn from the study

1 From the Chi-square test as goodness of fit, observed arrival pattern follows Poisson distribution at Section-I and Section-V.
2 Pearson6 distribution is found to be the best fit for headway data on Section-I whereas, GEV distribution is fitted best to the time headway data observed on Section-V and Section-VII. In addition, Gamma and Weibull distributions are also found suitable to fit time headway distribution at Section-I.
3 From the K-S test as goodness of fit, the observed speed frequencies at Section-I, Section-III, Section-VI and Section-VII follows lognormal distribution and at Section-V, Section-VI and Section-VIII it follows normal distribution. Moreover, the speed frequencies are observed to be followed gamma distribution at Section-III, Section-V and Section-VI. However, Speed data collected at Section-II and Section-VI does not follow any of these three distribution types.

The results of this study can be used in various traffic applications namely geometric design, capacity estimation, safety analysis and level of service analysis. The findings of this paper can also be directly used as an input in developing micro-simulation models.

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LABORATORY EVALUATION OF PERFORMANCE AND USE OF NYLON FIBERS IN CC PAVEMENTS

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ABSTRACT

In this project we will be dealing on nylon fibre reinforced concrete added to the total weight of total volume of concrete. This work deals with laboratory study of nylon fiber concrete using M25 grade. The nylon fibre are has many applications like strength, durability, tensile strength but its disposal pose a serious threat in environment. In this study, nylon fibre with varying amount are added in concrete and effects on tensile strength and compressive strength is reported. Nylon is used in different percentage from 0.5 to 1.5% by weight in total volume of concrete. After adding certain properties like compressive strength and flexural strength will be studied.

Keywords: *Concrete, Compressive Strength, Flexural Strength, Nylon Fiber, Workability.*

1. Introduction

Concrete is one of the most commonly used construction material at present in world most of structures are constructed by using concrete. The main reason behind this is because of high strength, durability and workability. The total world consumption of concrete per year is about two ton for every living human being. Due to privatization and globalization in modern era the construction of important infrastructure projects like Highways, Airports, Bridges, Dams and any other manmade structures etc. in India is increasing year after year. Due to developmental activities consume large quantity of natural resources. This leads depletion of natural resources.

In view of this, many researchers have started searching for suitable alternative materials used in concrete either as an additive or partial replacement to the conventional concrete By using the additives and partial replacement of these materials could be save natural resources some extent and its available for future generation. In this process, different industrial waste materials such as rice husk, Fly ash, GGBS, Quarry Dust, Textile waste, Tiles , Brick waste, Broken glass, Fibre like nylon fibers etc. have been tried as a viable substitute material to the conventional materials in concrete.

Fiber-reinforced concrete (FRC) is concrete containing fibrous material which increases its structural integrity. It contains short discrete fibers that are uniformly distributed and randomly oriented. Its consisting of cement, sand, coarse aggre gat, water and fibers.

In this concrete short discrete fibers are randomly distributed throughout the concrete.

Extensive research work has carried out on fibres used in concrete various types of fibers like steel, glass, synthetic, and carbon, in plain concrete improves strength, toughness, ductility, post-cracking resistance, etc.

At early age, Reduction in crack width and spacing is possible. Its possess a high tensile strength and a high elastic modulus are available at relatively low costs.

History of FRC

The use of fibers as reinforcement is not a new concept. Fibers have been used as reinforcement since ancient times. Historically, horsehair was used in mortar and straw in mud bricks. In the 1900s, asbestos fibers were used in concrete. In the 1950s, the concept of composite materials came into being and fiber-reinforced concrete was one of the topics of interest. Once the health risks associated with asbestos were discovered, there was a need to find a replacement for the substance in concrete and other building materials. By the 1960s, steel, glass (GFRC), and synthetic (such as polypropylene) fibers were used in concrete.

Objective

1. To Determine the Physical properties of Fine aggregates and coarse aggregates for making concrete.
2. For design mix of cement concrete proportions by M25 grade of concrete with OPC 53 grade of cement.
3. To find the compressive strength and flexural strength of conventional concrete and nylon fibre induced concrete.
4. To assess the effect on concrete by using nylon fibre as in concrete and to find the compressive and tensile properties of concrete.

2. Materials Properties

The following materials used

1.1. Cement
1.2. Coarse aggregate
1.3. Fine aggregate
1.4. Water
1.5. Nylon fiber

2.1 Cement

Locally available Ordinary portland cement (OPC) of 53grade has been used physical properties are mentioned in table 1

Figure 1 Cement

2.2 Coarse Aggregate

Coarse aggregates are collected from Yelhankaand size of 20mm stone are used in this project. The properties of coarse aggregate are tabulated below in table 2

Figure 2 Coarse Aggregate

2.3 Fine Aggregate

Locally available M-sand was used for this project. M-sand various properties are tabulated in table 3.

Figure 3: M -sand

2.4 Water

Water cement ratio (W/C) of 0.5 was in preparing concrete. Portable water was used for both mixing and curing process.

2.5 Nylon Fiber

Nylon is a thermoplastic silky material, generally made from petroleum, that can be melt-processed into fibers, films, or shapes. Nylon polymers can be mixed with a wide variety of additives to achieve many different property variations. Nylon polymers have found significant commercial applications in fabric and fibers and in films. Its properties are tabulated in table 4.

Figure 3: Nylon fiber

Work Flow Chart

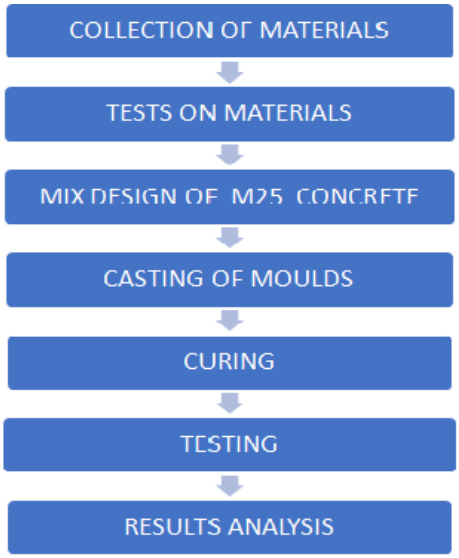

Table 1 Properties of Cement

Sl. No	Tests	Obtained Value	Standard Value
1	Initial and final setting time	75 min 600 min	>45 min Not more than 600 min
2	Specific gravity	3.06	3.1-3.15
3	Normal consistancy	32%	25-35%

Table 2 Properties of Coarse Aggregate

Sl. No	Tests	Obtained Values	IS Standard
1	Crushing strength	21.5%	<30%
2	Impact	24.42%	<30%
3	Specific gravity	2.85	2.5-3.2
4	Flakiness and elongation	13.78 & 9.55	Limited by 15% by weigth

Table 3 Properties of Fine Aggregate

Sl No	Tests	Obtained Values	IS Standards
1	Specific gravity	2.561	2.59
2	Water obsorpption	0.20%	0.1-2.5%

Table 4 Properties of Nylon Fiber

Sl No	Particulars	Properties
1	Elasticity	Breaking extension is 20-40%
2	Stiffness	20-40 gm/den
3	Moisture regain	3.5 - 5.0%
4	Specific gravity	1.14
5	Abrasion resistance	Excellent

3. Experimental Methodology

Mix design of M25 grade concrete is proportioned as per IRC : 10262-2019.With water cement ratio 0.5 are used for both conventional concrete and concrete with nylon fibres. Table 5 shows the details of mix

Table 5 Mix Proportion

Sl. No	Materials as Per (IS 456-2000)	Calculated Value (IS 10262-2019)
1	Cement	395 kg/m^3
2	Coarse aggregate	1086 kg/m^3
3	Fine aggregate	626 kg/m^3
4	Water	0.5 w/c ratio

Ordinary Portland cement (OPC 53 GRADE),Good stone aggregate and M-sand was used as coarse aggregate and fine aggregate. For this study cubes (150×150×150mm) and beam (100×100×500mm) were casted using Nylon fiber (0.5%,1.0%,1.5%) .Then further tested are conducted such as workability then it will be casted.

4. Curing of Concrete

Casting of concrete after the completion of 24 hours mould will be removed then cured by using portable water. The specimen is fully immersed in portable water for specific age 7,14, 28, days. After the completion of curing it will be tested.

5. Testing on Hardened Concrete

1. Compressive strength test
2. Flexural strength test

6. Results and Discussion

1. Compression Test

The compressive strength is determined by dividing the maximum of failure load of the specimen during the test by the cross sectional area of the specimen. The normal concrete and the percentage of nylon fiber induced concrete are crushed at different days (7, 14, 28 days) are show in table 6 & graph details. Compressive strength = P/A (N/mm²)

Table 6 Compression Strength Test

Mix	Compressive Strength (7 Days) N/mm^2	Compressive Strength (14 Days) N/mm^2	Compressive Strength (28 Days) N/mm^2
0%	16.44 17.3316.83 16.88	20.00 19.1119.70 20.20	24.88 24.4424.44 24.00
0.5%	18.22 18.66 } 18.36 18.22	21.33 20.88 } 21.18 21.33	27.11 26.66 } 26.96 27.11
1.0%	20.00 18.22 } 19.40 20.00	24.44 22.2223.33 23.11	31.11 31.50 } 31.24 31.11
1.5%	17.77 18.22 } 17.92 17.77	22.22 21.77 } 22.07 22.22	29.77 30.66 } 29.92 29.33

Figure 1: Compressive Testing Machine

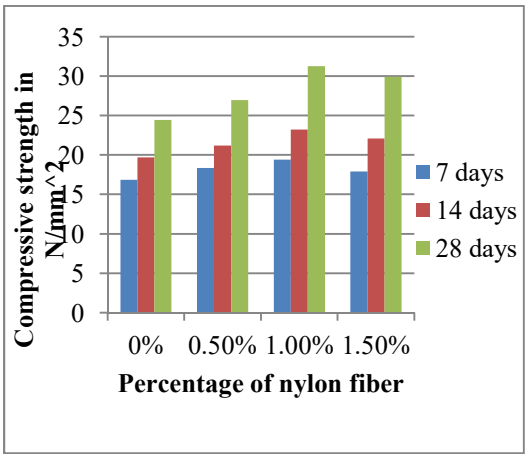

Chart 1 Compressive Strength

2. Flexural Test

The flexural strength is stress at failure in bending. Flexural strength ,also know as modulus of rupture, or bend strength, or transverse rupture is a materials property , defined as the stress in material just before it yields flexural test. Values are tabulated in table 7 & graph.

Flexural strength = Pl/bd^2 (N/mm²)

MIX	Flexural strength (7 days) N/mm^2	Flexural strength (14 days) N/mm^2	Flexural strength (28 days) N/mm^2
0%	6.82 6.94 } 6.92 7.0	7.32 6.98 } 7.16 7.18	7.74 7.80 } 7.78 7.82
0.5%	7.78 7.88 } 8.02 8.42	8.70 8.54 } 8.62 8.62	9.18 9.22 } 9.11 8.94
1.0%	9.46 9.36 } 9.41 9.42	9.78 9.62 } 9.73 9.80	10.20 10.14 } 10.14 10.10
1.5%	9.00 8.98 } 8.95 8.88	9.40 9.48 } 9.19 8.70	9.22 9.38 } 9.36 9.50

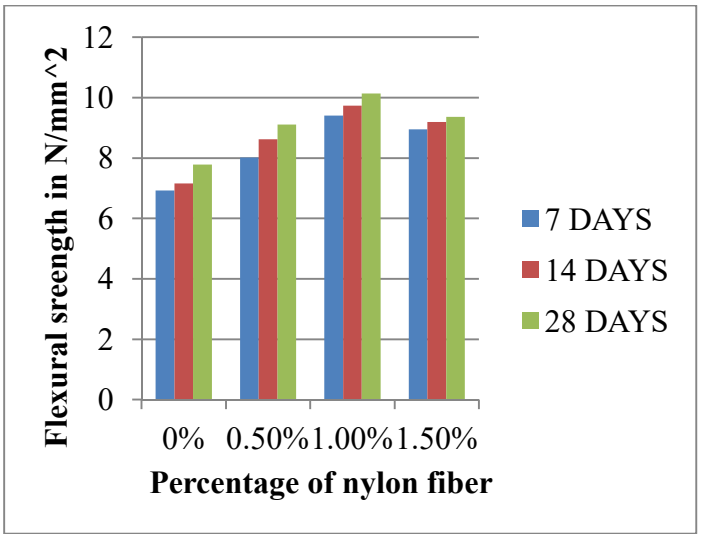

Chart 2 Flexural Strength

7. Conclusion

1. The following conclusion can be drawn from the results obtained from the experimental investigation
2. The specimen cast with 1.0% of nylon fiber to the total volume of concrete gives better compressive strength of 31.24 N/mm2when compared to normal concrete and 1.5% of nylon fiber concrete shows decrease in strength 29.92N/mm2.
3. The specimen cast with 1.0% of nylon fiber to the total volume of concrete gives better flexural strength of 10.14 N/mm^2 when compared to normal concrete and 1.5% of nylon fiber concrete shows decrease in strength 9.36 N/mm^2

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LOW-COST AUTOMATIC IRRIGATION SYSTEM USING SOIL MOISTURE SENSORS

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ABSTRACT

This paper contributes the implanted scheme for automatic irrigation system with GSM module grounded on solar power using soil moisture sensors. To lessen the energy crisis problem for irrigation system, solar energy is the one good means to use. The battery used, stores the electrical energy which is acknowledged from the photovoltaic cell. The solar pane captivates the solar energy and alters the solar energy into electrical energy. For apposite supervision of irrigation system, automatic irrigation system can be proficiently used. To get wholesome production of yields and to upsurge the lushness of the field, appropriate irrigation is essential. Advanced management of water throughout plant growth is vital to escalate the value of the crops. Soil damp sensor ascertains the moistness of soil. If the moistness is low then the motor is turned ON impulsively and whenever the moisture content is elevated, then the motor is turned OFF. Whenever the pump is ON or OFF, the statistics is sent to the agrarian on registered number. This is accomplished by using GSM unit. The benefit of this approach is the agronomic land is constantly aided by water supply to the crops and eases the labour cost.

Keywords: *Automatic Irrigation System, GSM Module, Photovoltaic Cell, Pump, Soil Moisture Sensor*

Introduction

The main goal of this project is to irrigate automatically using microcontroller for crops. We can irrigate the land automatically when we are able to irrigate the land manually due to some vacations or any other works. If we tell someone to irrigate the land, then they may over water or under water the crops and this may cause the damage to the crop. In India we have several equipment's which water the plants in timer based on intervals. None of these equipment's detect the soil moisture content in the agricultural field. It is very important to know the moisture content of the soil. The objective is that artificial irrigation of crops in the fields. For growing crops in agricultural fields, the invigilation is very important, and this is achieved by the automatic irrigation system. It can also overlook the crops whenever the land is in dry condition or in insufficient rainfall. Agriculture play an important role in development of any country. Due to lack of knowledge and due to scarcity of water supply, most of the lands which are cultivated lands are not used properly. When rainfall is less then for water supply the farmer should pay the amount which in turn increases the production cost. During the low selling time in the markets the farmer with increased cost production gets less or zero income. Due to over flooding or due to over watering it reduces the production rate of crops and affects the fertility of the land. To overcome all these complications a solar based automatic irrigation system using soil moisture sensors can be used. This system reduces the overflow and dying of crops by timely watering the agricultural land. The demand for the fossil fuels is largely increasing in the present days. Nowadays scarcity of electricity is seen in any rural areas. Therefore, use of renewable energy (solar energy) helps the farmers in irrigating the lands in correct time without any load shedding.

Soil moisture sensor which is placed in the field senses the moisture in the soil in this solar based automatic irrigation system. The soil resistivity or volumetric moisture measurement is done by soil moisture sensor. If the water content is less in the soil this system helps in pumping the water to the soil by turning on the motor. For every operation of turning on and turning off the motor the user will get the information via SMS, this operation is performed by the GSM module placed in the system.

Objectives

- To find out the moisture content of different types of soils.

- To develop a sensor to detect the moisture content of different types of soils.
- To execute the fully automatic system by using sensors for better irrigation.
- To manage the automatic water supply for proper cultivation of plants.
- To provide electricity through photo voltaic panels and to store the electricity in batteries.

Method

An Arduino UNO microcontroller in automatic irrigation system is programmed in such a way that it sends the signal to the motor-by-motor circuit. The soil moisture sensor senses the moisture content in the soil which is connected to the A0 pin in the microcontroller board. The Arduino give the signal to the pump to turn ON, whenever the moisture content of the soil goes down and it also gives the signal whenever the moisture content is high, then to turn OFF the motor. Whenever the motor goes turn ON or OFF the user or farmer will receive the SMS for his registered mobile number.

The components in the circuit are a microcontroller (Arduino), a soil moisture sensor, photo voltaic cell, a GSM module, a relay, A water pump. The entire system is powered by the solar energy.

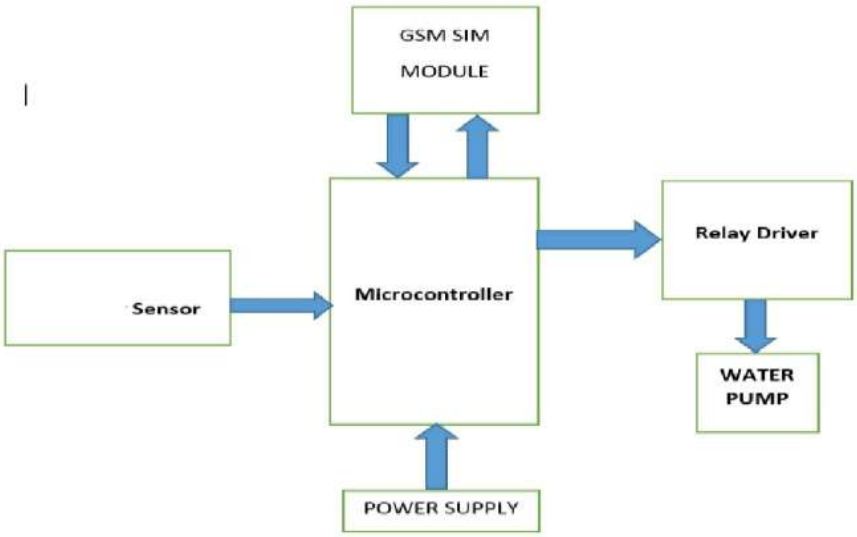

Figure 1 Block Diagram of Automatic Irrigation System

Figure 1 represents the main blocks of this system. The entire system of operation is monitored by the controller which is as mentioned above. The above system consists of blocks namely GSM module, sensor, relay, pump, power supply. The moisture sensor senses the moisture content of the soil in the field and sends to the controller. The controller receives the data and checks the value. If the sent value has reached the desired value, then the controller will monitor the system as it is programmed. To send the message to the user a GSM block is used. The power supply is from the renewable energy to perform the entire operation. The pump block is the motor to pump the water to the plants. To connect Arduino and motor a relay module is used. The programming language of Arduino UNO is simple C language. In this prototype we use Arduino UNO as microcontroller which user friendly.

Description of Materials

- Arduino UNO
- GSM module
- Soil Moisture sensor
- Relay
- Solar panel
- Battery
- Connecting wires
- LCD panel

1. Arduino UNO

Based on Atmel ATmega328 an Arduino is microcontroller. It consists of 14 pin input/outputs (out of these 14 pins 6 can be used as PWM outputs), 16 MHz resonance ceramics, 6 analog inputs, USB connector (to connect to laptop or PC), an ICSP, a reset button, and a power connector. This board has everything to support the microcontroller operations. We can connect the microcontroller

by using USB cable to the computer. It uses the ATmega16U2 rather than the FTDL USB serial chip.

All Arduino need to connect to the power supply. An Arduino UNO can be power sourced by either USB cable from computer or a wall supply. The code can be loaded by USB connection. To construct the circuit the connecting wires are placed at the pins of Arduino. The pins usually have black plastic headers which allows the wires to plug in the pins of controller.The pins usually have black plastic headers which allows the wires to plug in the pins of controller. The pins in the Arduino board are placed where we connect the wires to construct the circuit. Arduino has several pins in the board which are labelled and are used for different functions. GND pin is for "Short for Ground". There are several GND pins in the microcontroller board, for the ground of the circuit any one can be used among these many pins. Another pin is 5V and 3.3V pin. This supplies the power of about 5 volts and 3.3 volts, all the Arduino boards can satisfactorily run in these power supply. Analog Pin. The area of pins under the "Analog In" label are Analog In pins in Arduinoboard.

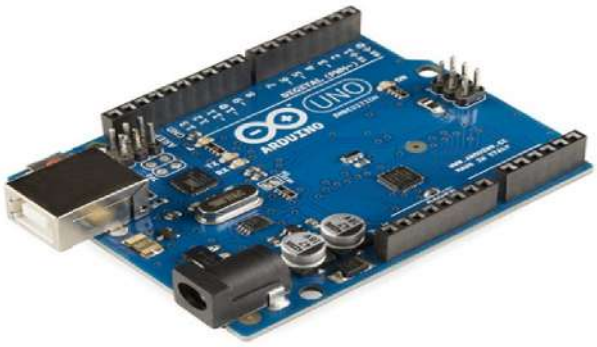

Figure 2 Arduino Board

2. GSM Module

GSM ellipsis Global System for Mobile Infrastructures.This is a set of ideals advanced by the European Telecommunications Standards Institute (ETSI) to designate etiquettes for next generation digital cellular networks (2G) used by mobile. A modem is a device that modulates and demodulates the signals as needed to meet the message necessities.Demodulates the data transmitted to decode said carrier signal and Modulates an analog carrier signal to encode digital information. GSM is device that modulates and demodulates signals and GSM in this case is 2G. We are a three based GSM modem so that it can operate at three different frequencies. EGSM and DCS 900MHz 1800MHz are the operating frequencies. GSM became such important thing in the world as there is no GSM, there is no place for the model. Using GSM, we can control the system on our fingertips from anywhere. When a SIM card is inserted and connected to the PC it uses SIM300 for sending the messages to the user. By using a COM port, it can send the SMS to the user. These commands are called AT commands. AT command helps in sending the SMS or MMS to the user. The RS232 interface can be used in this SIM300 to communicate with the computer. The Sim300 generally require 9600 baud, 1 bit shop, no parity, 8 Data bit and no hardware control. Many developments of this plates have been made due to its vast development strategy. These developed plates have special features to communicate with the SIM300. Some motherboards include RS232 and some include TTL interface and some include USB interface. RS232 interface includes MAX232 IC to communicate with the PC while TTL interface allows to interface directly with the microcontroller.

Figure 3 GSM Module

3. Soil Moisture Sensor

Soil Moisture content can be determined by direct (soil sampling) and indirect methods (soil moisture sensing), direct method of determining the moisture is not used for irrigation purpose due to labour requirement and it cannot provide much accuracy. To provide repeated moisture content in the agricultural field soil moisture probes can be permanently installed in the lands. Many devices require close contact with the soil so extra care should be taken in the coarse soil to achieve the results. All the available sensors in nowadays are of dielectric in nature. Many sensors estimate the soil permittivity bulk that determine the electromagnetic wave or pulse in the soil sample. In composite material the permittivity is measured by the contribution of each material permittivity in the soil. The sensors used are based on dielectric principle. Some examples of dielectric sensors are FDR, capacitance, time domain reflectometry, time domain transmission, ADR and phase transmission are important in terms of calibration, cost, and maintenance. Information of degree of soil moisture helps in forecasting of the risk of floods, or fog. The expression of mass or volume of water in the soil is the soil moisture content. To help the farmer for proper managing of irrigation system measuring of moisture content is important. To solve this soil moisture sensor is useful. This sensor gives the moisture content of soil. This sensor uses capacitance to measure the water content. By simply inserting this sensor into soil we can get volumetric moisture content of the soil.

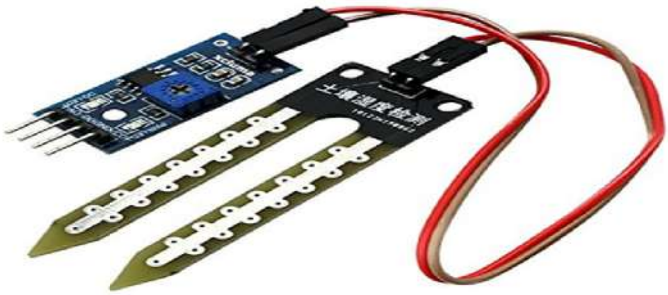

Figure 4 Soil Moisture Sensor

4. Relay

A relay is an electrically operated switch. Most of the relays use electromagnet to operate switch mechanically. When several circuits are controlled by only one signal then relay is used. In this project the relay used to control the operation of pump. They are also used to connect low voltage circuit to a high voltage circuit. A relay switch can be divided into two parts: input and output. Input has a generating coil magnet field when small voltage is applied. This voltage is known as operating voltage.

Figure 5 Relay

5. Battery

Lead Acid battery is used in this project and the rating of the battery is 12v and 7.2 AH. The main use of this battery is to store the Dc supply from the photo voltaic panels. These batteries are also known as SLA batteries. They have wide range of uses in many fields. They are commonly used of back up purpose..

Figure 6 Battery

6. Solar Panel

Photovoltaic cells are photovoltaic array of a plant that supplies and generates the solar electricity in commercial and residential uses. Photo voltaic cells are made up of silicon which acts as semiconductors. A certain portion of absorption takes place by semiconductor when light strikes on it. The electrical connections are made in series to obtain the desired voltage or they are connected in parallel to provide desired current capability of the sola panel.

Figure 7 Solar Panel or Photo Voltaic Cell

7. LCD Panel

Liquid Cristal Display are the flat panels which gives the electronic visual show that makes use of light modulating properties. This LCD panel basically consists of 16 character by 2-line display. A very common type of LCD panel is 16x2 LCD panel. In this project same panel is used to make a prototype.

Figure 8 LCD Panel

8. Water Pump

The water pump is used to supply the water to the plants. It can be connected to the microcontroller and can electronically controlled. Here we used small water pump to make a water supply. The water pump basically runs on solar power which is directly coming from the solar panel or from the stored power in the batteries.

Figure 9 Water Pump

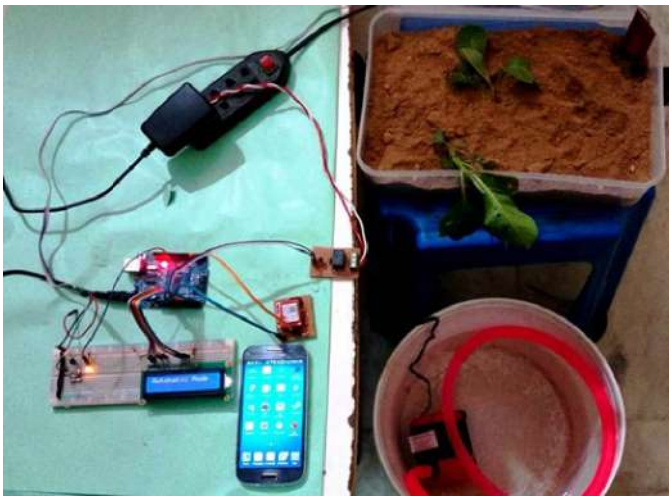

Figure 10 A Designed Prototype of Automatic Irrigation System Using Soil Moisture Sensor

Results and Discussion

The following outputs are obtained after successful implementation of software and hardware components.

- There will be no connection between the electrodes and an endless resistance will occur between the two electrodes when the soil moisture value is zero.
- This makes the relay ON.
- By this the Arduino sends the output to the motor.
- This will result in turning ON the pump.

Figure 11 At the Stage When Motor is ON

- Whenever the sufficient moisture present in the soil then the sensors also will have the sufficient moisture between the electrodes.
- In this condition there will be a complete connection between the electrodes.
- Then the relay gets switched OFF.
- The Arduino sends output to the motor circuit.
- This makes the motor to turn OFF by itself

Figure 12 At the Stage when Motor is OFF

Conclusion and Fure Scope

There are various benefits by implementing the above system:

- We can control the flow of water and reduce the wastage of water by continuously monitoring the status of soil moisture.
- Since the system is automatic, hence farmers do not need to continuous manual monitoring.
- The system is highly versatile, low cost.
- It is considered as low power consumption as it is powered by solar energy.
- This helps in over irrigation, under irrigation, reduces wastage of water and topsoil erosion.
- The systems action can be changed according to the situation. For example, rainy season the requirement of water is less than that in summer and depends on type of soil.
- The system not only provides benefits to the agricultural fields but also can be used in horticultural lands, parks, gardens, golf courses.
- By implementing more sensors, the project can be made more versatile.

- The accuracy of moisture content measurement can be increased by adding more sensors.
- This system works on solar power (DC power), it can be made to operate through two-way power supply and in AC power.
- Such that the motors can operate in AC power and during load shedding the motors take the input from the solar panel or energy stored in batteries.
- For supervision of large fields this system is useful.

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DEVELOPMENT OF THE INFORMATION SYSTEM FOR THE ENGLISH-RUSSIAN DICTIONARY OF EUPHEMISMS

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ABSTRACT

Popular electronic dictionaries, both online and offline, do not describe completely enough such an important part of vocabulary like euphemisms. A reader and especially an interpreter need some specific linguistic and extralinguistic information to uncover the real meaning hidden under the euphemism. The computerized information system has been developed to meet this requirement. The system contains the complete set of data about euphemisms including their key words, contexts, the persons who use them, the descriptions of the real objects and so on. The system has friendly user interface providing user with all necessary options for input, output, search, filtering and updating of the information about euphemisms. The system has been applied for creation of electronic English-Russian dictionary of political euphemisms, but the structure of its database and algorithms of data processing allows using the system for any other language and creating multilingual dictionary.

Keywords: *electronic dictionary, euphemism, political vocabulary*

1. Introduction

Political discourse is an essential element of modern politics. By political discourse we mean the speech activity, the subject of which is the political sphere of life (political views, interests, events, etc.), which is aimed at forming a political picture of the world in the minds of people and is used to control their political activity. The pragmatic focus of political discourse on the expression and promotion of the political interests of politicians and parties, whose interests often contradict the objective needs and aspirations of the people, forces the participants in political discourse to hide their true interests using various means of linguistic disguise.

One of the most common methods of hiding the unpleasant and ugly sides of politics in discourse is the use of euphemisms - words and expressions that soften and distort the meaning of the message, soften the negative assessment of unpleasant sides of reality or even change it to a positive one. Thus, a special group of euphemisms can be distinguished: political euphemisms – words and expressions used instead of unwanted words and expressions in order to hide the unpleasant sides of political reality by softening and distorting the meaning of the described phenomenon [1].

As an example of euphemisms used in political discourse, one can list the replacements of the word "war" with the expressions "armed conflict", "the use of force", "counter-terrorist operation", "peacekeeping mission", "restoration of law and order", etc.

The most important issue in the analysis of euphemistic substitutions of words and expressions is the preservation or distortion of the content of the information transmitted in the discourse. The euphemism can just soften the expression (like "armed conflict" instead of "war"), but it also can contain wider meaning (like "the use of force") or narrower meaning (like "counter-terrorist operation"), it can be only partially true (like "peacekeeping mission") or completely false (like "restoration of law and order"). Subsequently all political euphemisms can be classified into 5 types according to the relation between the meaning of direct name of the subject and the meaning of its euphemistic nomination. These 5 types of nomination are [2]:

- adequate nomination;
- broad nomination;
- narrow nomination;
- inaccurate nomination;
- false nomination.

These various distortions of information in the process of euphemizing significantly complicate the translator's identification of the true meaning of messages and the selection of equivalents in the translating language. Both bilingual and explanatory dictionaries do not always help the translator in solving this

problem. Euphemistic vocabulary is highly variable. As soon as a euphemism becomes widespread and its hidden meaning becomes generally known, it loses the properties of a euphemism and turns into another synonym for a direct nominate with a whole range of inherent meanings. And there is a need to find a new euphemistic replacement.

Specialized dictionaries of euphemisms are extremely small in number. Worth noting are Holder R.W. Dictionary of Euphemisms [3], Rawson H. Dictionary of Euphemisms and Other Doubletalk [4] and Neaman J.S., Silver C.G. Kind words: a thesaurus of euphemisms [5], in English. "Dictionary of Russian euphemisms" by E.P. Senichkina [6] in Russian. These dictionaries are explanatory, but bilingual dictionaries of euphemisms were not found. The main reason for the scarcity of vocabulary resources is, apparently, the very high variability of euphemisms, especially in political discourse. The volatility of euphemisms requires constant updating and re-issuance of these dictionaries, and traditional technologies of lexicology, lexicography and publishing do not provide the necessary dynamics for updating the dictionaries.

In addition, the interpretation of the semantic and emotional content of a political text containing euphemisms is determined by the context and extralinguistic situation accompanying the text. Therefore, the dictionary of political euphemisms needs to include such data as information about the political situation in which the euphemism is used, the author of the text, his political views and interests, linguocultural characteristics of the target audience, etc. None of the existing dictionaries contain such information.

Modern information technologies make it possible to create an information system that facilitates and automates the processes of searching, organizing, storing, updating and using information about political euphemisms. It is also possible to create bilingual and multilingual dictionaries by defining relations between data storages

2. An analysis of existing software tools for operation with euphemisms

The analysis of existing software tools for operation with euphemisms showed that a number of electronic dictionaries have been developed, the most complete of which are The Free Dictionary, Urban Dictionary, Oxford Learner's Dictionary, and Merriam-Webster. The comparison results are presented in Table 1

Table 1: Results of a comparative analysis of electronic dictionaries

Electronic Dictionaries	The Free Dictionary	Urban Dictionary	Oxford Learner's Dictionary	Merriam-Webster
Free of charge	Yes	Yes	Yes	Partially
Context availability	No	No	No	In paid version only
Available in Russian	No	No	No	No
Contains euphemisms	Yes	Yes	Yes	Yes
Available for different devices	Yes	Yes	Yes	Yes
Possibility to export information for offline work	No	No	No	No
Expansion and update possibilities	No	Yes	No	No
Classification of euphemisms	No	No	No	No

None of electronic dictionaries provides all necessary capabilities for updating dictionaries, their use for research in the field of linguistics and the development of software for automatic text analysis. The new information system should be developed to cover all the needs of researchers and users. Thus, the task of creating a computerized automated system for storing, organizing and searching for euphemisms is relevant and practically significant. Turning to such a system will help to improve the quality of translation of political texts. In addition, complete and up-to-date information about euphemisms is extremely necessary for the implementation of algorithms for automatic text analysis.

3. Requirements for a new system for working with euphemisms

The new specialized dictionary of political euphemisms should contain the following information:

1. **The key word**. Many political euphemisms contain the same key words such as "activity", "affair", "issue", "security", etc.
2. **The euphemism** (a word or expression).
3. **The context** (a fragment of the text containing the euphemism). There might be a number of contexts in which the same word or expression might have different meanings.
4. **The source** of the text.
5. **The date** when euphemism has been used in the discourse.
6. **The type** of euphemistic substitution.
7. **The subject** (an element of political reality covered under euphemism and, if necessary, a brief description of political situation and interests of the discourse participants).
8. **The person** who used the euphemism (if available). This information is important if the euphemism was used by a political leader.
9. **The translation** of the euphemism. Since real meaning of the euphemism often depends on the context, current policy and interests of discourse participants there might be a number of different translations.

The requirements for a new information system for maintaining an English-Russian dictionary of euphemisms based on the results of our analysis are the following:

- the possibility to view the contexts of the use of euphemisms;
- availability of translation of euphemisms from English into Russian;
- classification of euphemisms;
- the possibility to filter and search for euphemisms and information about them;
- the possibility to add new elements to the system;
- the possibility to maintain reference books of euphemisms, persons, events, etc.;
- the possibility to export and import data from the system to and from files in MS Excel format;
- Ensuring the separation of user and administrator operating modes.

4. Implementation of a system for working with euphemisms

The system was developed in Java using the jMorfSDK [7] libraries for morphological analysis of Russian texts, PullEntiSDK [8] for morphological analysis of English texts and the Yandex translator web interface for Russian-English translation. The graphical user interface is implemented using JavaFX.

To store data, the SQLite DBMS is used, interaction with which is carried out using the JDBC driver. The xlsx format is used as the data export / import format, the work with which is implemented by means of the Apache POI library [9]. The selected technology stack ensures cross-platform information system.

Figure 1 shows the system architecture as a component diagram.

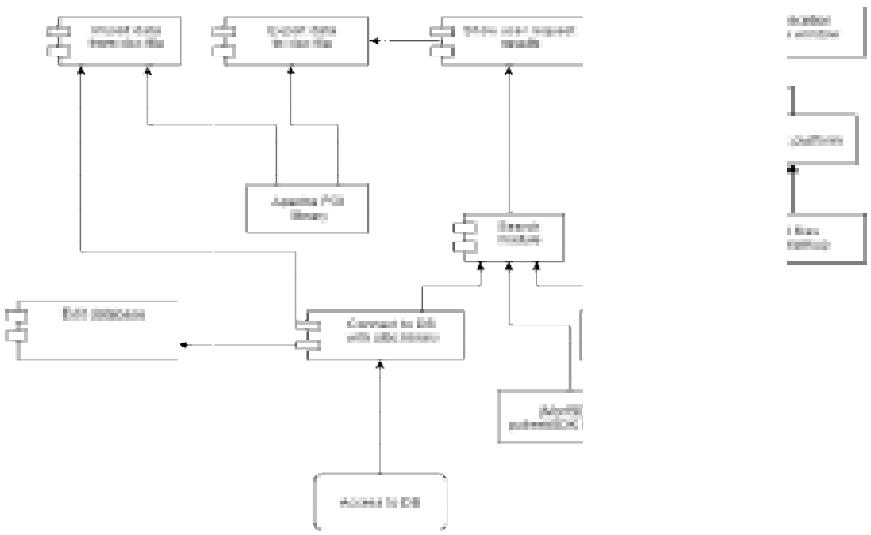

Figure 1: Diagram of information system components.

The architecture of the information system is based on modern approaches to the design of information systems, which provides a flexible opportunity to expand its functionality, replace external components (libraries, web services, DBMS), expand and optimize algorithms for automatic text analysis.

5. Information system functionality

The information system provides an opportunity to work with the dictionary of euphemisms, performing operations of adding, editing, deleting euphemisms, adding and changing the contexts of their use and additional information.

The dictionary of euphemisms is presented in tabular form (Fig. 2). Editing of reference books of euphemisms classification, persons, events, etc., as well as information about euphemisms is available via separate forms.

Figure 2. The main window of the information system for maintaining a dictionary of euphemisms.

The functions "Filter" and "Search" are used to search for the necessary information. These functions perform filtering and data search by various parameters: key words, events, in the context of which a specific euphemism was used, etc.

The system implements two types of filters: simple and composite. As a result of applying a simple filter only one field selected by the user is filtered; as a result of applying a composite filter the query data is taken into account simultaneously by several fields.

Figure 3 shows the result of applying a composite filter with the following parameters: key words - "activity, behavior", event - "Irangate scandal"

Figure 3. The result of the composite filter.

The contexts of using euphemisms contain arbitrary phrases in natural language and cannot be combined into a single reference book. In addition, different sources may contain contexts that are close in meaning, but expressed in different phrases. Therefore, the

search algorithms were developed using the means of computer linguistics, taking into account the availability of information in the system in two languages.

6. Automatic search algorithms for all system data

The search in the system is carried out on all data containing information about euphemisms taking into account the morphological parameters of the words set in the query. The search query can be a text in Russian or in English.

The search algorithm includes the following steps (Fig. 4):

1. Determination of the language of the entered text.
2. Splitting the query entered by the user into separate words.
3. Removal of the service parts of speech from the resulting list of words, which allows obtaining results that more closely match the user's request.
4. Normalization of all words from the list.
5. Generation of all the forms for each word from the resulting list and search for their occurrences in the fields in the corresponding language query.
6. Check if the found item has already been added to the list of results to avoid duplication of data in the result.
7. Output of the obtained result.

For example, for the query "war", the system will search for occurrences of all forms of the word "war", "wars", etc. in all data in the system in Russian, similarly for data in English.

Figure 4. Block diagram of the search algorithm without translation.

Considering that the data in the system is presented in two languages the search through all the data of the system with automatic translation into the desired language depending on the language in which the corresponding data is presented in the system is an urgent task. To solve this task we implemented a search algorithm with translation in which a step including the translation of the words used for the search and already reduced to the initial form into the second language was added. As a result, the set of words and their forms for the search is expanded. A block diagram of the translation search algorithm is shown in Figure 5

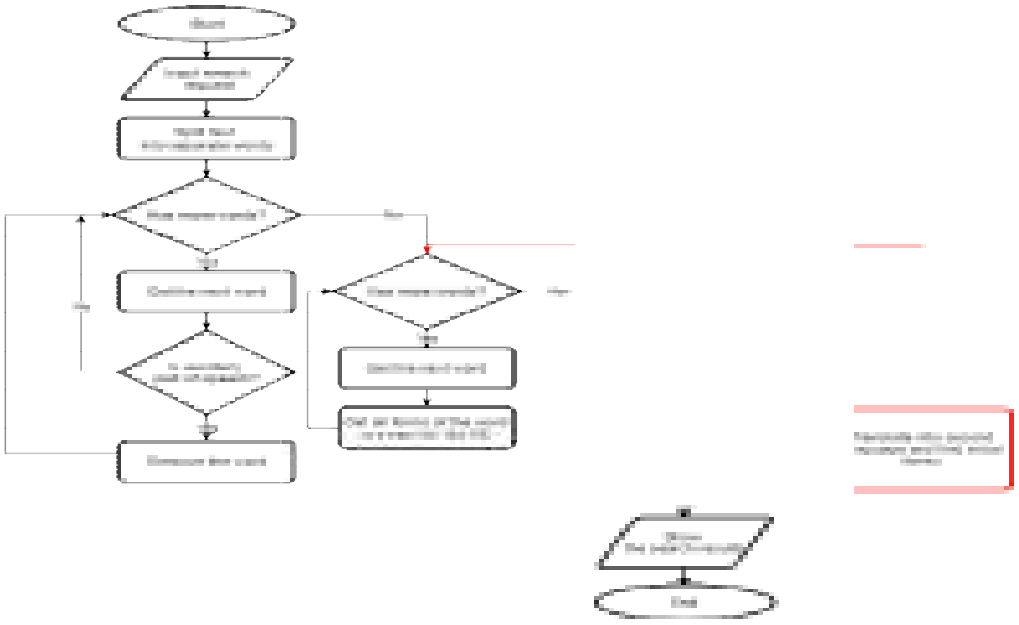

Figure 5. Block diagram of the search algorithm with translation.

7. System operation modes

The developed information system can be used both for maintaining a dictionary of euphemisms and for using it for caring out a research in the field of linguistics or developing new algorithms for automatic text analysis, taking into account the meaning of euphemisms in certain contexts.

To ensure the ability to control the correctness of data in the dictionary from a linguistic point of view, the system has implemented two modes of operation: standard mode and administration mode.

The standard operating mode is available to all users of the system after starting. In standard mode the user has the following functions:

- requesting the required data using search and filtering tools;
- export all system data or data on the current request to a file in xlsx format for further work with them.

User interface in standard operation mode is shown in Figure 6.

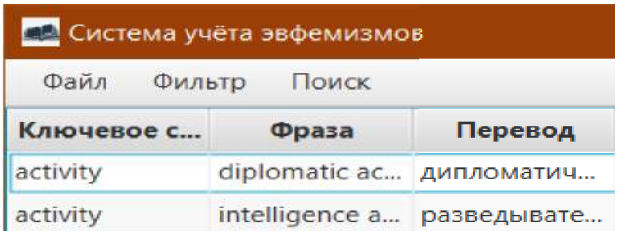

Figure 6. User interface in standard operating mode.

Administration mode is available only to specialists in the field of linguistics to prevent corruption or loss of data. The following functions are available in administration mode:

- requesting the required data using search and filtering tools;
- export of all system data or data on the current request to a file in xlsx format for further work with them;
- adding / deleting / editing reference books and data on euphemisms and contexts of their use;
- import of data into the system from a file in xlsx format;
- editing the list of users with administrator rights.

The system user interface in administration mode is shown in Figure 7.

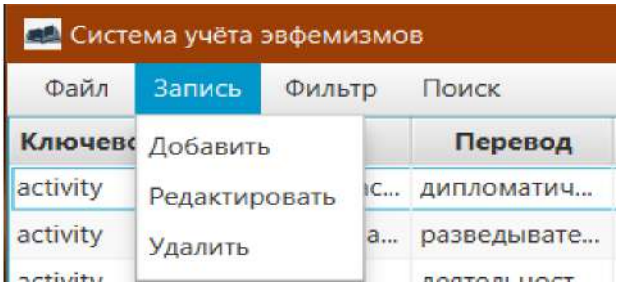

Figure 7. User interface of the system in administration mode.

8. Prospects of further development of the information system for maintaining a dictionary of euphemisms

The developed information system solves the issues associated with maintaining a dictionary of euphemisms, but there is a need to develop additional tools for working with euphemisms and the implementation of new functions of the system. As for any system that works with natural language, it is extremely important to take into account its dynamism, which is especially important when studying euphemisms as a linguistic phenomenon reflecting current events in the world politics. The implemented import capabilities solve this problem only in part, allowing different specialists to supplement the information in the information system.

Therefore, the topical direction of the system development is the implementation of an automatic search for new contexts with the euphemisms stored in the dictionary. The search area should cover popular news resources of the Internet.

One more task is the development of a client-server system with central data storage. Centralization of the system data storage will simplify the maintenance of the dictionary up to date by implementing the function of checking and accepting new changes in the dictionary after automatically completing the contexts of using euphemisms or importing additional data from the file.

Client-server architecture of the system allows with minimal changes to implement a thin web client to provide a mass access to the dictionary and simplify the work with the system. It is possible to keep the local versions of the information system for offline work.

9. Conclusion

The developed information system for maintaining an English-Russian dictionary of euphemisms allows not only to obtain the meanings of euphemisms, but also the contexts of their use, descriptions of events, actions, etc. that are hidden behind euphemisms. Advanced filtering and information search capabilities make the system a useful tool for researchers and translators, and the dictionary data can be used in the development of software for linguistic text analysis.

The structure of the database, search algorithms and user interface of the developed information system do not depend on the language, therefore the system can be used for other language pairs or even expanded to multilingual system.

Conflict of Interest: NO

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PLANNING, SCHEDULING AND ALLOCATION OF RESOURCES OF BUILDING USING MS PROJECT (CASE STUDY)

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ABSTRACT

India is the one of the fast growing construction industry in world. Project management method plays preliminary role in administrator and synchronize the whole project. In construction industry multilayer company are working, but every decade there is a change in construction industry. However all large scale and small scale companies should be depended on planning, scheduling and allocation of resources for better performance to complete the project with in the time period. But, I have observed that compared to large scale the small scale companies are suffering more, due to conventional practice inappropriate decrease the efficiency of the construction industry which affects the project in the form of increased duration of the project, this leads to increased overhead cost of the project and poor quality of work. In order to remove these wing in construction project, that's why project management software are introduced. In this study planning, scheduling, Tracking of the project plays major role in the Microsoft project software to recognize the project (cost, time ext.), recognizing the constrains to the project, cost overrun analysis is important to each and every project to manage overall project Budget

Keywords: *Cost Overrun Analysis, Duration of the Project, Managing the Project, Tracking of the Project, Recognizing Constrains and Resources.*

1. Introduction

Project management is not new. It as be used for hundreds of year's examples of project outcomes include, pyramids of Giza, Taj Mahal, and Panama Canal ext. The outcomes of these projects were the results of leaders and managers applying management practices, principles, processes, tools, and techniques to their work. The managers of the projects used a set of key skills and applied knowledge to satisfy their customers and other people involved in and affected by the project. In 20th century the construction industry in our country and in the world growing very quickly. Hence India is the largest country which providing the work force for Construction. Hence the traditional approach of planning, Scheduling in the project leads to over location of resources, thus includes the increases in construction and delay in the project delivery. Microsoft project software helps to overcome delays of project and also tracking of the project leads to identify the delays in the project with the help of the msp. Analysis of the cost and duration is easy in Microsoft project, assigning of activities and constrains to each and every task is easy in MSP software.

1.1 Importance of the Project Management

a) Management project soft wear is user friendly.
b) It should be easy to track at any given point duration by multiple users.
c) It should be robust and should provide support to complex solution breakdown.
d) The visibility of the data should be distributed.
e) Time consuming is minimal by the Software

1.2 Organizational Project Management (opm) and Strategies

Portfolios, programs, and projects are aligned with or driven by organizational strategies and differ in the way each contributes to achievement of strategic goals;

1. Portfolios management line up the portfolios with the methodological scheme of right programs or constructional projects, priority of work, and providing the needed resources.
2. Program management balance its components of programmer and controls interdependencies in order to realize specified benefits.
3. Project management enables the achievement of organizational goals and objectives.

2. About MSP

Microsoft project software is the single user endure. Here we preform single project at a time but we cannot perform multiple projects like as primavera. Project management tool that supports project schedule development and management, planning, tracking, resources management, project reporting. It assumes that you are familiar with a project management process. Hopefully at initial work breakdown structure (wbs) is created by the project team. A WBS is a deliverable based grouping of project tasks , an effective way to define and organize all the work required to complete a project .we need know the project start date and end date and after that entering the Gantt chart performances ,assign resources and costs .review and baseline project plan, tracking, after taking the reports .

3. Objectives

1. Planning, scheduling, tracking for residential project.
2. Assigning the resources for each and every activities.
3. Using tracking in Microsoft project to control the overall the project.
4. Analyzing the cost for overall project.
5. Recognizing constrains for each and every activities.
6. Analyzing the earned value analysis for the project.

4. Brieff Literature Review

E. Suresh Kumar & S. Krishnamoorthi (2015) "scheduling and financial analysis of high rise building" here they used the Microsoft project software to analysis the high rise building which include the scheduling and financial analysis of the building .they observed that the difference b/w budget cost and actual cost of the project and also they said that when material cost and wages of labours increased and cost of the project automatically increases. And time delay in project construction activity due to natural disasters.

Ch. Chowdeswari, D. Satish Chandra, SS.Asadi(2017) "optimal planning and scheduling of high rise building" this paper aims that empirical study on the msp soft wear in every single aspect of the project from planning and scheduling phase. Explaining the planning and scheduling if the high rise multi-story building (G+8) with Microsoft project to observe the condition of site, productivity of labour and resources availability, relationship b/w task and their independence should know.

Chiranjeevi D, Dr. G. Narayana, Rajeeva (2017) "analysis on cost, schedule and tracking of residential project by earn value management method using primavera p6"The Earn value management is a program evaluation approach which is evaluated and tracks a project in better manner. This project report indicates significance, execution and particular components of earned value management that advantages extend director &eventually brings about project achievement. The future research when all is said in done will incorporate most likely new measurements in the EVM analysis to consider Quality and technical performance for an effective project control and issues alike Risk Analysis. EVM analysis habit makes part of additional work where it is hard to mix of company's planning, scope, scheduling & budgeting. So, future research ought to be expected to diminish the additional work. And to eliminate the uncertainties as to carried through a various stages of project.

Pooja tripathi, vinay kumar singh, pravin singh tomar, j.p. gupta (2018) "PROJECT planning and scheduling of multi- story RCC building using Microsoft project "here they analyzed the (G+4) RCC residential building in Microsoft project soft wear here they generated the Gantt chart for planning, scheduling of the project construction and provide the minimum duration of the time of construction by crunching the scheduling and project crashing methods in soft wear. Within the scope of present work following conclusions are drawn. He is saying that Microsoft project works on the Gantt chat and resources allocation concept. This gives the easy analysing the process of scheduling time. Many construction mangers are suffers a lot to complete the project with in the time limit and project budget so that they increase the cost are resources to complete the project with in the deadline.to optimize the budget and duration they used the technique scheduling crunching, but quality will not appear because efforts are done fast to complete the project.

Gavde, Kinase Swapnali, Mulani Apreen, Jadav Varsha ,mane mayuri(2018)**"**planning and scheduling of residential building using ms project. "Research is went on the cas study of the residential building the project involves the planning and scheduling of a residential building. For this case G+ residential building, located at shenoli karad which is Mr. SOHAN KANASE" s residential building AT Shenoli Maharashtra, India was selected. The site details, plans and drawings etc. were utilized to achieve the goals of the project. Type of Structure -Reinforced Cement Concrete Structure (RCC) G + Residential Building. They adopted the CPM and PART method in msp software to reduce the duration of the project.it as give the good results when they used the software.

Gokul.G, Mala. M.V. Mahalingam.M, Vivek.J (2019**)** "construction scheduling project with time using critical path method". Based on the project work, "ms project software construction" the following conclusions are given Practice and Understanding of total project management provides better result, product, and service to the project organization. Effective project management provides balance between Scope, Time, Cost, Quality, Resource and Communication. Project management Software MS Project provides better planning, scheduling, monitoring and controlling of small as well as large projects. During the execution of a project, software is helpful for promoting effective coordination. Research and Study state that implementation of MS Project software for Time and Cost Management is proven technique. Implementation of MS Project software for construction of Buildings such as Villas, for Time and Cost Management provides effective monitor and control. For infrastructure project like construction of Buildings, implementation of MS Project software gives better schedule to control the project. Time management which gives accurate planning and scheduling of project and Cost management which gives earned value management of project. Earned Value Management gives better financial control of overall cost of the project. It can be used for measuring project performance and progress in an objective manner. Software provides effective Monitoring and Controlling through various Reports.

5. Methodology

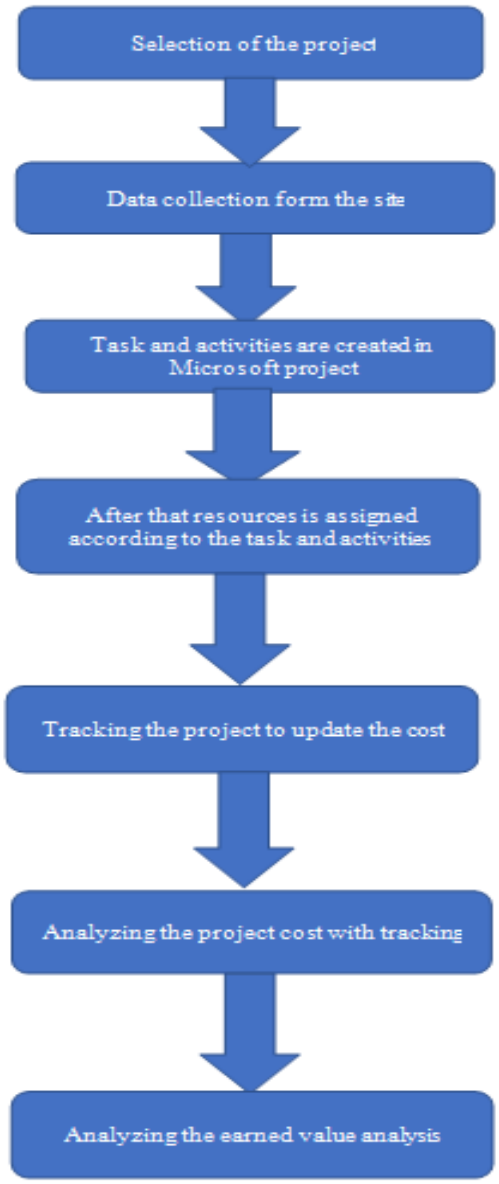


Figure 1

5.1 Data Collection

The residential building is establishment of the planning, scheduling, and allocation of resources for slitfloor+5 project. The project is in Karnataka, Krishna raj puram, Bengaluru. The required data like labor charges, workforce, material type, material cost, usage of equipment and material is collected for All reference. Planning and scheduling is assigned by this data.

Table 1:4.1 Data Collection of the Project

PROJECT DETAILS	**Data**
PROJECT TYPE	Residential Building
NUMBER OF FLOORS	Slit floor+5
Nature of the contractor	Item rate contract
PROJECT	RR COPNSTRUCTION
PROJECT COST	2.84 CORES
CONSTRUCTION STRAT DATE	2-6-2017
PLACE	KR,PURM ,BENGALURU,KARNATAKA

5.2 First Floor Plan of the Project

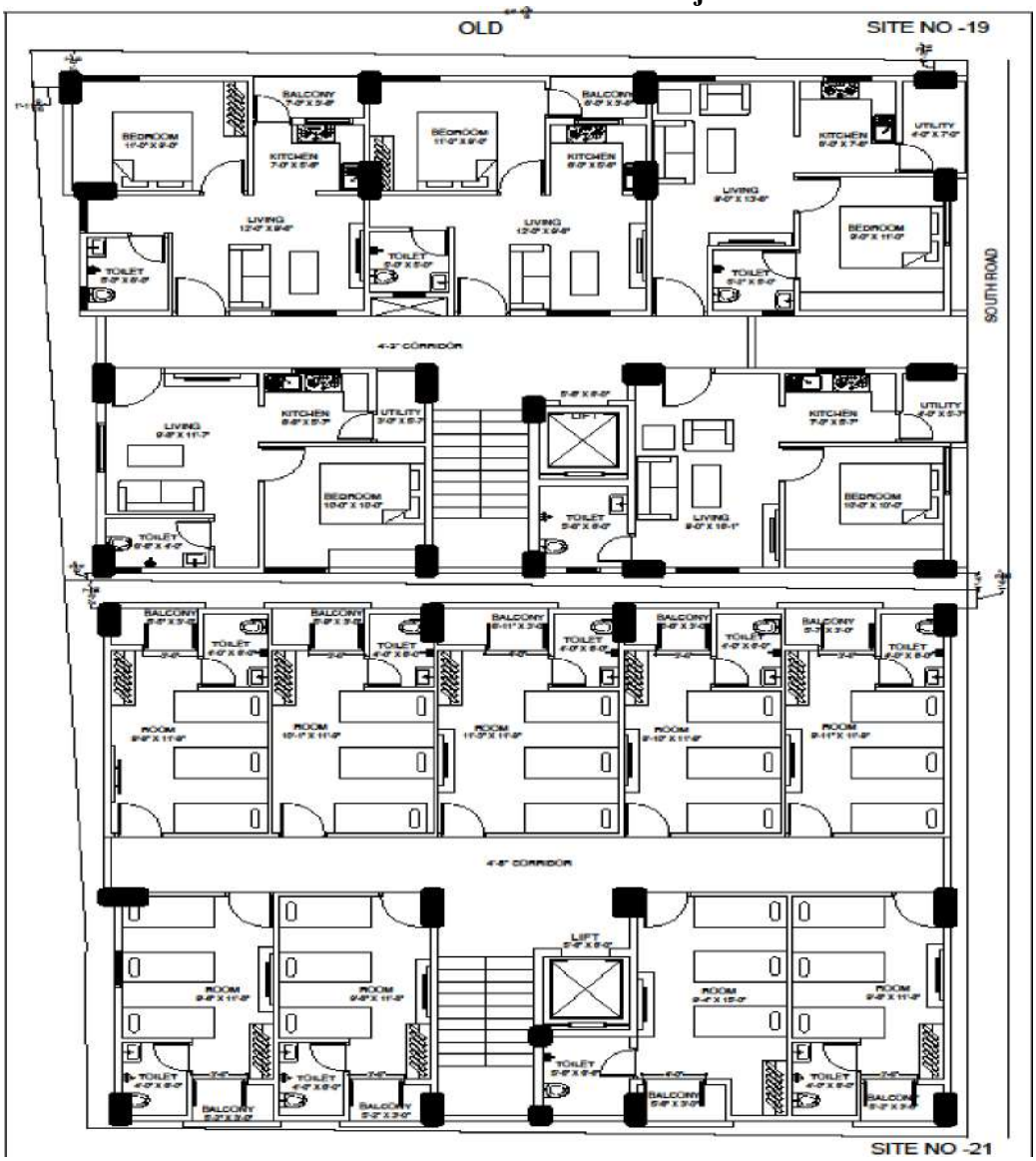


Figure 5. 2 First Floor Plan

5.3 Planning, Scheduling, Resource Allocation Tracking of the Project

In every day of human life has to be planning, scheduling and tracking should be monitor. Likewise each and every day of the project should be planned and scheduled, tracking should be monitor for better performance of the project. And assign the resources for each and every activity of the project should be in sequence otherwise the resources will be in over located.to overcome this type of errors Microsoft project (msp) software introduced. This software is used for better planning and tracking the project and

also taking the reports of the project. Microsoft project cost analysis also included for analyzing the budgets. Microsoft project planning and tracking performance\s than the conventional planning and tracking.

The speculative venture layout in which venture and administrative development and their critical staff singly organize leading-edge tactics. The main part of this construction includes the duration and cost of the construction and also the assigning of constrains is important.

And without scheduling it is difficult to identify the cost, manpower, material, duration of the project. In this the start date, end date are attached to each and every activities of the construction project. Duration must and should be provided to all activates their by the scheduling is completed. Assigning the start date of the project then robotic- ally it will assign start date and finish date of every activity of the project.

Resources allocation is one of most important task in every project based on availability of material, labor, and construction machinery depends on this the activities should be separated by day to day progress by consideration of the project time. How much of resources should be allocated is depends on the particular activity duration.

Tracking is the 2nd major important task in the managing the project. Tracking is used for knowing the progress of the each and every activity of the project. Recording like premonitory technique, assemble, write down, and detail data of the project to the project manager. Monitoring the project and identifying the lagging activities and restore the activities by assigning the proper allocation of the scheduling and resources.

5.4 Task Sheet:-Assigning the Task Name and Predecessor and Constrains

Table 1

G+5ggg (1)					
ID	**Task Mod e**	**Task Name**	**Duration**	**Predecessor**	**Start**
1		**RESIDENTIAL BUILIDINGPROJEC**	**1204.38 days?**		**Mon 2/6/17**
2		**PAPER WORK**	**40 days**		**Mon 2/6/17**
7		**EXCAVATION**	**21.88 days**		**Fri 3/24/17**
10		**SUMP**	**50.25 days**		**Fri 4/7/17**
16		**FOUNDATION**	**52.63 days**		**Tue 4/18/17**
26		**STILT FLOOR**	**687 days**		**Mon 6/19/17**
53		**FIRST FLOOR**	**1153.15 days**		**Mon 2/6/17**
54		**COLUMN CASTING**	**42.38 days**		**Tue 8/22/17**
55		Column marking	2 days	38,46FS	Tue 8/22/17
56		Column fabrication	17 days	55	Thu 8/24/17
57		Column shuttering	6 days	56	Wed 9/13/17
58		Column concreting	11 days	57	Tue 9/19/17
59		Column curing	7 days	58	Mon 10/2/17
60		**BEAM AND SLAB**	**127.13 days**		**Wed 10/4/17**
61		Beam and slab shuttering	7 days	58FS+4d	Wed 10/4/17
62		Beam fabrication	13 days	61	Thu 10/12/17
63		Slab fabrication	89 days	62	Wed 10/25/17
64		Beam and slab concrete	2 days	63	Wed 1/24/18
65		Beam and slab curing(P	21 days	64	Thu 1/25/18
66		Beam and slab de shutter	6 days	65	Fri 2/23/18

67		**STAIRCASE**	**24 days**		**Thu 10/5/17**
68		Shuttering with lubricant	6 days	61SS+1d	Thu 10/5/17
69		Fabricati on	5 days	68	Thu 10/12/17
70		Checking	1 day	69	Tue 10/17/17
71		Concreti ng	3 days	70	Wed 10/18/17
72		DE shutterin g	3 days	71	Fri 10/20/17
73		Curing	7 days	72	Tue 10/24/17
74		**BLOCK WORK**	**67 days**		**Fri 3/2/18**
75		Block carrying /	5 days	134,135,	Fri 3/2/18

5.5 Base Line cost and Percentage of Work Completion of Project and Fixed Cost

Table 2

Baseline Cost	% Complete	Finish
₹ 28,467,277.70	**87%**	**Fri 12/11/20**
₹ 426,500.00	**100%**	**Thu 3/23/17**
₹ 373,841.72	**100%**	**Tue 4/18/17**
₹ 215,375.00	**100%**	**Mon 6/5/17**
₹ 3,104,772.95	**100%**	**Mon 6/19/17**
₹ 991,770.77	**100%**	**Thu 8/29/19**
₹ 2,343,550.90	**91%**	**Tue 10/13/20**
₹ 97,846.35	**100%**	**Tue 10/10/17**
₹ 9,750.00	100%	Thu 8/24/17
₹ 52,215.10	100%	Wed 9/13/17
₹ 4,950.00	100%	Tue 9/19/17
₹ 20,431.25	100%	Fri 9/29/17
₹ 10,500.00	100%	Tue 10/10/17
₹ 913,825.00	**100%**	**Fri 3/2/18**
₹ 3,500.00	100%	Thu 10/12/17
₹ 292,612.50	100%	Wed 10/25/17
₹ 353,252.50	100%	Wed 1/24/18
₹ 249,735.00	100%	Thu 1/25/18
₹ 12,600.00	100%	Fri 2/23/18
₹ 2,125.00	100%	Fri 3/2/18
₹ 104,848.05	**100%**	**Thu 11/2/17**
₹ 2,062.50	100%	Thu 10/12/17
₹ 2,832.50	100%	Tue 10/17/17
₹ 0.00	100%	Wed 10/18/17
₹ 95,515.55	100%	Fri 10/20/17
₹ 937.50	100%	Tue 10/24/17
₹ 3,500.00	100%	Thu 11/2/17
₹ 259,025.00	**100%**	**Fri 5/18/18**
₹ 2,450.00	100%	Fri 3/9/18
₹ 7,700.00	100%	Tue 3/20/18
₹ 153,750.00	100%	Tue 4/17/18
₹ 16,600.00	100%	Fri 4/27/18
₹ 76,425.00	100%	Wed 5/9/18
₹ 2,100.00	100%	Fri 5/18/18
₹ 90,687.50	**90%**	**Fri 7/20/18**
₹ 12,000.00	100%	Wed 6/24/20
₹ 31,250.00	100%	Thu 6/18/20
₹ 10,218.75	100%	Wed 7/8/20
₹ 0.00	100%	Mon 6/22/20
₹ 0.00	100%	Fri 6/19/20
₹ 0.00	100%	Thu 6/25/20
₹ 19,687.50	100%	Wed 7/15/20
₹ 17,531.25	69%	Mon 8/17/20

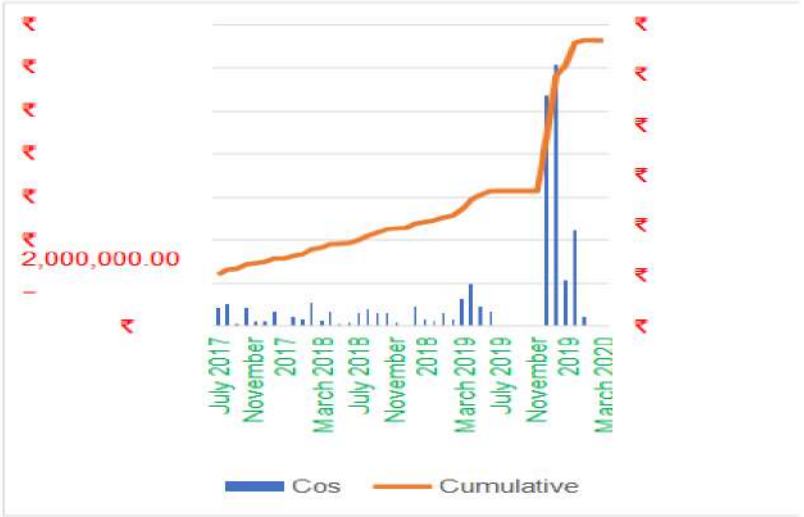
5.6 Resources of the Project Sown Below image

	Resource Name	Type	Material	Initials	Group	Max.	Std. Rate	Ovt.	Cost/Use	Accrue	Base	Code	Add N
1	MASONS MARKING	Work		M		1	₹600.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
2	MASONS CONCRETE	Work		M		1	₹600.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
3	MASONS BLOCK WORK	Work		M		1	₹700.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
4	MASONS PLASTERING	Work		M		1	₹700.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
5	SSM WORK	Work		S		1	₹700.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
6	MASONS TILE/GRANITE LYING	Work		M		1	₹900.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
7	UNSKILLED	Work		U		1	₹300.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
8	MALE COOLIES	Work		M		1	₹300.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
9	FEMALE COOLIES	Work		F		1	₹190.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
10	FITTERS BAR BENDING	Work		F		1	₹450.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
11	HELPERS BARBENDING	Work		H		1	₹350.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
12	FITTERS CENTRING/SHUTTERING/SCAFOLDI	Work		F		1	₹450.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
13	HELPERS CENTRING/SHUTTERING/SCAFOLDI	Work		H		1	₹350.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
14	PLUMBER	Work		P		1	₹800.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
15	WORKS CARRIED OUT	Work		W		1	₹0.00/hr	₹0.00/hr	₹0.00	Prorated	Standard		
16	FABRICATOR	Work		F		1	₹800.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
17	HELPERS	Work		H		1	₹500.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
18	ELECTRICIAN	Work		E		1	₹750.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
19	SURVYER	Work		S		1	₹6,000.00/day	₹0.00/hr	₹0.00	Prorated	Standard		
20	total	Work		t		1	₹0.00/hr	₹0.00/hr	₹0.00	Prorated	Standard		
21	LIST OF MACHINERY	Material		L			₹0.00		₹0.00	Prorated			
22	JCB	Material		J			₹600.00		₹0.00	Prorated			
23	TRACTOR	Material		T			₹800.00		₹0.00	Prorated			

Figure 3

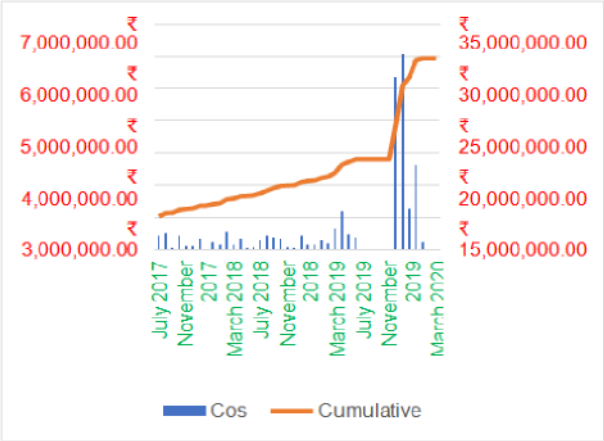
6. Cash Flow of the Project

6.1 Cash Flow of the Project before Updating the Project



Graph 1 Cash Flow Grafh before Updated the Project

6.2 Cash Flow after Updating the Project

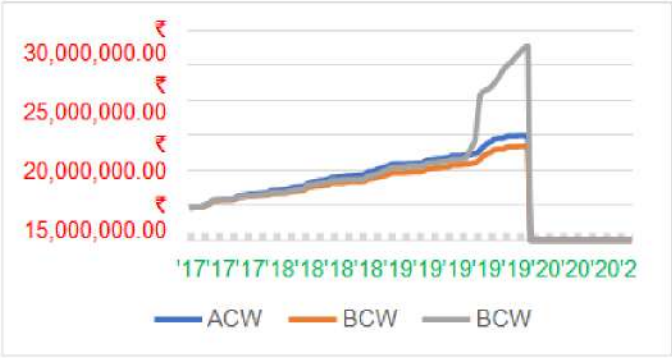


NAM E	REMAINING COST	ACTUAL COST	COST	ACWP	BCWP	BCWS
RESIDENTIAL BUILIDING PROJECT	₹ 11,466,354.90	₹ 18,158,922.80	₹ 29,625,277.70	₹ 13,827,367.48	₹ 13,371,735.15	₹ 27,678,060.71

Graph 2 Cash Flow Graph after Updation of the Project

7. Earned Value Anasysis

The project earned value based on the statues date. If actual cost (ACWP) is higher than earned value (BCWP), then the project is over budget. If planned value (BCWS) is higher than earned value, then the project is behind schedule.

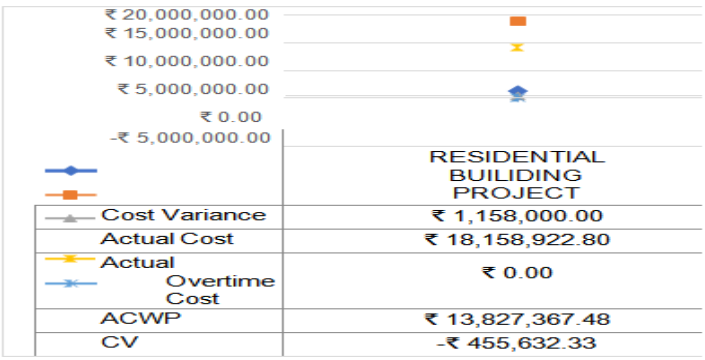


EAC	ACWP	BCWP
₹ 29,437,417.26	₹ 13,827,367.48	₹ 13,371,735.15

Graph 3 Earned Value of the Project

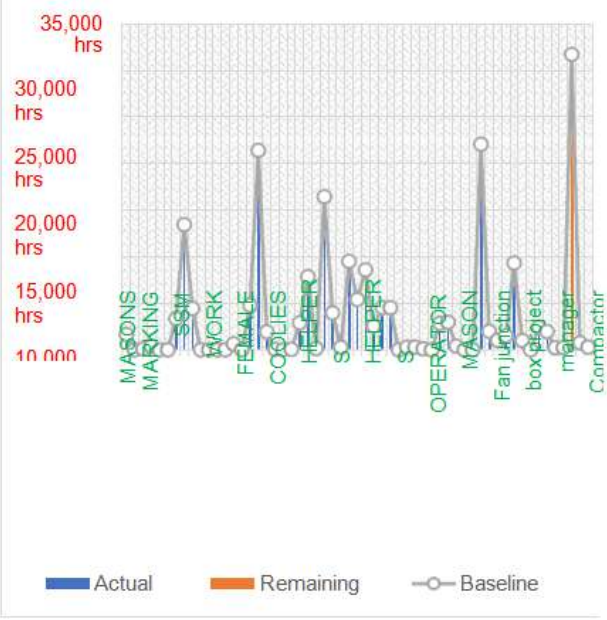
8. Cost Variance

NAME	%COMPLITED	COST	BASELINE COST	COST VARIANCE
Residential building	87%	2,96,25,277.00	28,467,277.70	1,158,000.00



Graph 4

9. Resources Overview of the Project



Graph 5

G+5ggg (1)

as of Sat 08/05/21

Dates			
Start:	Mon 06/02/17	Finish:	Wed 31/03/21
Baseline Start:	Mon 06/02/17	Baseline Finish:	Mon 27/04/20
Actual Start:	Mon 06/02/17	Actual Finish:	NA
Start Variance:	0 days	Finish Variance:	290.47 days

Duration			
Scheduled:	1298.85 days?	Remaining:	231.7 days?
Baseline:	1008.38 days	Actual:	1067.15 days
Variance:	290.47 days?	Percent Complete:	82%

Work			
Scheduled:	201,364.93 hrs	Remaining:	40,560.73 hrs
Baseline:	201,284.93 hrs	Actual:	160,804.2 hrs
Variance:	80 hrs	Percent Complete:	80%

Costs			
Scheduled:	₹ 29,625,277.70	Remaining:	₹ 11,490,354.90
Baseline:	₹ 28,467,277.70	Actual:	₹ 18,134,922.80
Variance:	₹ 1,158,000.00		

Task Status		Resource Status	
Tasks not yet started:	57	Work Resources:	50
Tasks in progress:	53	Overallocated Work Resourc	7
Tasks completed:	426	Material Resources:	81
Total Tasks:	536	Total Resources:	138

Graph 6

10. Result

- Actual required duration to complete the project is 1204.38 days.
- After updating the project by the references of tracking the duration increases 1298.38 days.
- Increases in the duration causes the project cost variance.
- Actual cost of the project is 2, 84,67,227
- Thus the project cost increases by 2, 96,25,277
- Generating and analyzing the cash flow graph of before and after updating the project.

11. Conclusion

Earned value analysis plays key role in project to identify that the project is in under or over the project by the taking of overall construction project activities. And earned value report specifying the consequence, implementation of the individual ingredient of earned value helps the project to reach the goals.

On June 2020 project as tracked and got the planned value, earned value, and actual cost of the project. And 57% of the project is completed and remaining 43% of the project is to be complete with the duration of 6months. And project is overrunning from the actual planned budget cost.

Project cost variance includes

- -₹4, 55,632.33 electro negative sign indicates that cost of project is in overrun. If the project is in electropositive sign then the project is in under budget cost.
- 87% of the project is complete at an actual finish date of project.

Completing the remaining work of activates cost assigned is ₹ 11,58,0000

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PREDICTION OF LOAD DEFLECTION BEHAVIOR OF RC SKEW SLABS SUBJECTED TO UNIFORMLY DISTRIBUTED LOADING WITH ALL EDGES SIMPLY SUPPORTED AND RESTRAINED USING FEM TECHNIQUE

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ABSTRACT

Slab is an important and extremely used structural element is the building construction. Slabs usually carry Uniformly Distributed loads in Gravity Direction. When it comes to shapes of the slabs there are different shapes like Square, rectangular, sometimes circular and Skew slabs having quite number of applications in modern civil Engineering. The Slabs are having different Supporting conditions like fixed edges, Simply Supported edges, mixed edges. The use of FEA has been a preferred method to study the behavior of concrete structural elements as this method is much easier and faster compare to Experimental method and is also cost effective. Some of the FEA software's used to study the behavior of structural elements are ETABS, SAP 2000, STAAD.pro, SAFE and ANSYS etc. The software used in this dissertation work is SAFE, to study the load deflection behavior of simply supported and End Restrained RCC Skew slabs subjected to Uniformly Distributed Loading. In this paper RC Skew slabs with different Skew angles having different reinforcement spacing's have been studied and compared with Experimental data. The Skew Slabs are subjected to Uniformly Distributed Loading with simply supported and End restrained Conditions. The Load – Deflection Curves are plotted to compare the results between SAFE data and the Experimental Data from cracking load till Ultimate load.

Keywords: *Slab, Skew Slab, Skew Angle, Reinforced Concrete, Analysis, SAFE Software.*

Introduction

A slab is an important reinforced cement concrete structural element in building which is considered as one of the components of framed structures and slabs plays a very important role in transferring the loads to beam, columns and sub structures. So understanding the behavior of slabs plays a very important role.

In slabs we have slabs of irregular shapes such as rectangular slabs, circular slabs, skew slabs, slabs with openings and slabs with different boundary conditions. Slabs can be prefabricated off site lowered into places or can be poured in-situ using formwork.

1.1 Introduction to Skew Slabs

In irregular slabs skew slab is a type of slab which can be defined as a slab which has an angle other than a right angle (90°) at corners and the angle is called as Skew Angle.

Skew slabs are mostly used in the buildings of irregular plan configurations where there are space constraints and maybe sometimes used for enhancing architectural aesthetics and with addition used in some bridge deck slabs.

For analysis of the slabs there are some methods of analysis – Elastic, Finite strip method, Finite difference method, Finite element method, FEM – node based shape functions. And for limit analysis the methods are Yield line analysis, Hillerborg strip method, Harrop's strip deflection method, Gurley's bi-moment equilibrium method and Grillage method.

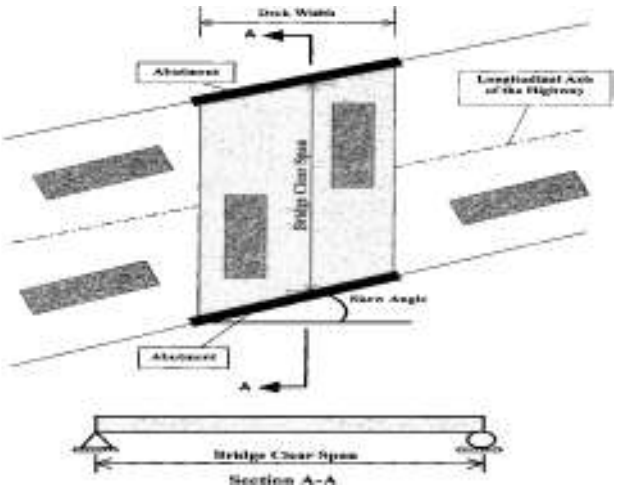

Figure 1 Skew Slab

1.2 Objectives

The main objectives of the present study are to analyze and compare the Load – Deflection behavior of RC skew slabs subjected to Uniformly Distributed Loading with all edges simply supported and all edges restrained. The Objectives are mentioned below as follows:

1. To understand the behavior of skew slab subjected to UDL with all edges simply supported and all edges restrained.
2. To predict the load deflection curves and cracking Width for such skew slabs using SAFE Software
   i) Considering geometric non-linearity.
3. To compare results obtained by analytical model with existing experimental data.

1.3 Methodology

This paper deals with the study of Load-Deflection behavior of RC skew slabs subjected to UDL with all the edges simply supported and all the edges retrained.

At first the primary study done is to review the existing experimental data. Considering some of the research papers the experimental data is studied and considered in this dissertation work. And the data required for the analytical modeling is listed. In the selected papers the experimental work for RC skew slabs with all the edges simply supported and all the edges restrained is done and deflections for cracking loads, Ultimate loads, working loads and Yield line loads are obtained and studied to compare with SAFE software.

Next is to understand the working of SAFE software. To understand and study the modeling and analytical capabilities of the software. To know the input data requirements like Loads, Load cases and assigning the loads. To know the working of software with modeling and analysis for Nonlinear cracked condition. At last to generate the results for the required data and to interpret the results and comparing with the experimental work data and conclusion.

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2. Experimental Data

In this dissertation work the experimental data from different journal papers has been taken to compare with SAFE Software.

In experimental work skew slabs with skew angles 15°, 30° & 45° are casted and tested which are subjected to Uniformly Distributed Loading with Simply supported and End Restrained boundary conditions having different reinforcement spacing's.

2.1 Experimental Work Carried Out

The aim of the experimental work was to study the load – deflection behavior and cracking Width of the RC skew slabs subjected to UDL with all the edges simply supported and all edges restrained.

Details of Skew Slabs from Experimental Data

The experimental work consist of casting and testing of RC skew slabs with 15°, 30° and 45° skew angle and M30 grade concrete having different reinforcement spacing's.

The geometrical details and the reinforcement details of the experimental work are shown in Table 1 & 2.

Table 1 Geometrical Details of Skew Slabs

Sl. No.	Slab ID	Skew Angle	Overall Size(mm)	Long Span(mm)	Short Span(mm)	Aspect Ratio	Thickness (mm)
1	SS-1	15°	1300 x 1800	1500	1035.27	1.45	50
2	SS-2	15°	1300 x 1800	1500	1035.27	1.45	50
3	SS-3	15°	1300 x 1800	1500	1035.27	1.45	50
4	SS-4	15°	1300 x 1800	1500	1035.27	1.45	50
5	SS-5	15°	1300 x 1800	1500	1035.27	1.45	70
6	SS-6	15°	1300 x 1800	1500	1035.27	1.45	70
7	SS-7	15°	1300 x 1800	1500	1035.27	1.45	70
8	SS-8	15°	1300 x 1800	1500	1035.27	1.45	70
9	FS1 – 15	15°	1600 x 2100	1500	1000	1.5	50
10	FS2 – 15	15°	1600 x 2100	1500	1000	1.5	50
11	FS3 – 15	15°	1600 x 2100	1500	1000	1.5	50
12	FS4 – 15	15°	1600 x 2100	1500	1000	1.5	50
13	FS1 – 30	30°	1600 x 2100	1500	1000	1.5	50
14	FS2 – 30	30°	1600 x 2100	1500	1000	1.5	50
15	FS3 – 30	30°	1600 x 2100	1500	1000	1.5	50
16	FS4 – 30	30°	1600 x 2100	1500	1000	1.5	50
17	FS1 – 45	45°	1600 x 2100	1500	1000	1.5	50
18	FS2 – 45	45°	1600 x 2100	1500	1000	1.5	50
19	FS3 – 45	45°	1600 x 2100	1500	1000	1.5	50
20	FS4 – 45	45°	1600 x 2100	1500	1000	1.5	50

NOTE: The slabs from Sl.No 1 – 8 are simply supported and the slabs from SL.No 9 – 20 are all the edges restrained.

Reinforcement Detailing

Table 2 Reinforcement Details of Skew Slabs

Sl. No.	Slab ID	Diameter of bars (mm)	Spacing of bars		Percentage of Reinforcement		Coefficient of Orthotropy
			Short span (mm)	Long span (mm)	Short span	Long span	
1	SS-1	4	50	50	0.630	0.700	1.126
2	SS-2	4	100	100	0.315	0.350	1.121
3	SS-3	4	75	100	0.315	0.467	1.458
4	SS-4	4	75	75	0.420	0.467	1.122
5	SS-5	6	75	75	0.420	0.467	1.121
6	SS-6	6	75	100	0.315	0.467	1.458
7	SS-7	6	100	100	0.315	0.350	1.121
8	SS-8	6	125	125	0.323	0.323	1
9	FS1 – 15	4	50	50	0.63	0.70	1.122
10	FS2 – 15	4	75	50	0.63	0.47	1.630
11	FS3 – 15	4	100	50	0.63	0.35	2.127
12	FS4 – 15	4	100	75	0.42	0.35	1.468
13	FS1 – 30	4	50	50	0.63	0.70	1.122
14	FS2 – 30	4	75	50	0.63	0.47	1.626
15	FS3 – 30	4	100	50	0.63	0.35	2.135
16	FS4 – 30	4	100	75	0.42	0.35	1.466
17	FS1 – 45	4	50	50	0.63	0.70	1.122
18	FS2 – 45	4	75	50	0.63	0.47	1.630
19	FS3 – 45	4	100	50	0.63	0.35	2.136
20	FS4 – 45	4	100	75	0.42	0.35	1.467

2.2 Findings from the Experimental Work

In this section the results of experimental work is included, which have been extracted for comparison with the work carried out in this dissertation. The load and deflection data of the all skew slabs indicating the cracking load and ultimate load is shown in below table.

Table 3 Cracking, Ultimate Loads and Corresponding Deflections of simply supported Skew Slabs

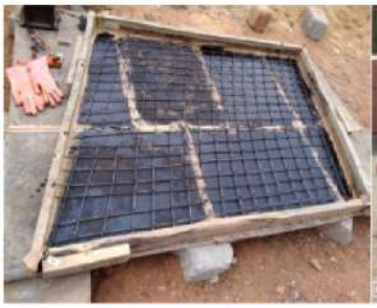
Sl. No.	Slab Id	P_{cr} (kN)	P_U (kN)	δcr (mm)	δu (mm)
1	SS – 1	34.5	138.6	5.89	36.46
2	SS – 2	27.5	114	3.74	40.03
3	SS – 3	29.5	131	3.79	41.56
4	SS – 4	32.5	142	2.41	34.16
5	SS – 1	105.1	363.5	5.03	18.32
6	SS – 2	57.9	316.5	10.80	32.01
7	SS – 3	30.8	270.4	8.3	20.12
8	SS – 4	40	242.2	4.07	16.97

The load and deflection data of the all skew slabs indicating the Working load and Yield Line Load is shown in below table.

Table 4 Working Load, Yield Line Loads and Corresponding Deflections of End restrained Skew Slabs

Sl. No.	Slab Id	P_W (kN)	P_Y (kN)	δW (mm0	δY (mm)
1	**FS1 – 15**	138.6	173.8	8.10	15.0
2	**FS2 – 15**	118.1	155.2	5.60	10.50
3	**FS3 – 15**	114.2	140.8	7.20	15.50
4	**FS4 – 15**	103.46	122.8	6.60	14.00
5	**FS1 – 30**	132.9	160.4	7.00	13.30
6	**FS2 – 30**	112.3	134.7	6.10	13.00
7	**FS3 – 30**	110.3	125.6	7.00	14.00
8	**FS4 – 30**	108.4	97.1	5.00	9.00
9	**FS1 – 45**	105.4	119.6	5.10	12.00
10	**FS2 – 45**	99.6	109.5	5.00	10.10
11	**FS3 – 45**	94.6	99.0	4.40	9.80
12	**FS4 – 45**	87.1	78.0	3.0	7.90

Some of the pictures showing the work disbursed throughout Experimental casting and testing of the Skew slabs.



Reinforcement Cage

Mould of Slabs

Casting of Slabs Curing of Slabs

Loading of Slabs

Figure 2 Experimental Working Stages of Skew Slabs

3. Modelling of Skew Slabs Using Safe Software

SAFE is software which provides an immensely capable yet easy-to-use program for structural designers, usually used to design the slabs and footing. SAFE software is easy to work and have good user interface.

SAFE software is developed by COMPUTERS AND STRUCTURES, INC. (CSI) America. Nowadays the updated version of SAFE is used to design the Slabs, Beams and foundation of reinforced and post-tensioned concrete.

For the work carried out in this dissertation, SAFE is used for modeling of Skew slabs and determining their load-deflections by considering material and geometric non-linearity. The Software version used in this dissertation work is version 12.

3.1 Steps involved in Modeling of Skew Slabs using Software

a) Model Initialization
b) Defining Material Properties
c) Slab Properties
d) CreatingSlabGeometry
e) Meshing
f) Assigning Boundary Conditions
g) Defining Loads
h) Defining Slab Reinforcement
i) Assigning Slab Reinforcement Details
j) Assigning Loads

The Material Properties are shown in below tables

Table 5

Concrete Material
Material Name: M30
Material Type: Concrete
Weight Per unit Volume: 25 kN/m^3
Modulus of Elasticity, E: 27386.12 N/mm^2
Poisson's Ratio, U: 0.2
Compressive Strength, Fck: 30 N/mm^2

Table 6 Material Properties of Rebar

Rebar Material
Material Name: FE500
Material Type: Rebar
Weight Per unit Volume: 78.5 kN/m^3
Modulus of Elasticity, E: 200000 N/mm^2
Minimum yield Stress, Fy: 500 N/mm^2
Minimum Tensile Stress, Fu: 500 N/mm^2

3.2 Steps involved in Analysis of Skew Slabs using Software

- Analysis
- Show Deformed Shape
- Show Crack Width

4. Results and Discussions

After the Analysis the results are obtained from SAFE and the following parameters are obtained and interpreted for the skew slabs

i) Deflection at Cracking Load $(\delta cr)_{SAFE}$
ii) Deflection at Ultimate Load $(\delta u)_{SAFE}$
iii) Load Deflection Plots $(P \text{ vs } \delta)_{SAFE}$

After obtaining the above parameters, comparisons have been done with the Experimental Values.

4.1 Results Obtained

The results obtained from SAFE Software are compared with the Experimental Data are shown in below tables.

Comparison of Cracking loads, Ultimate loads and corresponding Deflections of Simply Supported Skew Slabs is shown in Table 7.

Table 7 Comparison of Cracking Loads, Ultimate Loads and Corresponding Deflections of simply supported Skew Slabs

Sl.No.	Slab Id	Cracking Load	Ultimate Load	Experimental Deflection		SAFE Deflection	
		P_{cr}	P_U	δ_{cr}	δ_U	δ_{cr}	δ_U
1	SS-1	34.5	138.6	5.89	36.46	3.41	33.64
2	SS-2	27.5	114	3.74	40.03	2.2	35.38
3	SS-3	29.5	131	3.79	41.56	2.65	38.22
4	SS-4	32.5	142	2.41	34.16	3.87	43.40
5	SS-5	78.7	363.5	3.52	18.32	2.25	33.41
6	SS-6	57.9	316.5	10.8	32.01	1.48	29.07
7	SS-7	30.8	270.4	8.3	20.12	0.67	23.70
8	SS-8	40	242.2	4.07	16.97	0.87	20.40

Comparison of working loads, yield line loads and corresponding Deflections of end restrained skew slabs is shown in Table 8.

Table 8 Comparison of Working Loads, Yield Line Loads and Corresponding Deflections of End Restrained Skew Slabs

Sl.No.	Slab Id	Working Load (kN)	Yield Line Load(kN)	Experimental Deflection		SAFE Deflection	
		P_W	P_Y	δ_W	δ_Y	δ_W	δ_Y
1	FS1 – 15	138.6	173.8	8.10	15.0	29.53	38.58
2	FS2 – 15	118.1	155.2	5.60	10.50	24.203	34.81
3	FS3 – 15	114.2	140.8	7.20	15.50	23.89	32.09
4	FS4 – 15	103.46	122.8	6.60	14.00	23.25	30.51
5	FS1 – 30	132.9	160.4	7.00	13.30	19.91	26.75
6	FS2 – 30	112.3	134.7	6.10	13.00	15.63	20.83
7	FS3 – 30	110.3	125.6	7.00	14.00	15.58	19.12
8	FS4 – 30	108.4	97.1	5.00	9.00	16.52	13.40
9	FS1 – 45	105.4	119.6	5.10	12.00	4.67	6.68
10	FS2 – 45	99.6	109.5	5.00	10.10	5.006	5.40
11	FS3 – 45	94.6	99.0	4.40	9.80	3.864	4.99
12	FS4 – 45	87.1	78.0	3.0	7.90	2.914	2.06

Comparison between Experimental cracking load deflection and SAFE deflection of simply supported skew slabs is shown in Table 9.

Table 9 Comparison of Experimental and SAFE Cracking Load Deflections (δcr) of Simply Supported Skew Slabs

Sl.No.	Slab Id	Crack Width (mm)	Cracking Loads (kN)	(δcr) Experimental Cracking Load Deflection (mm)	(δcr) SAFE Cracking Load Deflection (mm)	$\frac{\delta cr\ SAFE}{\delta cr\ EXP}$
1	SS-1	0.27	34.5	5.89	3.41	**0.578**
2	SS-2	0.141	27.5	3.74	2.2	**0.588**
3	SS-3	0.198	29.5	3.79	2.65	**0.699**
4	SS-4	0.265	32.5	2.41	3.87	**1.605**
5	SS-5	0.485	78.7	3.52	2.25	**0.6392**
6	SS-6	0.241	57.9	10.8	1.48	**0.137**
7	SS-7	0.118	30.8	8.3	0.67	**0.0807**
8	SS-8	0.192	40	4.07	0.87	**0.2137**

Comparison between Experimental working load deflection and SAFE deflection of end restrained skew slabs is shown in Table 10.

Table 10 Comparison of Experimental and SAFE Working Load Deflections (δw) of End Restrained Skew Slabs

Sl.No.	Slab Id	Crack Width (mm)	Working Load (kN)	(δw) Experimental Working Load Deflection (mm)	(δw) SAFE Working Load Deflection (mm)	$\frac{\delta W\ SAFE}{\delta W\ EXP}$
1	FS1 – 15	0.358	138.6	8.10	29.53	**3.645**
2	FS2 – 15	0.312	118.1	5.60	24.203	**4.321**
3	FS3 – 15	0.318	114.2	7.20	23.89	**3.318**
4	FS4 – 15	0.380	103.46	6.60	23.25	**3.522**
5	FS1 – 30	0.574	132.9	7.00	19.91	**2.844**
6	FS2 – 30	0.688	112.3	6.10	15.63	**2.562**
7	FS3 – 30	0.671	110.3	7.00	15.58	**2.225**
8	FS4 – 30	0.727	108.4	5.00	16.52	**3.304**
9	FS1 – 45	0.377	105.4	5.10	4.67	**0.915**
10	FS2 – 45	0.350	99.6	5.00	5.006	**1.001**
11	FS3 – 45	0.336	94.6	4.40	3.864	**0.878**
12	FS4 – 45	0.535	87.1	3.0	2.914	**0.971**

Comparison between Experimental ultimate load deflection and SAFE deflection of simply supported skew slabs is shown in Table 11.

Table 11 Comparison of Experimental and SAFE Ultimate Load Deflections (δu) of Simply Supported Skew Slabs

Sl.No.	Slab Id	Crack Width (mm)	Ultimate Loads (kN)	(δu) Experimental Ultimate Load Deflection (mm)	(δu) SAFE Ultimate Load Deflection (mm)	$\frac{\delta u\ SAFE}{\delta u\ EXP}$
1	SS-1	1.143	138.6	36.46	33.64	**0.9226**
2	SS-2	0.652	114	40.03	35.38	**0.8838**
3	SS-3	1.314	131	41.56	38.22	**0.9196**
4	SS-4	1.343	142	34.16	43.40	**1.2705**
5	SS-5	1.324	363.5	18.32	33.41	**1.8236**
6	SS-6	1.633	316.5	32.01	29.07	**0.9081**
7	SS-7	2.162	270.4	20.12	23.70	**1.1779**
8	SS-8	2.007	242.2	16.97	20.40	**1.2021**

Comparison between Experimental yield line load deflection and SAFE deflection of end restrained skew slabs is shown in Table 12.

Table 12 Comparison of Experimental and SAFE Yield Line Load Deflections (δy) of End Restrained Skew Slabs

Sl.No.	Slab Id	Crack Width (mm)	Yield Line Load (kN)	(δw) Experimental Yield Line Load Deflection (mm)	(δw) SAFE Yield Line Load Deflection (mm)	$\frac{\delta Y\ SAFE}{\delta Y\ EXP}$
1	**FS1 – 15**	0454	173.8	15.0	38.58	**2.572**
2	**FS2 – 15**	0.423	155.2	10.50	34.81	**3.315**
3	**FS3 – 15**	0.446	140.8	15.50	32.09	**2.070**
4	**FS4 – 15**	0.530	122.8	14.00	30.51	**2.179**
5	**FS1 – 30**	0.641	160.4	13.30	26.75	**2.011**
6	**FS2 – 30**	0.873	134.7	13.00	20.83	**1.602**
7	**FS3 – 30**	0.837	125.6	14.00	19.12	**1.365**
8	**FS4 – 30**	0.606	97.1	9.00	13.40	**1.488**
9	**FS1 – 45**	0.394	119.6	12.00	6.68	**0.556**
10	**FS2 – 45**	0.419	109.5	10.10	5.40	**0.534**
11	**FS3 – 45**	0.352	99.0	9.80	4.99	**0.509**
12	**FS4 – 45**	0.446	78.0	7.90	2.06	**0.260**

Comparison between Experimental load-deflection curves with SAFE load-deflection curves of simply supported skew slabs are shown in Figure 3 to Figure 10

The Load-Deflection curves of the experimental work and the SAFE analysis values for all the skew slabs are plotted. With these curves we can study the behavior of the skew slabs based on the deflection for ultimate load.

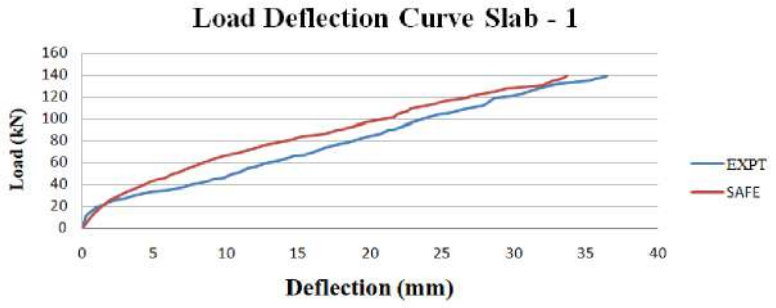


Figure 3 Load-Deflection Curve of Skew Slab (SS-1)

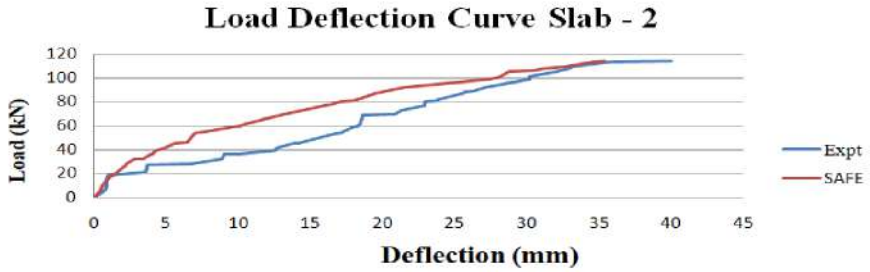


Figure 4 Load-Deflection Curve of Skew Slab (SS-2)

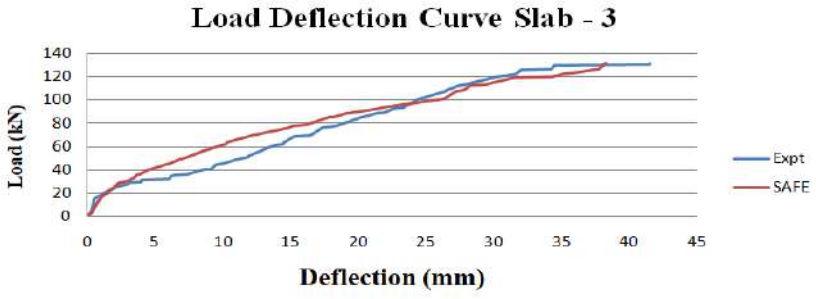


Figure 5 Load-Deflection Curve of Skew Slab (SS-3)

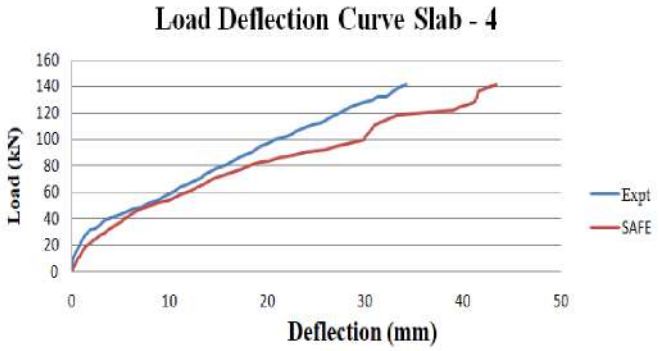


Figure 6 Load-Deflection Curve of Skew Slab (SS-4)

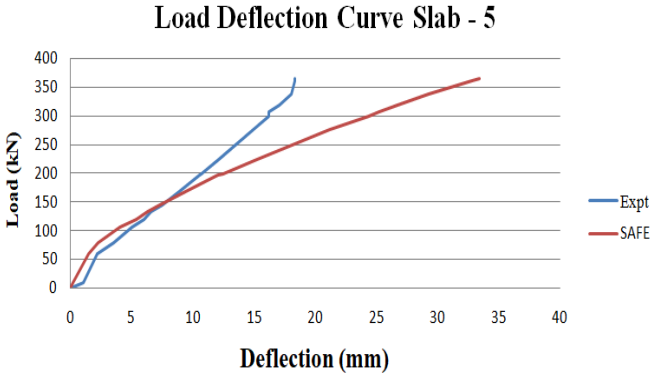


Figure 7 Load-Deflection Curve of Skew Slab (SS-5)

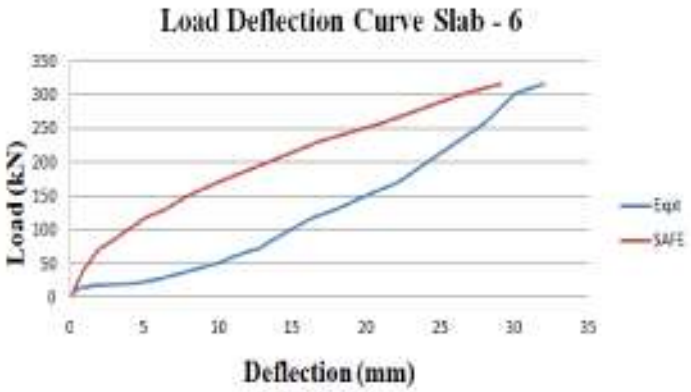


Figure 8 Load-Deflection Curve of Skew Slab (SS-6)

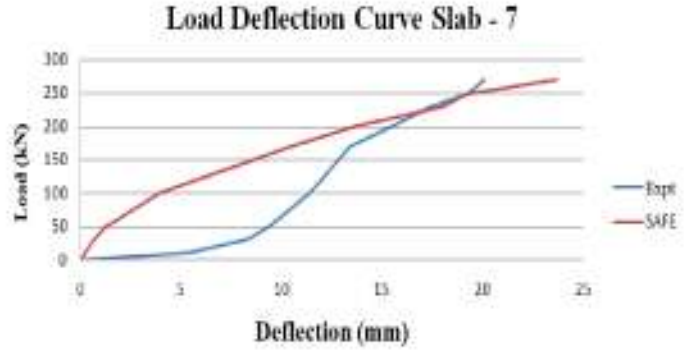


Figure 9 Load-Deflection Curve of Skew Slab (SS-7)

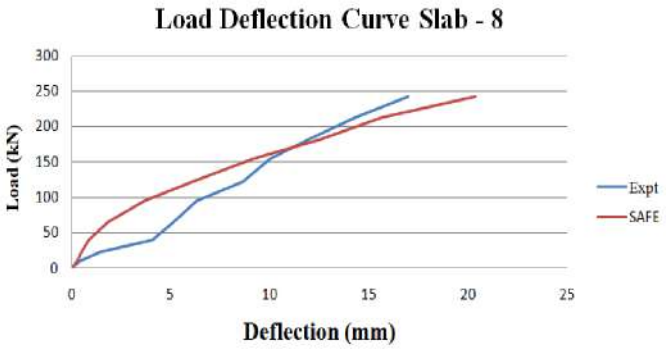


Figure 10 Load-Deflection Curve of Skew Slab (SS-8)

5. Conclusions

The following conclusions are made from the work carried out. In this study, analysis of skew slabs is done which are subjected to uniformly distributed loading, using SAFE software package. The results obtained by the SAFE software are compared with the experimental results of the skew slabs.

1. For modeling and analysis of the skew slabs SAFE software is used and the results obtained are deflections corresponding to Cracking Load, Ultimate Load, Working Load and Yield Line Load. And also corresponding Load – Deflection plots are drawn.
2. The comparison between Experimental Cracking Load Deflection and SAFE Cracking Load Deflection of simply supported skew slabs is made and the ratio of δcr(SAFE) to δcr(Experimental) for SS – 1 is found as 0.578, for SS – 2 is 0.588, for SS – 3 is 0.699, for SS – 4 is 1.605, for SS – 5 is 0.639, for SS – 6 is 0.137, for SS – 7 is 0.0807 and for SS – 8 is 0.213.
3. The comparison between Experimental Ultimate Load Deflection and SAFE Ultimate Load Deflection of simply supported skew slabs is made and the ratio of δu(SAFE) to δu(Experimental) for SS – 1 is found as 0.9226, for SS – 2 is 0.8838, for SS – 3 is 0.9196, for SS – 4 is 1.2705, for SS – 5 is 1.823, for SS – 6 is 0.9081, for SS – 7 is 1.1779 and SS – 8 is 1.2021.
4. The comparison between Experimental Working Load Deflection and SAFE Working Load Deflection of End Restrained Skew slabs is made and the ratio of δw(SAFE) to δw(Experimental) for FS1-15 is found as 3.645, for FS2-15 is 4.321, for FS3-15 is 3.318, for FS4-15 is 3.522, for FS1-30 is 2.844, for FS2-30 is 2.562, for FS3-30 is 2.225, for FS4-30 is 3.304, for FS1-45 is 0.915, for FS2-45 is 1.001, for FS3-45 is 0.878 and for FS4-45 is 0.971.
5. The comparison between Experimental Yield Line Load Deflection and SAFE Yield Line Load Deflection of End Restrained Skew slabs is made and the ratio of δY(SAFE) to δY(Experimental) for FS1-15 is found as 2.572, for FS2-15 is 3.315, for FS3-15 is 2.070, for FS4-15 is 2.179, for FS1-30 is 2.011, for FS2-30 is 1.602, for FS3-30 is 1.365, for FS4-30 is 1.488, for FS1-45 is 0.556, for FS2-45 is 0.534, for FS3-45 is 0.509 and for FS4-45 is 0.260.
6. Non-linear capability of SAFE software can be used to predict the Load-Deflection behavior of Skew slabs.
7. It is concluded that the results predicted by SAFE Software are dependent majorly on Skew angles. Therefore, it is necessary to investigate the effect of Skew angle on the Load – Deflection behavior of Skew Slabs.
8. In this study, the Load Deflection behavior predicted for simply supported slabs with Skew angle of 15° and end restrained skew slabs with Skew angle 45° are encouraging.
9. In this study, Load Deflection behavior predicted for Skew Slabs with restrained edges with skew angle 15° and 30° requires further refinements.

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.RELATIONSHIP OF SOIL PH AND MICRONUTRIENT IN AGRICULTURAL FIELDS NEAR INDUSTRIAL AREA- A CASE STUDY IN EASTERN GHATS OF INDIA

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ABSTRACT

Soil is the key element of agriculture and produces healthy crops that in turn nourish people and animals. Indeed, soil quality is directly linked to food quality and quantity. Zinc is one of the eight essential micronutrients. It is needed by plants in small amounts but yet crucial to plant development. Zinc deficiency is the most common micronutrient deficiency in crops worldwide, resulting in substantial losses in crop yield, quality, and human nutritional health problems. pH controls a wide range of physical, chemical, and biological processes and properties that affect soil fertility and plant growth. Soil pH, which reflects the acidity level in soil and will moderate the presence of zinc. If soil is acidic, micronutrients like zinc will be decreased, which directly influences the crop yield. In this study, we evaluated the correlation between soil pH to Organic Carbon and Zinc. An area of approx. 800 ha of Narasapura industrial area, Kolar (D), Karnataka, was selected. Soil parameters were tested from the samples collected upto the depth of 10 to 15 cm. By using the bivariate correlation, results showed that Soil pH is negatively correlated to organic carbon and zinc with an r-value of -0.347 and -0.193, respectively. Correlation is significant at the 0.01 level (2 tailed). This means the value will be significant if it lies between 0.001 to 0.01. This work has established a clear relationship between soil pH with selected soil properties in Agricultural soil.

Keywords: *Soil pH, micronutrient, industrial area.*

Introduction

Soil organic carbon is a measurable component of soil organic matter. Soil holds more than three times as much carbon as the atmosphere and terrestrial vegetation, thus playing an important role in global climate change and agricultural production (Lal, 2004; Li et al., 2017).Higher soil organic carbon promotes soil structure or tilth, meaning there is greater physical stability. This improves soil aeration (oxygen in the soil) and water drainage and retention and reduces the risk of erosion and nutrient leaching. Soil organic carbon is also important to chemical composition and biological productivity, including the field's fertility and nutrient holding capacity. As carbon stores in the soil increase, carbon is "sequestered," and the risk of losing other nutrients through erosion and leaching is reduced. pH also influences OC contents significantly because it regulates soil nutrient bioavailability, organic matter turnover and an array of soil processes (Kemmitt et al., 2006; Robson, Snowball & Robson, 1989). Zinc(Zn) is an essential micronutrient for plant life. The amount of zinc present in the soil depends on the parent materials of that soil. Mineral soils with low soil organic matter also exhibit zinc deficiency. Zinc is an important component of various enzymes responsible for driving many metabolic reactions in all crops. Industry plays an important role in the growth and development of a country. Industrialization enhances productivity, raises per capita income, and accelerates the pace of saving and capital formation, rapid Industrialization resulted in the development of urban centers. Process of Industrialization resulted in changes in crop pattern from traditional crops to commercial crops, supply of the agriculture labour due to rural -urban migration, conversion of rural land into urban areas and industrial land, reducing the availability of land for agriculture.

Soil pH, which reflects the acidity level in soil and will moderate the presence of zinc. If soil is acidic, micronutrients like zinc will be decreased, which directly influences the crop yield. In this concern, the study area Narasapura industrial area is selected to know the industrial effect on agricultural fields and the correlation between selected soil parameters. It is an emerging automobile industrial area, with agricultural land surrounded.Therefore, this study was

undertaken to examine the relationship between soil pH to organic carbon and zinc.

Study area and methods

The study was conducted at Narasapura industrial area, one of the largest industrial areas in Karnataka state, Kolar district, India lies between north latitude 13°06'33" to east longitude 77°59'12".The industrial area is best for Automobiles and General Industries. The general plateau surface is interrupted by several hills and peaks of varying height, particularly in the north. The terrain is completely undulating east and southeast and covered by a series of hillocks and mounds and then forms a runoff zone. Several mounds which are moderately weathered are seen around the area. The sampling sites were randomly distributed over agricultural land of the study area by considering land use and soil association maps, topography and heterogeneity of the soil type. Field data collection and soil sampling were carried out by using GPS by navigating those points. Fifty surface soil samples (0-15 cm) were collected from various agricultural lands in the month of March 2021. A single soil sample represents four to five sub-samples (replicates). The soil samples were air-dried and crushed with a wooden pestle and sieved through 600-micron sieve. The material passed through the sieve was used for the determination of various characteristics. The soil properties selected were pH, Organic carbon and Zinc. Soil pH was determined in 1: 2.5 ratios of soil in distilled water, Soil organic carbon by using the Walkley-black method and determination of zinc in soil by DTPA extraction method.

Correlation and regression analyses were carried out to detect functional relationship between soil pH and micronutrients. The data analyses were done using a statistical software package SPSS 16.0 and Microsoft Office Excel 2007.

Results & Discussions

The soil properties data sets obtained from soil analysis were evaluated using mean, standard deviation (SD) and coefficient of variation (CV) parameters and nutrient status collected from 50 locations in the study area. The descriptive statistics on soil parameters are presented in the table show that pH, OC and Zinc vary from 5.5-7.6, 0.26-2.41, 0.35-6.21 with mean values of 6.575, 0.648, 2.23. In addition, standard deviation of 0.468, 0.474, 1.495 respectively.

The coefficient of variation, which is the ratio of the standard deviation to mean expressed as a percentage, is a useful measure of overall variability. Considering CV <10% as low, 10 to 100% as moderate, >100% as high variability, OC has the largest variation compared to other parameters with 73.21%, followed by Zinc with 66.95%, and with the least variation of pH by 7.12%. (Table 1)

Table 1: Descriptive statistics of soil attributes

Soil parameters	min	max	mean	SD	CV%
pH	5.5	7.6	6.575	0.468	7.12
OC	0.26	2.41	0.648	0.474	73.21
Zn	0.35	6.21	2.23	1.495	66.95

The correlation analysis is a statistical method that determines the correlation between two variables. Here, the correlation coefficient measures the strength of the relation between two soils. The value of the correlation coefficient lies between -1 to +1 and the value "0" indicates that there is no correlation. In our study, a bivariate type of correlation is used, which is computed using Pearson Correlation Coefficient wherein it is used to calculate linear relationships between the soil properties. Pearson correlation gives the value for the correlation at a confidence interval of 95%(Table 2) .

The R-squared statistic quantifies the predictive accuracy of a statistical model. It shows the proportion of variance in the outcome variable that is explained by the predictions. It is also known as the coefficient of determination. The R^2 typically has a value in the range of 0 through to 1. A value of 0 indicates no linear relationship between the observed and predicted values. Values from 0 to 0.4 indicate it is poorly correlated, whereas 0.4 to 0.6 are moderately correlated and above 0.6 indicates significantly correlated. (Figure 1&2).

The results relating relationship between soil pH to organic carbon and Zinc is shown on the table(1-2) and figure (1-2)

Table 2: PearsonCorrelation analysis

	pH	O. C	Avl. Zn
pH	1	**-0.347****	-0.193
O. C	**-0.347****	**1**	**0.403****
Avl. Zn	-0.193	**0.403****	**1**

**** Correlation is significant at the 0.01 level (2-tailed)**

Relationship between soil pH and Organic carbon

the result relating correlation revealed that the organic carbon (r= -0.347**) were significantly and negativelycorrelated with soil pH (Table 2) This suggested that pH accounted for about 12% of the total variability inorganic carbon (Figure 1) .similarly, by the increase on pH, organic carbon decreases progressively and vice-versa In addition to this, with the increase on soil pH by one unit, organic carbon decreases by 0.35 units and vice-versa.

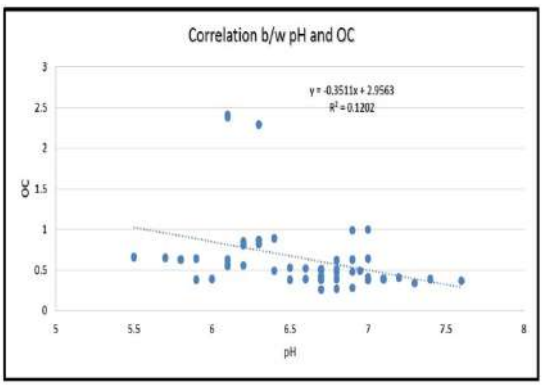

Figure.1 Relationship between Soil pH and Soil organic carbon (g kg-1)

Relationship between soil pH and Zinc

The result regarding correlation showed that the Zinc (r= -0.193) were non- significant and negatively correlated with soil pH (Table 2) . This suggested that pH accounted for about 05% of the total variability in zinc (Figure 2) .similarly, by the increase on pH, zinc decreases progressively and vice-versa in contrast to this, various researchers Sharma *et al.* (2003); Yadav (2008); Sidhu and Sharma (2010) found significant and negative correlation between soil pH and zinc.

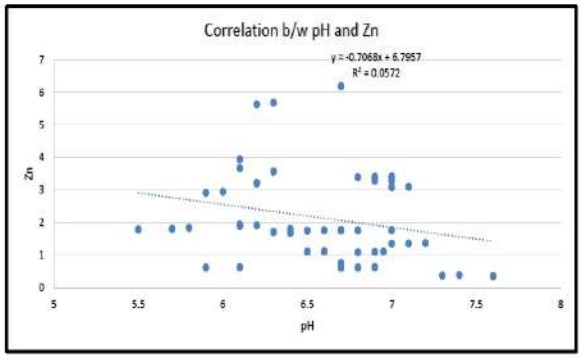

Figure.2 Relationship between Soil pH and available Zinc (mg kg-1)

Conclusion

The soil pH is a key component of soil fertility. The significant and negative correlation soil pH to organic carbon and zinc. The soils in and around Narasapura were acidic to neutral in soil reaction, low to medium in organic carbon content. With the increase on soil pH, organic carbon and zinc decreases gradually and vice-versa. Thus, the soil pH can control the availability of zinc.

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REMOVAL OF DEPOSITED SILT IN SHANTI SAGAR TANK BY SUCTION METHOD

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ABSTRACT

Shanti Sagar Tank has a history of 800 years in Channagiri taluk of Danvangere district. It is the second largest tank in Asia. Total water storage capacity of the tank is 2.67 tmcft. Water stored in the tank is supplied to number of villages nearby for various purposes. The water level of tank is reducing yearly due to evaporation, silt deposition etc. Due to large amount of silt deposition in the tank during this long period, villages were supplied the muddy water which was hard to consume. Removing the silt was challenge due to unavailable of large place for dumping. Sucking out the silt increases the capacity of the dam as much the percentage of the silt deposited. This study investigated on removal of silt deposit by Siphon dredging which results in a scour hole at appropriate place depending on applied suction head, pipe diameter, sediment mean diameter, penetration depth etc. Recording of the Hole depth ,diameter of the hole and the removed soil mass were taken. Silt is sucked through the pipe and dumped out. We can use natural energy i.e. solar energy for the whole process. Removed silt is sent to laboratories to test whether it is used for any construction purpose. If it doesn't meet the required strength, silt is treated with appropriate admixtures (lime, bentonite etc) to enhance the strength and used in road construction. This study concludes by increasing the capacity of tank to 7.7tmcft, Which can easily serve to number of villages for irrigation, drinking purpose etc. It is very useful during the drought period.

Keywords: *Increasing capacity, Silt deposition, Suction, Siphon.*

Introduction

In water Reservoirs and Shanti Sagar Tank in Chinnagiri Taluk, increasing the deposition od sediment caused the decrement of water storage in the tank and deterioration of water quality. Around 30 % of silt is deposited in the tank as the tank is very old. Removal of this silt increases 30% of tank capacity. Sand pump and bucket were the methods commonly used for silt removal purpose which requires a large power and cost. So it was necessary to develop a new efficient method for removing the sediment. Suction method or Siphonic removal method was developed. There were two Siphonic removal systems, (a) A siphon pipe was connected to the tank to suck the sediment and water by the technique of pumping water.; (b) A single siphon pipe was penetrated horizontally the tank to suck the sediment and the siphon inlet were hanged. Siphon system continuously removed the sediment from the tank using less amount of water, little power and operation and maintenance of the equipment was quite simple.

All the two types of removal system has two demerits each, First one demerits are: (a) For First system of removal required more power for the pumping purpose, (b) It required high cost because of the submergence of a covered tank and a huge separating tank in reservoir. Second type of the removal system demerits are; (a) Penetration of the siphon pipes are not easy,

(b) Sucking of water takes longer time than that of the sediment and water so it was ineffective. Siphon system continuously removed the sediment within the short time by using less amount of water due to the automatic inlet drop of the siphon pipe with the removal of sediments.

Some of the merits are i.e. it needs the less amount of power except the first removal system, first operation; Maintenance was easy and Siphon controlling were easy as it was simple structure.

Figure 1 Siphon Dredge

Shanti Sagar Tank

Figure 2 Shanti Sagar Tank

Shanti Sagar Tank has a history of 800 years and it is located in the Channagiri taluk of the Davangere District. Research tells that it is second largest tank in the Asia. This tank has 2.67 tmcft as total water storage. Water in the reservoir is supplied to various villages for the various purposes. Day by day due to evaporation and silt deposition the storage level/ water level was reducing.

Figure 3 Muddy Water in Tank

Siphon system is the most environmentally friendly solution for the problems. It has difference in the height between the inflow and outflow of side of the pipe due to which the system works. Because of the limited operational cost and low sound level, this system is highly sustainable. It can run just on one liter of fuel per day.

Siphon creates scouring hole depending on various factors; mean diameter of the silt; suction head applied; penetration depth etc. Inner sliding pipe and Sliding outer pipe were the parts of the suction section. When the Siphon sucks the sediments, outer sliding pipe is automatically dropped because of its mass and a pressure which is negative arised between both silt and flange. For the continuous and effective removal of the sediments, flange to the sediment distance is kept properly. Siphon pipe inlet is placed by rails horizontally on the bank and for the rolling movement it is placed on horizontal arm to drop the outer pipe sliding. Water is poured from the top for the first operation by opening the third valve by the close of first and second valve later it is reversed. Baffle plates; a rough screen as same as the diameter of the flange; circular flange; water jet etc are the parts of the bottom part. Screen is used for preventing the siphon by the large stone entering which causes the occlusion of the siphon. Baffle plate is used as a part in order to prevention of generation of the vortex in the pipe causing centrifugal force. By reducing the friction between the pipe wall and sediment; sand and mud is flown in the central core of the pipe. Water jet is used when the sediment is hard, clayey to break the clay for entering the water into the siphon pipe.

Figure 4 Shanti Sagar Tank

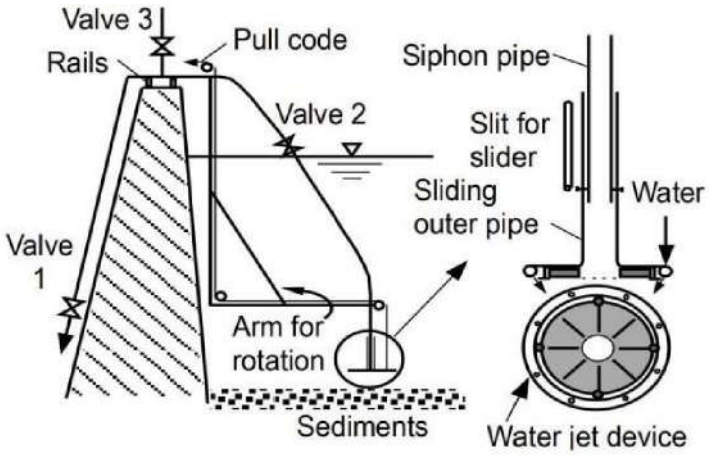

Figure 5 Siphon System

Table 1 Four Various Types of Siphon

Name of the System	Diameter (cm)	Total Length (KM)	Horizontal Length	Level Difference
Small	20&30	2.8 to 3.3	2.4	15 to 20
Medium	30&40	5.1 to 6.1	4.1	25 to 35

Table 2 Velocity of Materials

Scouring Velocity Material	Velocity m/sec
Soft earth, river mud, silt	0.08
Clay	0.15
Sand-fine	0.21
Sand Course	0.24
Fine Gravel	0.30
Pebbles (25 mm dia)	0.60
Stones (75 mm dia)	1.50
Boulders (300-450mm dia)	3.00

Calculation of Volume

Table 3 Data of Shanti Sagar Tank

Length	8.1 km (5.0 mi)
Width	4.6 km (2.9 mi)
Area of the surface	2,651 ha (27 km^2)
Depth	10 ft (3 m)
Maximum. depth	27 ft (8 m)
Length of the shore	50 km (31 mi)
Elevation of the surface	612 m (2,008 ft)

Capacity of the tank= 2.7 TMC
Calculated volume = Surface area*1000000*3.25*3.25*27
=7700062500/1000000000
= 7.7000625 TMC

Results

30% of the deposited silt is removed so that 30% Storage capacity of the tank is increased.

By desilting and excavating soil helps more area for irrigation. In Shanti sagar tank earlier capacity 6.8 TMC reduced to 2.67 TMC, this tank water is used for drinking water to Chitraduga, Channagiri. By increasing capacity, it helps for drinking water source.

Table 4 Capacities of Tank

Earlier Capacity	6.8 TMC
Reduced Capacity;	2.67 TMC
Calculated increased Capacity	7.7 TMC

Figure 6 Sediment Deposition

Conclusion

Sediments or silt deposited in the Shanti sagar tank made a huge problems like; reduction of the water storage, supply of the muddy water to the village people which is unfit for their daily needs, causing insufficient supply of water during droughts etc. Shanti Sagar tank was supplying water for many villages, so maintain the tank regularly was a big challenge and necessary.

In conclusion, Dam storage capacity is increased by the area calculation. Finally, the Dredged materials are used for various purpose. Suction method is conducted by Siphon pipes to remove the silt from the tank to increase the capacity of the tank.

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AN ANALYSIS OF AGRICULTURE SECTOR FINANCE & ITS IMPACT ON INDIAN AGRICULTURE GROWTH DOMESTIC PRODUCT

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ABSTRACT

Agriculture is a key sector of Indian economy in view of its contribution to employment and GDP. Agriculture is described as the backbone of Indian economy mainly because of the three reasons. One, agriculture constitutes large share of country's national income though the share has declined from 55 percent in early 1950s to about 25 percent in early 2000s. Two, recent census data for the year 2001 indicates that agriculture workers (cultivators and agricultural laborer) account for 58.4 percent of workforce of India. Three, growth of other sectors and overall economy depends on the performance of agriculture to a considerable extent. Looking at the Role of Agriculture in the world's economy in 2019; you can see that developed countries like the U.S.; France; Australia, agriculture sector employs less than 3% of the total population except China which employs 26.77% and Nigeria in Africa with 36.67%. India in particular employs 43.86% by 2019

Introduction of the study

Agriculture is a key sector of Indian economy in view of its contribution to Gross Domestic Product especially when you look at this during the year of 1900s. Agricultural credit plays a vital role in farming sector development and facilitates adoption of new technologies such as agricultural inputs, services and profitable markets for the produces., interest subvention scheme and directed lending by way of regulatory prescription under Priority Sector Lending guidelines. These policies along with other policy interventions at the level of Government and RBI have yielded commendable results in the field of agricultural credit. However, agricultural sector still faces challenges such as lack of capital formation, dependence of farmers especially small and marginal farmers, tenant farmers, landless laborer's and non-realization of the fair price for agricultural produce and farm loan waivers impacting credit culture and weakening state finances. Farmers not only need credit but also guidance in adopting improved methods of cultivation. Thus, it is necessary to provide such guidance and extension services along with credit. They must be taught how to use quality seeds, fertilizers, pesticides, etc. and also how to grow crops. They must also be provided marketing assistance so that they can obtain the best possible return from their produce. Only institutions like co-operative societies, commercial banks, etc can provide such guidance

Research Problem

A research problem is the main organizing principle guiding the analysis of your paper. The problem under investigation offers us an occasion for writing and a focus that governs what we want to say. It represents the core subject matter of scholarly communication, and the means by which we arrive at other topics of conversations and the discovery of new knowledge and understanding. For that reason; we have elaborated our research question as follow: "Is there a positive correlation between agriculture sector finance and Indian Agriculture GDP?".

This will help us to understand the key variables such as Agriculture, Agriculture sector, Agriculture sector Finance and Indian Agriculture GDP in particular.

During this study; we will try to verify if there is a positive correlation between these variables and we come up with conclusions; suggestions and recommendations.

Identification of Research Gap

Agricultural sector still faces challenges such as lack of capital formation, dependence of farmers especially small and marginal farmers, tenant farmers, landless laborer and share croppers on non-institutional sources of credit at higher rates, non-realization of the fair price

for agricultural produce causing farmers' distress and farm loan waivers impacting credit culture and weakening state finances. From my research point of view, I did not see any work related to the Impact of agriculture sector finance on Indian economy. This brought us to do it and find out if the related results and give our contributions; suggestions and recommendations accordingly

Literature Review

Analysis is the process of breaking a complex topic or substance into smaller parts in order to gain a better understanding of it. The technique has been applied in the study of mathematics and logic since before Aristotle (384–322 B.C.), though analysis as a formal concept is a relatively recent development. The word comes from the Ancient Greek ἀνάλυσις (analysis, "a breaking-up" or "an untying;" from ana- "up, throughout" and lysis "a loosening"). As a formal concept, the method has variously been ascribed to Alhazen, René Descartes (Discourse on the Method), and Galileo Galilei. It has also been ascribed to Isaac Newton, in the form of a practical method of physical discovery (which he did not name).

Agricultural Finance

Agricultural finance generally means studying, examining and analyzing the financial aspects pertaining to farm business, which is the core sector of India. The financial aspects include money matters relating to production of agricultural products and their disposal.

Production loans: These loans refer to the credit given to the farmers for crop production and are intended to increase the production of crops. They are also called as seasonal agricultural operations (SAO) loans or short – term loans or crop loans. These loans are repayable within a period ranging from 6 to 18 months in lumpsum.

Investment loans: These are loans given for purchase of equipment for the productivity of which is distributed over more than one year. Loans given for tractors, pump sets, tube wells, etc.

Marketing loans: These loans are meant to help the farmers in overcoming the distress sales and to market the produce in a better way. Regulated markets and commercial banks, based on the warehouse receipt are lending in the form of marketing loans by advancing 75 per cent of the value of the produce.

Agriculture Sector in Indian Economy

The Gross Domestic Product (GDP) in India was worth 2,875.14 billion US dollars in 2019, according to official data from the World Bank and projections from Trading Economics. The GDP value of India represents 2.39 percent of the world economy from Agriculture in India decreased to 5,306.26 INR Billion in the first quarter of 2020 from 6,098.83 INR Billion in the fourth quarter of 2019.

Definition of Agricultural finance

Murray (1953) defined agricultural finance as "an economic study of borrowing funds by farmers, the organization and operation of farm lending agencies and of society's interest in credit for agriculture." Tandon and Dhondyal (1962) defined agricultural finance "as a branch of agricultural economics, which deals with and financial resources related to individual farm units."

Agricultural finance can be dealt at both micro level and macro level. Macro finance deals with different sources of raising funds for agriculture as a whole in the economy. Micro-finance refers to financial management of the individual farm business units. And it is concerned with the study as to how the individual farmer considers various sources of credit, quantum of credit to be borrowed from each source and how he allocates the same among the alternative uses within the farm.

Based on time: This classification is based on the repayment period of the loan. It is sub-divided in to 3 types.

Short–term loans: These loans are to be repaid within a period of 6 to 18 months. The borrower is supposed to repay the loan from the sale proceeds of the crops raised.

Medium – term loans: Here the repayment period varies from 18 months to 5 years. The relatively longer period of repayment of these loans is due to their partially-liquidating nature.

Long – term loans: These loans fall due for repayment over a long time ranging from 5 years to more than 20 years or even more.

Table 1: The Percentage share of Gross Value Added (GVA) in India from 2011 to 2018 at Current Prices

S.No.	Sector	2011-12	2012-13	2013-14	2014-15	2015-16*	2016-17#	2017-18@
1	Agriculture, Forestry & Fishing	18.5	18.2	18.6	18.2	17.7	17.9	17.1
1.1	crops	12.1	11.8	12.1	11.2	10.6	11.1	
1.2	livestock	4.0	4.0	4.1	4.4	4.6	4.6	
1.3	forestry and logging	1.5	1.5	1.5	1.5	1.5	1.3	
1.4	fishing and aquaculture	0.8	0.9	0.9	1.0	1.0	1.0	
2	Industry	32.5	31.8	30.8	30.0	29.8	29.3	29.1
2.1	mining & quarrying	3.2	3.1	2.9	2.7	2.4	2.4	2.5
2.2	manufacturing	17.4	17.1	16.5	16.3	16.8	16.8	16.7
2.3	electricity, gas, water supply & other utility services	2.3	2.3	2.5	2.5	2.7	2.6	2.6
2.4	construction	9.6	9.2	8.9	8.5	7.9	7.4	7.4
3	Services	49.0	50.0	50.6	51.8	52.5	52.8	53.9
4	Gross Value Added at basic prices	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*: 2nd Revised Estimates (New Series) #: 1st Revised Estimates (New Series) @: Provisional Estimates

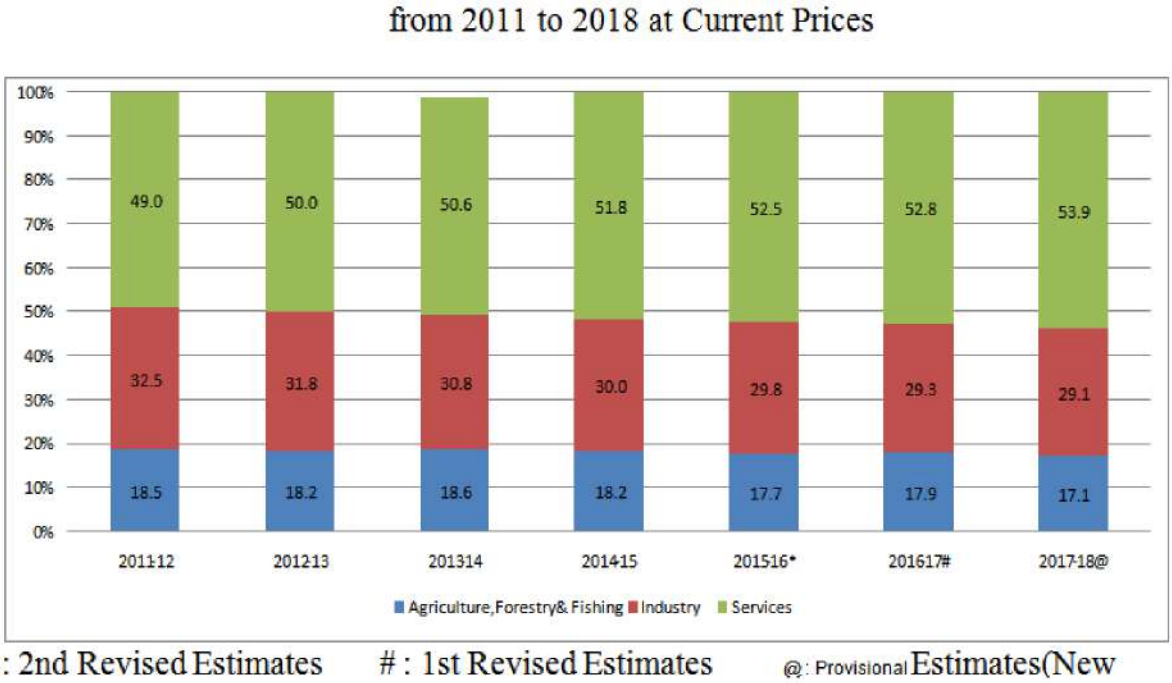


Figure 1: Graphical presentation of the Percentage share of Gross Value Added (GVA) in India

Source: Central Statistics Office

Agriculture as percentage of Agri-GDP reached its peak at 18.5 per cent in 2011-12. Thereafter, it showed a declining trend till 2015-16 where it had 17.7 percent and then a slight downward trend with 17.1 per cent in 2017-18. Hence, there is a need for the Central Government along with state governments to improve their spending towards capital expenditure which ultimately will stimulate the demand for investment credit in the agriculture sector consequently reduce the poverty by creating jobs and many other opportunities in manufacturing and services sector respectively along with these economic sectors.

Impact of Agriculture Credit Policy in India from 1951 to 2018

In order to understand the impact of policy milestones discussed above on agricultural credit and its performance with respect to agricultural GDP, the ratio of agricultural credit to agricultural GDP was computed taking into account the agricultural credit outstanding as well as disbursement. Accordingly, two-line graphs are plotted in the following chart.

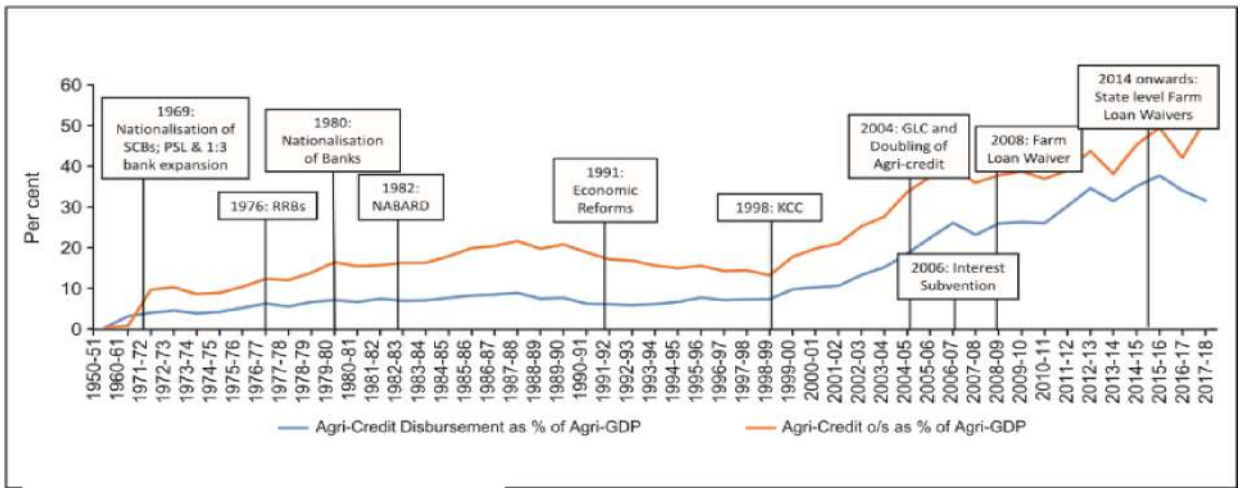


Figure 2: Direct Agriculture credit as percentage of GDP (at current price)

Source: Source: Trade economics; World Bank

The ratio of Agri-Credit outstanding to Agri-GDP jumped from 0.6 per cent in 1950-51 to 9.81 per cent in 1971-72. Post 1972, the ratio shows an upward trend up to 1987- 88 increasing to 21.76 per cent. The impressive achievement of agricultural credit against agricultural GDP during. After 1999 the ratio increased steeply and reached up to 39.55 per cent in 2006-07, which indicates that introduction of KCC was a big booster for agricultural credit and brought about a sea change in improving the reach of credit to the farming community. Many of the other policy initiatives started in 2004-05 also played an important role. In later years, despite a fluctuating trend, it rose to 49.63 per cent in 2015-16 and 51.56 per cent in 2017-18. The chart reveals that the trend of both the Agri-credit outstanding as well as disbursement as percentage of Agri-GDP are largely similar except in certain periods where there is divergence between the two. The reasons could be announcement of loanwaivers which negatively impacted the repayment behavior of the borrowers and also made the banks averse to fresh lending.

Institutional vis-à-vis non-Institutional Agricultural Credit

In the 1950s, the rural agrarian credit needs were traditionally met from the non-institutional sources largely through the local money-lenders. While the rural farmers had easy access to finance for their immediate needs, the steep interest rates, coupled with high illiteracy levels and the subsequent lack of awareness put them into a spiraling debt trap leaving them at the mercy of the money-lender. The evolution of the institutional structure through various Government policy interventions changed the scenario, whereby institutional sources, primarily through commercial banks became the major source for rural credit. The share of institutional credit vis-à-vis non-institutional credit as per AIDIS 2013 is shown in the chart below. Position for 2015 has been plotted based on NAFIS 2016-17.

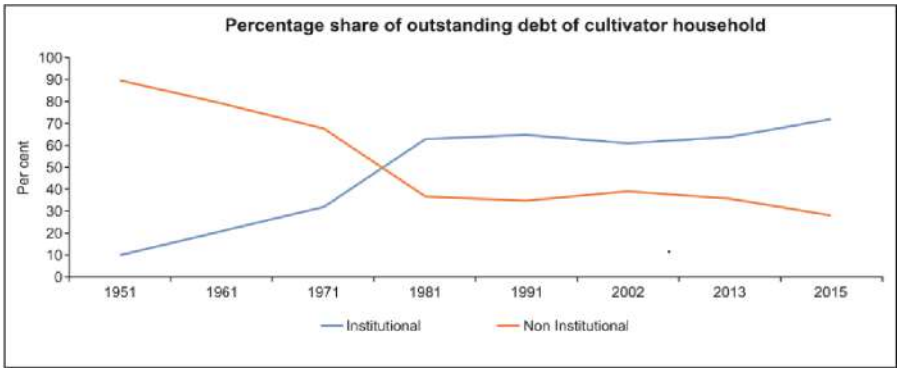


Figure 3: Percentage share of outstanding debt of cultivator household

Source: AIDS 2013 and NAFIS 2016-17.

According to AIDIS report, non-institutional sources were dominant in 1951, accounting for 90 per cent of the outstanding debt of cultivator households, but their share declined sharply to 37 per cent in 1981. After 1981, the rate of decline slowed down, and the share of non-institutional sources was 35 per cent in 1991. Thereafter a reversal of this pattern resulted in higher share of 39 per cent in 2002 which again dropped to 36 per cent in 2013.

As per NAFIS Report 2016-17, the share of non-institutional credit in 2015 was 28 per cent. As against this, the share of institutional credit in agriculture increased from 10.2 per cent in 1951 to 63 per cent in 1981 and thereafter the share of institutional credit was hovering in the range of 63-65 per cent during 1981 to 2013. As per NAFIS, in 2015 the share of institutional credit was approximately 72 per cent. Further, NAFIS Report 2016-17 has revealed that agricultural households avail credit from sources other than banks such as NBFC/MFI, financial companies, financial corporations, provident fund, insurance, relatives, friends, moneylenders, landlords, etc. The chart below shows the distribution of agricultural households according to type of sources of loans.

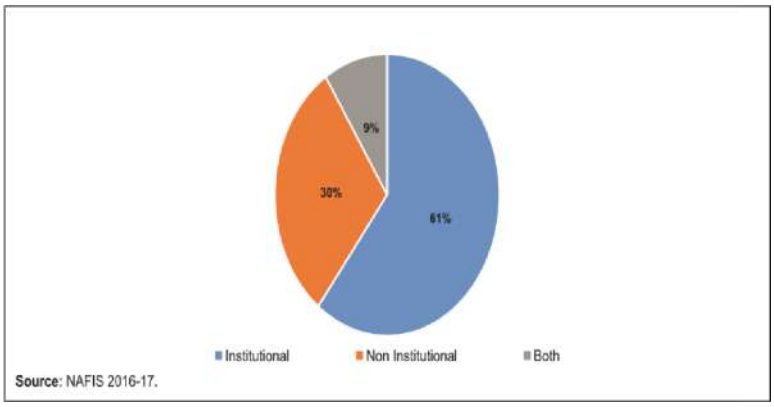


Figure 4: Distribution of agricultural households who have taken loan by source of loan
Source: Report of the Internal Working Group to Review Agricultural Credit; Date: 13 September 2019;p 6

NAFIS Report 2016-17 has revealed that agricultural households avail credit from sources other than banks such as NBFC/MFI, financial companies, financial corporations, provident fund, insurance, relatives, friends, moneylenders, landlords, etc. The chart below shows the distribution of agricultural households according to type of sources of loan According to NAFIS, institutional sources were preferred by agricultural households to avail credit as approximately 61 per cent of them avail credit from them. However, a significant portion, i.e., approximately 30 per cent of agricultural households still avail credit from non-institutional sources only which is a cause of concern. There is a need to ascertain the reasons why 30 per cent are still left out from getting institutional credit.

The probable reasons could be that their credit demand could be for consumption purposes or they could be tenant farmers, sharecroppers and landless laborers who are not able to offer collateral security to avail institutional credit, or they are involved in unviable subsistence agriculture or banks don't find them credit worthy. As a result, these farmers find it convenient to borrow money from non-institutional sources due to easy accessibility.

Research Objectives

In general, research objectives describe what we expect to achieve by a project. Research objectives are usually expressed in most used terms and are directed as much to the client as to the researcher. Research objectives may be linked with a hypothesis or used as a statement of purpose in a study that does not have a hypothesis. In other words, the reader should be able to understand the research from the objectives.

The objective of this Research is to apply business concepts and theories to real-world decision-making, increase proficiency in specific business disciplines; such as human resources management, operations

management, marketing, accounting, statistics, economics, finance, and business law and or develop and improve business skills in communication, technology, quantitative reasoning and data analytics. Coming to our topic "An Analysis of Agriculture Sector Finance and Its Impact on Indian Agriculture Growth Domestic Product "the objective is to scientifically prove if there a positive correlation between these two main variables or not.

Research Methodology

The methodology is the general research strategy that outlines the way in which research is to be undertaken and, among other things, identifies the methods to be used in it. These methods, described in the methodology, define the means or modes of data collection or, sometimes, how a specific result is to be calculated. Methodology does not define specific methods, even though much attention is given to the nature and kinds of processes to be followed in a particular procedure or to attain an objective. When proper to a study of methodology, such processes constitute a constructive generic framework, and may therefore be broken down into sub-processes, combined, or their sequence changed.

This study is causal research. It is conducted to identify the relationship between two variables such as the Impact of agriculture sector finance on Indian economy (GDP). It is also descriptive research because within this study; we will be able to answer who, what, when, where, and how kind of questions. For the success of this study; we have used the secondary data analysis method. It means that we have read books and collected information from web sites to collect data and analyze the impact of agriculture sector finance on Indian economy from 1951 to 2019 for the completion of this work. The secondary data are not only used for problem understanding and exploration but are also used to develop an understanding about the research findings. The study is based on the data collected from the Indian statistical office and World Bank about India agriculture sector finance. The secondary data have been collected from the published journal, books, magazines and websites. The data collected will be processed further with the help of the Statistical hypothesis test which will allow us to analysis technique to analyze and interpret the data in the study to arrive at meaningful conclusions. According to Census 2011, out of the total workers of 481.7 million, there are 118.7 million cultivators and 144.3 million agricultural laborers, which mean approximately 55 per cent of the total workers were employed in agriculture and allied sector. However, the percentage share of workers engaged in agriculture sector has been declining. As per Labor Bureau Report 2015-16, 46.1 per cent of the working population was employed in agriculture and allied sector. Further, as per an ILO estimate employment in agriculture sector as percentage of the total employment was approximately 44 per cent in the year 2018. Agriculture plays a significant role in the development of the Indian economy. However, the contribution of agriculture to GDP has gone down from 52 per cent in the 1950s to 30 per cent in the1990s and further below 20 per cent from 2010 onwards. The share of Agriculture & Allied GVA in overall GVA at 2011-12 prices was 14.4 per cent and at current prices was 16.14 per cent during 2018-19.

Hypothesis Formation

According to Alvesson, Mats and Jörgen Sandberg in his book'' *Constructing Research Questions: Doing Interesting Research*, 201, P 98; a hypothesis is a proposed explanation for a phenomenon. For a hypothesis to be a scientific hypothesis, the scientific method requires that one can test it. Even though the words hypothesis and theory are often used synonymously, a scientific hypothesis is not the same as a scientific theory. In statistical hypothesis testing, two hypotheses are compared. These are called the null hypothesis and the alternative hypothesis. The null hypothesis is the hypothesis that states that there is no relation between the phenomena whose relation is under investigation, or at least not of the form given by the alternative hypothesis. The alternative hypothesis, as the name suggests, is the alternative to the null hypothesis: it states that there is some kind of relation. The alternative hypothesis may take several forms, depending on the nature of the hypothesized

relation; in particular, it can be two-sided (for example: there is some effect, in a yet unknown direction) or one-sided (the direction of the hypothesized relation, positive or negative, is fixed in advance). For our research; we have taken a null hypothesis (Ho) which says that there is no a positive correlation between Agriculture Sector finance and Indian economy (GDP). In this study about "An Analysis of Agriculture Sector Finance and Its Impact on Indian Agriculture Growth Domestic Product." stated that Agriculture sector Finance does not have a positive impact on the Indian Agriculture GDP while the alternative hypothesis states the contrary. With this study we are going to prove that and give conclusion and suggestions.

Statement of the Problem

The agriculture sector is important for food security, employment generation and economic growth. In India, agriculture is the most overriding sector in the economy. The institutional lending and the institutional credit have been highly reduced. Farmers are to depend on money lenders and their indebtedness led to sell their produces below the production cost. Farmers approach banks and cannot get a loan from the bank for the main reason of holding small size of land and hence they approach money lenders and take money at a higher rate of interest and suffer.

This has pushed us to conduct this study with research problem asking as follow: "Is there a positive correlation between agriculture sector finance and Indian agriculture GDP. To answer this question, we have used secondary data collection such as reading books and reports both from Indian Statistic's office reports and world bank and carry out the correlation Test and Hypothesis Test before confirming our null hypothesis or taking alternative hypothesis which says that there is a positive Correlation of agriculture sector finance to Indian agriculture GDP

Finding Alternatives of the situation

Indian Economy is classified into three major sectors;

1. Agriculture & Allied Sector: This sector includes forestry and fishing also. This sector is also known as the primary sector of the economy. At the time of Indian independence, this sector had the biggest share in the Gross Domestic Product of India. But year by year its contribution goes on declining and currently, it contributes only 17% of Indian GDP at current prices. It is worth to mention that the agriculture sector provides jobs to around 53% population of India.
2. Industry Sector: This sector includes 'Mining & quarrying', Manufacturing (Registered & Unregistered), Gas, Electricity, Construction, and Water supply. This is also known as the secondary sector of the economy. Currently, it is contributing around 29.6 % of the Indian GDP (at current prices) in 2018-19.
3. Services Sector: Services sector includes 'Financial, real estate & professional services, Public Administration, defense and other services, trade, hotels, transport, communication and services related to broadcasting. This sector is also known as the tertiary sector of the economy. Currently, this sector is the backbone of the Indian economy and contributing around 54.3% of the Indian GDP in 2018-19.

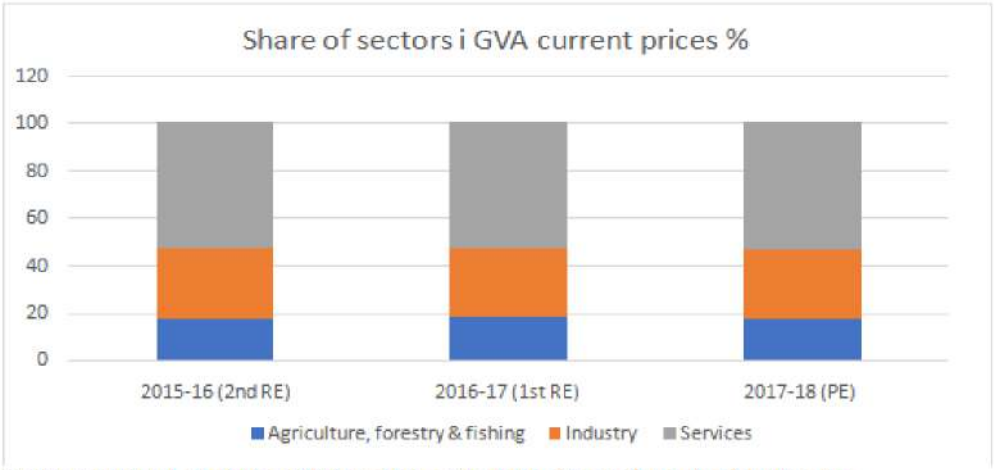
The services sector is the largest sector in India. Gross Value Added (GVA) at current prices for the Services sector is estimated at 73.79 lakh crore INR in 2016-17. The services sector accounts for 53.66% of total India's GVA of 137.51 lakh crore Indian rupees. The industrial sector contributes 29.02% with GVA of Rs. 39.90 lakh crore. While Primary Sector of the economy i.e. Agriculture and the allied sector contributes 17.32% and its GVA is around Rs. 23.82 lakh crore at the current prices in the FY 2016-17.

Let's have a look at all three sectors of the Indian economy in the FY 2017-18 at the current price. The share of various sectors in Gross Value Added (GVA) during last three years is given in the table below. (updated up to Dec. 2018).

Table 2

Share of sectors in GVA at current prices (%)				Average
Sector	2015-16 (2nd RE)	2016-17 (1st RE)	2017-18 (PE)	
Agriculture, forestry & fishing	17.7	17.9	17.1	17.6
Industry	29.8	29.3	29.1	29.4
Services	52.5	52.8	53.9	53.1

Source: Central Statistics Office;
Notes: 2nd RE: Second Revised Estimates



Source: Central Statistics Office; Notes: 2nd RE: Second Revised Estimates

Figure 5

The above table shows that the service sector is the backbone of the Indian economy; contributing the most in Indian GDP at 53% followed by the industrial sector with 29.4% where agriculture has 17.6%. But the declining percentage of the agriculture and allied sector in the Indian GDP is the cause of concern for the policymakers because this sector still provides livelihood to around 53% population of the country but its contribution to the economy is declining year by year.

Suggestive measures to overcome the problem

In order to bring the excluded agricultural households into the fold of institutional credit in a structured and sustainable manner, there is a need to build an enabling ecosystem with respect to policy interventions, institutional innovations and digital technologies. The enabling ecosystem would include digitization of land records, reforming of land leasing framework, creating a national level agency to build consensus among states and the Centre with regard to agriculture-related policy reforms and innovative digital solutions to bridge the information gap between the banks and farmers.

Co-operative credit societies should be organized to make it efficient and purposeful for delivering the best in terms of rural credit by reaching the small farmers. For that reason, these societies may be endowed with sufficient funding capacity. Reserve Bank of India should arrange sufficient fund so that long term loans can be advanced to the farmers. Moneylenders should be checked so as to declare an end to the exploitation of farmers. The Government should introduce the credit guarantee scheme so as to provide guarantee on behalf of the farmers who have a highly productive projects for getting loans in form of Farmers Guarantee Fund such as BDF called Business Development Fund in Rwanda which helps anyone especially women and youth who have good business ideas without guarantee. It is surprising to hear that in some cases farmers commit suicide especially in Maharastra.

Findings & Conclusions

Indian Agriculture GDP (at current price)

During our study: "Analysis of Impact of Agriculture sector Finance on Indian Economy (GDP) from 1950 to 2019" we have found that Agriculture sector has positively contributed to the GDP value of India year by year without decline. That was due to agriculture policies taken by Indian government to improve the

efficiency of this sector. After 1999 the ratio increased steeply and reached up to 39.55 per cent in 2006-07, which indicates that introduction of KCC was a big booster for agricultural credit and brought about a sea change in improving the reach of credit to the farming community.

Many of the other policy initiatives started in 2004-05 also played an important role. In later years, despite a fluctuating trend, it rose to 49.63 per cent in 2015-16 and 51.56 per cent in 2017-18.

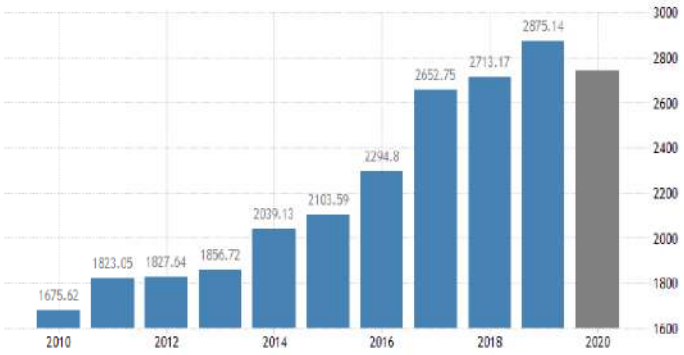


Figure 6: Agriculture GDP (at current price) from 2010 to 2020
Source: Data collected from Trade economics; World Bank

Compared to agriculture credit disbursement as shown by the curve we have found that the chart reveals that the trend of both the Agri-credit disbursement as well as the trend of Agri-GDP are largely similar. The quantum of agricultural credit can be judged from the figures of credit disbursed by all the banks at all India level.

Chart No 7**:** Quantum of agricultural credit by all the banks at all India level from to 1997 to 2019

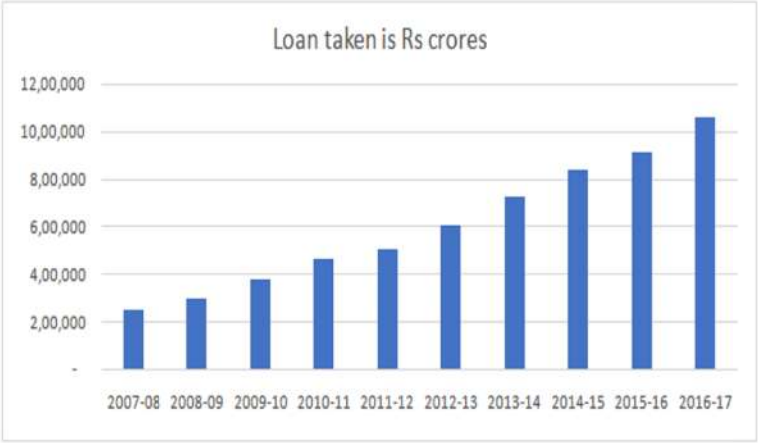


Figure 7
Source: Collected data from our research

These two above graphs show us an increasing trend. To be conclusive we must carry out a correlation test in order to confirm our research null hypothesis test [Ho] which says that there is no positive correlation between agriculture finance and Indian Agriculture GDP and reject the alternative hypothesis [H1] : which says that there is a positive correlation between agriculture sector finance and Indian Agriculture GDP. Meanwhile; if you look at the Agriculture sector stand alone with other economic sectors (services and industry); this sector has started to lose its first rank in the contribution of Indian economy (GDP) since 1975 and taken the last rank from 1997 up to 2019 in favor of services and industry consecutively. From 1976 up to 2019 the services have taken the control of Indian

economy due to the development of Information Technology. Compared to the developed countries such as USA (1.42%), China (26.77%), France (2.6%) and Egypt (24.87%) where agriculture sector employs less than 30% Indian agriculture sector employs 46%.

Suggestions

For effective modernization of agricultural sector and also to stimulate its growth pattern, a broad based and simplified rural credit structure is very much desired and important. A proper system of agricultural credit will not only lower the rate of interest but also imply a system in which productive loans will gradually replace the unproductive ones. Thus, in order to remove limitations and problems of agricultural credit in India the following measures may be suggested: Co-operative credit societies should be organized to make it efficient and purposeful for delivering the best in terms of rural credit by reaching the small farmers. For that reason, these societies may be endowed with sufficient funding capacity. Reserve Bank of India should arrange sufficient fund so that long term loans can be advanced to the farmers. Moneylenders should be checked so as to declare an end to the exploitation of farmers. The Government should introduce the credit guarantee scheme so as to provide guarantee on behalf of the farmers who have a highly productive projects for getting loans in form Farmers Guarantee Fund such as BDF called Business Development Fund in Rwanda which helps anyone especially women and youth having good business ideas without guarantee. It is surprising to hear that in some cases farmers commit suicide especially in Maharashtra. This fund is subsidized at 25% for the first time and at 50% the following rounds if the beneficiaries have performed well with the first-round agriculture loan.

Contribution of the study

Agricultural credit is one of the most crucial inputs in all agricultural development programs. For a long time, the major source of agricultural credit was private moneylenders. The financial requirements of the Indian farmers are for buying agricultural inputs like seeds, fertilizers, plant protection chemicals, feed and fodder for cattle etc. Supporting their families in those years when the crops have not been good. Buying additional land, to make improvements on the existing land, to clear old debt and purchase costly agricultural machinery. Increasing the farm efficiency as against limiting resources such as hiring of irrigation water lifting devices, labor and machinery. In addition, farmers get loans for purchase of electric motor with pump sets, tractor and other machinery, digging wells, installation of pipe lines, drip irrigation, planting fruit orchards, purchase of dairy animals, poultry, sheep and goat keeping and for many other allied enterprises. The quantum of agricultural credit can be judged from the figures of credit disbursed by all the banks at all India level

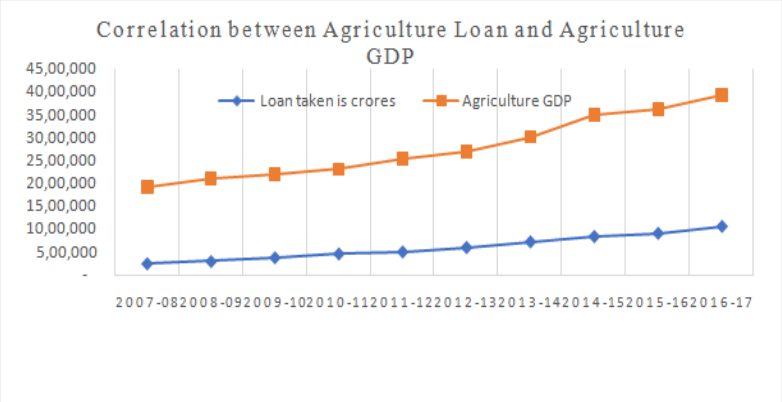


Figure 8: Correlation between Agriculture loan and Agriculture GDP from 2008 to 2019

Source: From collected Data

Looking at the graph above; it shows that the agricultural loan has progressively increased from2007 up to 2017 without decline with slow rhythm but the Agriculture GDP in crores of rupees has grown more than the loan allocated to the same economic sector.

We can say that the amount of loan disbursed to finance agriculture activities in India is still not sufficient to influence the Agriculture GDP compared to how much needed to solve the financial problems linked with this sector. Meanwhile; whatever small loan distributed over this period of time as shows the curve above has shown tremendous contribution to agricultural GDP in the Indian economy.

This brings us to carry out the statistical correlation test in order to verify the degree of correlation between Agriculture sector Finance and its contribution to the Indian Agriculture GDP from 2007 to 2017.

The agriculture sector finance is independent variable (x) while the Agriculture contribution (GDP) to the Indian economy is dependent variable (y).

$$r = \frac{n.\sum xy - \sum x.\sum y}{\sqrt{(n.\sum x^2 - (\sum x)^2).\sqrt{(n.\sum y^2 - (\sum y)^2)}}}$$

Table 3

Year	Agriculture Loan (Rs. in crore)	Agriculture GDP (Rs. in crore)			
	X	Y	X^2	Y^2	X*Y
2007-08	254,658	1,675,620	64,850,696,964	108,665,124,846,818,000	426,710,037,960
2008-09	301,908	1,823,050	91,148,440,464	166,168,164,387,895,000	550,393,379,400
2009-10	384,514	1,827,640	147,851,016,196	270,218,431,240,457,000	702,753,166,960
2010-11	468,291	1,856,720	219,296,460,681	407,172,124,475,626,000	869,485,265,520
2011-12	511,029	2,039,130	261,150,638,841	532,520,102,179,848,000	1,042,054,564,770
2012-13	607,375	2,103,590	368,904,390,625	776,023,587,074,844,000	1,277,667,976,250
2013-14	730,122	2,294,800	533,078,134,884	1,223,307,703,931,800,000	1,675,483,965,600
2014-15	845,328	2,652,750	714,579,427,584	1,895,600,576,523,460,000	2,242,443,852,000
2015-16	915,509	2,713,170	838,156,729,081	2,274,061,692,640,700,000	2,483,931,553,530
2016-17	1,065,755	2,875,140	1,135,833,720,025	3,265,680,961,792,680,000	3,064,194,830,700
TOTAL	**2,120,540**	**21,861,610**	**4,496,689,891,600**	**98,304,880,701,101,500,000**	**46,358,418,469,400**
	8,205,029	**43,723,220**	**8,871,539,546,945**	**109,224,299,170,196,000,000**	**60,693,537,062,090**

Source: Collected data from our research

$$r = \frac{n.\sum xy - \sum x.\sum y}{\sqrt{(n.\sum x^2 - (\sum x)^2).\sqrt{(n.\sum y^2 - (\sum y)^2)}}}$$

$$r = \frac{10 * 10 * 60693537062090 - (8205029 * 43723220)}{\sqrt{(88715395469450 - 67322500890841) * \sqrt{(109224299170196000000 - 19117199671}}$$

$$r = \frac{248185082547520}{4625245353 * 1045103382}$$

$$r = \frac{248,185,082,547,520}{4,833,859,561,000,080,000}$$

$$r = \quad 0.0000513430478100553$$

Based on the results of our research as shown by the correlation test between Agriculture sector finance and Agriculture contribution to the Indian Economy (GDP) there is no correlation between the two variables as the r is equal to 0.0000513430478100553.

Briefly speaking r= 0. This means that the Agriculture sector finance still face difficulties to sustain and there is much to be done within the agriculture sector finance for it to stimulate the agriculture sector production and consequently the GDP at the end. In other words; it reveals that agricultural credit in India is very much inadequate. This means that the unorganized sources of finance still remain very important in supplying credit to the farmers or the budget and policies in place to promote agriculture and agriculture finance are still insufficient. For this reason, we confirm our research null hypothesis test [Ho] saying that there is no positive correlation or no correlation at all between agriculture sector finance and Indian Agriculture GDP and reject the alternative hypothesis which was saying that ‘’There is a positive correlation between agriculture sector finance and its contribution to the Indian Agriculture GDP”.

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Annexure

1. Agricultural credit by all the banks at all India level

Year	Loan taken is crores Rupees
2007-08	254,658
2008-09	301,908
2009-10	384,514
2010-11	468,291
2011-12	511,029
2012-13	607,375
2013-14	730,122
2014-15	845,328
2015-16	915,509
2016-17	1,065,755

2. Correlation Between Agriculture Loan and Agriculture GDP

Year	Loan taken is crores	Agriculture GDP
2007-08	254,658	1,675,620
2008-09	301,908	1,823,050
2009-10	384,514	1,827,640
2010-11	468,291	1,856,720
2011-12	511,029	2,039,130
2012-13	607,375	2,103,590
2013-14	730,122	2,294,800
2014-15	845,328	2,652,750
2015-16	915,509	2,713,170
2016-17	1,065,755	2,875,140

3. Agriculture Sector Situation From 2007 to 2017

	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14*	2014-15*	2015-16*	2016-17*
Co-operative Banks	43294	40164	56946	69038	81829	102592	113574	130350	143803	131880
RRBs	21133	22413	29802	38121	47401	55957	70697	89326	101579	105001
Commercial Banks	116966	147818	189908	228391	266928	314951	364164	415736	419930	452576
Sub Total (A)	**181393**	**210461**	**276656**	**335550**	**396158**	**473500**	**548435**	**635412**	**665312**	**689457**
II. MT/LT Credit										
Co-operative Banks	4964	5802	6551	9083	6134	8611	6389	8119	9492	10878
RRBs	4179	4352	5415	6172	7049	7724	11956	13157	17681	18215
Commercial Banks	64122	81133	95892	117486	101688	117540	163342	188640	223024	347205
Sub Total (B)	**73265**	**91447**	**107858**	**132741**	**114871**	**133875**	**181687**	**209916**	**250197**	**376298**
Total Credit (ST + MT/LT)										
Co-operative Banks	48258	45966	63497	78121	87963	111203	119963	138469	153295	142758
RRBs	25312	26765	35217	44293	54450	63681	82653	102483	119260	123216
Commercial Banks	181088	228951	285800	345877	368616	432491	527506	604376	642954	799781
Grand Total (A+B)	**254658**	**301908**	**384514**	**468291**	**511029**	**607375**	**730122**	**845328**	**915509**	**1065755**

* Figures have been revised based on the updated information from the respective agencies.ST: Short Term
LT: LongTermMT: Medium Term *Source*: Department of Agriculture, Cooperation & Farmers Welfare

SMART BINS – IoT GARBAGE MONITORING SYSTEM

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ABSTRACT

This paper mainly focuses on the garbage monitoring system in real time which will result in an eco-friendly and clean environment. These days the garbage polluted areas are not being cleared in the real time even though the garbage is filled to the brim. This overflow of garbage will lead to unhygienic city. So, this paper emphasizes on how an IoT device is evolved, which gives accurate results for the real time monitoring of garbage. Here, Ultrasonic sensor, DC motor, push button, are programmed and connected to the Raspberry pi0(Broadband BCM2835SOC). The Raspberry pi0 board sends the parameter from ultrasonic which shows accurate results in the web interface. And when the garbage is filled in the system, then the authority person will be notified.

Keywords: *Ultrasonic Sensor, DC Motor, Raspberry pi0, (Broadband BCM2835SOC), PUSH Button*

Introduction

Developing countries like India face a lot of internal problems including garbage monitoring. The increase growth of Urbanization has led to a great amount of garbage. The collected garbage should be cleared from time to time but because of irregular maintenance and overflow of garbage causes air pollution and affects the human health and animals. Hence, this paper gives an idea on how a smart dustbin using an IoT device plays an important role in garbage clearing, which makes the process easier. In this paper, we have selected ultrasonic sensors which measures the amount of garbage filled in the dustbin and we have also used automatic door opening and closing mechanism which is controlled by a push button. We have also used messaging technology to inform the authority person when the garbage is filled.

So this type of sensor based on IoT device can be developed economically and can be easily understood since it has a simple working mechanism. It also gives instantaneous results and is less time consuming .Therefor, all the peripherals are programed accordingly and are connected to microprocessor such as Rapberrypi0 then the processed data will be displayed on the dashboard (IoT).

Materials

1. Ultrasonic Sensor

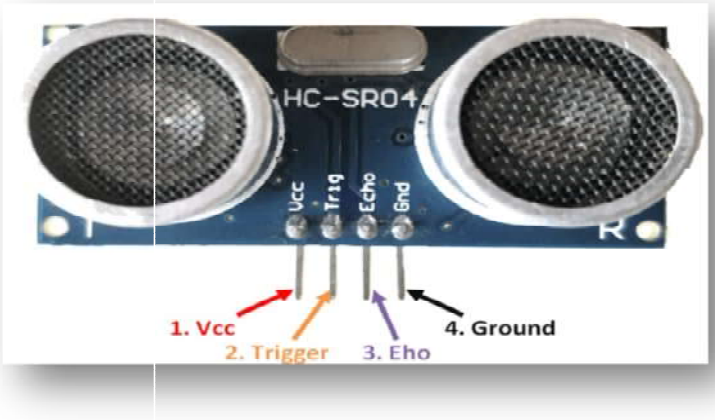

Figure 1 Ultrasonic Sensor

This sensor is used to measure the distance from the obstacle to the sensor. Sound waves are used in calculating the distance which will be transmitted from the trig. When the obstacle appears in front of the sensor, these sound waves will reach the obstacle and will be

reflected wave is receives by the receiver echo. To calculate the distance between the sensor and obstacle is given by a formula,

$$\frac{\text{Time x speed of sound waves}}{2}$$

2. DC Motor

An electric motor operated by DC (direct motor) is known as a DC motor (unlike an induction motor it operates via an alternating current).A DC motor converts DC electrical energy into mechanism energy. When kept in a magnetic field a current carrying conductor gains torque and develops a tendency to move. In short, when electric fields and magnetic fields interact, a mechanism force arises. This is the principle on which the DC motors work.

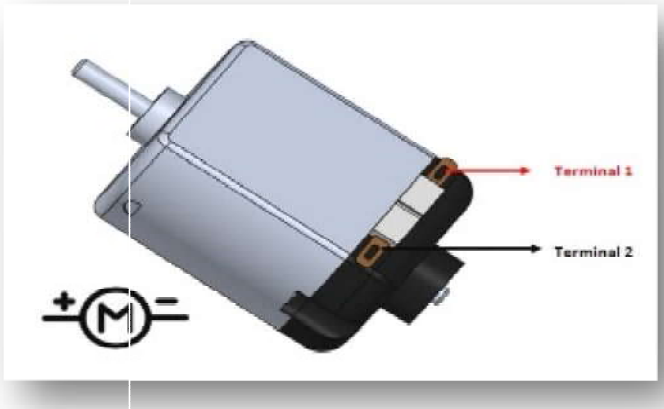

Figure 2 DC Motor

3. Push Button

Figure 3 Push Button

The push button usually allows us to hold the circuit to make any particular connections. It makes circuit connect when we hold down and breaks when rescue. Push button consists of two pins with zero polarity. Here one pin connects to GPIO and another pin connects to ground. The mechanism actuating the transition between these two states (open and close).

A switch may be directly manipulated by a human as a control signal to a system, such as a computer keyboard button, or to control power flow in a circuit, such as a light switch.

4. Raspberry pi 0

Raspberry pi0 is a single board minicomputer which is mainly designed for IoT projects. The operating system used in Raspberry pi0 is raspbian. The Raspberry Pi0 contains 40 GPIO pins, mini HDMI, micro USB, socket, and CPU with 1 GHz.

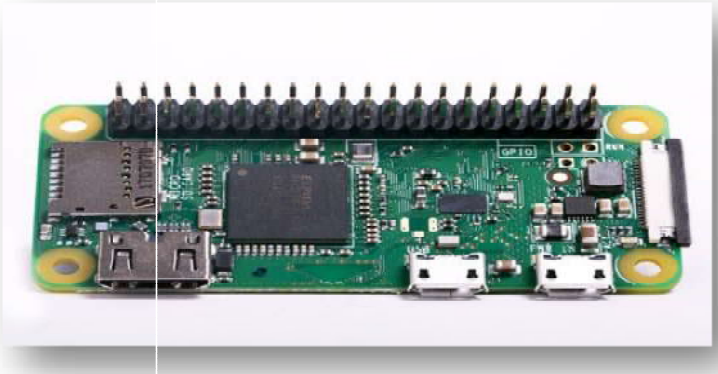

Figure 4 Raspberry pi0

Methodology

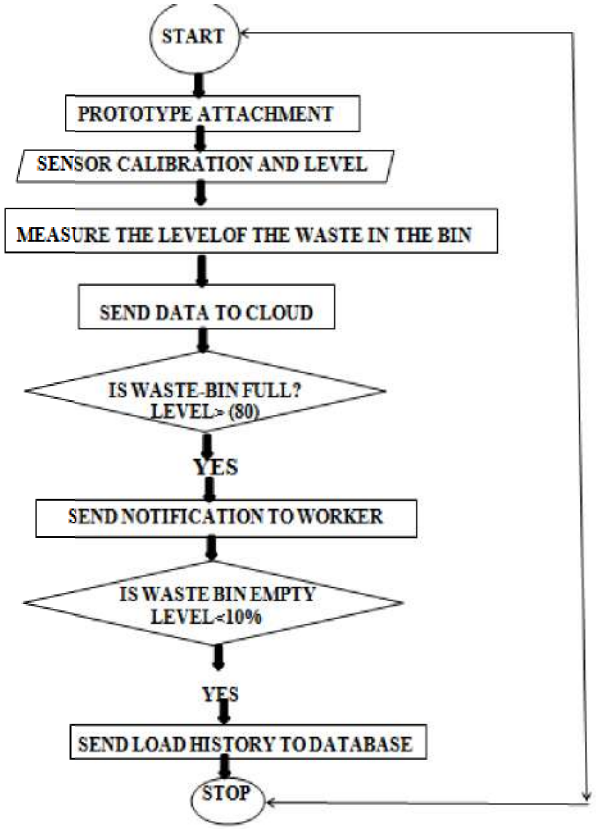

Figure 5 Programming Sequence of Sensors

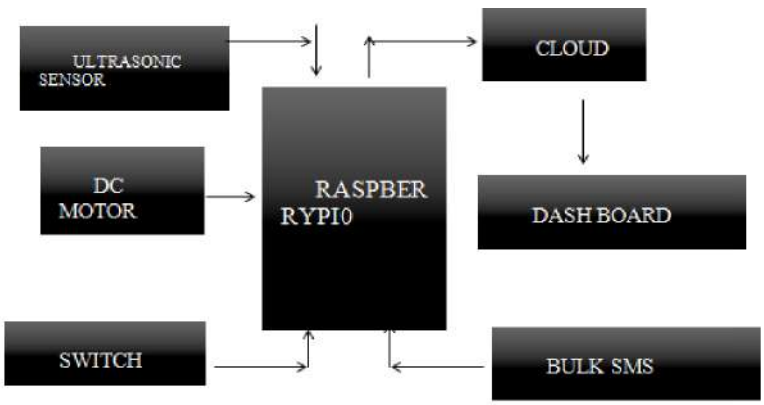

Figure 6 Connection and Working Chart of Sensors

1. An integrated program is developed to synchronize the identification system, automated lid system, microcontroller and communication system.
2. A Switch is provided for the trash users to press whenever they want to use the bin, once the switch is pressed, it signal the stepper motor attached to the lid to open the bin.
3. An ultrasonic sensor is placed inside the dustbin to detect the level of trash present in the bin.
4. A Vibrator (DC Motor) is provided in order to level off the trash in the bin in order to obtain the accurate trash level.
5. A Bulk SMS System is provided and interconnected in order to send message to the municipal authority when the trash reaches that threshold level in the bin.
6. All the above sensors are placed in the bin and the input will be sent to the microcontroller (Raspberry Pi) and the output will be uploaded to CLOUD and it is displayed through dashboard (UBIDOTS).

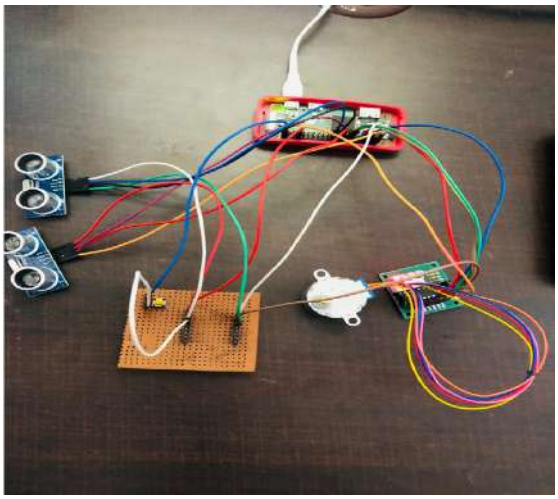

Figure 7 Sensor Based IoT Device (Project Set Up)

Benefits

1. Results with high accuracy and Consumes less time duration.
2. Real time garbage monitoring.
3. Reduces environmental pollution.
4. Save fuel and time using appropriate route planning or Route Optimization.
5. Our system offers great access to the dustbin.
6. Reduces Air pollution & mitigates other respiratory diseases.

We can achieve cleaner ecosystem as the surface water is not contaminated due to overflowing trash.

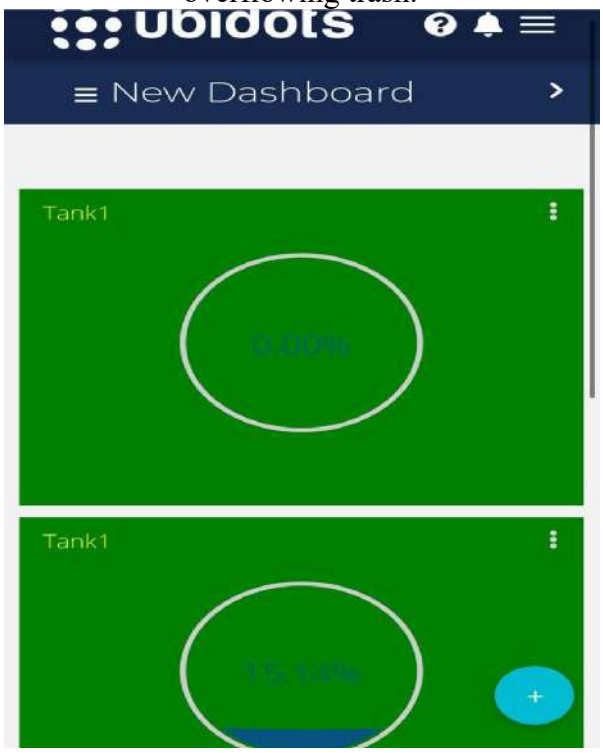

Figure 8 Test Results Obtained

The dustbin is able open with pressing of the switch with the help of stepper motor.
Ultrasonic sensor is giving the details about waste present in the bin and can be seen and monitored through IoT in UBIDOTS Website. After the message reaches the concerned municipal authority the dustbin can be emptied.

Working Priciple

Ultrasonic sensors emit short, high frequency sounds from time to time. These spread through the air at the speed of sound. When they hit an object, then they are also shown as symbols of the echo sensor, which in turn covers the target distance based on the length of time between signal output and receiving the echo

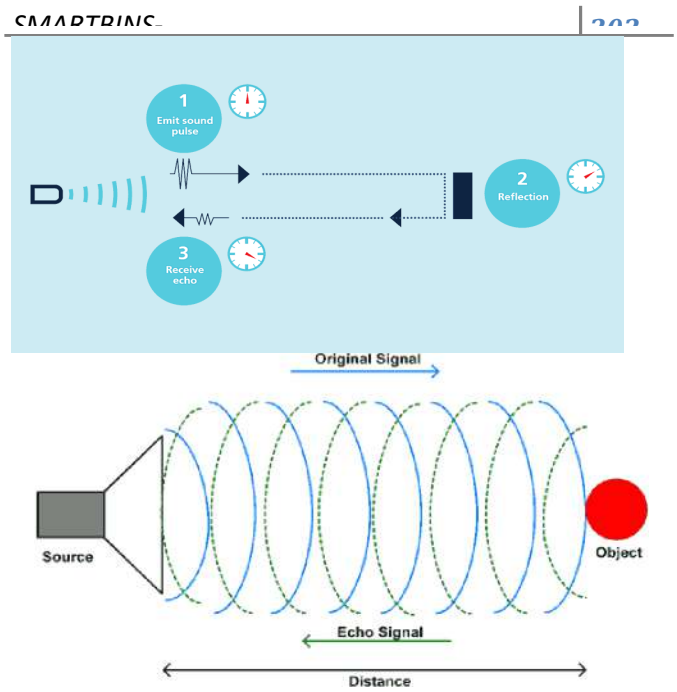

Figure 9 Working Principle of Ultrasonic Sensor

Working of Stepper Motor

The stepper motor works on the principle that the rotor is aligned with the teeth of the amusement pole in a magnetic circuit where there is little doubt. Whenever energy is used in a Truck and with a certain inclination, it produces its own magnetic field and builds its own magnetic field.

Due to the magnetic residue left on the rotor magnet poles, it will cause the rotor to move in such a position to gain less unwanted position and that is why a single set of rotor poles corresponds to a power set of stator poles. In this position, the axis of the stator's magnetic field is similar to that of an axis that passes through any of the two rotating magnetic poles.

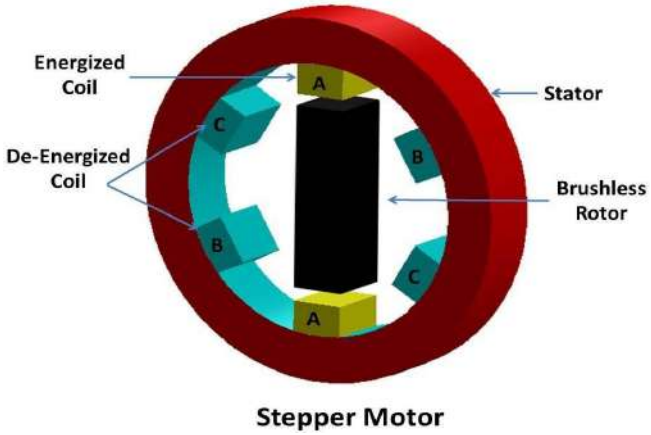

Figure 10 Working of Stepper Motor

Route Optimization

Improved solid waste collection (MSW) and resource separation is one of the major concerns in the development of the MSW management system, because existing MSW management systems meet high collection and transportation costs. In the city, various sources of waste are distributed throughout the city in a dramatic way that increases garbage collection and transportation costs in the waste management system. Therefore, a very short waste and transportation strategy can effectively reduce waste collection costs and transportation costs. In this paper, we propose an excellent MSW collection and transportation program that focuses on the problem of reducing the length of each waste collection and transportation route. We begin by creating the problem of MSW collection and transportation in a fully integrated system. In addition, we propose a heuristic solution to the problem of waste collection and transportation that can provide a better way of garbage collection and transportation. Extensive simulation and actual tested results indicate that the proposed solution could significantly improve MSW performance. The results show that the proposed system is able to reduce by more than 30% of the length of the waste collection method.

Conclusions

This project is the implementation of an automatic waste warning system using Ultrasonic Sensor, Raspberry Pi, DC Motor, Stepper Motor, switch. This system ensures the cleaning of dust bins as soon as the level of waste reaches a maximum. This reduces the total cost of the garbage truck trip and thus reduces the operating costs associated with garbage collection. Ultimately it helps to keep the community clean. Therefore, Smart bin makes collection much faster.

Future Scope

- Links between Dustbins.
- Cloud Platform and Raspberry Pi can be used for data storage and data analysis.
- Daily waste disposal can be considered.

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.STUDY OF THE COMPOSITION OF THE STEROLS OF WHEAT CHLOROPLAST RAFTS

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ABSTRACT

The qualitative and quantitative composition of wheat chloroplast raft sterols was investigated. It was found that the composition of sterols in rafts of wheat chloroplasts is represented by β-sitosterol, stigmasterol, campesterol and cholesterol. β-sitosterol and stigmasterol predominated among sterols. Sterols in rafts are present both in free and bound form, in the form of sterol esters. The amount of sterol esters (9.19 μg / mg total lipids) exceeded the amount of free sterols (8.76 μg / mg total lipids). Thus, sterols predominated in the rafts of wheat chloroplasts, which play a significant role in the ordering of fatty acid chains in the membrane. The high content of sterol esters probably reflects the mobility of rafts, since sterol esters bind inactive sterols and, if necessary, store and release free sterols and essential fatty acids.

Keywords: *wheat, chloroplasts, biological membranes, sterols, lipid rafts.*

Introduction

The biological membrane is an important multifunctional component of a living cell that performs protective, structural, transport, signaling functions. The lipid component of biological membranes is heterogeneous and very dynamic and determines the optimal functioning of cells [1]. Sterols are an important element of the lipid bilayer of biological membranes. The most important representatives of plant sterols are sitosterol, stigmasterol, campesterol, brassicasterol and their esters [2]. Currently, sterols are assigned not only a structural, but also a regulatory role. The role of sterols in stretching cells, their polarity, proliferation, in the formation of blood vessels, tissues and organs, in the development of the embryo, plant fertility, gravitropism, and hormonal signaling has been revealed [1]. It is assumed that sterols are involved in cellular signaling, being the main component of membrane microdomains, the so-called “lipid rafts” [3]. The study of lipid rafts made it possible to take a fresh look at the morphology, organization and functioning of membranes, both of animal and plant origin.

The concept of lipid rafts is that certain regions of the membrane are self-organized into cholesterol-rich “rafts” in which lipids are in another phase state, liquid-ordered. This phase state indicates that the rafts are denser than the rest of the membrane regions, and therefore freely drift in the surrounding space [4]. This direction is actively developing and is of great interest, because these structures are involved in important cellular processes (signaling, transport, apoptosis). To date, lipid rafts have been identified in many membranes of eukaryotes and prokaryotes [5]. Lipid rafts in chloroplasts have been identified recently, therefore, they are insufficiently studied [6].

It is known that chloroplast membranes are actively involved in the processes of photosynthesis [7]. The photosynthetic activity of wheat plants serves as the biological basis for the formation of the yield. In this connection, the photosynthetic apparatus of wheat leaves is one of the most studied [8].

The availability of these data will help to interpret our results. Thus, the aim of this work was to study the composition of lipid rafts sterols of wheat chloroplasts.

Materials and methods

We used spring wheat of the Novosibirskaya 29 variety. The plants were grown in a climatic chamber until the first true leaf. Growing conditions: air temperature - 22 ° C, photoperiod –16/8 day / night, illumination 300 µmol / m-2s-1. Then, chloroplasts were isolated using the method of differential centrifugation. The purity of chloroplast fractions was monitored using an inverted biological microscope (Axio observer Z1, Carl Zeiss, Germany)[9]. To obtain lipid rafts, chloroplast fractions were solubilized with 1% Triton X-100 for 30 min at 4° C, applied to a sucrose gradient of 35–25–15–5%, and centrifuged at 200,000 g for 2 h. After centrifugation in area 15% of the sucrose gradient, an opalescent zone was identified, which contains the largest amount of rafts [6]. Extraction, identification and separation of lipids were carried out according to the method [10].

Sterols were analyzed by one-dimensional TLC using a solvent system for neutral lipids: hexane - diethyl ether - acetic acid (80: 20: 1). The chromatogram was treated with a specific detector (10% sulfuric acid) and heated [10]. Sterols eluted from the plates with chloroform and ethyl acetate were silylated with hexamethyldisilazane and N, O-bis (thimethylsilyl) acetamide. The resulting trimethylsilyl sterol derivatives were analyzed using a GC – MS 7000/7890A TripleQuad gas chromatography – mass spectrometer (Agilent Technologies, USA). The volume of the injected sample is 0.02 µL. The temperature of the evaporator is 250° C, the ion source is 230° C, the detector is 150° C, the temperature of the line connecting the chromatograph with the mass spectrometer is 280° C. Scanning range 41-550 amu. A capillary column HP-5MS (30 m×0.250 mm×0.50 µm) (Agilent Technologies, USA) was used to separate the components. Stationary phase - 5% phenylmethyl polysiloxane. Temperature gradient: 2 min at 150° C, then at a rate of 10° C/min the temperature was increased to 300° C and held for 15 min. The mobile phase is helium, the gas flow rate is 1 ml/min. Split streams 5: 1. Mass spectrometer - quadrupole, ionization method - electron impact (EI) (ionization energy: 70 eV). Sterols were identified by comparing their retention times with the standards, and the NIST08 and WILEY7 mass spectra libraries [11] were also used. Quantitative analysis was performed using a calibration curve for cholesterol, campesterol, stigmasterol and ββ-sitosterol using an internal standard, which was ergosterol.

Microsoft Excel was used for statistical data processing. The experiments were carried out in at least three independent replicates. The data obtained were presented as the arithmetic mean, and the scatter of values was presented as the standard deviation (± S.D.) [12].

Results and discussion

Rafts were found in chloroplasts of wheat, as well as in chloroplasts of halophytes, in the form of an opalescent band in the zone of a 15% sucrose gradient. Then, lipids were extracted from the obtained zone and analyzed. The results of the analysis of the sterol component of chloroplasts and rafts are presented in Table 1.

Currently, sterols are one of the main classes of lipids that form lipid rafts in the membrane [13]. The presented results show that the sum of total sterols (free sterols and sterol esters) in rafts is more than 17 µg/mg total lipids, which is more than in the membranes from which they are isolated (about 15 µg/mg total lipids).

The sterine composition of plants, in contrast to that of animals and fungi, is very complex and diverse. The predominant membrane sterols of higher plants are β-sitosterol, campesterol, and stigmasterol; the presence of cholesterol has also been shown [14]. A similar spectrum of sterols is observed in the membranes of chloroplasts from wheat and rafts isolated from them. (Table 1).

Sterols in plants can be present both in free and in bound form in the form of esters, glycosides and acylated sterol glycosides. Sterol esters are found in plant cells in much smaller volumes than free sterols. Esters of sterols with fatty acids are also localized in intracellular organelles, but they do not act as a membrane stabilizer [2].

Fatty acids such as palmitic, oleic, linoleic, and linolenic were identified in the sterol esters in the leaves of the sterov tobacco mutants (over accumulation of sterols) and warty birch (Betula verrucosa) shoots[1;2]. These acids are present in the fatty acids of the total lipids of the membrane rafts of various cell organelles, including chloroplast rafts [5;6]. Perhaps in this connection, there are more sterol esters in rafts of wheat chloroplasts than free sterols (Table 1). Based on the postulate of free sterols as biological precursors of sterol esters, it can be assumed that some of the free sterols constantly transforms into a bound form, which also increases the amount of sterol esters in rafts of wheat chloroplasts. For example, there are more cholesterol and stigmasterol esters than in free form (Table 1). In chloroplast membranes, on the contrary, there are less sterol esters, which confirms the literature data [1]. It has been shown that sterol esters regulate the level of both free sterols and essential fatty acids, in different periods of ontogenesis, store and release these compounds at the necessary time, and, in addition, bind inactive sterols [2]. Apparently, these functions of sterol esters are reflected in the quantitative and qualitative composition of esters wheat chloroplast raft sterols (Table 1).

Free sterols are integral components of the membrane lipid bilayer that interact with certain molecular types of phospho- and sphingolipids. The extent of this interaction plays a functional role in the regulation of membrane fluidity and permeability. It is known that sterols have an ordering effect on the structure of biological membranes. The effectiveness of the effect of free sterols on membrane permeability is different. Cholesterol has the greatest effect, followed by campesterol, β-sitosterol and stigmasterol. There is evidence that plant sterols, especially β-sitosterol and campesterol, play a significant role in the ordering of fatty acid chains in the membrane, which can affect its permeability to water and ions, as well as the activity of membrane-bound proteins [1]. Free sterols, as in the cells of animals and fungi, in the plant cell are localized mainly in the plasma membrane. It was shown that the proportion of sterols in the membranes of various plant cell organelles is relatively small. The proportion of sterols is also small in the chloroplast membranes of halophytes, from which rafts were first isolated [12].

Detailed analysis of raft-forming plant lipids revealed the presence of sterols, including β-sitosterol, stigmasterol, campesterol, cholesterol, brassicasterol, sterol glycosides, acylsteryl glycosides, as well as two classes of sphingolipids - Glycosylceramides (GlCer) and Glycosyl Inositol Phosphoryl Ceramides (GIPCs) [1].

B-sitosterol, stigmasterol, campesterol, and cholesterol were identified in wheat chloroplasts and in wheat chloroplast rafts (Table 1). The proportion of β-sitosterol both in rafts and in the membranes themselves was significantly higher compared to other sterols. It was also noted that stigmasterol occupied a considerable percentage (14.3%) in chloroplast rafts. Previously, β-sitosterol, stigmasterol, cholesterol, as well as a number of components, the identification of which requires additional research, were also identified in the isolated rafts of chloroplasts from halophytes. However, among the detected sterols, stigmasterol dominated - 38%, the proportion of β-sitosterol was 25%, cholesterol - 6% (Nesterov V.N., personal communication). It is known that β-sitosterol, like campesterol, can regulate the fluidity and permeability of membranes by interacting with saturated alkyl chains of phospholipids and sphingolipids, limiting their mobility. In this regard, the share of this sterol in chloroplast rafts prevails. Compared to β-sitosterol, stigmasterol has an additional double bond at C22 in the side chain, which makes the alkyl chain less flexible due to the rigidity of the double bond and, therefore, affects the incorporation and placement of stigmasterol in the lipid bilayer. It has been experimentally proven that the incorporation of stigmasterol by inter-unsaturated and monounsaturated fatty acid chains leads to a lower ordering of the bilayer than the incorporation of β-sitosterol [1].

There were less free sterols in the rafts than in the membrane itself (Table 1), but this does not mean that the rafts are less dense. The density of rafts depends not only on the sterol component in lipids, but also on the amount of saturated fatty acids [3; 5; 13].

Thus, the sterol composition of wheat chloroplast rafts is represented by β-sitosterol, stigmasterol, campesterol, and cholesterol. Sterols in bound form, namely esters of sterols, predominate in rafts. Perhaps this is due to the fact that rafts are mobile structures and sterols are needed to form quickly, and sterol esters regulate the level of free sterols.

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Table 1. The content of sterols in chloroplasts and rafts of wheat chloroplasts, µg/mg of total lipids.

Sterolsname	Freesterols		Sterolesters	
	Chloroplasts	Chloroplastrafts	Chloroplasts	Chloroplastrafts
Cholesterol	0.28±0.11	0.74±0.11*	0.37±0.15	0.9±0.22*
Campesterol	0.77±0.08	0.61±0.07	0.28±0.11	0.56±0.03*
Stigmasterol	0.41±0.1	1.25±0.37*	0.19±0.05	1.83±0.62*
β-sitosterol	9.82±1.3	6.15±0.38*	3.12±1.28	5.9±0.52*
∑	11.28±1.35	8.76±0.48*	3.96±1.43	9.19±0.22*

$p \leq 0.01$* – µg/mg of total lipids

To prove the presence of significant differences in the remaining dependent groups, the Mann-Whitney U-test was used. Differences between experimental data were considered statistically significant at $p \leq 0.01$ [12].

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TO STUDY MECHANICAL PROPERTIES AND REGRESSION ANALYSIS FOR PARTIAL REPLACEMENT OF EGG SHELL AND COCONUT COIR TO CONCRETE

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ABSTRACT

The issues of sustainability are of prime concern these days as we utilize an enormous number of characteristic assets for delivering materials like construction materials. The new pattern in the construction business is to utilize the elective wellspring of construction materials which can substitute the utilization of characteristic materials to decrease environmental effect as far as energy utilization, contamination, garbage removal, and a worldwide temperature alteration. Targeting describing the conduct of concrete constructions made with eggshell powder and coconut shells are supplanted in the extents of the concrete combination. In the current work, the trial program was intended to contemplate the properties like strength and usefulness of concrete by utilizing M30 grade. This exploratory investigation comprises of testing compressive strength of three cubes and split tensile strength of three cylinders of traditional concrete and the relative cubes and cylinders are made by utilizing various extents of coconut shells replacement in coarse aggregate and replacement of eggshell powder instead of cement to discover optimum measure of eggshell powder and coconut coir in concrete.

Keywords: *Compressive Strength, Tensile Strength, Concrete, Egg Shell, Coconut Coir, Optimum Percentage*.

Introduction

The Concrete is the most generally utilized structure material. It enjoys the benefit of being framed into any ideal shape most advantageously. It is a fake stone got by blending aggregates, cement and water permitting this item to solution for solidifying. The word concrete came from Latin term CONCRETEUS, which intends to become stronger and some different properties of concrete rely upon hydration items, which keep on shaping for quite a long while. Concrete might be projected into bricks, blocks, and other generally little structure units, which are utilized in concrete construction. Concrete has an incredible assortment of utilizations since it satisfies primary needs and fits engineering treatment. Extremely significant structure components, establishments, segments, dividers, sections, and rooftops are produced using concrete. Other concrete applications are in streets, runways, bridges, and dams.

Figure 1. 1 Concrete

The idle fixings and the cement are first altogether combined as one. When the water is added, a compound response starts between the water and the cement. The response, called

hydration, makes the concrete solidify. The solidifying cycle happens through hydration of the cement by the water, not by drying out of the blend. Rather than being dried out, concrete should be kept as soggy as conceivable during the underlying hydration measure. It's fundamental fixings are cement and water which respond with one another chemically, to frame another material having the valuable strength .The strength of concrete relies on the nature of its fixings, their overall amounts and the way wherein they are blended, compacted and cured .It is feasible to create concrete of various details for different purposes by appropriately changing the extent of cement , aggregate and water. Concrete is a composite material that comprises basically of a holding medium inside which are inserted particles of pieces of aggregates. In hydraulic cement concrete, the fastener is framed from a combination of cement and water. Concrete is the head construction material across the world and the most broadly utilized in a wide range of Civil Engineering works.

Literature Review

Bandhavya G.B et all (2017) Currently India has taken a major initiative on developing the infrastructure such as express highways, power projects and industrial structure etc., to meet the requirements of globalization, in the construction of building and other structure. Concrete plays the key role and a large quantum of concrete is being utilize dinevery construction practices. The egg shell usually which are disposed, is used as an alternate for the cement since the shell is made up of calcium. An egg shell are used in different combinations to find the feasibility of using the egg shells as an alternate to cement. Egg Shell powder replaces 0%, 5%,10% and 15% of weight of cement. Concrete is cast and compressive test and tensile tests were carried out to find the best combination which results in optimum percentage of strength. Compressive strength was higher than conventional concrete for 5 % and 10% ESP replacement at 3, 7 and 28 days of curing ages. ESP replacements greater than 10 %had lower strength than conventional concrete. Split tensile strengths of ESP concretes were comparable with conventional concrete up to 15 % ESP replacement. However, concrete with 10 % and 15% ESP had lower split tensile strength than conventional concrete.

Mohamed Ansari M etall(2016), The paper describes the effect and experimental result of replacement of egg shell powder in cement. The compressive test was carried out for concrete replaced with 10%,15% and 20% of egg shell powder in Portland pozzolona cement. The results came indicates the egg shell powder can be used in replacement for cement. The results which came after carrying out all tests found successful which indicates that eggshell powder can be used as an replacement material for cement. From the result sit is proved that replacement of egg shell powder if about 10% to15% is effective and when we increase further the percentage of egg shell powder decreases the compressive strength.

DhanalakshmiM et all, In this study, the eggshell waste is used as partial replacement of cement and various properties like workability, compressive strength, split tensile strength and flexural strength were determined. Egg shell powder are varied up to 12.5% (0%, 2.5%,5%, 7.5%, 10% and 12.5%). They have concluded that compressive strength of egg shell concrete at 7 days is almost similar to control concrete mix (M40) and greater than control mix strength at 28 days. Egg shell concrete gives greater split tensile and flexural strength compared to concrete without egg shell powder.

Gowsika.D et all (2014), This paper reports the results of experiments evaluating the use of egg shell powder from egg production industry as partial replacement for ordinary Portland cement in cement mortar. The chemical composition of the egg shell powder and compressive strength of the cement mortar was determined. The cement mortar of mix proportion 1:3 in which cement is partially replaced with egg shell powder as 5%, 10%, 15%, 20%, 25%, 30% by weight of cement. The compressive strength was determined at curing ages 28 days. There was as harp decrease in compressive strength beyond 5% egg shell powder substitution. The admixtures used are Saw Dust ash, Fly Ash and Micro silica to enhance the strength of the concrete mix with 5% egg shell powder as partial

replacement for cement. In this direction, an experimental investigation of compressive strength, split tensile strength, and Flexural strength was undertaken to use egg shell powder and admixtures as partial replacement for cement in concrete. It was found that replacement of 5% Egg shell powder+20% Micro silica can be added without any reduction in compressive strength properties of conventional cement. And replacement of 5% Egg shell powder + 10% Micro silica replacement in cement yields similar flexural strength as in conventional concrete. And replacement of 5% Egg shell powder+10% Micro silica replacement in cement yields higher Split Tensile strength as compared to other composition.

Shreeshail. B. Hetall (2014), The materials chosen for structural upgradation should not pollute the environment and endanger bio reserves. They should be accessible to the ordinary people and be low in monetary cost. Coconut fiber is an abundant, versatile, renewable, cheap, fiber and more resistant to thermal conductivity. The aim of investigation is to study the possibilities to use the coconut fiber in addition to the other constituents of concrete and to study the strength properties. A literature survey was carried out, which indicates that the detailed investigation of coconut fiber concrete is necessary. In the present study the deformation properties of concrete beams with fibers under static loading condition and the behavior of structural components in terms of compressive strength for plain concrete(PC) and coconut fiber reinforced concrete(CFRC) has been studied. The compressive strength, Split tensile strength and Flexural strength has a increasing trend upto 2%. Later, strength decreased with the increase in fiber content. CFRC with 2% fiber content has higher compressive strength, Split tensile strength and Flexural strength as compared to that of PC.

Parbhane.DM et all (2014), The rising cost of construction material is a matter of concern. The reason for increase in cost is high demand of concrete and scarcity of raw material. Hence the concrete technologists are researching on alternative materials in the construction world. In this study, M 20 grade of concrete was produced by adding coconut fiber (coir). Forty five cylinders were casted and their split tensile strength and workability's were evaluated at 7, 14 and 28 days. The workability and tensile strength of concrete increased to some extent as the coir increased. Concrete produced by 1%, 2%, 3%, 4% & 5% addition attained 28 days tensile strength. The maximum strength was found to be for 2%. These results showed that Coir Fiber Concrete can be used in reinforced concrete construction. Its utilization iseco-friendly.

Materials

The materials of concrete are:

- CoarseAggregate
- FineAggregate
- Cement
- Water
- Egg Shell Powder (ESP)
- Coconut Coir(CC)

Methodology

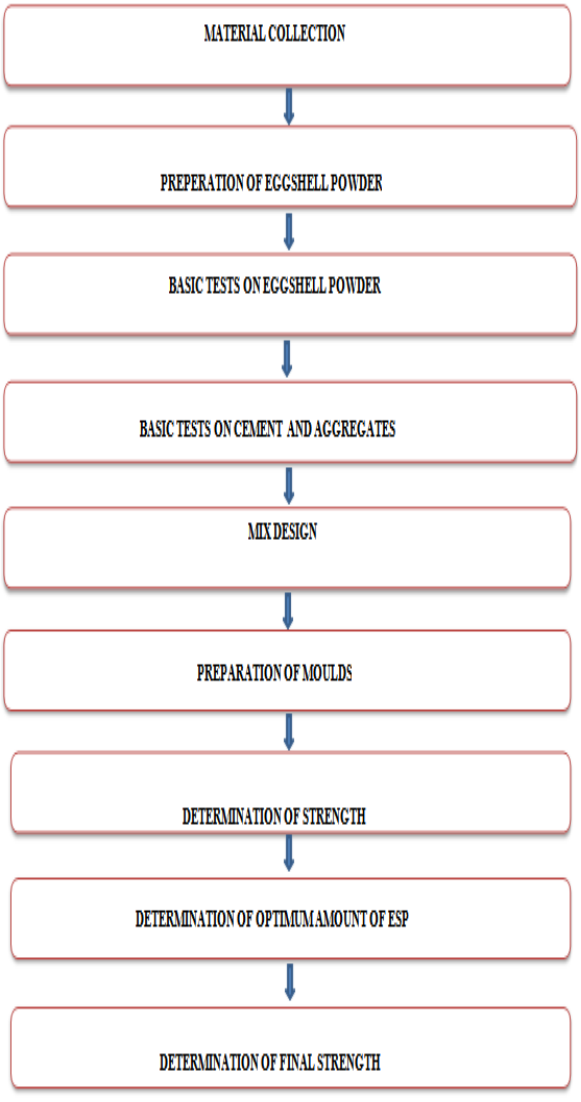

Figure 1

Testing of Basic Materials
Tests on Cement

Table 1

SL. No.	Test	Results	Requirements as per IS:12269-2013
1.	Normal Consistency	31%	Not Specified
2.	Initial Setting Time	45 min	Shall not be less than 30 minutes
3.	Final Setting Time	325 min	Shall not be more than 600 minutes
4.	Specific Gravity	3.22	Not Specified
5.	Fineness	1.8%	Should be less than 10 % of its weight

Note: Cement test Result

Tests on Coarse Aggregate Sieve Analysis

Table 2

Sl. No	Sieve Size (mm)	Cumulative Percentage Wt. Retained (C)	Percentage Passing (100-C)	Specification as per IS:383-1970(Reaffirmed 1997) for Coarse Aggregates (Percentage Passing)	
				For Single Size Aggregates	For Graded Aggregates
1.	40	-	100	100	100
2.	20	4.0	96	85-100	95-100
3.	10	83.2	16.8	0-20	25-55
4.	4.75	99.6	0.4	0-5	0-10
5.	Pan	100.0	0	-	-

Note: Specific Gravity of coarse aggregate is 2.63
Water Absorption =0.67%

Tests on Fine Aggregate
Fine Aggregate Sieve Analysis

Table 3

Sieve Size (mm)	Weight Retained (gms)	% Retained	Cumulative % Retained(C)	% Passing (100-C)
4.75	19.9	1.99	1.99	98.01
2.36	35.1	3.51	5.5	94.5
1.18	164	16.4	21.9	78.1
0.6	187.3	18.73	40.63	59.31
0.3	308.6	30.86	71.49	28.51
0.15	142.6	14.2	85.75	14.25
0.075	106.0	10.6	96.35	3.65
Pan	36.5	3.65	100	0

Calculations

- Co-efficient of uniformity (Cu) = D60 / D10 = 0.9/0.12 =7.5
- Co-efficient of curvature (Cc) = D^2 / (D1300*D60)
  =1.134
- Cc = 1.134 (between 1-3) =Well Graded
- Cu =7.5 (>7) =Sand
- Percentage of Gravel = 100- % passing from 4.75mmsieve
  = 100 – 98.01
  = 1.99%
- Percentage of silt and clay = % of sand passing through 0.075 mm sieve =3.65%
- % of sand = 100- % of Gravel - % of silt and clay
  = 100 – 1.99 -3.65
  = 94.36 %
- The fine aggregate confines to ZONE-I
- The average **specific gravity** of fine aggregate is2.6

Tests on Egg Shell Powder (Esp)

- **Finess** of ESP =2.7%
- The average **specific gravity** of Egg shell powder is 2.12

Results

Grade Conventional Concrete (0.5 w/c Ratio)

Average Compressive Strength of Conventional Concrete

The concrete cubes of M30 grade (0.5 w/c ratio) were prepared by using laboratory tap water and curing carried out by using laboratory tap water. The compressive strength test is carried out on each specimen and the results are depicted in table below:

Table 4

W/c	Curing Age(days)	Weight of Cube (Kg)	Average Compressive Strength (N/mm^2)
0.50	7	8.006	19.23
	14	8.007	31.22
	28	8.006	39.86

Note: Table Average Compressive strength of Conventional concrete

Average Tensile Strength of Conventional Concrete

The concrete cylinders of M30 grade (0.5 w/c ratio) were prepared by using laboratory tap water and curing carried out by using laboratory tap water. The split tensile strength test is carried out on each specimen and the results are depicted in table below:

Table 5

W/c	Curing Age(days)	Weight of Cube (Kg)	Average Compressive Strength (N/mm^2)
0.50	7	12.43	1.73
	14	12.32	2.23
	28	12.12	2.48

Note: Table Average Tensile strength of Conventional Concrete

M30 Grade Replaced with Egg Shell Powder (0.5 w/c Ratio)

Average Compressive Strength for Egg Shell Powder Replacement

The concrete cubes of M30 grade (0.5 w/c ratio) were prepared by using laboratory tap water and curing carried out by using laboratory tap water. The compressive strength test is carried out on each specimen and the results are depicted in table below:

Table 6

W/c	ESP	Compressive Strength of Concrete At Different Curing Ages			Weight
		7 Days	14 Days	28 Days	
0.5	5%	20.26	34.14	37.29	7.98
	10%	14.65	27.66	31.45	7.96
	15%	12.49	23.75	27.495	7.99
	20%	10.5	14.41	21.64	8.12

Note: Table Average Compressive strength for Egg shell powder replacement

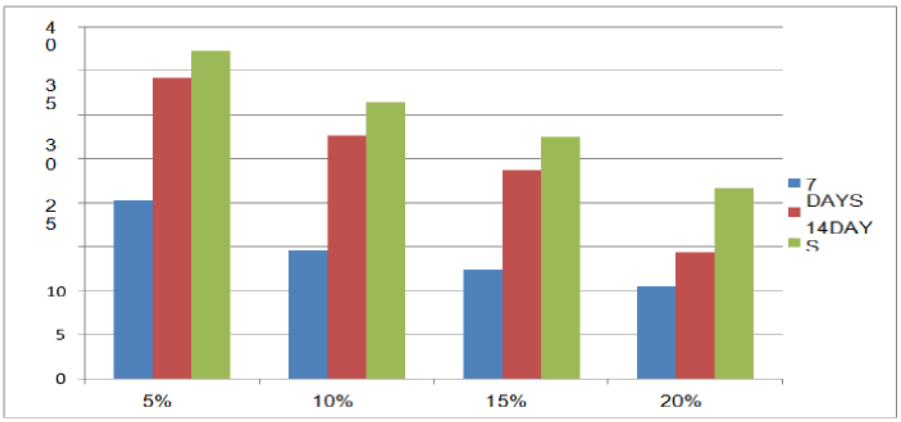

Figure 2

Note: Average Compressive strength for Egg shell powder replacement

Average Split Tensile Strength for Egg Shell Powder Replacement

The concrete cylinders of M30 grade (0.5 w/c ratio) were prepared by using laboratory tap water and curing carried out by using laboratory tap water. The split tensile strength test is carried out on each specimen and the results are depicted in table below:

Table 7

W/c	Esp	Split Tensile Strength of Concrete at Different Curing Ages			Weight
		7 Days	14 Days	28 Days	
0.5	5%	2.66	2.8	2.3	12.56
	10%	1.51	1.62	1.67	12.48
	15%	1.31	1.41	1.49	12.65
	20%	1.13	1.27	1.3	12.59

Note: Table Average Split Tensile strength for Egg Shell powder replacement

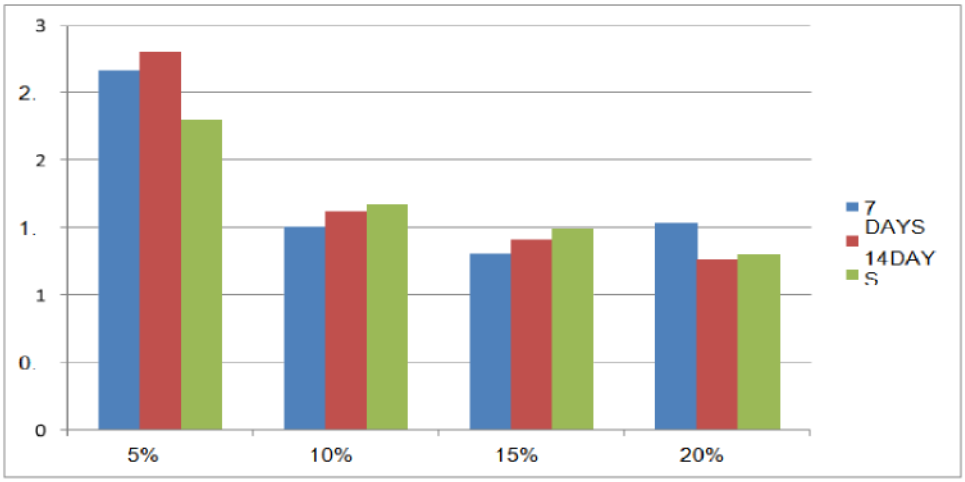

Figure 3

Note: Average Split Tensile strength for Egg Shell powder replacement

Regression Analysis

In statistical modeling, regression analysis is a set of statistical processes for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. More specifically, regression analysis helps one understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed.

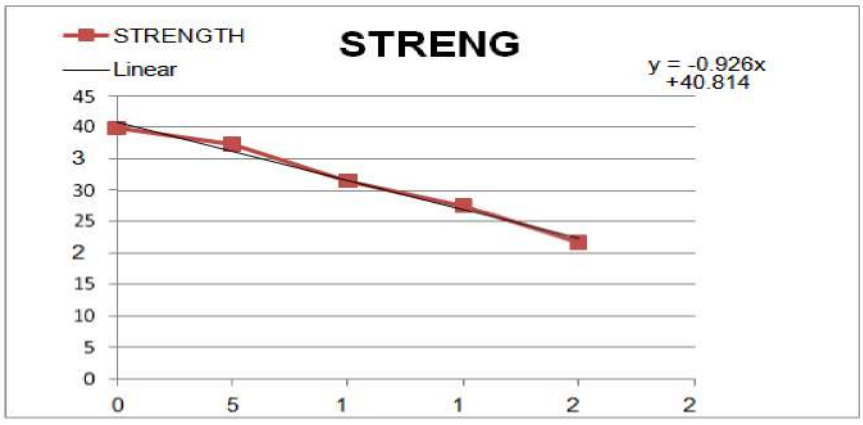

Figure 4

Note: Regression Analysis

M30 Grade Replaced with Egg Shell Powder and Coconut coir (0.5 w/c)

Average Compressive Strength for Egg Shell Powder and Coconut Coir

The concrete cubes of M30 grade (0.5 w/c ratio) were prepared by using laboratory tap water and curing carried out by using laboratory tap water. The compressive strength test is carried out on each specimen and the results are depicted in table below:

Table 8

W/C	Esp 3.43% + Cc	Compressive Strength Of Concrete At Different Curing Ages			Weight
		7 DAYS	14 DAYS	28 DAYS	
0.5	0.2%	21.23	35.09	42.85	7.85
	0.4%	22.36	36.74	44.88	8.09
	0.6%	23.21	37.36	45.59	7.65

Note: Average Compressive strength for Egg Shell powder and coconut

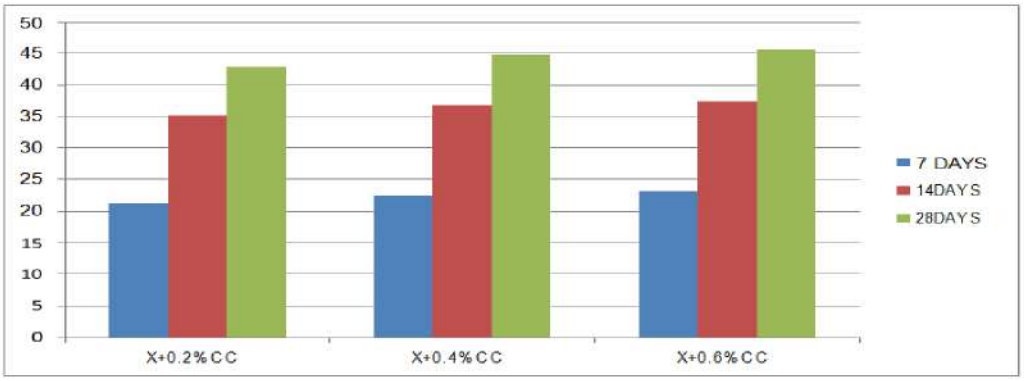

Figure 5

Note: Average Compressive strength for Egg Shell powder and coconut coir

Average Split Tensile strength for Egg Shell Powder and Coconut Coir

The concrete cylinders of M30 grade (0.5 w/c ratio) were prepared by using laboratory tap water and curing carried out by using laboratory tap water. The split tensile strength test is carried out on each specimen and the results are depicted in table below:

Table 9

W/C	Esp 2.77% + Cc	Split Tensile Strength of Concrete At Different Curing Ages			Weight
		7 Days	14 Days	28 Days	
0.5	0.2%	2.31	2.37	2.7	12.55
	0.4%	2.44	2.46	2.81	12.76
	0.6%	2.56	2.56	2.88	12.45

Note: Average Split Tensile strength for Egg Shell powder and coconut coir

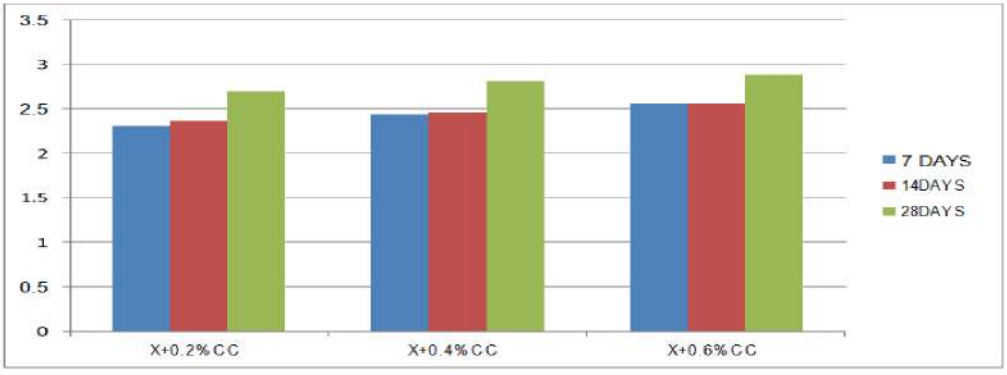

Figure 6

Note: Average Split Tensile strength for Egg Shell powder and coconut coir

Conclusion and Future Scope

- Linear Regressive analysis was done on Egg shell powder concrete and the following equation was obtained,

$$Y = -0.926X + 40.814$$

From the above equation, we get 2.77% of egg shell powder is optimum.

- It was observed that with the increase in Eggshell powder content ,the workability of the concrete reduces, however it is found that compressive strength of 5%and10% eggshell powder was comparatively lesser than that of the conventional M30 concrete in practical.
- It is found that 2.77% ESP and 0.6% CC gave greater compressive and Split tensile strength than conventional M30 concrete.
- It was observed that Egg Shell Powder forms available option as are placement for cementinous concrete and even coconut coirs be added in concrete to improve its properties.
- It is seen from the above results that beyond10% of eggshell powder addition there is drastic decrease in compressive and split tensile strength than the conventional concrete.
- Future research can be made with the addition of super plasticizers such that the work ability of the concrete increases.
- Future research can be made with an increased percentage of egg shell powder being added to concrete for higher grades of concrete so as to test its properties.
- Future research can be carried out to see other calcium based elements as a option for replacement of cement in concrete and test its properties.

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INVESTIGATION MECHANISM TOWARDS SOCIAL MEDIA ADVERTISEMENT USING GOOGLE ANALYTICS

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ABSTRACT

Current scenario has witnessed social media network websites like Facebook, Instagram, etc. emerging as an essential and cost-effective source of advertising which has significantly transformed the marketing activities of corporate by slowly replacing the conventional marketing landscapes with digital platforms. Today social media marketing, a form of digital marketing is used by many companies for promoting their products and services among the users due to its speed and easy accessibility. Many companies have started connecting on different social networks to disseminate the key information about their products, along with feedback and reviews of consumers about the products/services which enables the users to compare them in equal measure for purchasing and analysing. Ticketgoose.com is one of the online portals in India dealing with online travel booking which employs a variety of advanced and internet advertising techniques to succeed and make it successful in the computerized media Ad campaign. This research was done to examine the effect of Facebook advertising of ticketgoose.com on clients over the social media AD campaign. Totally six number of ad campaigns done by ticketgoose.com on Facebook during seven weeks which accounted for 7,09,346 impressions, 16239 clicks and 7244 purchases were selected and assessed for studying its impact on the conversion rate of visitors into consumers which was experimented using google Analytics. The study identified the parameters such as Local language preference by visitors, appeal of the post, landing page preference to mobile view, and sports related image usage that had significant positive impact on ad campaign.

Keywords: *Ad campaigns, digital marketing, digital technology, google analytics, landing page, social media marketing.*

Introduction

The new generation millennial's unending interest towards hot technologies has not only supported them but also has driven the rest to adapt themselves to sweeping changes in technology. Particularly, Information technology has brought lot of changes in the human life which has drastically increased the usage of internet users to rapidly change the entire world into a digital one. Digital technology finds its applications across all functional business management areas and particularly it has lot of contributions in the field of marketing making it digital. One of the most popular digital marketing applications in the world is social media marketing and today many businesses firms actively use social media marketing to ensure their operational efficiency. Social Media is one of the innovative tools that firm scan use today for instituting a very good relationship with the customers using virtual networks (Jan & Khan, 2014). According to Weinberg, (2009) social media marketing is understood as the process of authorising individuals to promote their brand, products, and services through online social networks and move on into a much larger community which cannot be possible through other traditional channels. Chi (2011,46) explained social media marketing as an effective tool for connecting the brands and consumers, by offering a personal channel and currency for enhancing user centered networking and social interaction. The social media have significantly transformed the tools and approaches for communicating with customers and hence the business firms need to learn about operating through social media according to the nature of their business plan (Mangold and Faulds, 2009). Hence, the companies today have started using the social media tools for different purposes. Since customers are very powerful and busy, the companies should reach them at all time and be available in all kinds of social media network channels such as Face book, Twitter, Blogs, Forums, etc. (Gordhamer, 2009). So the companies prefer to do their promotion through social media especially through Facebook to generate brand awareness and direct the traffic to their website. Also they create blogs to comment on any product-related content, use micro blog sites such as businesses or brands to browse web pages so that they can have information about their products. Furthermore,

before or after buying a product, they also exchange ideas with other consumers in online communities and social networks to change their buying decisions by being influenced by those comments and ideas. People who are familiar with the use of those products can follow the fan pages of social networking sites like Facebook and take part in the opportunities they offer to share with their favourite companies or brands by following a product introduction video on media sharing sites. Today, we can say that social networks actively used by individuals have converted into a large consumer market and that consumers are creating opportunities to communicate with businesses through these networks. Facebook the target consumers to become communicators by sharing on ads to their friends and groups where they get connected to the advertisers explicitly, sometimes making comments on the advertisements and also making those comments viral in various channels (Interactive Advertising Bureau 2009 as cited in Chu 2011, 32).

Now a days, internet communities, blogs and social networks have become important in most people's lives. As a result, social media relationships and activities have become a fun alternative communication tool to enrich the users' experience. At the same time, due to increased usage of social media, it can be regarded as a platform that affects brand-ability and consumers' purchasing decisions. People's awareness in terms of information has increased drastically due to their exposure towards these Social networking and multimedia sharing sites which have tremendous developmental changes in the communication process. Websites are used asa tool for performing marketing functions and especially social networking tools are used as a means for strengthening social and economic networks as itaids the firms to advertise and sell products/services.

The social media networks have greatly changed the consumer consumption habits by providing them with the opportunities to identify assess, choose, and buy products and services (Albors, Ramos, & Hervas, 2008). Social media users interact with each other in their network where they share their own experiences and ideas about many products and services; especially they follow the recommendations of the individuals who like their wishes and preferences, and put forward the concept of social media marketing. Purchase decisions are greatly driven by online reviews, word of mouth and the posts. A positive word-of-mouth or recommendation about a product or service of a firm is considered to ensure the strongest positive advertising outcome (Baker et al., 2016). Hence, today majority of the businesses have moved from traditional media advertising to the digital interactive mode. Curran et al. (2011) found out that one out of every thirteen individuals all over the world is a user of Facebook, which had turned out as a likely way for identifying the potential market for any firm's product or service. Hill, et.al, (2006) had explained that the firms can get highly benefitted by using social media networks to foresee the prospects of purchase intention of customers. This can be effectively implemented by examining the firm's choice of social media network and also network's data. The network's data can be assessed whether it can be used for improving a company's marketing functions since it provides it with the key information regarding network's users, which can be used for determining or formulating the relevant social media network tactics and strategies for that particular website. In this regard, the researchers were interested to determine the effect of digital marketing on consumers' purchasing intentions and their connection with their demographic characteristics. Hence this study was done to experiment the effectiveness of ad Champaign of the online portal, ticketgoose.com in Facebook

Review of Literature

Today the companies use the social networking websites such as Facebook to attract, engage and involve the customers in maintaining a good relationship with them. The employees of the companies are also encouraged to use relevant social and professional networking websites such as LinkedIn. According to Lipsmanet al., (2012), the firms could enhance their brand by communicating with the friends and groups of their existing customers through

social networks so that they can improve their understanding about people.

Ramsunder, (2011) aimed to examine the impact of marketing and promotions of firms on customers' purchase through online social media networks. He found out that 33 % of the respondents were using internet to browse the social media sites. Further the social marketing methods should also be used in association with older media channels in order to provide the most inspiring experience to their customers.

Today the online firms are promoting online social communities that motivate their customers to write reviews, rate others reviews about the products/services, and also to share their experiences regarding usage of products and purchase using the online. This resulted in a positive perception towards companies' products and further increased of confidence to purchase them. The interactions and relationships developing within a group facilitate methods for exchanging and sharing brand experiences with others. These methods or mediums include the online social websites and blogs such as Facebook, Twitter, YouTube, Instagram, Pinterest, Reddit, Tumblr, etc. (Kim, 2007).

Ghania Bilal et al.,(2014) explored that media and social networking has a significant impact on the process of consumer decision making. Social networks had developed a positive impact on consumer behaviour and also a positive people interaction with virtual community which can help companies to improve the awareness about their brands. Further it also serves as an opportunity for small business firms to improve their business with unique product and services.

The firms can use social media and social networks to maximise input and knowledge about their customers so that the further decisions could be taken to improve the process of Customer Knowledge Management. Hence they can use various Social networking sites including Facebook, Twitter, LinkedIn, MySpace, Meeting Up etc. to improve their strategic position to deal with current global business competition (Chua and Banerjee, 2013).

Simkin, L., & Dibb, S. (2013) studied about SME brand awareness and digital marketing. They offered inputs on the mistakes and the suggestions as to how to reinvent the marketing strategy of the company. Woo-Gon Kim Seo Ah Park (2017) confirmed in Hubsport.com that 92 % of marketers took part in social media campaigns and it was very much necessary for its business operations. This led to an increase in website traffic and hence their customer count increased. In turn there was greater brand recognition.

Statement of the problem:

Today the world has become very shorter due to the application of Information Technology (IT). Many services are offered by the field of IT especially internet which is used by almost all people today throughout the world in their day to day life for doing most of their operations. Especially today many are using the social media for interacting with their friends and groups which proves to be a major source for connecting a large mass of people. Hence today many companies have started promoting their products and services through online social media and of course everyone want know about the performance of their advertisements. But the measurement of effectiveness of online advertisement is very difficult because the measurement mechanism is not strong enough. Hence the researchers decided to select the online ad campaign effectiveness assessment as their research problem. Ticketgoose.com, an online portal which is involved in online ticket booking for bus, hostel and flight was selected for the study. The researchers decided to experiment the performance of advertisements posted byticketgoose.com in Facebook.

Objectives of the Study

This research study was conducted with following objectives:

1. To analyse key factors on user traffic towards social media advertisement with special reference to Facebook Ad manager (ticketgoose.com).
2. To examine the effectiveness of the advertisement for the selected ads of ticketgoose.com.
3. To analyse the user's engagement by enhancing the Landing page and marketing campaign.

Hypothesis of the study

H1: The Facebook publicizing affects the expectation to-buy among online clients.
H2: The Demographic variables affect the expectation to-buy inferable from Facebook promoting.
H3: The Appeal attributes of online clients affect the buying due to Facebook publicizing.
H4: The Landing Page content and Appeal influence increase the users' intent to purchase.

Scope of the study

The study focuses on the effectiveness of selected advertisements done by ticketgoose.com on Facebook. However this study analyse the maximum conversion rate which will be helpful to the online portals in formulating their marketing strategies.

Research Methods And Data

The present study's research design is descriptive in nature. The principal reason for the examination is to experiment how online media is affecting shopper conduct. The experiment was conducted using selected advertisements of tickectgoose.com using Facebook Ad Manager to compare and analyse the Ad manager data efficiency.

Samples

This study used both primary data and secondary data. A judgemental sampling approach adopted for selecting ads with the support of Ad Managers. The sample gathered from the expertise of Facebook Ad manager Data insights of the advertisement for ticketgoose.com for three continuous ad campaign during the period of 5 months from 3rd may 2019 to 3rd October 2019 and the data includes "Bid Rate", "Budget", "Impression", "Clicks", "Visits", "Purchase", "Cost", "User", "New User", "Session", "Bounce rate", "Desktop Purchase" and "Mobile Purchase".

Data Analysis And Interpretation

The Ad campaign was performed in Facebook for the promotional activity to generate brand awareness for Ticketgoose.com. The major goal of the Ad campaign is to traffic Facebook users to enhance the intention to purchase free mobile Application. Each Facebook Ad campaign was performed for an average period of 45 days and was monitored with interval of every week to augment the Campaign property to bring the best result for the performance.

Facebook Advertisement Insights:

Figure 1: Ad Campaign – 1 (English post)

Ad campaign property: Goal – 5000 App Purchase; Age Group – 18 to 45 Years; Gender -Both
Male and Female; Geographic Area – Major cities of Tamilnadu, India including Chennai, Coimbatore, Salem, Madurai, Trichy, Thanjavur, Erode and Tuticorin.
Audience - Interests: The audience interest include, PC Gamer, Online casino, Cricket, Sports betting, Indian Premier League, Games, Roulette, Fantasy sport, Online gambling, Mobile game, Fantasy cricket, Sports, Hardcore Gamer, Dream 11, Sports games, PC game, Poker or Video games.
Behaviours: Facebook access (mobile): All mobile devices, Apple (iOS) devices, Android devices, new smartphone and tablet users or Console gamers, Employers including Fantasy, PC Gamer or Gamer. The Ad campaign was performed during the period from 03-05-2019 to 21-06-2019.

Table 1: Weekly Analysis of Ad campaign - 1

Period	Bid Rate	Budget	Impression Frequency	Clicks Frequency	Visit Frequency	Purchase Frequency	Cost
Week 1	2.00	2000	58562	1384	378	336	1967.27
Week 2	2.00	2000	126618	2866	849	726	1989.63
Week 3	2.00	2000	194674	4348	1320	1116	1892.54
Week 4	2.00	2000	268771	5935	1882	1570	1997.38
Week 5	2.00	2500	349722	7633	2573	2085	2378.89
Week 6	2.00	2500	438730	9441	3456	2961	2487.92
Week 7	2.00	2500	536223	11321	4435	3019	2492.56

Source: primary data

The Ad campaign was considered to be a failure, since it could not meet its pre-set goals. The Assumption Factors involved include, Bid rate, content, Language and Appeal of the Post. The conversion rate was only 2.11% (Average for a Purchase Facebook Ad campaign).

Figure 2: Ad Campaign – 2 (Tamil post 1)

Ad campaign property: Goal – 7000 App Purchase; Age Group – 18 to 45 Years; Gender -Both Male and Female; Geographic Area – Major cities in the state of Tamilnadu, India.
Audience - Interests: Audience interest include, PC Gamer, Online casino, Cricket, Sports betting, Indian Premier League, Games, Roulette, Fantasy sport, Online gambling, Mobile game, Fantasy cricket, Sports, Hardcore Gamer, Dream 11, Sports games, PC game, Poker or Video games.
Behaviours: Facebook access (mobile): All

mobile devices, Apple (iOS) devices, Android devices, new smart phone and tablet users or Console gamers, Employers including Fantasy, PC Gamer or Gamer. The Ad campaign was performed during the period from 22-06-2019 to 12-08-2019.

Table 2: Weekly Analysis of Ad campaign – 2

Period	Bid Rate	Budget	Impression Frequency	Clicks Frequency	Visit Frequency	Purchase Frequency	Cost
Week 1	2.00	2000	96951	1901	1614	766	1982.42
Week 2	2.00	2000	188920	3664	3081	1552	1987.78
Week 3	2.00	2000	280889	5428	4548	2338	1990.92
Week 4	2.00	2000	378345	7501	6093	3204	1990.97
Week 5	3.00	2000	480795	10750	7682	4125	1991.41
Week 6	3.00	2000	590638	14981	9350	5138	1994.92
Week 7	3.00	2000	709346	16239	11079	7247	1997.89

Source: Primary Data

The Ad campaign was considered to be successful as the purchase number has reached more than the assigned goal. However, bit rate was modified for assessing the attractiveness of advertisement and also measured the click frequency. The conversion rate was increased to 2.76 % where it could be assumed as a new property based on geographical Language and Geography location, The Landing page of the of the user direct is modified to user friendly in order to increase purchase conversion.

Figure 3 - Campaign – 1 (Tamil post 2)

Ad campaign property: Goal – 10,000 App Purchase; Age Group – 18 to 55 Years; Gender -Both Male and Female; Geographic Area – Major cities in state of Tamilnadu, India.

Audience - Interests: The audience interests include, PC Gamer, Online casino, Cricket, Sports betting, Indian Premier League, Games, Roulette, Fantasy sport, Online gambling, Mobile game, Fantasy cricket, Sports, Hardcore Gamer, Dream 11, Sports games, PC game and Poker or Video games.

Behaviours: Facebook access (mobile): All mobile devices, Apple (iOS) devices, Android devices, New smart phone and tablet users or Console gamers, Employers including Fantasy, PC Gamer or Gamer. The Ad campaign was performed during the period from 13-08-2019 to 3-10-2019.

Table 3: Weekly Analysis of Ad campaign – 3

Period	Bid Rate	Budget	Impression Frequency	Clicks Frequency	Visit Frequency	Purchase Frequency	Cost
Week 1	2.50	2000	130684	5077	3077	1339	1868.65
Week 2	2.50	2000	274451	10537	6540	2792	1897.72
Week 3	2.50	2000	573232	21859	13659	5759	1899.83
Week 4	2.50	2000	744428	27934	17626	7341	1905.92
Week 5	2.50	2000	935264	34203	21972	9876	1930.57
Week 6	2.50	2000	1133837	40835	26787	12706	1934.92
Week 7	2.50	2000	1187710	44213	32041	14891	1938.87

Source: Primary Data

Landing Page Insights:

The arrival was dissected by integrating the google examination together with the site. Google Analytics is a free tool offered by Google that creates detailed understandings about the visits to a particular website. It is a simple application with the promise of Google innovation. This application helps in recording the amount of traffic by embedding the HTML code into each page of website. It further informs the owner of website about the way visitors entered the website and how used the same. Clients also have the opportunity to understand the manner of guests who were referred from web crawlers, from alluding destinations and Social Advertisement, and direct visits, thereby gaining an understanding to improve the webpage's substance and plan.

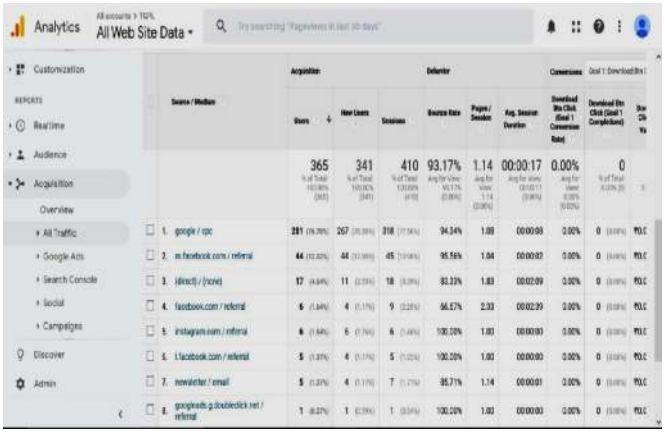

Figure 4: Google Analytics Property: Session Duration – 30 Minutes, Page per Session – 30 Minutes, Date – June 22nd to 3rd October.

1. Landing Page – 1

Figure 5: Desktop View

Figure 6: Mobile View

Table 4: Weekly Analysis of Landing page from Ad -1

Period	Users	New Users	Session	Bounce Rate	Desktop Download	Mobile Purchase
Week 1	310	68	45	88.89%	40	296
Week 2	386	85	57	85.51%	87	639
Week 3	386	85	57	84.55%	134	982
Week 4	461	101	67	83.42%	188	1382
Week 5	567	124	83	81.03%	250	1835
Week 6	724	159	106	85.68%	355	2606
Week 7	803	176	117	68.07%	362	2657

Source: Primary data

The Landing page was considered to be unsuccessful since the Landing Page failed to meet its goals of user engage. The Assumption Factors involve Session, Page per Session, Bounce rate and Appeal of the Post. The Bounce rate was 82.45%, which is very high for an intention to-purchase.

2. Landing Page – 2

Figure 7: Desktop View 2

Figure 8: Mobile View 2

Table 5: Weekly Analysis of Landing page from Ad – 2

Period	Users	New Users	Session	Bounce Rate	Desktop Download	Mobile Purchase
Week 1	1323	291	159	47.46%	92	674
Week 2	2526	555	303	50.37%	186	1366
Week 3	3729	819	448	51.41%	281	2057
Week 4	4996	1097	600	52.58%	384	2820
Week 5	6299	1383	756	53.70%	495	3630
Week 6	7667	1683	920	54.95%	617	4521
Week 7	9085	1994	1090	65.41%	870	6377

Source: Primary Data

The Landing page was considered to be partially success, as the Landing Page was nearly to meet its goals of user engage. The Assumption Factors involve Session, Page per Session, Bounce rate and Appeal of the Post. The Bounce rate was only 53.70 %, which is average and hence intention-to-purchase is increased through landing page improvising.

3. Landing Page – 3

Figure 9: Desktop View 3

Figure 10: Mobile View 3

Table 6: Weekly Analysis of Landing page from Ad – 3

Period	Users	New Users	Session	Bounce Rate	Desktop Download	Mobile Purchase
Week 1	2523	554	303	43.52%	161	1178
Week 2	5363	1177	644	42.69%	335	2457
Week 3	11200	2459	1344	42.16%	691	5068
Week 4	14453	3173	1734	41.65%	881	6460
Week 5	18017	3955	2162	44.95%	1185	8691
Week 6	21965	4822	2636	47.43%	1525	11181
Week 7	26274	5767	3153	46.47%	1787	13104

Source: Primary data

The Landing page was considered to be partially success, as the Landing Page was closely to meet its goals of user engage. The Assumption Factors involve Session, Page per Session, Bounce rate and Appeal of the Post. The Bounce rate is only 44.12% which is low and it influenced the user to revert back and intent to purchase, because of the landing in mobile view has been improvised.

Managerial Implication And Discussion

Table 7: Facebook Advertisement Analysis

Campaign Name	Impressions	Clicks	Visit	Purchase	Cost
Ad Campaign 1	536223	11321	4435	3019	15206.19
Ad Campaign 2	709346	16239	11079	7247	13936.31
Ad Campaign 3	1187710	44213	32041	14891	13376.48

Source: Primary data

Table 8: Landing Page Analysis

Landing Page	User	New User	Session	Bounce Rate	Desktop Download	Mobile Download
Landing Page 1	3637	798	532	82.45%	1416	10397
Landing Page 2	35625	7822	4276	53.70%	2925	21445
Landing Page 3	99795	21907	11976	44.12%	6565	48139

Source: Primary data

The primary target of this examination was to analyse whether Facebook publicizing had favourably affected the social perspectives of online clients in the state of Tamil nadu, India. The examination shows that Facebook promoting affects the goal to-buy and buy among explicit geological area, despite the fact that at a minimal level, which bolsters correspondences of the AIDA model. These discoveries are in concurrence with a number uncovered that a positive involvement in Facebook would prompt a good disposition towards the Business Page, that publicizing given by Facebook upgrades the buyers' perspectives towards brand and buy aims, while promoting portfolio that were given by associations had a more noteworthy effect than those explored the Facebook Feed. E Marketer (2012) from his research found that customers who were presented to both paid and acquired media could help associations with buy thought and brand loving/inclination. These outcomes could likewise be clarified by the way that Facebook has a different scope of intuitive and components, for example, dividers newsfeeds, collections, websites, conversation discussions, etc. which empower associations to produce relations with buyers. Consequently, with the longstanding presentation of Facebook applications, motivators and association, shoppers will in general set up more ideal brand perspectives and more prominent buy aims relating to mark promoting on this stage.

The second target of the examination was to decide whether certain use attributes affected users in Tamil nadu social mentalities towards Facebook promoting. The examination uncovered that promoting on Facebook was the best when Advertisement portfolio is distributed with geological language and short attractive substance, which is a consistent recognition, as they would have greater occasion to communicate with the publicizing. The correspondence of the advertisement by means of text, designs and verbally; just as looking for buyer related data to settle on buy choices. This examination affirmed that Facebook client in Tamil nadu all the more productively encouraged expanded positive conduct perspectives towards own language with short eminent substance. This is a sensible thought, since expanded action on Facebook should prompt more noteworthy action in promoting.

The third target of this examination was to inspect whether specific appeal factors affected Facebook clients' social mentalities towards Facebook promoting. This examination found that the Colour blended Advertisement portfolio showed lower levels of aim to-buy contrasted with the dark foundation and Bright hued Text gatherings. Thus, an enormous

extent of dark foundation with splendid shaded content have picked up web access over the previous decade, and had more presentation and experience to SNS.

The fourth target of this examination was to inspect whether Facebook is the interpersonal organization that is the most utilized organization for clients on this page. There is a Landing page for each client and afterward there is first, second, third connection and so on. Communications imply that clients from beginning page go to another connection from the page. This examination found that shading differentiation of the foundation, text shade of the substance and allure of the site in both work area view and portable, wipe out the deserted truck proportion and impact the expect to buy.

Conclusion

The discoveries of this investigation show that there is a useful impact of Facebook promoting on the movement of the web based business association. There is anyway a condition, which is that so as to achieve an effective mission through advanced showcasing, the associations and their advertising chiefs must figure out how to choose and apply the most fitting procedures for their association and its intended interest group. Moreover, this examination presumes that the Demographic factor and Appeal factor of advanced advertising is more viable and suitable for e-commers target crowd as it guarantees more certain purchaser response, makes a higher progress rate and is less expensive than different organizations of computerized showcasing efforts, for example, connect snaps, pictures and text designs. This investigation reasons that the supervisors decide the achievement or disappointment of its promoting effort achievement, yet in addition the association's prosperity, hence, they ought to know about the cycles and hypotheses of advanced advertising procedures and apparatuses, correspondences with buyers and numerous others.

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WATER RESOURCES PROFILE AND GROUND WATER POLLUTION IN URBAN AREAS, KARNATAKA

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ABSTRACT

Groundwater is one of the important components in development of any area. In the past, it was thought that groundwater is protected from pollution by layers of rocks and soil that act as filters. Several microorganisms pollute the groundwater. India has nearly 17 % of total world population as we all know water is essential for numerous activities such as domestic purposes industrial purposes and agricultural needs. Most of the population in India is dependent completely on agriculture. Water is required to irrigate crops and to ensure the employment opportunities. Water is a life giving resource and also a precious resource if we do not save water and conserve it life is impossible on earth so it is very important to conserve the earth for a better life. Coming to ground water necessity, out of hundred percent 89% is used for irrigation 9% is used for domestic purposes and 2% is used for industrial purposes. According to a survey was carried out, India has a population of 136.64 crores therefore it is very important to conserve the water and carefully use it with various limitations. The objective of this study is review researches of groundwater pollution and contamination as well as pollution types and the effects of groundwater contamination and pollution on public heal.

Keywords: *Groundwater pollution control and remediation.*

Introduction

India sustains 18 percent of the world's population and with four per cent of global water resources. Water losses and seepages in the water supply system shrink 50 % of per capita of usable water. India initiated more investments and various infrastructure developments like constructing the large dams, water storage reservoirs and canal channels to encounter the water supply demand in the country. And agricultural necessities, especially in support of technology related interventions in order of improving the production of fruits, vegetables, food grains.

Study Area

The Bengaluru urban area covers over an area of nearly 400 sq.km. The study area taken that is Peenya Industrial area, is covered in part of the Survey of India Topo sheet no.57 G/12 and 57 G/8. The industrial area which covers over 40 sq.km lies in the Northern part of Bangalore urban area and for the homes more than 2100 industries dominated by chemical, leather, pharmaceutical, plating and allied industries. These industries are established since 1970s.
Peenya industrial area (PIA), has the industries which are significant from water pollution point of view are engineering with surface treatment, garment washing and textiles and pesticides. Chemicals from industries in and around the industrial area and domestic sewage are also huge sources of pollution.
The bore wells adjacent to Peenya industrial areas have found huge amount of heavy metals including zinc, copper, lead, manganese, total dissolved salts, sulphates and fluorides beyond permissible limits. The data available on groundwater pollution in Peenya is limited.
Therefore, an attempt is made in order to study the groundwater quality assessment of whole Peenya industrial area and its surroundings to identify the contaminated bore wells which are beyond permissible limits for drinking water and also the parameters which are significant contributors for the pollution in the area. Depending on the type and extent of pollution remedial approaches can be rewarded.

Materials and Methodology

Water Sampling Technique

Five surface water samples and five groundwater samples were collected each during pre-monsoon season and analyzed for various physicochemical parameters like pH, EC, TDS and TH major ions and trace element chemistry. The methods of collection of samples plays an important role for maintaining the high degree of of analytical data and its application to physio chemical study. The water samples were analyzed as per

the standard procedures.

Sampling

The main objective of sampling is to collect a part of water which is small enough in volume to be transported conveniently and handled in the laboratory while still representatives of the characteristics of the water available in that water body. Water is a dynamic system it constituents vary with time.

There are basically three types of sampling techniques and are as follows:

- Grab or catch samples also known as spot or snap samples
- Composite samples
- Integrated samples

Grab sampling:

Sampling of water from huge sources such as Wells, rivers, oceans and reservoir for physio-chemical analysis.

When a source is known to be constant over a considerable time period, in that case a single grab sample should be considered as representatives. If the sources are known to vary with time, graph sample should be collected at suitable intervals of time and analyzed separately. The results can be documented in terms of mean, standard deviation, frequency and duration of variations. When does ORS composition varies in space collect samples from appropriate locations.

Composite Sampling:

The term composite refers to a mixture of grape samples collected at the same sampling point at different times.

A composite sample of 24 hours' period is considered standard for most of the determination. It provides more meaningful data then the grab samples.

Sometimes a composite sample by presenting one shift or a shorter time period for a complete cycle of a period operation can be preferable.

Take at least 120 to 150 ml of sample in each hour in some cases even at intervals of 30 minutes at the end of sampling period in a single bottle as collected.

A final volume of 4-5 liter is sufficient.

Integrated sampling:

For certain purpose, the information needed is provided best by analyzing mixture of crab samples collected from different points simultaneously.

Table 1: Water sample codes of sampling stations along Shiva

Water Sample	Code	Latitude	Longitude
Surface Water	S1	13°01'34.9"N	77°30'17.9"E
Surface Water	S2	13°01'33.7"N	77°30'15.1"E
Surface Water	S3	13°01'27.4"N	77°30'16.7"E
Surface Water	S4	13°01'22.4"N	77°30'14.2"E
Ground Water	G1	13°01'31.1"N	77°30'18.9"E
Ground Water	G2	13°01'33.2"N	77°30'18.1"E
Ground Water	G3	13°01'33.3"N	77°30'18.1"E
Ground Water	G4	13°01'33.5"N	77°30'17.9"E
Ground Water	G5	13°01'21.2"N	77°30'14.6"E
Ground Water	G6	13°01'20.5"N	77°30'13.7"E

Such samples are useful for rivers or streams that in composition across the width and depth. For connection of integrated samples device is needed. Sample is collected at a known depth without disturbing the surface water.

Figure 2: Flowchart of Methodology adopted in the study

Table 2: Water Quality Parameters of the Samples collected at the Study Area				
PARAMETERS	S1	S2	S3	S4
spH	7.21	7.13	6.2	7.1
EC (milli mhos)	47.9	35.8	5.2	6.4
TDS (mg/L)	181	143	119	714
Turbidity (NTU)	7.6	11	15	14
Total Hardness (mg/L as CaCO3)	436	492	588	669
Calcium (mg/L)	142	170	127	160
Magnesium (mg/L)	22	50	65	65
Total Alkalinity (mg/L)	109	114	201	100
Chloride (mg/L)	998	648	319	367
Sodium (mg/L)	96	49	82	63
Potassium (mg/L)	4	7	3.1	0.7
Nitrate (mg/L)	174.3	167.25	224.52	235.12
Sulphate (mg/L)	68	239	123	24
Phosphate (mg/L)	2.1	1.7	0.45	1
Fluoride (mg/L)	0.52	1.1	0.9	1.31
Iron (mg/L)	3.9	4.832	7	5
Copper (mg/L)	0.006	0.6	0.002	0.026
Lead (mg/L)	1.079	2.643	1.114	1.912
Cadmium (mg/L)	0.683	0.141	0.568	0.188
Chromium (mg/L)	0.705	0.024	1.117	0.919
Zinc (mg/L)	0.898	0.098	0.608	0.218
Nickel (mg/L)	3.057	3.891	2.803	2.891

G1	G2	G3	G4	G5	G6
6.85	6.26	7.8	6.71	6.6	7.36
26.2	98.7	20.7	41.5	30.8	7.2
462	328	751	151	124	84
0.73	1.5	0.6	1.4	0.3	0.91
716	620	670	1134	1082	614
152	140	160	216	229	137
82	66	66	140	123	63
92	52	97	113	62	76
392	1145	268	703	572	269
114	64	74	114	55	100
6	2.5	2	6	3.2	1.6
98	80	20	98	16	41
62	322	98	62	66	187
0.3	0.6	1	0.3	0.4	0.5
0.9	1.31	1.5	1	1.49	0.8
0.32	0.58	0.3	0.14	0.1	0.209
0.01	0.321	0.008	0.005	0.02	0.008
0.07	0.098	0.0	0.25	0.0	0.12
0.015	0.011	0.1	0.05	0.003	0.03
0.0	0.0	1.5	0.05	0.0	1.88
0.27	0.18	0.19	0.41	0.1	0.34
0.016	0.004	0.03	0.16	0.04	0.19

Discussions

Water Quality Analysis

PH

In the study area, the minimum value of pH obtained in the surface water is 6.2(S3) and the maximum value is 7.21(S1). The standard range of PH value that should be present in the surface water is 6.5-8.5. Therefore, the sample S3 and S4 is safe for the consumption. The minimum value of PH obtained in the groundwater is 6.26 (G2) and the maximum value is 7.8 (G3). The standard range of PH value that should be present in the groundwater is 2.33-7. Therefore, the sample G2 is safe and G3 is not safe for the usable purposes as it is

out of standard range.

Electrical conductivity EC (milliohms)

In the study area, the minimum value of electrical conductivity obtained in the surface water is 5.2 milliohms (S3) and the maximum value obtained is 47.9 milliohms (S1). The standard range of electrical conductivity that should be present in the surface water is 200-800 milliohms. Therefore, the sample S1 and S3 is not safe for consumption. The minimum value of Electrical conductivity obtained in the groundwater is 7.2 (G6) and the maximum value obtained is 98.7 (G2). Therefore, the groundwater samples G2 and G6 is not safe for the consumption as the values are put of limits.

Total dissolved solids TDS (mg/L)

In the study area, the minimum value of TDS obtained in the surface water is 119 mg/L (S3) and the maximum value obtained is 714 mg/L (S4). The standard range of TDS that should be present in the surface water is 0-300 mg/L. Therefore, the sample S3 is not safe for the consumption and S4 can be used for consumption by purifying it by various techniques. The minimum value of TDS obtained in the groundwater is 84 mg/L. (G6) And the maximum value obtained is 751 mg/L (G3). The standard range of groundwater that should be present is 500-1500 mg/L. Therefore, G6 is not safe for consumption whereas G3 is safe for consumption by purifying it with various technique.

Turbidity

In the study area, the minimum value of turbidity obtained in the surface water is 7.6 NTU (S1) and the maximum value of the obtained is 15 NTU (S3). The standard range of turbidity that should be present in the surface water is 0-4 NTU. Therefore, the samples S1 and S3 are not safe for the consumption according to its standard values. The minimum value of turbidity of groundwater is obtained as 0.3 NTU (G5) and the maximum value obtained is 1.5 NTU (G2). Standard value of turbidity present in the groundwater should be 0-1. Therefore, the sample G2 is not safe for consumption whereas G5 is safe for consumption after purification.

eTotal hardness

In the study area, the minimum value of total hardness obtained the surface water is 436 mg/L (S1) and the maximum value obtained is 669 mg/L (S4). The standard range of total hardness present in the surface water must be 0-60 mg/L (>180 very hard). Therefore, the samples S1 and S4 are ranging more than 180, it is considered as hard water. The minimum value of total hardness obtained in the groundwater is 614 mg/L (G6) and the maximum value obtained is 1134 mg/L (G4). The standard ranges of groundwater that should be present is 70-543.9 mg/L. Since, the samples G4 and G6 are out of range it is considered to be as hard water.

Calcium

In the study area, the minimum value of calcium content in the surface water is obtained as 127 mg/L (S3) and the maximum value obtained is 170 mg/L (S2). The standard range of surface water that should be present is (0-60 soft) (61-120 moderate hard) (121-180 hard) (>180 very hard). Therefore, the samples s2 and s3 are considered to be hard has it lies in the range 121 to 180. The minimum value of calcium content present in the groundwater is obtained as 137 mg/L (G6) and the maximum value obtained is 229 mg/L (G5). The standard values of the groundwater that should be present is (10-100 soft) (>100 hard). Therefore, the samples G5 and G6 are considered to be hard as out of range.

Magnesium

In Surface water samples the minimum value is 22(S1) and maximum value is 65(S3&S4). In groundwater sample the minimum value is 63(G6) and maximum value is 140(G4). The standard range of this parameter for surface water should be 2.5-5.6mg/l. Hence the maximum value and min value obtained aren't safe for drinking purpose or for domestic purpose. The standard range of this parameter for ground water should be50-100mg/l. Hence the maximum values obtained isn't safe and the minimum value is safe for drinking purpose or for domestic purpose.

Alkalinity

In Surface water samples the minimum value is

100(S4) and maximum value is 201(S3). In groundwater sample the minimum value is 52(G2) and maximum value is 113(G4). The standard range of this parameter for surface water should be 200-300mg/l. Hence the maximum value obtained is safe and the minimum value isn't safe for drinking purpose or for domestic purpose. The standard range of this parameter for ground water should be 122-282mg/l. Hence the maximum values obtained isn't safe and the minimum value also isn't safe for drinking purpose or for domestic purpose.

Chlorides

In Surface water samples the minimum value is 319(S3) and maximum value is 998(S1). In groundwater sample the minimum value is 268(G3) and maximum value is 1145(G2). The standard range of this parameter for surface water should be 0-250mg/l. Hence the maximum value and min value obtained aren't safe for drinking purpose or for domestic purpose. The standard range of this parameter for ground water should be 5-460mg/l. Hence the maximum value obtained isn't safe and the minimum value is safe for drinking purpose or for domestic purpose.

Sodium

In Surface water samples the minimum value is 49(S2) and maximum value is 96(S1). In groundwater sample the minimum value is 55(G5) and maximum value is 114(G1&G4). The standard range of this parameter for surface water should be 150-370mg/l. Hence the maximum value and min value obtained aren't safe for drinking purpose or for domestic purpose. The standard range of this parameter for ground water should be 0-100mg/l. Hence the maximum value obtained isn't safe and the minmum value is safe for drinking purpose or for domestic purpose.

Potassium

Thehigher potassium concentration is observed in the study area is due to the application of excessive fertilizers. Potassium concentrations in water are generally very small. In Surface water samples the minimum value is 0.7(S4) and maximum value is 3.1(S3). In groundwater sample the minimum value is 1.6(G6) and maximum value is 6(G4). The standard range of this parameter for surface water should be 0-8mg/l. Hence, the maximum value and min value obtained are safe for drinking purpose or for domestic purpose. The standard range of this parameter for ground water should be 6.51-23.4mg/l. Hence the maximum value obtained and the minimum value aren't safe for drinking purpose or for domestic purpose.

Nitrtes

In Surface water samples the minimum value is 17.25(S2) and maximum value is 235.12(S4). In groundwater sample the minimum value is 16(G5) and maximum value is 98(G1&G4). The standard range of this parameter for surface water should be 0-18mg/l. Hence the maximum value and min value obtained are safe for drinking purpose or for domestic purpose. The standard range of this parameter for ground water should be 50mg/l. Hence the maximum value obtained isn't safe and the minimum value is safe for drinking purpose or for domestic purpose.

Sulphate

In the study area maximum value of sulphate content present in the surface water is 2.39mg/l (S2) and the minimum value is 24mg/l (S4). The range of sulphate content that should be present in the surface water is around 3 to 30 (mg/l). Therefore the sample S2 is not safe for consumption, whereas sample S4 is fit for drinking because it's within the range. The maximum value of sulphate content present in the ground water is 322mg/l (G2) and the minimum value is 62mg/l (G1 and G4). The range of sulphate content that should be present in the groundwater is around 2 to 250 (mg/l). Therefore, the sample G2 is not safe for consumption, whereas sample G1 and G4 are fit for drinking because they're within the range. The main sources of sulphates in groundwater samples may generate from the dissolution of minerals, such as gypsum and anhydrites.

Phosphate

In the study area maximum value of Phosphate content present in the surface water is 2.1mg/l (S1) and the minimum value is 0.45mg/l (S3). The range of phosphate content that should be present in the surface water is around 0.005 to 0.05(mg/l). Here both the samples are not in

the permissible range. Therefore, both sample S1 and S3 are not safe for drinking. The maximum value of phosphate content present in the groundwater is 1mg/l (G3) and the minimum value is 0.3mg/l (G1 and G4). The range of phosphate content that should be present in the groundwater is 0 t0 0.5 (mg/l). Therefore, the sample G3 is not safe for consumption, whereas sample G1 and G4 are fit for drinking because they're within the range. The sources may be due to anthropogenic activities mainly input of fertilizers and decomposition of organic matter during the study period.

Fluoride

In the study area maximum value of Fluoride content present in the surface water is 1.31mg/l (S4) and the minimum value is 0.52mg/l (S1). Here both the samples are in the permissible range, therefore both sample S4 and S1 are safe for drinking. The maximum value of Fluoride content present in the groundwater is 1.49mg/l (G5) and the minimum value is 0.8mg/l (G6). The range of Fluoride content that should be present in the groundwater is 0.2 to 2.2 (mg/l). Therefore, both the samples G5 and G6 are safe for consumption because they're within the range.

Iron

In the study area maximum value of iron content present in the surface water is 7mg/l (S3) and the minimum value is 3.9mg/l (S1). The range of iron content that should be present in the surface water is around 0 to 0.3 (mg/l). Here both the samples are not in the permissible range, therefore both sample S3 and S1 are not safe for drinking. The maximum value of iron content present in the groundwater is 0.58mg/l (G2) and the minimum value is 0.1mg/l (G5). The range of iron content that should be present in the groundwater is around 0 to 50 (mg/l). Therefore, both the samples G2 and G5 are fit for drinking because they're within the range.

Copper

In the study area maximum value of copper content present in the surface water is 0.6mg/l (S2) and the minimum value is 0.002mg/l (S3) . The range of copper content that should be present in the surface water is around 0.005 to 1 (mg/l). Therefore, both the samples S2 and S3 are fit for drinking because they are within the range. The maximum value of coper content present in the ground water is 0.321mg/l (G2) and the minimum value is 0.008 mg/l (G3 and G6). The range of copper content that should be present in the groundwater is around 0 to 2 (mg/l). Therefore, all the samples G2 G3 G6 are fit for drinking because they're within the range.

Lead

In the study area maximum value of lead content present in the surface water is 2.643 mg/l (S2) and the minimum value is 1.079mg/l (S1). The range of lead content that should be present in the surface water is around 0 to 5 mg/l. Therefore, the sample S2 and S1 is safe and also fit for drinking because it's within the range. The maximum value of lead content present in the ground water is 0.25mg/l (G4) and the minimum value is 0mg/l (G3&G5). The range of lead content that should be present in the groundwater is around 1 to 2 mg/l. Therefore, the sample G2 and G3, G5 is safe and fit for drinking because they're within the range.

Cadmium

In the study area maximum value of cadmium content present in the surface water is 0.683mg/l (S1) and the minimum value is 0.141mg/l (S2). The range of lead content that should be present in the surface water is around 0 to 0.005 mg/l. Therefore, the sample S2 and S1 is not safe for consumption and fit for drinking because it's not within the range. The maximum value of cadmium content present in the ground water is 0.1mg/l (G3) and the minimum value is 0.011mg/l (G2). The range of lead content that should be present in the groundwater is around 0 to 0.003 mg/l. Therefore, the sample G3 is not safe for consumption, whereas sample G2 are fit for drinking because they're within the range.

Chromium

In the study area maximum value of chromium content present in the surface water is 0.919 mg/l (S4) and the minimum value is 0.024 mg/l (S2). The range of chromium content that should be present in the surface water is around 0.5 to 2 mg/l. Therefore, the sample S2 and S4

is safe and fit for drinking because it's within the range. The maximum value of chromium content present in the ground water is 1.8 mg/l (G6) and the minimum value is 0mg/l (G1, G2, G5). The range of lead content that should be present in the groundwater is around 0 to 0.05 mg/l. Therefore, the sample G6 is not safe for consumption, whereas sample G1, G2, G5 are fit for drinking because they're within the range.

Zinc

In the study area maximum value of zinc content present in the surface water is 0.898 mg/l (S1) and the minimum value is 0.098 mg/l (S2). The range of zinc content that should be present in the surface water is around 0.01 to 0.05 mg/l. Therefore, the sample S2 and S1 is not safe and also not fit for drinking because not within the range. The maximum value of zinc content present in the ground water is 0.41 mg/l (G4) and the minimum value is 0.1 mg/l (G5). The range of lead content that should be present in the groundwater is around 0.021 to 0.1 mg/l. Therefore, the sample G4 and G5 is not safe and not fit for drinking because they're not within the range.

Nickel

In the study area maximum value of nickel content present in the surface water is 3.891 mg/l (S2) and the minimum value is 2.803 mg/l (S3).

The range of lead content that should be present in the surface water is around 0.001 to 0.06 mg/l. Therefore, the sample S2 and S3 is not safe and also not fit for drinking because it's not within the range. The maximum value of nickel content present in the ground water is 0.19 mg/l (G6) and the minimum value is 0.004mg/l (G2). The range of lead content that should be present in the groundwater is around 0.001 to 0.06 mg/l. Therefore, the sample G6 and G2 is not safe and not fit for drinking because they're not within the range.

Water Quality Index

The aim of the study was to assess the WQI in order to evaluate the water quality of the area for public use, irrigation and other purposes. According to NSF, Surface water quality and Groundwater quality of overall Shivapura Lake was mainly assessed as medium and bad qualities. Since, the values were between 25-70 as shown in table 3.

Table 3: WQI of samples in the study area

Sl no.	Water Sample Type	Code	Water Quality Index	Water Quality
1.	Surface Water	S1	44	Bad
2.	Surface Water	S2	44	Bad
3.	Surface Water	S3	43	Bad
4.	Surface Water	S4	37	Bad
5.	Ground Water	G1	50	Medium
6.	Ground Water	G2	43	Bad
7.	Ground Water	G3	48	Bad
8.	Ground Water	G4	54	Medium
9.	Ground Water	G5	59	Medium
10.	Ground Water	G6	56	Medium

Conclusions

The present work was carried out to know the Physio-Chemical Characteristics and Heavy metal concentration in surface water and Groundwater in Peenya Industrial area

The following are the major conclusions drawn from the work carried out:

The analysis of groundwater and the surface water samples from the Peenya Industrial area has shown that almost all of the samples are unfit for drinking purpose.

The Quality of Surface water and Groundwater is determined using a technique called water quality index. The results obtained shows that the Bore-well water is unsuitable for drinking and the overall quality is bad.

Hence the periodical monitor of surface water and ground-water is required to prevent contamination.

Hence, from the perspective of improving the quality of groundwater and surface water in the area and protecting the people from the troubles of groundwater and surface water contamination, and it is absolutely essential to initiate measures to check the pollution of industrial effluents through strict enforcement of legislation for industries, setting up effluent

treatment plants.

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WHATSAPP AS A DIGITAL EDUCATIONAL RESOURCE: A SYSTEMATIC REVIEW

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ABSTRACT

Objective of the study, to analyze academic contributions to the use of Whats App as a digital educational resource Methodology systematic review, descriptive level, using the PRISMA Statement method The review took into account the teacher's profile, didactic strategies, skills for digital competence. The analysis of 13 scientific articles was carried out. It was concluded that the use of WhatsApp is more current than ever and is used in the regular planning of learning sessions

Keywords: *WhatsApp, educational resource, digitization, systematic review*

Introduction

It is known worldwide that the necessary and obligatory education is having to turn towards fields where it had not yet been invested or planned in most of the countries of the world, only countries that are very planners and well prepared have been able to structure and execute plans really effective action to respond to the pandemic situation, which makes the use of virtual and low-cost platforms very necessary so that all students can access horizontally without having to encounter difficulties to be able to achieve their learning in the different educational levels. In this sense, the impact of this reality in school and also in higher education centers has generated a current of scientific research, which has focused on studying the possibilities of the communication tool in improving learning and learning. establishing a fluid environment for coordination with parents of students. (Sataloff et al., 2020).

In Ibero-America, the appearance of the COVID-19 pandemic, and the consequent quarantine and health emergency, led to the solution of using the internet and the mass media, to ensure the continuity of the educational service. Therefore, the intensity with which these media currently intervene as a support for communication between parents and feedback from students, on the issues they develop at a distance (Sataloff et al., 2020).

Along the same lines of analysis, in the sister country of Brazil, it was determined that as there are still few studies available written in the Portuguese language, many possibilities can still be explored once the WhatsApp application, in addition to the textual communication option, allows the transfer of audio, video and documents. However, in the analyzed studies, the vast majority of experiences explored only the text, leaving the remaining possibilities of the application. (Bottentuit, Patriota & Pereira, 2016).

For its part, in the reality of Peru, under the strategy adopted by the Ministry of Education in this context of a pandemic, whose platform was called "I learn at home", the use of WhatsApp has become very common to meet different needs of part of teachers to communicate with students and parents.

In the same sense, the use of WhatsApp has led to a change in the way we interact at the school level, parents, students, teachers, hierarchical and administrative personnel since it has the potential to generate learning by integrating all the actors of the educational processes and it also originates social and pedagogical interactions that constitute novelties in the world of education. (Alfarah and Bosco 2018).

The WhatsApp digital resource in the new normal has brought with it the facilitation of learning and the involvement of families as a reinforcement of the instruction of their children, this dynamic shared between parents and children allows knowledge to become more transversal (Cascales, Gomariz. & Paco, 2018) in this sense, defines how technologies are opening the doors to new learning experiences, which until a few months ago was a useful tool for communication, now in this new reality WhatsApp is a support to achieve significant knowledge (Martínez Hernández et

al., 2017) likewise this virtuality not only occurs in large cities but also in rural areas, which can easily access continuous and verifiable learning, such as what happens in nature and to be able to share experiences of sowing in the field for seasonal reasons and crop improvements, this is what he refers to. ere in education to use the WhatsApp tool. For (Cascales, Gomariz. & Paco, 2018) considers that "technological evolution will continue, therefore, learning from the youngest will be more versatile, ensuring that they have a skill achieved based on the permanent and constant use of said equipment. " (p.21) Likewise, although advances in technology pass and increase, they must pay attention to what causes said event, it is also necessary to express that everything must be with time measures, in order to correctly train minors , that is, children and adolescents should be allowed to have access to technological equipment, web pages and everything interactive online and keep in mind that it is beneficial to enhance the learning they obtain in the educational institutions where they receive Formal education, however, these times should be measured in the sense of limiting them taking into account that life also consists of going out for a run in the fields, playing with their peers, distracting themselves looking at the landscapes among other forms of healthy and necessary fun.

Technological evolution has to use ICT as a support for distance education only to put the student in front of information, problems and objects of knowledge may not be enough to involve him and awaken that motivation for learning, leading him to create personal procedures that allow you to organize your own time. For studies and participation in activities, regardless of the time or place where you are. However, it is necessary to have the considerations that distance education is an educational modality whose development is related to the management of time by the student, the development of autonomy to carry out the activities indicated at the time it deems appropriate, provided that the time limitations imposed by the course activities are respected, dialogue with colleagues to exchange information and develop collaborative productions.

In addition, "being together virtually" indicates the role of the teacher as a student advisor who follows their development in the course, provokes them to make them reflect, understand the errors and refine their productions, but does not indicate the full duty of the teacher in the course (Bottentuit, Patriota & Pereira, 2016). The teacher is present at certain times to accompany the student but does not enter melee play nor does he have the role of controlling her performance. Otherwise, it will create the dependency of the student on their considerations and will perpetuate the hierarchy of student-teacher relationships in instructional teaching, more sophisticated in digital learning environments, perpetuating a teaching approach that in traditional classroom situations has already proven inadequate. and inefficient.

The integration between digital technology and telecommunications resources, which gave rise to the internet, showed possibilities to expand access to education, although this use does not imply more innovative practices and does not represent changes in the concepts of knowledge, teaching and learning or in student and teacher roles (Bottentuit, Patriota & Pereira, 2016). However, changing the way in which education and communication between students and teachers develops brings with it changes in teaching and learning that must be understood by analyzing the potential and limitations of the technologies and languages used for pedagogical mediation. and student learning.

The objective of the research is to identify and analyze the academic contributions made for the use of WhatsApp as a digital educational resource in students of regular basic education, in its three educational levels in Ibero-American countries between the years 2015 to 2020.

Methods

Within the multiple perspectives to solve the present problem, a descriptive systematic review investigation was considered, in order to carry out a review and collect information using digital tools such as the internet. This was done in four search engines that present specialized databases, Scopus, ProQuest, ESBCO and Concytec, in the time period from

October 15 to December 19, 2020. The structured list of free search terms was used and controlled, using the following descriptors in searches in Spanish and English: "WhatsApp", "students", "digital resource", "educational resource", "social networks", "digital tool". In addition, the boolean AND and OR were used.

The exclusion criteria were duplication, not being scientific articles (papers, reviews, publications in newspapers, doctoral or master theses, testimonies, etc.) and because they did not correspond to the subject of interest. For the inclusion criteria, the name of the title, abstract, methodology, as participants, were the regular basic education teachers from Ibero-American countries of the last six years and the results of the articles retrieved with the search strategies; In addition, the articles found were exhaustively peer-reviewed, full-text and open access.

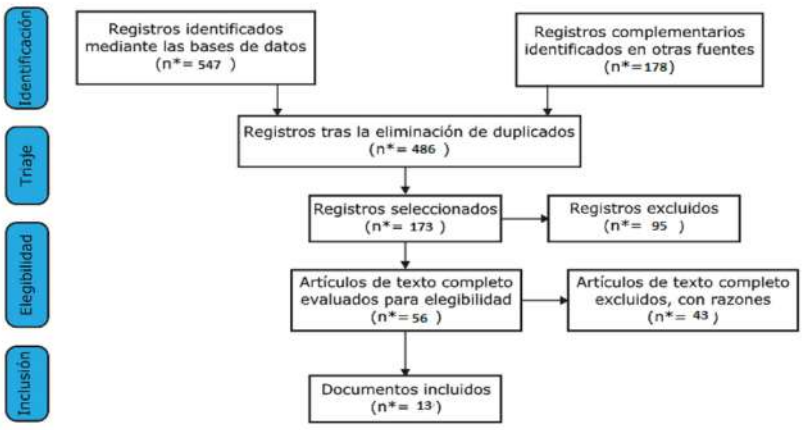
It is important to note that all of this was stored in the Mendeley bibliographic manager in order to organize the research review and support documents. The PRISMA Declaration method was used, which consists of a protocol for selecting a minimum set of evidence-based elements. It is worth mentioning that it was an improvement of the QUOROM with the incorporation of 4 items to the checklist out of a total of 27. (Urrutia, & Bonfill, 2010).

Results

Identification of the selected publications

The research was carried out with the review of the possible combinations between the descriptors, in the various search engines, in order to use a reliable metric instrument for the study, as well as the Booleans used in it, having as an initial result 725 selected publications, of which 239 were considered duplicates. After that, the title and abstracts were reviewed, consequently 313 publications were discarded because they did not meet language criteria, given that only two (English and Spanish) were considered for the present investigation, they were finally removed. 56 publications, as they are studies of an ambiguous nature in the scientific method. Thus, the textual revision of the articles was carried out, this resulted in the suppression of 56 investigations, mainly because their approach was not applied to the use of WhatsApp in terms of the educational environment as a teaching tool.

Among the results, 13 studies were identified that meet the inclusion criteria and are 8 with a quantitative approach, 4 with a qualitative approach and 1 with a mixed approach, published in the period from 2015 to 2020. It should be noted that, in the middle of the search and discard, the growth curve of research related to the application of WhatsApp in the educational environment has been exponential in recent years. The result shows the processing of the data obtained, for the articulation of the theoretical analysis.



Source: Adapted (Urrutia & Bonfill, 2010)

Figure: 1. PRISMA flow chart document selection process

Description of the publications included

The included studies were 13, being 61.5% of them (9) from Spain, leaving the rest distributed in 1 from Costa Rica, 1 from Argentina, 1 from Brazil and finally one from Peru. (see table 1).

It should be noted that most of these are original scientific articles on qualitative studies, which exemplify the use and impact of the WhatsApp app in educational work, where the link between social networks, their influence on young people and the exploration of pedagogy in this area and its use in education is a present reality.

Table 1: Documents included in the review

N°	Title	Author/Year	Country	Show	Design	Indexing	Contributions
1	The uses of Facebook and WhatsApp in rebuilding Education in areas affected by armed conflict: The case of Syria.	Alfarah M. y Bosco A. (2018)	Spain	26 students	Methodology	REICE	WhatsApp improves the performance of organizations and institutions whose objective is to offer an improvement to the Syrian education crisis in three main aspects: in the teaching and learning process, in communication, coordination and information, and in data collection and management . Thus, it is also pointed out that more research is still needed to discover all the possibilities offered by WhatsApp and other applications, to support education in contexts of crisis and armed conflict.
2	The classroom blog and WhatsApp, useful tools for communication between teachers and families?	García y López (2020)	Spain	72 basic level teachers	Qualitative multiple case study	ProQuet	It points out that there is little use of the tool by teachers, and those who do use it do not use it as educational support. It contributes to having more quantity and diversity of resources Technology does not always translate into a closer family-school relationship.
3	WhatsApp for the development of oral and written communication skills in Peruvian adolescents	Escobar y Gómez (2020)	Perú	343 secondary level teachers	Qualitative approach. Descriptive exploratory design	EBSCO	It is a highly motivating resource that allows students to learn in a fun way and have a more personalized relationship with the teacher, which fills them with confidence to produce their texts. This mobile learning resource has allowed students to read and

							write short texts, developing their critical and argumentative capacity, using text and iconic resources in a spontaneous way. Likewise, and with greater intensity, WhatsApp has enabled the development of oral communication skills, making students listen to audios, analyze videos and issue voice messages to make their critical appraisals known about the texts heard
4	WhatsApp as an educational tool in Primary Education: students, teachers and families	Cascales-Martinez, Gomariz y Paco (2020)	Spain	98 primary school teachers, students and families	Quantitative approach.	ProQuet	The remarkable thing about this study lies in the need to reconsider the use of WhatsApp in schools, having to reformulate their use to promote family and school communication.
5	As Tecnologias Digitais da Informação e Comunicação as a didactic resource not Curriculum of Mathematics	Homa y Oliveira (2020)	Brasil	10 primary level teachers	Descriptive ex-post-fact design.	Scopus	The results found, with the use of digital resources, are positive and show potential to be used by teachers in the classroom, in such a way that they can be explored in didactic planning, both in basic education and in teacher training
6	WhatsApp and Facebook as pedagogical mediation in Socio-Occupational Guidance processes	Lafaurie A., Sinning P. & Valencia J. (2018)	Colombia	22 11th grade students	Quantitative approach. analytical-descriptive	Scielo	Among the main findings, it is evident that ICT and virtual social networks, such as WhatsApp, used in OSO processes create new forms of interaction and an enriched and participatory learning environment, where everyone is encouraged to be self-guides and support of their peers, and with

							this the traditional way in which the OSO process has been carried out in educational institutions is transcended.
7	WhatsApp as an educational tool in Primary Education: students, teachers and families	Cascales A., Gomariz A. & Paco A. (2020)	Spain	98 Primary Education teachers	Quantitative study of the type former descriptive post-facto	PIXEL – BIT	After analyzing the degree of importance as curricular content that teachers give to WhatsApp, as well as its treatment or inclusion in the curriculum, we can conclude that participating Primary school teachers are not involved in working on this aspect as curricular content, either due to ignorance, due to not consider it proper to their teaching task or for other reasons that should be studied in depth.
8	Possibilities for use of WhatsApp in education: Analysis of cases and pedagogical strategies	Bottentuit, J.B. y Patriota, O.C. (2016)	Brasil	Regular Basic Students	Review article	GEP – TDE	In the category of instant communication application, WhatsApp emerged as one of the most used tools in recent times given its practicality and offering a friendly environment. In addition, with each new update, this application allows more possibilities of textual, visual and auditory communication.
9	Everyday looks. The use of WhatsApp as a social research experience.	Scribano (2017)	Argentina	1 teachers lack level	Quantitative approach. Documentary film	EBSCO	This research concludes that it is a tool that allows the vision of multiple edges of a problem, in addition to allowing constant remote monitoring of the actors of reality, however, when a

							mobile device is used as an instrument to identify, record and report, these are "effects" against which you must always have a reflective attitude.
10	WhatsApp as a tutoring support tool	Suarez (2017)	Spain	70 teachers lack level	Quantitative approach. Quasi-experimental design	EBSCO	The use of WhatsApp as a tool to support academic tutoring has favored more personalized interaction with students. Given that the classrooms have different profiles of students (work, specific educational needs, etc.), this tool has favored the attention to students, adapting to their individual conditions and their learning style.
11	WhatsApp groups in Early Childhood and Primary Education families	Cascales-Martinez y Gomariz-Vicente (2017)	Spain	134 kindergarten and primary education teachers	Quantitative approach. Non-experimental design	Scopus	WhatsApp is a social network, and as such its consequences will be both positive and negative depending on the approach given to its use and the regulation that exists with respect to published content.
12	Didactic possibilities of ubiquitous digital writing in the WhatsApp Messenger application	Cremades, Maqueda y Onieva (2016)	Spain	33 basic level teachers	Quantitative approach. Quasi-experimental design	Concytec	Teachers must question their possible negative prejudices because, beyond the risks already indicated, it can also be an optimal instrument to increase the quality of education.
13	WhatsApp e suas Aplicações na Eduçaõ: a systematic review of Literature	Bottentuit, J.B., Patriota, O.C. y Pereira C. (2016)	Brasil	Regular Basic Students	Review article	Revista Educaonline	As there are still few studies available written in the Portuguese language, many possibilities can still be explored once the WhatsApp application, in addition to the textual communication option, allows the transfer of audio, video and documents. However, in the analyzed studies, the vast majority of experiences explored only the text, leaving the remaining possibilities of the application.

Discussion

The 13 studies agree that the evolution of WhatsApp and social networks in general, despite being sometimes frowned upon in settings where pedagogy is taught, is a valuable tool for educational interest. In relation to this, in Europe, specifically in Spain, important investigations focused on the use of WhatsApp as an educational tool were also developed, managing to determine through its investigative processes that WhatsApp

improves the performance of organizations and institutions whose objective is to offer an improvement to the crisis of Syrian education in three main aspects: in the teaching and learning process, in communication, coordination and information, and in data collection and management. Thus, it is also pointed out that more research is still needed to discover all the possibilities offered by WhatsApp and other applications, to support education in contexts of crisis and armed conflict (Alfarah & Bosco, 2018).

Also highlighting that, from a training perspective, digital literacy in communication mediated by smartphones is essential among the objectives of teaching, which should not be left out of this reality. In addition to this, there is the vision according to the educational and research context related to education in Colombia Lafaurie, Sinning & Valencia (2018) determined that ICT and virtual social networks, such as WhatsApp, used in OSO processes create new forms of interaction and an enriched and participatory learning environment, where everyone is encouraged to be self-guides and support from their peers, and with this the traditional way in which the OSO process has been carried out in institutions is transcended. educational.

Consequently, the authors García and López (2020) in their research entitled "The classroom blog and WhatsApp, useful tools for communication between teachers and families?" they highlight that “a tool or resource that has been gaining relevance in communication between families and teachers is WhatsApp” (p.19). Consequently, the authors point out that technology has evidently been an advance to impart knowledge, where the interactions not only student-teacher, but also that of the teacher with the representatives have been redefined, allowing close communication outside the school environment.

However, this study highlights that despite the fact that teachers are aware that the use of the WhatsApp tool is significant, only 17% of the staff make use of it to improve communication, also claiming that its benefit brings with it other variables such as excessive use, deviation from the educational topic or workload due to their attention after hours.

On the other hand, in the Brazilian reality, various researchers have also delved into the use of WhatsApp as an educational resource, in that sense, in the category of instant communication application, WhatsApp emerged as one of the most used tools in recent times given its practicality and offering a friendly environment. In addition, with each new update, this application allows more possibilities of textual, visual and auditory communication. (Bottentuit & Patriota, 2016)

Among the most important findings of the aforementioned authors, it is highlighted that the WhatsApp application is easy to use in both generational gaps, so it supposes a reduction of those barriers in communication between young people and adults, this being also an ease for the distribution of the information, which in textual words represents "a medium full of advantages, despite some objections such as compulsive use and the demand they feel to always be connected."

For his part, Scribano (2017) points out that WhatsApp “enables a redefinition of connections / disconnections, allows the participation of multiple observers; it facilitates access to various moments of social reality in terms of the tensions of lived “worlds” and facilitates the recording of multiple edges of social conflict” (p. 17). This research indicates that with social networks the concept of real was redefined, and the way of experiencing emotions, in fact, it indicates that it is necessary to “use as a vehicle of inquiry the same means that is used today to do politics, to buy and sell, to fall in love and to entertain (oneself) is a challenge for social scientists” (p.16)

More specifically, in the research by Escobar and Gómez (2020) they highlight that “the use of WhatsApp, as a learning resource, has positive effects on the development of communication skills” (p. 117). This study emphasizes the motivational use of the mobile phone as a pedagogical resource, which, far from hindering the dynamics of learning, can be very useful to improve elements such as reading time and spelling in young people. Specifying that "this application, used rationally in an ethical framework, is a very useful learning resource to promote the development of oral and written

communication skills" (p. 118).Another point to consider is the closeness aspect that voice notes allow, which although it is not a call itself, generates a more personalized communication between teachers and students, which in turn brings the advantage of cooperation with others classmates and keep the group out of the classroom area. As well as in turn, that the teacher's voice reaches the home and allows a more personal note that can be heard at any time of the day by parents and representatives. That is why Suárez, J. (2018) emphasizes the priority need for teachers to include the WhatsApp tool to belong to this virtual world in which university students find themselves and to be able to access them within their interests and current realities for academic purposes.

For their part, research such as that of Cremades, Maqueda and Onieva (2016) and Suarez (2017) highlight that there is a great opportunity to enrich writing and strengthen reading with the proper use of WhatsApp, which is even easier to apply in current generations, who are considered digital natives, so it is imperative that the teacher make use of strategies that involve not only what is of interest to the student, but also what is natural to him. Both investigations highlight that teachers must dispel the obstacles that prevent them from experimenting with tools with great potential such as WhatsApp, which, although it presents some difficulties, the benefits it generates, with well-used strategies, could greatly enhance the activities within the classroom. In the words of Cremades, Maqueda and Onieva (2016), in their research they managed to visualize an "increase in motivation, bidirectionality and immediacy to share all kinds of materials (written, oral and audiovisual) (p.118)" with the use of this tool.

From another point of view, authors such as Cascales-Martínez, Gomariz and Paco (2020) affirm that "the novelty and speed with which this instant messaging application has broken into schools and classrooms has not allowed teachers to reflect on whether it is pertinent or not its inclusion in the school curriculum" (p 84). Bringing into cause that debates are generated about the benefits or disadvantages of its use in the school environment. But as regards this study, he affirms that "the participating teachers do not agree that this social network is beneficial since they do not use it in class with their students; although it is true that there is a diversity of opinions among the participating teachers" (p. 84).

In this same order of ideas are the authors Cascales, Gomariz & Paco (2020) who, after analyzing the degree of importance as curricular content that teachers give to WhatsApp, as well as its treatment or inclusion in the curriculum, we can conclude that teachers Primary school participant is not involved in working on this aspect as curricular content, either due to ignorance, not considering it to be part of his teaching task or for other reasons that should be studied in depth.

However, these investigations affirm that teachers recognize the relevance of the WhatsApp application environment and the influence on young people, being a tool that facilitates communication but requires their guidance for proper use, which is why they consider inclusion important of this technology in the educational curriculum to adapt the classroom to the surrounding reality and thus complement the traditional communication channels and improve the effectiveness between home and school. What complements Homa and Oliveira (2020) who emphasize that the teacher must be prepared to insert these resources in the classroom, but should not aim to use only technology through use, without a clear and well-structured intention.

On the other hand, there are opinions a little more balanced, such as those of Hernández, Cascales-Martinez and Gomariz-Vicente (2017) who conclude that "the use of WhatsApp groups by families in schools is not so harmful as socially it is considered, not as beneficial as social groups can defend it "(p. 253) to which they complete affirmed that this is a social network and everything depends on the use that is given to it, that in itself it is neutral, and that it is on the part of the teacher or family to make beneficial use of it.

Conclusions

After making an exhaustive review of the bibliography and validating the different poles of opinions, results and analysis of the different authors and contracting with the literature, it

can be concluded that whatever the position of the teacher regarding the use of technology, it is a reality that this is part of the life of society. It should be noted that the WhatsApp tool specifically aims to provide a digital channel to allow communication, where whoever uses it maintains levels of interaction through this resource. Given this, it is clear to affirm that communication between people produces is one of the bases of education, so WhatsApp can serve with the appropriate strategy model to promote endless utilities in the pedagogical area.

It is known that teachers do not receive complete training in the use of technology to enhance the pedagogical act, but, although it is true, they must have self-taught skills to adapt to the dynamism of global change, which is increasingly accelerated.

Being able to be on platforms that young people are familiar with is an advantage that can be taken advantage of, not only because it generates closeness, but because it is more comfortable for the student, the use of elements in which he It has a constant interaction and it even becomes a reminder every time it sees, for example, "The WhatsApp Literature Group"

One aspect to consider is the evolution and adaptation of the application, which in a short time went from being an app for sending text messages to a multifunctional platform where information ranging from sending files to video calls interacts, incorporating each and more positive things, such as group calls, ideal for lectures, which has made it more interesting for the communication of knowledge. In relation to this, Suárez (2018) points out that WhatsApp, “although it is a generator of knowledge in itself, can help teachers to improve their communication, in a simpler and faster way, generate more open teaching-learning processes and flexible, implement the interest and motivation of the students, etc. " (p. 129)

In fact, the options and scope are more than expected, since by allowing making calls and video calls, sending messages and documents for free to anyone who has the application, it allows not only to communicate with friends, family or colleagues study, but with students, teachers or educational institutions in different areas of the planet and even to exchange cultural aspects and learn about other study methods, it can also be used as a means of motivation, to share specific study tips that they can have on hand as reminder, among others.

An example of its scope and usefulness is in the case of isolation due to the COVID 19 pandemic where authors such as Ferrer et. to the. (nd) they highlight that "The use of cellular technology through WhatsApp messaging facilitated an exchange without limits or barriers in time-space" (p. 9) but, above all, it allowed the advancement of education without expose anyone to get sick. This was only possible with the use of this tool, since not everyone has access to a computer, but more likely to a mobile, since since 2017 there are more cell phones than people.

Proper use requires certain rules to be respected, such as respect for grammatical rules and the rules of a good listener and writer, to avoid the collapse of the social network and the saturation of information. By this, what is meant is that the app by itself is not designed for the educational environment, but with due application and ingenuity on the part of the teacher, making use of it will be beneficial.

In the same way, the use of this social network without due order generates some discomforts that, if they are not known to control, can be very harmful. Among them, the disproportionate use where it is not possible to migrate from the communication medium to be hooked to the tool, the encouragement to not study the contents because they are stored at the immediacy of a click, this gives the students the feeling that it is not necessary to learn information that is stored in the Smartphone, the disorder of all the virtual documents sent in the digital environment that can generate a bit of confusion among students among others.

It can be concluded that the application is more current than ever, and for what is projected it will be for a longer time, so the teacher, far from removing it from their usual planning, must find a way to appropriate that digital space and link the formal academic learning to this virtual channel, to stop being alien to a palpable reality.

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REGULATORY ROLE OF RELIGION AND ENVIRONMENTAL CONSERVATION: LOOKING BACK TO SCRIPTURES

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ABSTRACT

Protection of the environment is considered a late development and the policy struggle to contain human practices is also well-known. It may sound like the earlier generations till 19th century were unaware of environmental consequences of their actions and the need to conserve. However, the fact is that the ancient vision was more towards settling human civilization in an environment friendly ways. The ancient policy and regulatory currents used to flow from the religions and an examination of the religious conditioning of life well establishes that environment was a concern. The religious texts and consequent practices are examined without comparing different religions for their environment friendly values and sermons. Reason for non-comparative study and analysis is that different religions developed at different times and at different locations. Contemporary time and geography being different, the conservation needs were also different. A religion which originated and grew on a water scarce location could have had more sensitive guidance for water\. Another religion could have had value for some other natural resource. Therefore, minus comparison, many religions are covered and their religious prescriptions are cited. Basic premise remains the same; that all religions had value for environmental conservation. The same has been examined and elaborated in the paper. Perspective is that rejuvenating the religious practices, may be after due confirmation with modern researches, will give a boost to the environmental conservation movement with ordinary efforts on regulation.

Introduction

"Protecting our environment is an urgent imperative and a sacred duty for all people of faith and people of conscience."[1]Religion can evoke a kind of awareness in persons that is different from scientific or technological reasoning. Religion helps make human beings aware that there are limits to their control over the animate and inanimate world and that their arrogance and manipulative power over nature can backfire. Religion instills the recognition that human life cannot be measured by material possessions and that the ends of life go beyond conspicuous consumption. Law is a late evolved tool to regulate human conduct. Earlier, religion and society used to exercise control over the regulatory rhythms. The entire gamut of family laws is an evidence of how religions have shaped the practices of people and how powerful is the influence of religions over their followers that they even agree to face difficulty and losses for the sake of religious compliances. World religions, each in their own way, offer a unique set of moral values and rules to guide human beings in their relationship with the environment.[2] Religion plays a great role in shaping our attitude towards the natural world. Religion is sometimes defined as the relationship between people and that which they regard as holy, often in supernatural terms. Nine of the world's major faiths represent billions of people worldwide. They include 1.161 billion Hindus, 506 million Buddhists,14.7 million Jews, just under 2.282 billion Christians, 1.907 billion Muslims, and 5 million Bahais[3]. All faiths around the world share a common ethic based on harmony with nature, although a wide gap is often perceived between the religious texts and the current practices of the adherents of those religions.[4]

Religious values and practices are deeply entwined in the fabric of daily lives, and the leaders of churches, mosques, Knesset, temples, and other religious communities play an important role in shaping attitudes, opinions, behaviors, and addressing societal

[1]Ban Ki-moon, Former UN Secretary-General; SG/SM/16710-ENV/DEV/1510, 28 APRIL 2015 available at https://www.un.org/press/en/2015/sgsm16710.doc.htmvisited on 30th July, 2021

2Environmental Ethics And Religious Traditions In Environmental Protection: An Overview Anju & R. Satyawan International Journal Of Environment, Ecology, Family And Urban Studies (Ijeefus) Issn(P): 2250-0065; Issn(E): 2321-0109 Vol. 3, Issue 5, Dec 2013, 1-10

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challenges. India had an ancient tradition of paying constant attention to protection of environment.[5]

Role of Religion and Environment

Long before Environment became the refrain of the global song at Stockholm and Rio, the ancient Indic heritage had already provided a spacious spiritual home for the environmental ethos. The Hindu, Islam, Jain, Vedic and Buddhist traditions established the principles of ecological harmony centuries ago - not because the world was perceived as heading for an imminent environmental disaster or destruction, nor because of any immediate utilitarian exigency, but through its quest for spiritual and physical symbiosis, synthesized in a system of ethical awareness and moral responsibility.[6] Religion protects and nurtures nature. If we take a look at Hinduism, we worship the sun, wind, land, trees, plants, and water which is the very base of human survival. Likewise, respect and conservation of wildlife—garuda, lion, peacock,and snake—are part of our cultural ethos from time immemorial.[7]

Environmental ethics inculcate a precious code in the individuals and societies and ought to be developed in each person, to command him/her as a force from within to make decisions and take actions on the different aspects of the environment which are not harmful to the local, national and international community. Environmental ethics has to sharpen the judgments of a person not to jeopardize the health and security of other fellow beings for the sake of material and political gains. The ethics command us not to endanger the health of an individual and communities, but to serve as a proud and honest person in the service of humanity.[8] Religions and traditional cultures tell us another narrative. For instance, to receive a seed and watch its germination is to enter into the universal order of things present in the manifestation of florescence without which we would not be here. To seek water is to be conscious of the intimate exchange of ocean and cloud. Thus the question today is how to achieve the convergence of science and religion wherein "objective analysis" and "subjective communion" are distinct yet complementary aspects of our experience and perception of the natural world.[9]

Hinduism is a religion where the concept of dharma is considered to be the universal organizing principle that governs all reality and guides how all things—animate or inanimate—ought to be, connoting a sense of duty, virtue, and moral righteousness that all Hindus should uphold.[10] In the context of the human-nature relationship, protecting the environment has thus been considered by some to be an expression of dharma.[11] As worded in the Hindu Declaration on Climate Change, it is a "dharmic duty to ensure that we have a functioning, abundant, and bountiful planet."[12] Another central concept to Hinduism[13] is karma, which holds that every action has consequences and that there is a causal relationship between one's actions and one's future fate, even in subsequent lifetimes.[14] Thus, karma is also closely related to the concept of rebirth, or Saṃsara. Both concepts further illustrate the Hindu conception of the human-nature relationship in two ways: (1) that there is a continuity and an intimate relationship among all forms of beings on Earth, and so it is essential that no harm is done to any of them[15]; and (2) that one's behavior toward the environment will have karmic consequences, which means one can

5 https://opentextbc.ca/introductiontosociology2ndedition/chapter/chapter-15-religion/(last visited Jan 6 2021)

[6]Environmental Ethics And Religious Traditions In Environmental Protection: An Overview Anju & R. Satyawan International Journal Of Environment, Ecology, Family And Urban Studies (Ijeefus) Issn(P): 2250-0065; Issn(E): 2321-0109 Vol. 3, Issue 5, Dec 2013, 1-10

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accumulate good karma by actively protecting the environment.[16]

Hinduism is a religion deeply rooted in nature. The sacred text (Vedas, Upanishads, Bhagavad Gita, Epics) has many references of divinity related to nature, such as rivers, mountains, trees, animals, and the earth. To protect them, Hinduism encourages environmental protection and there are organizations who promote sustainable development and support the protection of the environment through awareness campaigns and actions (GreenFaith, 2010).[17]

Hinduism Connections and Reflection on Environment: "I shall now explain the knowable, knowing which you will taste the eternal. Brahman, the spirit, beginning less and subordinate to me, lies beyond the cause and effect of this material world." (Bhagavad Gita 13.13)[18]

"According to the different modes of material nature — the mode of goodness, the mode of passion and the mode of darkness — there are different living creatures, who are known as demigods, human beings and hellish living entities. O King, even a particular mode of nature, being mixed with the other two, is divided into three, and thus each kind of living creature is influenced by the other modes and acquires its habits also." (BhagavataPurana 2.10.41)[19]

"There is an inseparable bond between man and nature. For man, there cannot be an existence removed from nature." (Amma, 2011)[20]

Religious texts provide more insights into the different ways the Hindu tradition makes sense of the environment, and in turn, the human-nature relationship. The Rig Veda—believed to be one of the earliest Hindu religious texts—contains various hymns describing the sacred phenomena of nature, with different environmental elements perceived as extensions of the divine. Another Vedic text—the Atharva Veda—has mantras that remind Hindus of the need to behave respectfully toward "Mother Earth" by making sure that any personal activities do not hurt her vitals, body, or appearance.[21] The culture of conservation of nature dates back to the ancient Vedic Period. The four Vedas — Rig-Veda, Sama-Veda, Yajur-Veda and Atharva- Veda — are full of hymns dedicated to the supremacy of various natural entities. The Rigvedic hymns refer to many gods and goddesses identified with sun, moon, thunder, lightening, snow, rain, water, rivers, trees etc. They have been glorified and worshippedas givers of health, wealth and prosperity. The rain–god Indra has the largest number of hymns attached to him.The Gāyatrī mantra of the Rig-Veda, which is chanted on every auspicious occasion, is full of praise for the sun. Similarly, the Atharva-Veda highlights the importance of nature and has a beautiful hymn in praise of the earth. With remarkable foresight, Thiruvalluvar'sKural, an ancient text in Tamil from south India stresses the need to remain under nature's protection: 'Sparkling water, open space, hills and forests constitute a fortress.' Guru GranthSaheb states, 'Air is the guru, water is the father, and earth is the great Mother of all.'

The worship of the pipal tree (also known as Boddhi tree, *ashvattha*in Sanskrit, *Ficusreligiosa*) became a folk ritual, and the pipal was called the king of trees in *Brahma Purāṇa*. In the course of time, many such plants andtrees came to be associated with various gods and goddesses and were worshipped accordingly. The Hindu Hymn to the Earth, "The PrithviSukta, the 12th chapter of the Artharva Veda, recognizes the intimacy of earth nurturance and human cultivation. Hindus are enjoined to protect animals and to respect nature and the river by not contaminating it with sewage or domestic wash water. Buddhism sees in the composite nature of phenomena, the insight of transience and the instance of enlightened awareness – an awareness of the value of life by not destroying

16 Pankaj Jain, "10 Hindu Environmental Teachings", *The Forum on Religion and Ecology at Yale*, April 10, 2011, http://fore.yale.edu/news/item/10-hindu-environmental-teachings/.
17https://www.unep.org/about-un-environment/faith-earth-initiative/religions-and-environmental-protection (last visited Jan 6 2021)
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human, animals and plants. Confucian thought engages the realities of the natural world in a manner to cultivate the inner spontaneities of the human mind and heart, the Sage Personality, and the ability of those who possess absolute sincerity.[22]Rig Veda says, "Thousands and Hundreds of Years If You Want to Enjoy the Fruits and Happiness of Life Then Take Up Systematic Planting of Trees."[23]

"Do Not Harm the Environment; Do Not Harm the Water and The Flora; Earth Is My Mother, I Am Her Son; May the Waters Remain Fresh, Do Not Harm the Waters"; "Do Not Cut Trees, Because They Remove Pollution." (Rig Veda, 6:48:17)[24]

"The waters in the' sky, the waters of rivers, and water in the well whose source is the ocean, may all these sacred waters protect me" (Rig-Veda 7.49.2)[25]

Yajur Veda "Do Not Disturb the Sky and Do Not Pollute the Atmosphere." (Yajur Veda,5:43)[26]

Charaka wrote about Vikrti (pollution) and disease, he mentioned air pollution specifically as a cause of many diseases (Charaka Samhita, Vimanastanam III 6:1.9)[27]

"A person, who is engaged in killing creatures, polluting wells, and ponds and tanks, and destroying gardens, certainly goes to hell" (Padmapurana, Bhoomikhananda 96:7-8).[28]

Moreover, Hinduism Recognizes That the Human Body Is Composed of And Related to These Five Elements, And Connects Each of The Elements to One Of The Five Senses. The Human Nose Is Related to Earth, Tongue to Water, Eyes to Fire, Skin to Air and Ears to Space. This Link Between Our Senses and The Elements Is the Foundation of Our Human Relationship with The Natural World. For Hinduism, Nature and The Environment Are Not Outside Us. They Are an Inseparable Part of Our Existence. [29]

A Quote From Vishnu Purana States: "As The Wide-Spreading Nargodha (Sanskrit For Banyan) Tree Is Compressed In A Small Seed, So At The Time Of Dissolution, The Whole Universe Is Comprehended In Thee As Its Germ; As The Nargodha Germinates From The Seed, And Becomes Just A Shoot And Then Rises Into Loftiness, So The Created World Proceeds From Thee And Expands Into Magnitude."[30]

The VarahPurana Says, "One Who Plants One Peepal, One Neem, One Bar, Ten Flowering Plants or Creepers, Two Pomegranates, Two Oranges and Five Mangos, Does Not Go to Hell."[31]

Other texts like the various Hindu folklore or epics include similar teachings, but further illustrate the human-nature relationship through narratives, sometimes to make the teachings more relevant or to provide more specific guidance. The Puranas are one such collection of Hindu myths and traditional lore. For example, some are related to the Ganges River, or Ma Ganga, which is depicted as a goddess who descended to Earth to save the world.[32]

Customs like worship of tree was quite popular and one of the best practice to conserve the groves of forest. The evolution of the concept of natural resource management is not new. The fact remains that the conservation and

[22]https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjhyJ_bibfvAhUzzjgGHZq5AjkQFjAAegQIAhAD&url=https%3A%2F%2Fwedocs.unep.org%2Fbitstream%2Fhandle%2F20.500.11822%2F8696%2F-Environment%2C_religion_and_culture_in_the_context_of_the_2030_agenda_for_sustainable_development-2016Environment%2C_religion_and_culture_in_the_context_.pdf%3Fsequence%3D2%26isAllowed%3Dy&usg=AOvVaw2GqWUQFhKOQxlnG0TxXLth(last visited Jan 6 2021)

23https://www.lawyered.in/legal-disrupt/articles/environment-protection-dharma-and-duty-which-establishes-code-conduct-every-bhartiya-and-person-arou/ (last visited Jan 6 2021)

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26 https://www.lawyered.in/legal-disrupt/articles/environment-protection-dharma-and-duty-which-establishes-code-conduct-every-bhartiya-and-person-arou/(last visited Jan 10 2021)

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protection of the natural resources has been significant since ages. It has been noticed that there has been a direct link between resource management and traditional societies with the continuous interaction and dependency of communities on natural resources. This dependency reflects in terms of ecosystem services such as food, fodder, fuelwood, fresh air, water, medicinal plants and herbs etc, apart from soothing and recreational qualities that accomplish the basic requirement of the communities residing in and around natural areas. In the earlier time most of the rural societies were highly dependent on these services but there were certain measures recognized to conserve the natural resources. They had realised that these services are limited in nature and there is a need to protect them. In this direction certain beliefs, custom and tradition have been evolved and established their connection with the natural environment.

The oldest visual image of the human fascination, love, and reverence for nature in India can be found in the 10,000 year-old cave paintings at Bhimbetka in Central India depicting birds, animals, and human beings living in harmony. The Indus Valley civilization provides evidence of human interest in wildlife, as seen in seals depicting images of rhino, elephant, bull, etc. Historically, conservation of nature and natural resources was an innate aspect of the Indian psyche and faith, reflected in religious practices, folklore, art and culture permeating every aspect of the daily lives of people. Scriptures and preachings that exhort reverence for nature and relate to conservation can be found in most of the religions that have flourished in the Indian subcontinent.[33]

Twenty-two centuries ago Emperor Ashoka decreed that it was a king's duty to protect wildlife and the trees of the forests. He got edicts inscribed on rocks and iron pillars throughout his kingdom, prohibiting the destruction of forests and the killing of various species of animals. This historical evidence, surviving to this day, is the first recorded measure on conservation anywhere in the world.[34] In more recent historical times, Mughal Emperor Babur's memoirs (Baburnama), Guru Nanak's hymns on 'Baramasa' (the seasons) depicting each month with a dominant bird image, and Emperor Jehangir's memoirs showing his keen interest in and study of wildlife provide fine illustrations of this Indian tradition.[35]

Not only Hinduism but almost all religions address the issue of the creation of the universe, or universes, in different forms and with varying degrees of clarity or detail.

Buddhism: The notion of karma alone, being an important part of Buddha's lessons, conveys the values of conservation and responsibility for the future. It is said that the morality of our actions in the present will shape our character for the future, an idea close of sustainable development.[36]

Buddhist Connections and Reflection on Environment: “As a bee – without harming the blossom, its color, its fragrance – takes its nectar and flies away: so should the sage go through a village.” (Dhammapada IV, Pupphavagga: Blossoms, 49)[37]

“Drop by drop is the water pot filled. Likewise, the wise man, gathering it little by little, fills himself with good.” (Dhammapada IX, Papavagga: Evil, 122)[38]

Jainism: Originated from India, the main teaching from Jainism is Ahimsa, the non-violence, in all parts of life. Verbally, physically and mentally, Jainism doctrines focus on a peaceful and disciplined life. Kindness to animals, vegetarianism and self-restraint with the avoidance of waste are parts of Jains life. In addition, in 1990, The Jain Declaration on Nature was written to mark the

[33] http://ccrtindia.gov.in/readingroom/nscd/ch/ch11.php(last visited Jan 10 2021)

[34]Soliman, S. M., Hagar, M., Ibid, F., & El Sayed, H. (2015). Experimental and theoretical spectroscopic studies, HOMO–LUMO, NBO analyses and thione–thiol tautomerism of a new hybrid of 1, 3, 4-oxadiazole-thione with quinazolin-4-one. *Spectrochimica Acta Part A: molecular and biomolecular spectroscopy*, *145*, 270-279.

[35]Soliman, S. M., Hagar, M., Ibid, F., & El Sayed, H. (2015). Experimental and theoretical spectroscopic studies, HOMO–LUMO, NBO analyses and thione–thiol tautomerism of a new hybrid of 1, 3, 4-oxadiazole-thione with quinazolin-4-one. *Spectrochimica Acta Part A: molecular and biomolecular spectroscopy*, *145*, 270-279.

[36] https://www.unep.org/about-un-environment/faith-earth-initiative/religions-and-environmental-protection(last visited Jan 10 2021)

[37]Soliman, S. M., Hagar, M., Ibid, F., & El Sayed, H. (2015). Experimental and theoretical spectroscopic studies, HOMO–LUMO, NBO analyses and thione–thiol tautomerism of a new hybrid of 1, 3, 4-oxadiazole-thione with quinazolin-4-one. *Spectrochimica Acta Part A: molecular and biomolecular spectroscopy*, *145*, 270-279.

[38]Soliman, S. M., Hagar, M., Ibid, F., & El Sayed, H. (2015). Experimental and theoretical spectroscopic studies, HOMO–LUMO, NBO analyses and thione–thiol tautomerism of a new hybrid of 1, 3, 4-oxadiazole-thione with quinazolin-4-one. Spectrochimica Acta Part A: molecular and biomolecular spectroscopy, 145, 270-279.

entry of the Jain faith into the WWF Network on Conservation and Religion (The Jain Declaration on Nature, 1990).[39]

Jainism Connections and Reflection on Environment: "Do not injure, abuse, oppress, enslave, insult, torment, torture, or kill any creature or living being." (Mahavira)[40]

"As a highly evolved form of life, human beings have a great moral responsibility in their mutual dealings and in their relationship with the rest of the universe. It is this conception of life and its eternal coherence, in which human beings have an inescapable ethical responsibility, that made the Jain tradition a cradle for the creed of environmental protection and harmony." (The Jain Declaration on Nature, 1990).[41]

Islam: Hundreds of Qur'an verses support the protection of the environment. Many some Islamic organizations promote the relation between Islam and sustainability. Islam also approaches environment from a stewardship perspective. The earth is God's creation, and as humans, we have been entrusted to preserve it as we found. The responsibility of humanity is to protect and ensure the unity (Tawheed) of the God's creation. Moreover, Islam prohibits the excessive consumption of resources the planet provides to the humanity (Qur'an 7:31, 6:141, 17:26-27, 40:34). In fact, Qur'an mentions wasteful consumption (Isrāf) as the thirty-second greatest sin. In 2015, the Islamic Climate Change Symposium adopted the Islamic Declaration on Global Climate Change.

Muslim Connections and Reflection on Environment: "Devote thyself single-mindedly to the Faith, and thus follow the nature designed by Allah, the nature according to which He has fashioned mankind. There is no altering the creation of Allah." (Qur'an 30:30)[42]

"Do not strut arrogantly on the earth. You will never split the earth apart nor will you ever rival the mountains' stature" (Qur'an 17: 37).[43]

"It is Allah who made for you the earth a place of settlement and the sky a ceiling and formed you and perfected your forms and provided you with good things. That is Allah, your Lord; then blessed is Allah, Lord of the worlds." (Qur'an, 40:64)[44]

The Sufi Master Rumi recommended us if we want to "make peace with the universe" we should "take joy in it". Then "it will turn to gold. Resurrection will be now. Every moment, a new beauty."[45]

In Judaism, the Torah outlines a series of ethical obligations including several relevant to the conservation of nature. The Torah says: "When God created Adam, he showed him all the trees of the Garden of Eden and said to him: 'See my works, how lovely they are, how fine they are. All I have created, I created for you. Take care not to corrupt and destroy my universe, for if you destroy it, no one will come after you to put it right'" (Ecclesiastes, Rabbah).[46]

Christianity teaches that all creation is a loving act of God and that humanity may not destroy biological diversity or destroy God's creations without the risk of destroying itself. In the Christian Bible, the book Ecclesiastes states in chapter 3, verse 19: "For that which befalleth the sons of men befalleth beasts ... as the one dieth, so dieth the other ... so that a man hath no pre-eminence above a beast." There are other comparable passages in the Bible on the conservation of wildlife (Deuteronomy, chapter 2, verses 6 and 7, and Genesis, chapter 9), agricultural lands (Leviticus, chapter 25, verses 2 to 4) and the preservation of fruit trees (Deuteronomy, chapter 20, verse 19, and Genesis, chapter 19, verses 23 to 25). Christmas itself was originally a time of pagan celebration of the winter solstice, and

[39]Soliman, S. M., Hagar, M., Ibid, F., & El Sayed, H. (2015). Experimental and theoretical spectroscopic studies, HOMO–LUMO, NBO analyses and thione–thiol tautomerism of a new hybrid of 1, 3, 4-oxadiazole-thione with quinazolin-4-one. *Spectrochimica Acta Part A: molecular and biomolecular spectroscopy*, *145*, 270-279.

[40]Soliman, S. M., Hagar, M., Ibid, F., & El Sayed, H. (2015). Experimental and theoretical spectroscopic studies, HOMO–LUMO, NBO analyses and thione–thiol tautomerism of a new hybrid of 1, 3, 4-oxadiazole-thione with quinazolin-4-one. *Spectrochimica Acta Part A: molecular and biomolecular spectroscopy*, *145*, 270-279.

[41]Soliman, S. M., Hagar, M., Ibid, F., & El Sayed, H. (2015). Experimental and theoretical spectroscopic studies, HOMO–LUMO, NBO analyses and thione–thiol tautomerism of a new hybrid of 1, 3, 4-oxadiazole-thione with quinazolin-4-one. *Spectrochimica Acta Part A: molecular and biomolecular spectroscopy*, *145*, 270-279.

[42] https://www.unep.org/about-un-environment/faith-earth-initiative/religions-and-environmental-protection(last visited Jan 10 2021)

[43]Soliman, S. M., Hagar, M., Ibid, F., & El Sayed, H. (2015). Experimental and theoretical spectroscopic studies, HOMO–LUMO, NBO analyses and thione–thiol tautomerism of a new hybrid of 1, 3, 4-oxadiazole-thione with quinazolin-4-one. *Spectrochimica Acta Part A: molecular and biomolecular spectroscopy*, *145*, 270-279.

[44]Soliman, S. M., Hagar, M., Ibid, F., & El Sayed, H. (2015). Experimental and theoretical spectroscopic studies, HOMO–LUMO, NBO analyses and thione–thiol tautomerism of a new hybrid of 1, 3, 4-oxadiazole-thione with quinazolin-4-one. *Spectrochimica Acta Part A: molecular and biomolecular spectroscopy*, *145*, 270-279.

[45]Rumi, J. A. D., & Barks, C. (2005). *Rumi: The book of love: Poems of ecstasy and longing*. HarperSanFrancisco.

[46] https://iefworld.org/unepgc21.htm

Christmas trees came from sacred groves dedicated to a pagan goddess.[47]

Sikhism teaches that all forms in the universe exist under God's command and that, having brought a life form into being, God will protect it. The teachings of Sikhism are based on a premise of life liberated from conspicuous consumption.[48]

According to the above mentioned details there are many points of religious agreement in environmental ethics, like:

- The natural world has value in itself and does not exist solely to serve human needs
- There is a significant continuity of being between human and non-human living beings, even though humans do have a distinctive role. This continuity can be felt and experienced.
- Non-human living beings are morally significant, in the eyes of God and/or in the cosmic order. They have their own unique relations to God, and their own places in the cosmic order.
- The dependence of human life on the natural world can and should be acknowledged in ritual and other expressions of appreciation and gratitude.
- Moral norms such as justice, compassion and reciprocity apply (in appropriate ways) both to human beings and to non-human beings. The wellbeing of humans and the wellbeing of non-human beings are inseparably connected.
- There are legitimate and illegitimate uses of nature.
- Greed and destructiveness are condemned. Restraint and protection are commended.
- Human beings are obliged to be aware and responsible in living in harmony with the natural world, and should follow the specific practices for this prescribed by their traditions.[49]

The philosophy of sufficiency is deeply rooted in the human past. Materialism was denounced by all sages, from Buddha to Mohammad, and every world religion is rife with warnings against the evils of excess. These religious founders disagreed with each other on various issues but they all emphasized with one voice that if made material wealth our paramount aim, this would lead to disaster.

At present the dilemma of environment degradation become a matter of concern at global level and emerged because of rapid industrialization, growing urbanization, rigorous cultivation and other developmental activities posed detrimental impact on environment. The major environmental issues identified are deforestation, pollution (air, water and land) and loss of biodiversity, depleting ground water sources etc. The air pollution mainly concentrated in ten cities because of the eighty percent industrial areas are located with in these cities. Besides this the heavy volume of traffic causes pollution and adding significantly in the severity of problem. The huge population of a developing country like India highly dependent on natural resources for their food, shelter, fodder, medicinal plants etc and causing a greater pressure on the existing resources.

At the same time, India is also no stranger to widespread environmental problems, and the situation has been dire due to population growth, rapid industrialization and agricultural activities, and the depletion of natural resources.[50] Religious activities do constitute a part of those problems, especially when it comes to the pollution of bodies of water that hold religious and ritualistic significance to the Hindu communities. There have been various studies on how worshipping activities like the KumbhMela festivals, the annual Ganesh Chaturthi festivals, or the daily aarthi ceremonies contribute to the pollution problem for rivers such as the Ganges and the Yamuna, especially with the use of religious offerings that are usually non-biodegradable and often contain heavy metals or plastic. However, the Ganges is unique in that it has been viewed as a sacred river for 5,000 years. Mentioned in all

47https://iefworld.org/unepgc21.htm (last visited Jan 12 2021)

[48]Soliman, S. M., Hagar, M., Ibid, F., & El Sayed, H. (2015). Experimental and theoretical spectroscopic studies, HOMO–LUMO, NBO analyses and thione–thiol tautomerism of a new hybrid of 1, 3, 4-oxadiazole-thione with quinazolin-4-one. *Spectrochimica Acta Part A: molecular and biomolecular spectroscopy*, *145*, 270-279.

[49] Pedersen, K. P. (2018). Environmental ethics in interreligious perspective. In *Explorations in global ethics* (pp. 253-290). Routledge.

[50] Parikh, J. K. (1977). Environmental problems of India and their possible trends in future. *Environmental Conservation*, *4*(3), 189-197.

major Hindu texts and scriptures, the river is seen as the physical manifestation of a divine Goddess. Bathing in the Ganges is thought to cleanse the soul, leading tens of millions of Hindus to bathe in its waters and also to immerse the remains of their loved ones.[51] While there have been many calls for efforts to clean these sacred rivers, the paradox is that there are also devotees who believe that since these rivers are part of the all-powerful divine, any human practices—whether to pollute or to clean—are insignificant and inconsequential. Furthermore, even if there are ways to promote more environmentally-friendly religious practices through the use of biodegradable offerings, there are also other deep-rooted cultural practices—motivated by the same set of religious beliefs—that are much more difficult to address, such as bathing in the Ganges or cremating bodies near the Ganges to then scatter the ashes into the river.[52]

One might then question the effectiveness of appealing to religion or faith to promote positive environmental action; as seen in the case of Hinduism, even a religion that seems to have deep underpinnings of ecological sensibility can also indirectly promote a level of indifference for environmental harm. Critical action is needed by the international community to address urgent and increasing environmental degradation, and related challenges of social and economic unsustainability. Religion and culture can significantly address climate change, biodiversity and ecosystem loss, pollution, deforestation, desertification and unsustainable land and water use, and other urgent issues.

Constitutional Provisions

It is noticeable that Environment Protection in India has been recognised as an integral and fundamental right under the garb of Article-21 of the Indian Constitution, on the lines of the Western Civilisations by virtue of Judicial Activism exercised to develop the Right's oriented Environmental Jurisprudence.

The provisions in the Indian Constitution, which specifically talks about the Environment Protection are as follows,

Part IV: Directive Principles of State Policy

Article 47- "The State shall regard the raising of the level of nutrition and standard of living of its people and improvement of public health as among its primary duties."

Article 48A- "Protection and Improvement of Environment and safeguarding of Forests and Wildlife. - The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country."

Part IVA: Fundamental Duties

Article 51A(g)- "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures."

Article 51A(j)- "It shall be the duty of every citizen of India to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievements."

Moreover, it is also of great significance to quote that expressly Part IV of the Indian Constitution is neither enforceable nor justiciable by virtue of Article 37 which states,

"The provisions contained in this Part shall not be enforced by any court, but the principles therein laid down are nevertheless fundamental in the governance of the country and it shall be the duty of the State to apply these principles in making laws."

The aforementioned similar express rider for enforceability is absent for Part IVA (Fundamental Duties) of the Indian Constitution and this silent move on the part of the Constituent Assembly has many times raised an issue as to who shall be made liable, punished, compensated for and compensated by in the matters pertaining to Environmental Pollution and Degradation.

Further, as to the justiciable nature of Fundamental Duties, there exists contradictory views among various High Courts, as well as in the Supreme Court as well. This contradiction of views to uphold the pious duty to preserve & Protect the Environment and rise of the Environmental Degradation in past 10 decades (after the Industrial Evolution) coupled with lack of responsibility on the part of Executive and Legislature has obliged the Judicial Organ of the Government to step-in while exercising

[51] Alley, K. D. (2002). *On the banks of the Gaṅgā: When wastewater meets a sacred river*. University of Michigan Press.

[52] Vazquez, M. (2018). People Moving Water: Religious and Secular Perspectives at Play in Legal Water Management. *Quaderni di diritto e politica ecclesiastica*, *21*(2), 437-466.

the Judicial Activism, by bringing this duty to Protect Environment be recognised under Part III of the Indian Constitution, for the basic reason that Constitution of India very well provides for a systematic machinery for effective enforcement of Rights and thus, this was only the way by which this duty could be enforced for the protection, preservation and improvement of Environment by manifesting it as a Right, but in reality Environment Protection was and is and in future shall be a DHARMA and DUTY casted upon everyone. So, to say it owes a nature as that of a Right, categorically would go wrong.[53]

According to Paul W. Taylor (1981)[54], 'the ethics of respect for nature is made up of three basic elements: a belief system, an ultimate moral attitude, and a set of rules of duty and standards of character. These elements are connected with each other in the following manner. The belief system provides a certain outlook on nature, which supports and makes intelligible an autonomous agent's adopting it; ultimate moral attitude brings forth the respect for nature, that it recognizes the attitude of respect to be the only suitable or fitting attitude to take towards all forms of life. Living beings are now viewed as the appropriate objects of the attitude of respect and are accordingly regarded as entities possessing inherent worth. One then places intrinsic value on the promotion and protection of their good. As a consequence of this, one makes a moral commitment to abide by a set of rules of duty and to fulfill the same, certain standards of good character in which the attitude of respect for nature is manifested. The overall well being of *Homo sapiens* is dependent upon the ecological soundness and health of many plant and animal communities, while their soundness and health does not in the least depend upon human well being! If such has been the tradition, philosophy and ideology of world religions, what then are the reasons behind the present state of environmental crisis? Our ethical beliefs and religious values influence our behaviour towards others, including our relationship with all creatures and plant life. If, for some reason, these noble values become displaced by other beliefs, which are either thrust upon the society or transplanted from another culture through invasion, then the faith of the masses in their own cultural tradition is shaken. As the foreign culture, language and system of administration slowly takes root and penetrates all levels of society, and as appropriate answers do not come, it is only natural that the people or the locals will become more inward looking and self-centered. Under such circumstances, religious values, which acted, as sanctions against environmental destruction do not retain a high priority and more often than not economic factors display respect for nature.

As evident, policies have been struggling for adequate implementation and the desire to develop has always taken huge toll over the goals of conservation. Agenda conservation will always demand curbs in the lifestyle and policy may always fall short of such influence. Deterrence may also not be able to do the desired. In such situation, rejuvenating the religious aspects for environmental conservation may provide some solution. For this, appropriate researches combining modern science with religious practices will be of help.

[53]https://www.lawyered.in/legal-disrupt/articles/environment-protection-dharma-and-duty-which-establishes-code-conduct-every-bhartiya-and-person-arou/(last visited Jan 6 2021)

[54] Taylor, P. W. (1981). The ethics of respect for nature. *Environmental ethics*, *3*(3), 197-218.

STABILIZATION AND LEACHATE ANALYSIS OF HEAVY METAL SLUDGE USING DIFFERENT ADDITIVES

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ABSTRACT

This paper presents the issues on the experiments fifteen mixtures of cement, fly ash and lime were tested; each of these mixtures was mixed with water. The study also evaluated the best consolidation/stabilization process for encapsulating hazardous inorganic waste (heavy metals) in cement to produce safe products. Estimate the concentration of metals in the filtrate. If additives are added to the drilling fluid and cured at 23°C for 7 days, a compressive strength of 13.7 kg/cm2 can be achieved for curing. The best mixtures (according to CS) showed exceptionally high compressive strength values (almost five times the minimum standard value). The Optimal mixtures are those which have a sludge: additive ratio of 60:40 and it contain 50% of cement. Optimal mixing can effectively harden chromium sludge (ETP mud) and reduce the leaching property to the required limit. Therefore, the composition is effective in obtaining acceptable compressive strength and reducing leaching properties. Advantage of this process is.

(1) partial replacement of cement to save costs.

(2) Introduction of the concept of WASTE TREATING WASTE for ultimate safe disposal of metal laden sludges on to landfills.

Keywords: *Solidification, Stabilization, Leachate, Compressive strength, Digital compression testing machine, TCLP, Chromium sludge, Metal laden sludge..*

Introduction

Rapid growth in Indian industries, owing to liberalization of economic policies, is observed in past forty years. The production of textiles, dyes, pesticides, pharmaceuticals, petrochemicals, fertilizers, paint, leather products and chlor- alkali has grown significantly. Any waste that may cause irreparable damage to the environment or harm to people is considered hazardous. This may be due to its biological, chemical, physical and infectious properties. Toxic, this waste is corrosive, reactive and flammable. Dangerous consequences occur both in nature and in nature. Any substance that can disrupt normal physiological functions, is

poisonous and cause serious harm to animals and humans is called a toxic substance. Improper handling of these wastes can cause air pollution, surface water ,ground water, bioaccumulation, and soils; sediments (leaching into water bodies).

Hazardous waste has been defined as , "Hazardous waste means wastes solid, sludge and containerized gases other than radioactive & infectious wastes which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics cause danger or likely to cause danger to health or to the environment."

Characteristics of Hazardous Waste:

- Ignitability: Ignitability or Flammability is a term used to define residues as hazardous substances that may cause fires during transportation, storage, or disposal.
- Reactivity: Reactive wastes are chemically unstable and react violently with air or water. They cause explosions or form toxic vapours.
- Corrosivity: Corrosive wastes are acids or bases.
- Toxicity: Toxic waste is only waste "that is harmful or fatal to living organisms when absorbed or ingested".

After studying and characterizing the waste as hazardous waste, it needs special storage, transport, and disposal.

Storage of hazardous waste:

- Hazardous waste may be stored temporarily before being treated and disposed of. The

storage should not be at the place of the generation.

- The storage area which is away from waste generation area should be left for storage and should be cleaned at fixed intervals.

Disposal of hazardous waste:

- Hazardous waste must be disposed of scientifically at locations selected and approved by the CPCB after environment impact assessment of the place.
- The hazardous waste should be disposed at places specified and notified for the purpose that is at least 0.5 km from a residential area.

Materials

1. **Electroplating Sludge:** This is a typical solid waste produced by the electroplating industry or surface treatment plants and is generally classified as hazardous waste.

Figure 1: Electroplating Sludge

2. **Cement:** Cement type used here is 53 grade, Class 53 OPC has the best particle size distribution and excellent crystal structure, so the structure has high strength and durability

Figure 2: Cement

3. **Fly Ash:** It is a byproduct of the combustion of pulverized coal in electric powered strength producing plants

Figure 3: Fly Ash

4. **Lime:** Calcium oxide is a white crystalline solid

Figure 4: Lime

Method

While ANOVA test was conducted in elbow joint and shoulder joint researcher could not find any significance difference in in long service, flick service, and short service. The p-value of elbow joint is 0.834 which is more than 0.05 hence researcher failed to reject the null hypothesis. The p-value of shoulder joint is 0.77 where researcher failed to reject the null hypothesis as the p-value is more than 0.05.the insignificance result is may be due to the nature and position of the service. In both the services the position is same and the technique of delivering service is also similar with each other.to do better investigation once require better equipment.it is recommended to conduct research through three dimensional analysis to understand the movement pattern of different joint. All the basic movement like flexion, extension in shoulder joint and elbow joint is more or less same while delivering long service, flick service, and short service. Same kind of study was carried out by Husain, I., & Bari, M.A. (2011) in "Kinematic analysis of forehand and backhand smash in badminton" (Husain & Bari, 2011)where they found significance result in shuttle velocity, contact height, racket angle, wrist angular velocity of shoulder joint and elbow joint. Researcher failed to get significance difference in flight angle, shoulder angle, elbow angle. This research will help the coaches, players to get the knowledge about badminton forehand service.

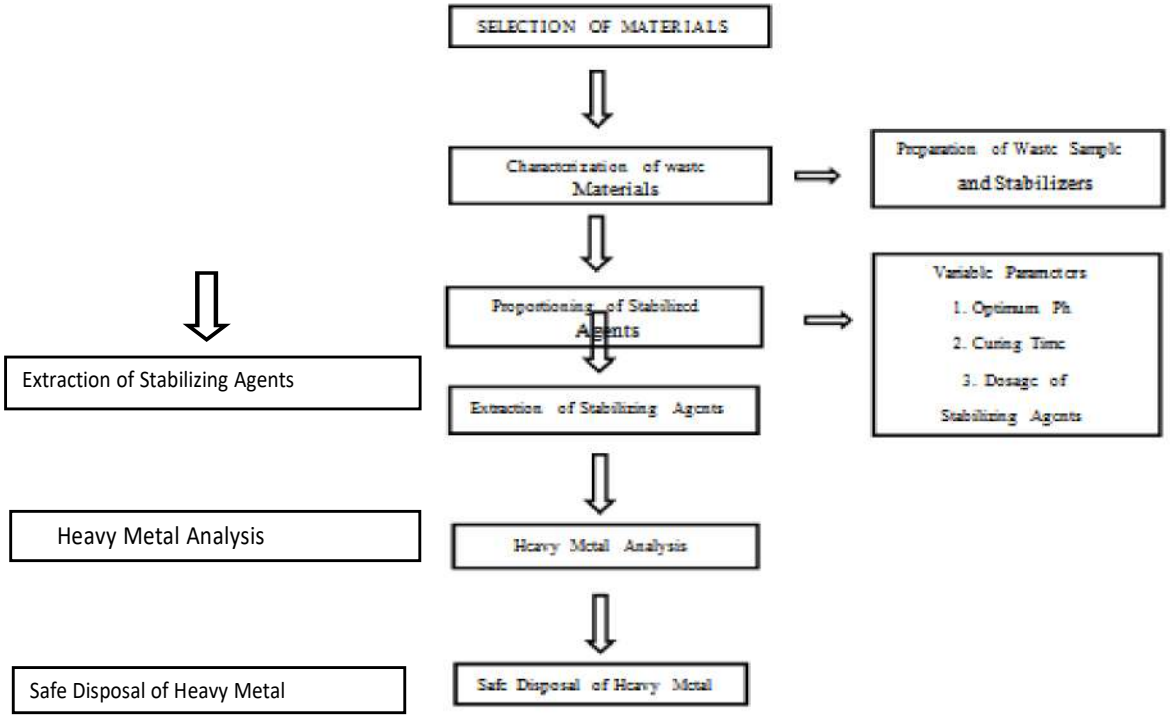

Figure 5: Flow Chart of the process

determined by two parameters: compressive strength and leaching resistance. Process carried out is:

- Five kg each of the chromium sludge is collected and analyzed to determine the physical and chemical properties mentioned briefly.
- Analyze stabilizers such as cement, ash, lime, CaO, SiO2, Al2O3, Fe2O3, MgO, misfire and other additives.
- Conduct leaching resistance test by changing the ratio of stabilizers.
- Characterization studies were performed on these substances and recovered stable samples, and the concentration of heavy metals was measured.
- By changing the operating parameters such as the amount of stabilizer, the combination of stabilizers, their ratio and curing time (3 days and 7 days), the best operating conditions for processing stable materials have been achieved.

Preparation of sample:

- 100 gm of the metal laden soil was taken and mixed with predetermined weights of cement, and solidification additives (fly ash & lime) by adding distilled water.
- The mixtures of samples were then placed into 2.5 cm diameter by 7.5 cm long PVC moulds (Fig.7) for 24-hour hardening and cured for 3, & 7 days in a controlled temperature/humidity room (23 °C, 95 % relative humidity).
- Moulds proportion for 3- and 7-days curing period, and compression test is done using Digital compression testing machine after this the crushed samples were taken to TCLP test.

TABLE 1: Proportions of the Stabilizing Agent For 3- and 7- Days Chromium Sludge

Sl.n o	Additives. Cement ratios	Chromium Sludge(g)	Additive + Cement Quantities		
			Fly Ash (g)	Lime(g)	Cement (g)
1	20:80	60	4	4	32
2	i.e., (8g:32g)	60	8/2=4	8/2=4	32
3	20:80		0	8	
	20:80	60	8	0	32
4	30:70	60	6	6	28
	i.e., 12g:		12/2=6	12/2=6	
5	28g	60	0	12	28
6	30:70	60	12	0	28
	30:70				
7	40:60	60	8	8	24
	i.e., 16g:		16/2=8	16/2=8	
8	24g	60	0	16	24
9	40:60	60	16	0	24
	40:60				
10	50:50	60	10	10	20
	i.e., 20g		20/2=10	20/2=10	
11	:20g	60	0	20	20
12	50:50	60	20		20
	50:50				
13	60:40	60	12	12	16
	i.e., 24g:		24/2=12	24/2=12	
14	16g	60	0	24	16
15	60:40	60	24		16
	60:40				

After a predetermined curing time, a digital compression tester was used to analyze the compressive strength (CS) of the sample. Measure the composition of each sample in duplicate. The CS test is performed on a cylindrical sample of a stabilized/cured matrix.

Heavy metal analysis using TCLP test: Preparations of standard solutions.

- For Zinc, Magnesium and cadmium prepare 1,2,3 and 4 ppm using 1000 ppm NIST traceable stock solutions.
- Iron 2 , 4 6 and 8 ppm standard solutions using 1000ppm stock NIST traceable solution.
- Chromium, Lead, and cobalt prepare 5,10,15 ppm standard solutions using 1000 ppm NIST traceable stock solution.

Analysis:

- Weigh accurately about 05g, 1.0g & 2.0g into silica crucibles pre ignited at 900°C. Heat the sample over burner for about 10 minutes and finally ignite the sample at 850°C for constant weight.
- Transfer the residue completely to a 500ml beaker with the help of about 30-40ml distilled water. Add 10ml of concentrated hydrochloric acid.
- Heat the contents to dryness on a hot plate inside the fuming cup board with slow heating.
- After the complete dryness remove the beaker, cool and add 25 ml water followed by 5ml concentrated HCl and 5ml concentrated HNO3. Boil the contents for about 5 minutes.
- Filter the solution using whatman filter paper. Make up the solution 0.5g and 1g to100 ml and 2g sample to 250ml. Make further dilutions 1ml, 2ml and 10ml to 100ml, 100 ml and 25ml, respectively.

After analysis metal concentration in the samples are all according to the safe disposal limits and waste can be disposed of the landfill sites

Results

Stabilization/Solidification, and leachate analysis of the heavy metals is the major goal of this project. Collect chromium sludge samples at different locations, test samples containing heavy metals in advance to determine the most important characteristics, and conduct specific studies on various parameters, namely specific gravity, calorific value, LOD, LOI, pH, etc., one of which is used in these experiments A new combination made of cement, fly ash and lime is used to reinforce metal-contaminated soil and reduce the concentration of heavy metals in the leachate before it is sent to a safe landfill. Stability studies were conducted on a laboratory scale. Experiments were performed by varying the dosage of the adhesive in various combinations and durations (i.e curing time). In addition, an atomic absorption spectrometer was used to check the initial value of the heavy metal concentration in the sample. Concentration of heavy metals

Table 2: Characteristics of the sludge samples

Parameter	**Instrument/Method Used**	**Chromium Sludge**
Physical State	**Visual Observation**	**Solid**
Colour	Visual Appearance	Deep Brown
Texture	Visual Appearance	Granular
Specific Gravity	Pycnometer Method	2.72
Calorific Value (KCal/kg)	Bomb Calorimeter	287.6
Loss On Drying(%)	Oven Drying Technique	12.3
Loss on Ignition (%)	Furnace Volatilization Technique	7.84
pH	pH Meter	8.36

Table 3: Heavy metal concentration in samples

Sno	Sample	Heavy Metal Concentration (ppm)								
		Cu	Cr	Fe	Mn	Ni	Pb	Zn	Co	Cd
1	Chromium Sludge	340	230	20567	1243.3	56.8	4.1	182	8.2	-
2	SLF Disposal Limits	10	0.5	-	-	3	2	10	-	.2

from the table 3, it can be observed that the chromium sludge from the common effluent treatment plant is found to contain large quantities of Fe, Mn, Ni , Cu, Cr, Zn, Pb , Co and Cd

Table 4: Compression Strength of Chromium sludge Laden samples

Batch No.	3rd Day Compressive Strength (kg/cm2)	7th Day Compressive Strength (kg/cm2)
1	3.4	3.4
2	3.5	3.6
3	3.6	3.5
4	3.5	3.6
5	3.3	3.7
6	3.4	3.7
7	3.2	10.1
8	3.1	10.1
9	3.1	3.6
10	3.3	9.3
11	9.0	13.7
12	0.0	6.5
13	5.1	6.5
14	5.4	6.4
15	0.0	7.9

The compressive strengths of all 30 mix designs (for Chromium metal) were determined in a Digital Compression Testing Machine. The CS values were measured after a curing period of 3, and 7 days. It was observed in all the cases that a mere 3 day curing period was sufficient to attain the minimum secured landfill disposal criteria value of 3.5 kg/cm2.

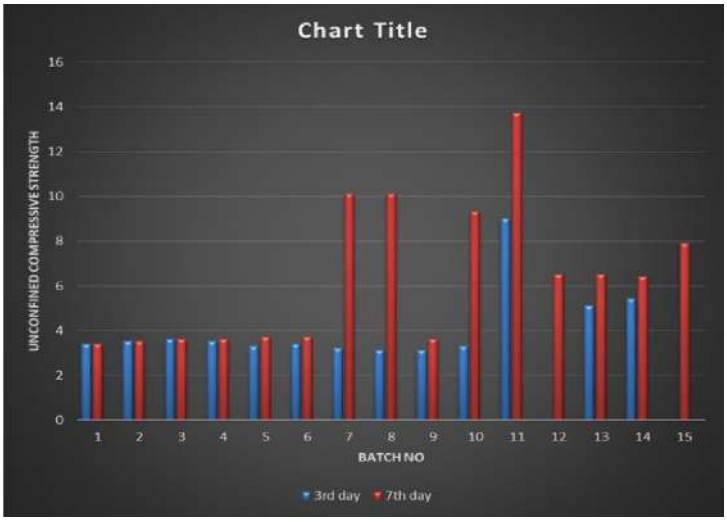

Figure 6: CS for 15 Chromium Metal Sludge Cylinders after 3rd, and 7th Day Curing

Conduction of the leachability studies yielded the concentrations of the individual heavy metals present in the leachates extracted from the 15 mix design batches for Chromium Sludge sample

Table 5 : Heavy Metals Stabilization in Chromium Sludge

Mix Design Batch No.	Additiv e: Cement Ratio	HM concentrations in leachate								
		Cu	Cr	Fe	Mn	Ni	Pb	Zn	Co	Cd
Criteria Conc (ppm)->	10	0.5	-	-	3	2	10	-	0.2	
1	20:80	0	0.6	1.6	0.1	0	6.8	133	9.0	<1
2	20:80	0	1.0	1.1	0.3	0	7.2	130	8.5	<1
3	20:80	0	0.4	1.0	0.6	0	7.3	144	8.4	<1
4	30:70	0	0.5	1.2	0.7	0	6.0	146	7.5	<1
5	30:70	0	0.7	1.5	0.1	0	5.4	140	7.3	<1
6	30:70	0	1.0	1.4	0.5	0	5.8	150	7.0	<1
7	40:60	0	0.9	1.3	0.9	0	5.9	152	6.4	<1
8	40:60	0	0.8	1.7	0.7	0	5.4	154	6.3	<1
9	40:60	0	0.9	1.8	0.6	0	6.4	158	6.2	<1
10	50:50	0	0.9	1.4	0.5	0	5.1	151	4.5	<1
11	50:50	0	1.1	1.5	0.8	0	5.4	140	4.2	<1
12	50:50	0	1.0	1.2	1.0	0	5.3	138	3.9	<1
13	60:40	0	1.2	0.9	1.6	0	5.0	132	4.0	<1
14	60:40	0	1.6	0.5	1.4	0	4.7	130	3.6	<1
15	60:40	0	1.8	0.8	1.8	0	4.3	127	3.1	<1

By comparing obtained results from the TCLP test all the proportions are stabilized and solidified for safe disposal limits and all the materials are stabilized to the mentioned criteria and this stabilized material can be disposed of into the landfill site and now it does not release a greater number of toxic gases into the environment.

Figure 7 is indicative of the Chromium metal's concentrations (Y axis) exist in the leachate of various calculated batches of sludge mixture post the stabilization activity. The 15 bars shown correspond to the 15 batches analyzed by TCLP and heavy metal studies. The batch nos. 13, 14 and 15 have exceeded the specified secured landfill disposal criteria (indicated by the horizontal cut of line) for the copper metal (i.e., 10 ppm) and hence prove to be unsuitable mix designs from the point of view of this sole metal. However, the remaining batches numbered 1-12 succeed in meeting the disposal criteria

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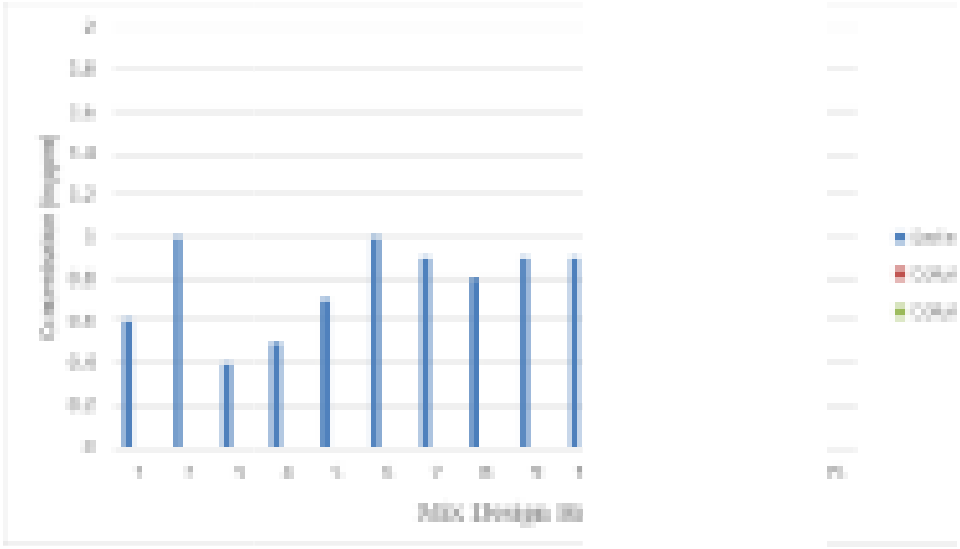

Figure 7: Cr concentrations in the leachate

Figure 8 is indicative of the Iron metal's concentrations (Y axis) present in the leachates

extracted from the various sludge mix design batches post the stabilization activity. The 15 bars shown correspond to the 15 batches analyzed by TCLP and heavy metal studies. The batch nos. 1, 8 and 9 have exceeded the specified secured landfill disposal criteria (indicated by the horizontal cut of line) for the zinc metal (i.e., 10 ppm) and hence prove to be unsuitable mix designs from the point of view of this sole metal. However, the remaining batches numbered 1-12 succeed in meeting the disposal criteria.

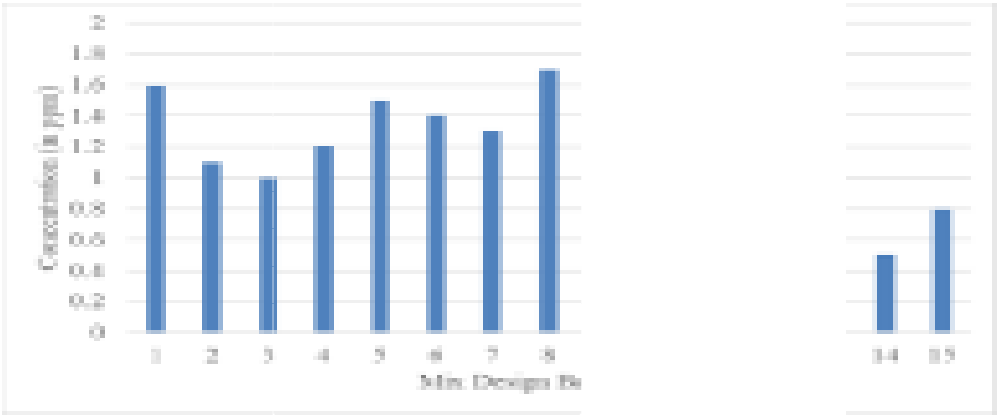

Figure 8: Fe concentrations in the leachate

Figure 9 is indicative of the manganese and cobalt metal's concentrations (Y axis) exist in the leachate of various calculated batches of sludge mixture post the stabilization activity. The 15 bars shown correspond to the 15 batches analyzed by TCLP and heavy metal studies. Both these metals have no specific SLF criteria value defined leading us to safely assume that all the batches, irrespective of the concentrations obtained in the leachates, are not a matter of concern from the SLF disposal point of view.

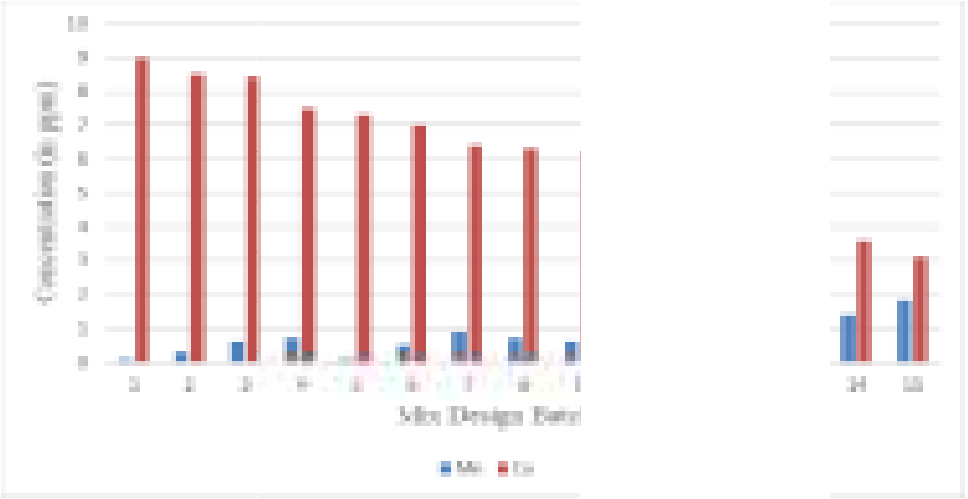

Figure 9: Mn, Co concentrations in the leachate

Figure 10 is indicative of the zinc metal's concentrations (Y axis) exist in the leachate of various calculated batches of sludge mixture post the stabilization activity. The 15 bars shown correspond to the 15 batches analyzed by TCLP and heavy metal studies. The batch nos. 7, 8 and 9 have exceeded the specified secured landfill disposal criteria (indicated by the horizontal cut of line) for the zinc metal (i.e., 10 ppm) and hence prove to be unsuitable mix designs from the point of view of this sole metal. However, the remaining batches numbered 1-12 succeed in meeting the disposal criteria.

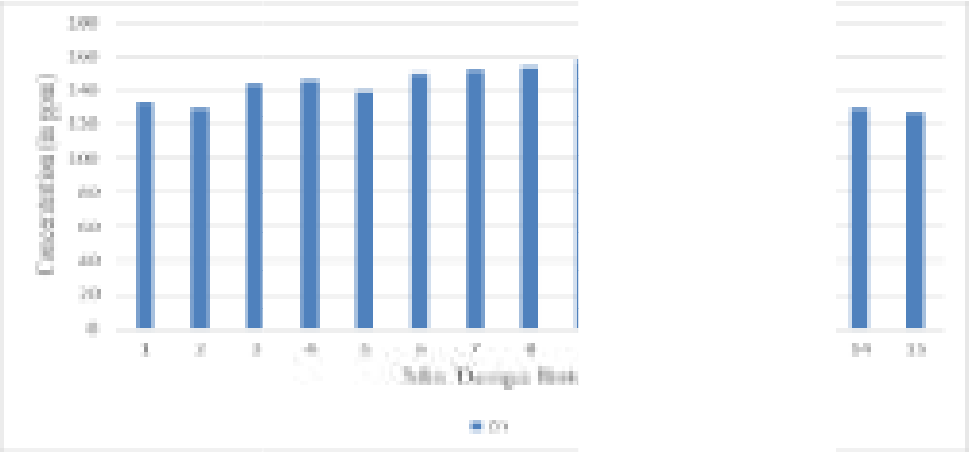

Figure 10: Zn concentrations in the leachate

Figure 11 is indicative of the Pb metal's concentrations (Y axis) exist in the leachate of various calculated batches of sludge mixture post the stabilization activity. The 15 bars shown correspond to the 15 batches analyzed by TCLP and heavy metal studies. The batch nos. 1, 2 and 3 have exceeded the specified secured landfill disposal criteria (indicated by the horizontal cut of line) for the zinc metal (i.e., 10 ppm) and hence prove to be unsuitable mix designs from the point of view of this sole metal. However, the remaining batches numbered 1-12 succeed in meeting the disposal criteria.

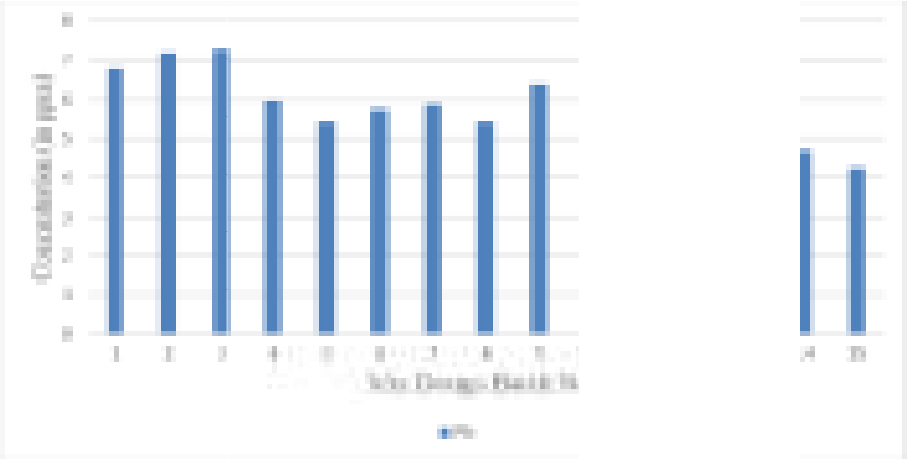

Figure 11: Pb concentrations in the leachate

Conclusions

These curing/stabilization techniques using adhesives have been used as the last step before hazardous waste disposal. The purpose of this project is to find a new waste additive to be added to cement to stabilize metal-contaminated soil from different locations. All samples of the stable composite design were found to be very effective for curing because their compressive strength values are much higher than the minimum required for safe landfills, which is 3.5 kg/cm2. The best blend of (from the CS point of view) shows extremely high compressive strength values, which shows the great success of using hardening additives. When the cement: admixture ratio remains unchanged, the mixture with a higher fly ash ratio shows higher curing efficiency. The 60:40 admixture: cement ratio is not effective for stabilizing Co and Zn in chromium sludge.The mixed design of the slurry treatment shows consistent curing and stabilization results (S / S). This confirms the use of a mixture of S/S additives in various sediments contaminated by heavy metals. If the hardener is added to the mortar and cured at 23°C for 7 days, the extremely high compressive strength of 13.7 kg/cm2 can be

achieved with the hardener. The mixture that provides this maximum compressive strength (13.7 kg/cm2) is the same as a 50:50 slurry: additives and 50% additives. A suitable mixture of pozzolan waste can be used as a binder to harden the waste. The compressive strength of the stabilized mass meets the land fill criteria in all the mix combinations for the sludge tried in this study.

Future Scope

- The study can be extended for other sludge: additive ratios.
- The process of stabilization can be taken up for further studies by varying the pH of the sample, since immobilization of metals varies with pH.
- A bench scale study can be taken up by varying the temperature as a variable of the stabilization process.

To save landfill area, studies on the secondary use of stabilized waste as construction materials, road materials or for other purposes can be initiated

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