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Aim & Scope

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Contents

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Android based Defence Robot

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A B S T R A C T

Being in the era where the defense robots are implemented, for the purpose of reconnaissance, breaching missions were the patrols have never tried in the war field. In previous conventional systems, the terrain infantry's tough jobs had been done by utilizing zig-bee based teleoperation systems, CMOS cameras & LCD displays. The proposed system is improved with computerized display and Android-based ethical hacking technique. This is to achieve a live video streaming with less time and power consumption between the peripherals. The newly proffered system involves a bot that can perform all directional movements, night vision, pick and place by using gripper, gun projection control. It is based on the user's instruction from the control room the robot can perform laser shoot and sensing temperature conditions. This can be done simply by utilizing Node MCU (ESP 8266(Wi-Fi module) with inbuilt microcontroller), Android mobile phone, servo motors and a DHT22 or DHT11 (temperature sensor).

Key words- Node MCU, Servo motors, DC motors, Blynk app, IP web cam, Ethical Hacking, DHT 11, Arduino IDE.

I. INTRODUCTION

The primary goal of the paper is to secure the precious life of the patrols and to reduce the causality of the terrorist. The enhancement of the defense robot is that it can be able to perform multitasking operations through Wireless Fidelity (Wi-Fi). Similarly, the directional movements, the pick and place movements and gun control with laser shoot operations can be performed by the person from remote areas.

II. EXISTING SYSTEM

The conventional robots were implemented with certain features like controlling all possible directional movements, temperature sensing, pick and place along with gun control movements by utilizing different terminologies. Those terminologies utilized microcontrollers such as raspberry pi, Web Input Output PI (WEBIOPI), different Robot Operating System (ROS) and Peripheral Interface Controller (PIC) boards. Blue-tooth, WI -FI and high power Zig- bee were used for the transmission of data from a controller region to the reception areas.

The Robots have been controlled by utilizing Nintendo Wifi remote and Third Generation (3G) technology for video transmission. Android studio environment is used for writing Java program codes in order to feed the robot and virtual reality technologies. Some application software has been utilized based on Internet Of Things (IOT) for connecting and sharing the data between the Access Points (AP).

III. PROPOSED SYSTEM

The proposed system has developed with a few techniques such as the computerized display for live video streaming and updating current weather conditions. The robot can able to perform bi- directional movements which can be achieved by using DC motors. The gripper control movement allows it to make a necessary response to the commands based on pick and place movements. The gun controlling mechanism along with laser shoot can be performed by the instruction that has been transmitted from the control room. The atmospheric temperature and weather conditions of the robot will be predicted by using a temperature sensor, which converts the observed analog data into the digitized form and will be provided in the computerized display. This robot has a feature night vision for the mission to be accomplished even at the night times by operating the LEDs attached with it. The hardware part includes Node MCU as a Wi-Fi module with an inbuilt microcontroller which performs wireless transmissions with less cost by reducing the delay between the transmitting and receiving end.

DHT11 or DHT22 has been attached with the microcontroller in order to observe the weather conditions of the field where the robot is placed. LEDs are provided to get enough Light vision at situations when the robot is in need to perform surveillance by means of darkness. The space of software tools is occupied by utilizing Arduino IDE software for coding and feeding that particular code into ESp8266-Node MCU. This software developing environment is found to be very adaptive and user- friendly from the developer side. It enables the developers to build their codes with the available open sources and implementing it through hardware to form an embedded environment. Fig .1 and Fig. 2 explains about the implementation of the robot using the hard ware components.

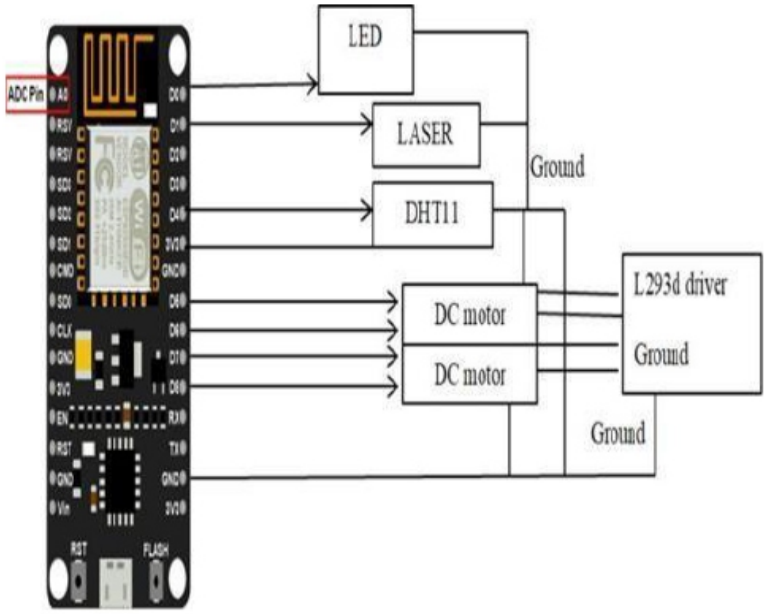

Fig.1. Circuit diagram for implementing the directional movements with laser shoot and current updates of temperature conditions.

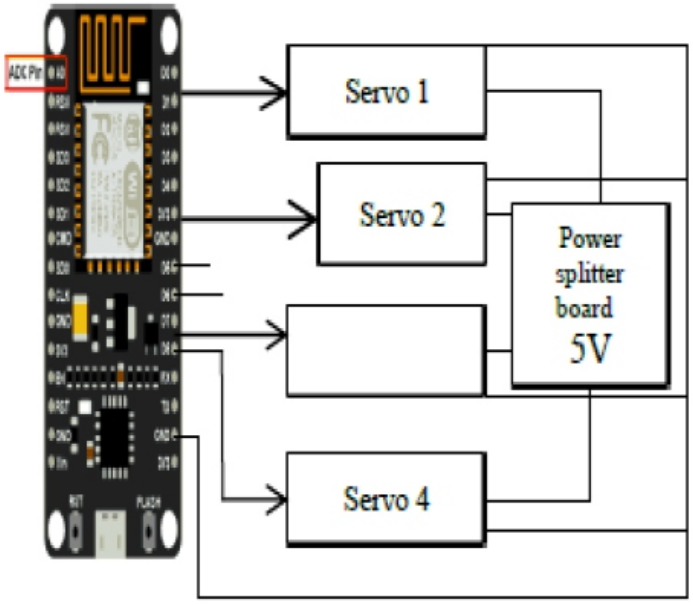

Fig. 2. Circuit diagram for implementing the pick and place movements, Surveillance and gun control movements by using servo motors.

IV. WORKING PROCEDURE

The General block diagram of Android based defense robot with all the application is shown in the Fig. 3.

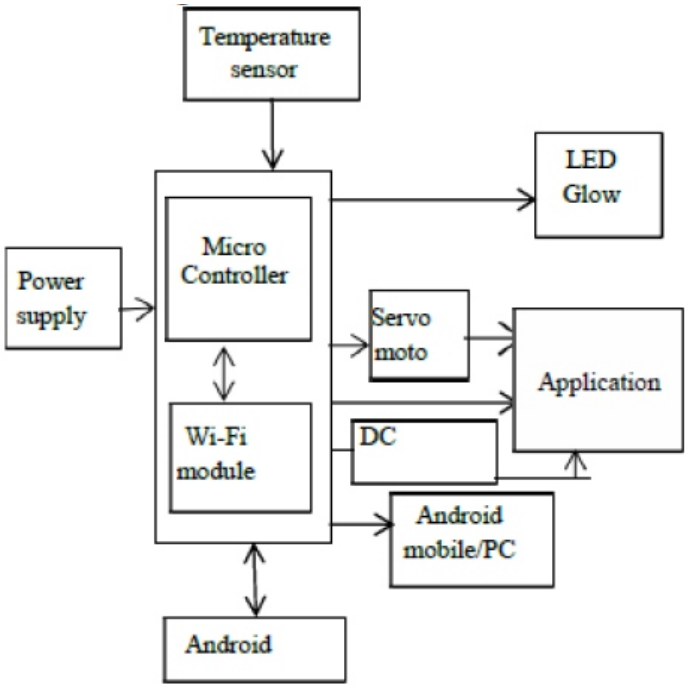

Fig.3. General block diagram of the Android based defense robot.

The system consists of three main division, they are 1.Control unit 2.Monitoring the robot and 3.Live streaming through ethical hacking. The control unit is provided with either a Personal Computer (PC) or an android mobile phone where the robot's action can be controlled through a web page filled with icons

and widgets. The command that get triggered from the control room can be executed by performing necessary actions as per the program is designed. Monitoring the robot is to look after the actions performed by the robot at every instance and situations. The live video coverage from the war field can be done through ethical hacking technique, in which two devices get connected with necessary authentications and ensuring highly secured transmission of data. Since, the data which gets propagated from one device to another is found to be encrypted provides an assurance for complete security and privacy.

The controlling operations can be done through Blynk community that comes under the Android platter which enables to create widgets to control the robots utilizing online environment. Since a single Node MCU cannot uptake all the features that are involved in the applications of the robot. It can be divided into two sections as already shown in the circuit diagrams that are involved in the Fig. 1. and Fig. 2. Hence two set of widgets were created by using Blynk application were one set is to control the servo motors which are in account to perform the surveillance operation, gun control and pick and place movements. Where the other widget enable to control the directional movements, Laser shoot operation, night vision light and current updates of temperature condition through DHT11 temperature sensor.

The code can be generated by using the Blynk code generator from the web browser. It is an online platform provides the necessary open source that enables the developers to create a code that deals with the implementation of the project. The code can be developed through analyzing the authentication ID in which the Blynk application is reqistered. Fig. 4. and Fig. 5. shows the widgets that are created for controlling the entire application of the robot by using Blynk application.

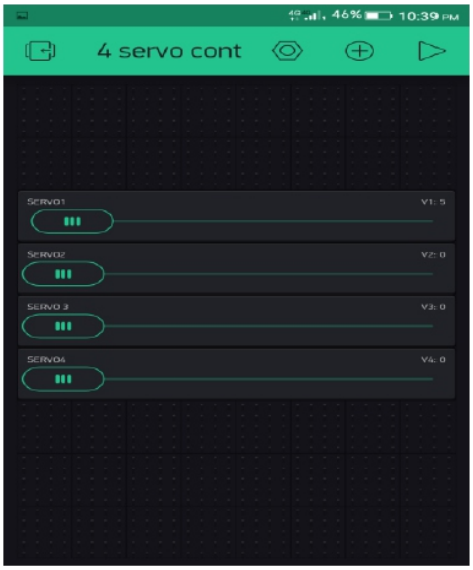

Fig.4. Widget created to control the pick and place movements, gun control movements and surveillance using Blynk.

Fig.5. Widget created for controlling Laser shoot, Directional movements, temperature and humidity updates and night vision light by using Blynk.

The surveillance application can be done through the Android mobile by providing the Internet Protocol (IP) web cam which gets connected through Transmission Control Protocol (TCP/IP) over the internet layer between the peripherals.

This provides live video streaming of data by ensuring privacy and security throughout the propagation time. The generated IP address is entered into the browser which enables the streaming of video with complete audio coverage and less delay in transmission.

The development of code for feeding into the Node MCU which is a wi -fi module with inbuilt micro controller enables a large spectral width and less time delay for transmission. The module has to be feed with the developed code using Arduino Integrated development Environment (IDE). The Blynk library must be installed and added along with the code by using the board manager option which is provided by the IDE.

The live video streaming of data and visualized through a Personnel computer (PC) is illustrated in Fig.6.

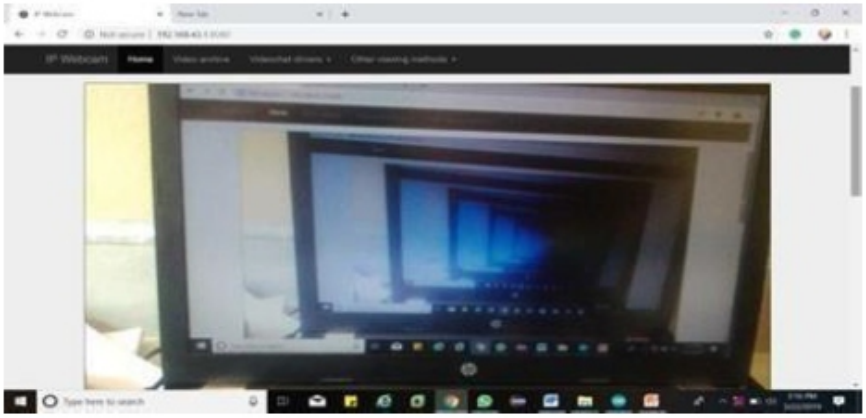

Fig. 6. Live video streaming of IP web cam application through web browser and visualized by using a PC.

V. CONCLUSION

This Android based defense robot in the patrol application must be utilized by the people who are well trained and tested with the basic knowledge. The patrols must be provided with the necessary skill of rectifying the technical and mechanical causes which arises while involved in performing certain applications. It will be better to provide necessary environment to develop any other additional features that are in need to be included with the bot to perform any other specialized applications. Because the system is provided with quality features that can provide enough support for the future development and attachments. The system can be enhanced by expanding spectral width and the area of coverage based on the improvement of the future technologies. The future works includes mainly enhancing the quality of camera with high pixel resolution instead of utilizing an ordinary inbuilt camera in an Android mobile. The patrols and infantries must be trained to utilize the robot before they enter into the war field. The delay for transmitting the data can also be reduced so that it may reduce the tough situations that are faced by the people in the war field. Utilization of IR sensors and RFID can be applied for the purpose of recognizing the native members who utilize the Robot.

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Design of Obstacle Detection System for Visually Challenged People

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A B S T R A C T

This paper describes a obstacle detection system for visually impaired people using Image processing in MATLAB.This system, together with ultra-sonic sensor interfaced with Arduino detects stairs and doors with or without signage and distance of these objects from the user. This information is conveyed to the user through a speaker. The results show satisfactory accuracy in detecting stairs and extracting different signage on doors such as that of washroom, exit, elevator etc.

Keywords : MATLAB; fourier; regionprops(); arduino; ultrasound

I. INTRODUCTION

A significant percentage of the world population suffers from visual impairment and blindness. According to the World Health Organization, globally about 285 million people are visually impaired, and 39 million of them a r e blind. Independent travel presents significant challenge to visually impaired or blind people. GPS technology and guided electronic way finding devices show a lot of promise in outdoor environment. But, still they face a lot of difficulty in unfamiliar indoor environment such as to find stairs, elevators and doors, rooms in an office or a building. Even in familiar indoor environment such as home, they have to memorize where every- thing is kept. Computer vision technology in principle has the potential to assist blind individuals to independently access, understand, and explore such environments. An obstacle detection system for such problem is proposed by using a web cam to detect and recognize objects using MATLAB and ultrasonic sensors for distance calculation. In an unfamiliar environment, this system can also detect the signage associated with the detected object, like say sign of elevator or washroom is labeled on. Signs play an important role in navigation and way finding for even fully-sighted persons. In order for this system to work accurately, it is assumed that all doors are labeled on with different signage. In case it's not labeled, then the system simply tells the person that a door has been detected without any information about the door. Large number of signs as templates is stored in the database of MATLAB. This system simply compares the sign encountered with all the ones in its database and informs the persons when it gets matched along with its .

II. EASE OF USE

A. Versatility

One of our goals was to make a device which can be used in variety of application. Apart from making the device to help visually impaired people, the algorithm used with little tweaks can also be used in areas such as scene understanding, robot navigation, autonomous systems, etc.

B. Learnability

A transparent system is by definition one that requires little or no learning on the part o f the user. While we do not claim that our system will require no learning, we aim to require as little learning as possible. The user should be able to understand how to operate o u r system within moments of first exposure.

C. Cost Effectiveness

Our device is fairly simple to use and very economical. It has been designed to keep the cost to a minimum, so that everyone could afford it.

III. APPARATUS/SOFTWARE USED FOR PROTOTYPING

1. Arduino Development Board,
2. Mp3 shield for Arduino with microSD card slot
3. Ultrasonic sensor

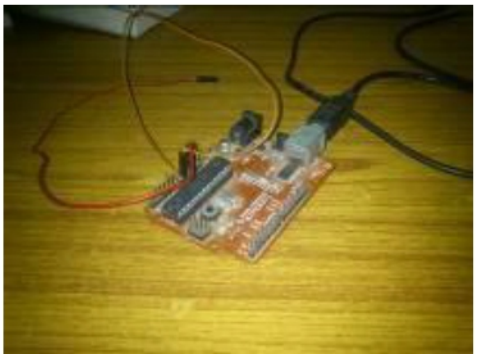

Fig. 1: Arduino Duemilanove(Freeduino)

Fig. 2: USB Webcam

Fig. 3: Sparkfun MP3 shield for Arduino

Fig. 4: Ultrasonic Sensors

4. A small set of speakers
5. Web Cam
6. Matlab R2011b with Image Processing ToolBox and MATLAB support package for Arduino

IV. IMPLEMENTATION

This particular system which can be used to develop a full fledged steps and rectangular object detection system for the blind has been simulated in the following manner in MATLAB. A standard web- cam was connected to a laptop running MATLAB R2011b. A webcam which can produce an image of resolution greater than or equal to 640X480 and of the RGB format is required. For the actual recording of the video and analysis, manual triggering was used. Conditions are set in the MATLAB program to process each trigger. With each trigger, a fixed number of frames are recorded. These frames are processed instantaneously, and the results of the firs t pass are computed. If it is found that the image (the frame extracted) has steps, processing stops. On the other hand, if it is found that the image has a rectangular object, image goes through a second pass, and further processing takes place to extract the label from the frame. This label is compared with a known set of templates to determine the type of the object bearing the label. Once processing is complete, the results from the fixed number of frames processed are collated together and the most frequently occurring observation is said to be the output for that particular

batch of frames. Once the frames are matched, output is sent to the attached Arduino microcontroller to activate the ultrasonic sensor to calculate distance. After the distance has been calculated through this method, an appropriate tune is played through the attached speakers.

V. A-FIRST PASS

The image is transformed into the Fourier domain, where after appropriate processing it can be determined if it has strong horizontal or vertical edges. Strong vertical and horizontal edges in the frame map to a single horizontal and/or vertical line in the Fourier domain, its brightness increasing with the strength of edges in the frame. So, if the image has steps, a horizontal line of substantial intensity will be produced in the Fourier spectrum, along with a somewhat dull vertical line. If it contains a rectangular object (like a door), there is majorly a vertical line of substantial intensity in the spectrum with little or no horizontal lines. Once the image has been transformed into its Fourier spectrum, thresholds are set in reference to the intensity of the line and its maximum deviation from perfectly vertical/horizontal position. This differentiates between steps and other rectangular objects.

VI. B-SECOND PASS

It is found the image contains a rectangular object. The image is passed through an unsharp mask and the appropriate R or G or B frame is extracted. The image is then converted to a binary image, and then either dilated and/or eroded with appropriate parameters so that only the label is extracted. This helps in ensuring non detection of other artifacts that might be found on the surface of the door/rectangular object. After segmentation, MATLABs image processing toolbox's region props() function has been used which returns segmented regions in an image along with some of their properties. With appropriate thresholding in the Area, Extent and Length and Width properties a rectangular object(the label) is identified and using its coordinates, the label is extracted from the frame. Using correlation, this label is then compared with a set of templates with a further threshold to determine the best match. Conditions are also inserted for no match. In all cases, the matching is performed by calculating correlation between the extracted image and the templates. MATLAB's corr2 () function helps find the correlation between two matrices easily. Maximum correlation corresponds to the maximum match.

VII. C-OUTPUT STAGE

An ultrasonic sensor is attached to the Arduino Development Board. It works on a simple echo principle to calculate the distance taken for a wave to reflect back from the rectangular obstacle. This distance is then relayed back to MATLAB, which further activates a sound message to play through the Arduino's MP3 shield.

VIII. TESTING

For the testing of this simulation, similar sized labels with different symbols on them were stuck on the hostel doors of our college campus. Some of them were stuck on door-like objects like cupboard doors. After this a person carrying the device pointed the webcam one by one at such doors and recorded a fixed number of frames with each trigger. Images of steps and of non-rectangular objects were also recoded. A script was written in MATLAB to display a message box corresponding to the detected image after each computation. We also read in the detected distance to the object from the Arduino using the serial connection.

IX. RESULTS

It was seen that despite doors having a number of artifacts, this detection scheme worked with a good number of positive results. Some sample cases are shown at the end.

Table 1: Detection Accuracies

		Detected	NOT DETECTED
Steps	Present	20 (94.4%)	3(5.6%)
	Not Present	2(20%)	8 (80%)
Doors	Present	41 (82%)	9 (18%)
	Not Present	2 (17%)	10 (83%)

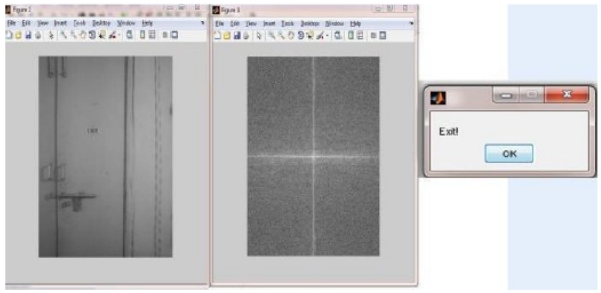

Fig. 5: Recognition of exit sign

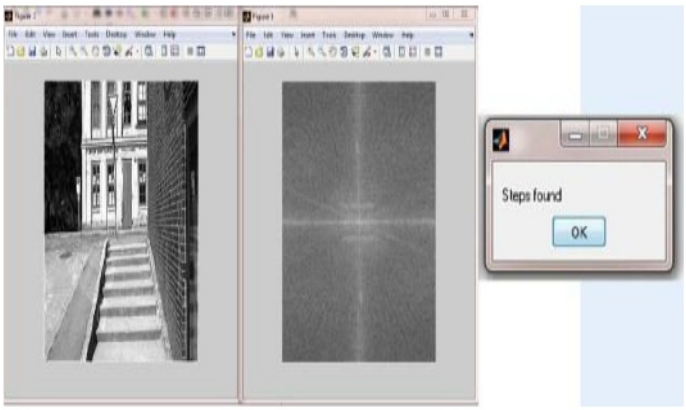

Fig. 6: Recognition of steps

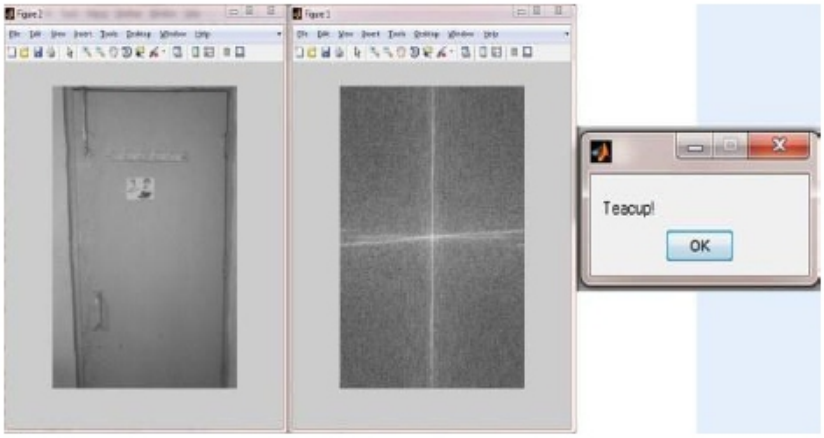

Fig. 7: Recognition of coffeeshop symbol

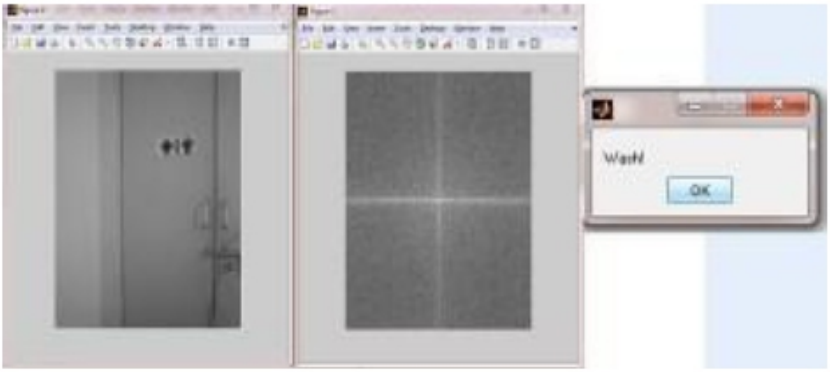

Fig. 7: Recognition of washroom sign

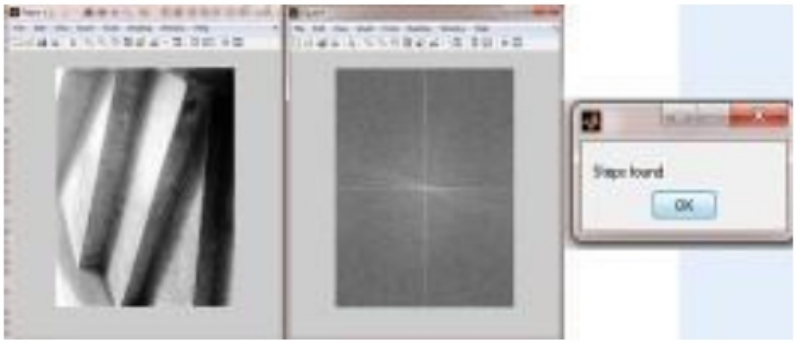

Fig. 8: Recognition of steps

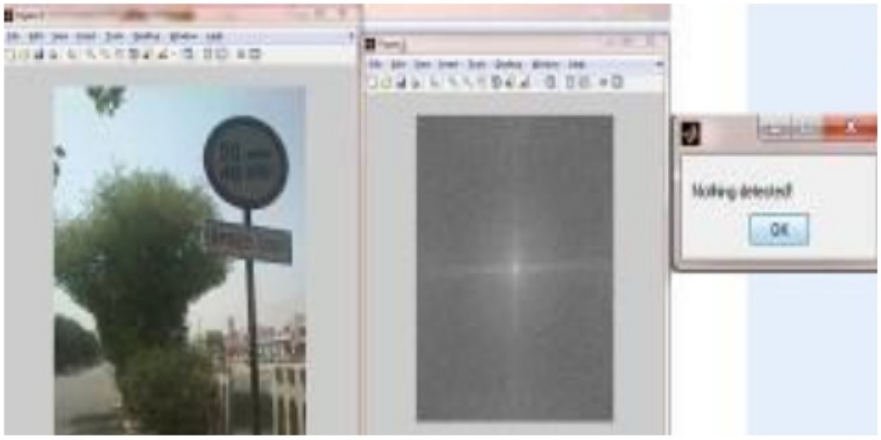

Fig. 9: Random image where nothing is detected

X. FUTURE WORK

The paper covers the detection of only two kinds of obstacles: doors with or without labels, and steps. We are working to improve the variety an range of obstacles that can be detected through this system, while at the same time keeping the cost to a bare minimum and maintaining the computation time. Future work will include detection of tables, chairs and more such common obstacles. Also, we are hoping to simulate it on a DSP board with image processing capabilities, thereby also translating the code to embedded C, which should speed up processing considerable. Also we are trying to achieve the distance calculation through image processing alone by using stereo cameras in place of the webcam. This will also help eliminate the cost and power requirements that the excess hardware (Arduino and MP3 shield), entail now.

XI. CONCLUSION

In this paper, we have presented an obstacle detection sys-tem for the blind using image processing. We have used techniques such as segmentation and Fourier domain transforms to develop an algorithm for the same. We believe that this system offers a novel solution to the problem domain. As we develop this system further, we believe it will take on a much more polished form and its features will help blind people carry out their day to day tasks with greater ease.

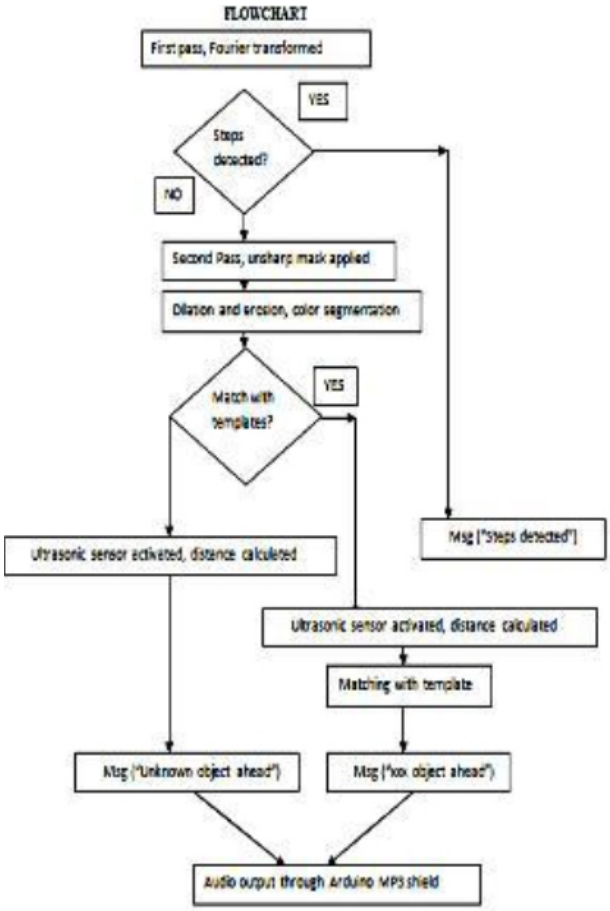

Fig. 10: Flowchart

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AUTHORS PROFILE

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Potential Effects of Microorganism to Reduce Building Defects in Malaysia

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ABSTRACT

Over the last few years, building defects is major concern in Malaysian construction industry. Design mistake or building flaw define as a defect which reduces building value and make a hazardous situation. A Building defect arises due to various reason, such as low handiwork or the use of adherent components, climatic construction, and faulty design. Building defects never emerge to have been minimized in contempt of new improvement in building technology. Defective building construction contributes both final cost of the product and cost of maintenance, which can be generous. By using effective microorganism (EM) in concrete building defects such as surface cracks, fatigue cracks and thermal contraction can be reduced significantly. Previous works in Japan and Malaysia found that effective in agriculture microorganism makes it possible increasing crop yields to twice or three times what they are at present to do so without the agricultural chemicals or artificial fertilizers, 5% of EM mixed into the concrete the tensile, compressive and flexural strength were 25.23%, 143.90% and 19.17% that are compared to design compressive strength that signify improve the concrete strength and durability. By using 25% EM in concrete the tensile strength was higher than the lower dosage. From the previous study, fermentation is the main notion in EMC in which the process will not produce detrimental texture. The research was carried out to investigate the potential usage of effective microorganism and its application in concrete that can help to reduce the building defects and improve building strength and durability. It was observed that most cost-effective and maximum percentage of EM mixed into the concrete is 5% in which enhancing its compressive, tensile and flexural strength.

Keywords: Effective Microorganism of Concrete (EMC), Crack, Defects, Cost, Effectiveness.

I. INTRODUCTION

Currently, concrete application is constantly growing around the world due to its availability of basic ingredients. Cement is the main element of concrete that has a greater impact on global warming on the environment. Making sustainable concrete is therefore one of the instantaneous environmental justification requirements. Concrete admixtures with filling capacity can be implemented and their characteristics improved. There are some herbal waste materials that have extra capacity to produce less

brittle concrete as a partial substitution for ordinary Portland cement. Construction issues and combining the difficulty of construction using waste materials are reasonable evidence of any other form of concrete. Bacterial concrete is a unique area of study and can be used for cemented materials that use the bio-mineralization mechanism to cure it automatically. The aim to introduce microorganism into concrete is to precipitate calcite through pores and small areas of the cavity. The presence of pores and micro-cracks in the hydrated cement paste can have a great effect on the concrete properties and could provide a route through which humidity, chlorides, carbon dioxide and other hostile retailers could penetrate. Mostly the microcracks will intensify without sufficient and immediate consideration, causing the concrete strength to deteriorate and collapse. According to Wang et al. 2012 [1], the concentrations of microorganism or variety of colonies are not cited as the factor and bacteria are typically bought from the lifestyle collection centers. Distinct mobile concentrations of microorganism had been introduced in concrete to achieve most efficient attention of bacteria that may increase its electricity notably. Bacteria became directly isolated from the tropical surroundings and its extraordinary concentrations had been extracted primarily based on the correct serial dilution factor. Bacillus is a sort of microorganism that may produce as a binding filler cloth to decrease concrete capillary pores to improve its energy and sturdiness. According to De Muynck et al. 2008 [2], there are some species of Bacillus that produce urease enzyme to precipitate calcite associated with biomineralization. According to Rao et al. 2013 [3], The process of bio-mineralization will not interfere with concrete laying time. It is therefore appropriate to use any concrete mix design standards for bacterial concrete. Based on the mechanism for bio-mineralization (precipitation of CaCO3), this new approach can significantly reduce the protection fee required for bacterial concrete due to its longer life span boom, a good way to reduce atmospheric CO2 emissions, thus helping to reduce the demand for cement. Based on the mechanism for bio-mineralization (precipitation of CaCO3), this new approach can significantly reduce the protection fee required for bacterial concrete due to its longer life span boom, a good way to reduce atmospheric CO2 emissions, thus helping to reduce the demand for cement. According to Wu et al. 2012 [4], the equations show a sequence of biochemical response occurring with the help of ureolytic bacteria to form calcium carbonate in cemented fabric. The present work shows that the mechanism of bio-mineralization in cemented materials can be the appropriate method for improving the characteristics of structural concrete. Hence, to gain extra potential to recognize the outcomes of microorganism in concrete, more investigation should be carried out to observe the importance. Costs are without a doubt the most vital concern in any business try, not slightest in the development business.[5]

II. BUILDING DEFECTS IN MALAYSIA

Defect is defined as [6] a aspect which has a shortcoming and no longer fulfils its intended feature". However, constructing illness is "a failure or shortcoming within the characteristic, performance,

statutory or person necessities of the structure, cloth, offerings or different facilities". According to Buys and Roux, 2013 [7] building defects can categories into two which are: a) patent and b) latent defects. Patent defects can be diagnosed at some point of production's inspection and all through. According to Isa 2011 [8], Defect Liability Period (DLP) evaluate to latent illness which normally occurs after the building is occupied. Normally, constructing defects will occur via wear and tear [9]. There are various kind of building defects which causes by using moisture problems inclusive of staining, discoloration paint, peeling paint, blistering of wallpaper, corrosion and mold. The staining troubles in rendered wall are because of one-of-a-kind moisture contents with numerous origins inclusive of ground, rainfall etc. [10]. Rainwater is considered as one of the prime causes for staining problems on façade.[11]. For the discoloration of paint, peeling paint and blistering of wallpaper are because of water seepage and leakages ([12];[11]). The corrosion disorder at steel sheeting and AI sheet is due to (1) materials together with incompatible substances and presence of micro-organism, (2) environmental elements inclusive of pollution, direct exposure and moisture infiltration, (three) chemical effects [13]. For mould to grow, it needs 4 elements along with viable spores, a nutrient source as timber, carpet or and so forth, moisture, and heat. Kubba, 2008 [14] observed that the increase of microbes inclusive of mold, fungi, microorganism are cause by excess moisture at the building elements with a view to pollute indoor air best that could an negative impact on fitness risk. Most mould troubles befell at ceiling, floor and wall. For medical institution study was carried out by Othman et al. 2015 [15], in which moisture troubles have prompted building defects consisting of peeling paint, discolored paint, blistering of wallpaper, staining, sweating on wall and water marks or fungus. According to Of and Mosque 2018 [16], there are usually diverse causes and kinds of defects (layout and creation deficiencies) that affect the overall performance of a construction. Home defects also include dust, honeycomb, roof defects, mortar joint deterioration, reinforced steel corrosion, base failure, peeling paint, faulty plater rendering, and wood rot. A disorder is typically defined as deterioration, damages, default or deficiency [9] Besides, there are few levels of defects which patent degree can be, latent stage, progression degree and habitual degree. The patent stage and latent degree defects regularly can be seen in buildings and the defects occur at some stage in the building life cycle [9] On the opposite hand, the styles of defects that have an effect on the building is terrible workmanship, production cloth, loss of supervision and protection, confined time and cost, faulty design, climatic situation, and external surroundings [16]. The reason why disorder takes place within the buildings may be due to non-compliance with the Building Code and does not follow the same old technique when constructing the paintings. Therefore, maintenances are needed to be able to save you those types of defects which might be take place.

III. CRACKS IN BUILDING STRUCTURES

Of and Mosque 2018 [16] studied about Cracks that can be categorized according to the extent of the crack, such as a classic crack and balance crack; the shape of the crack, such as a horizontal, vertical,

diagonal or random crack, and the width of the crack, ranging from a delicate crack to a large crack. Cracking usually can arise in numerous elements inside the buildings. In addition, cracking is also an indication of corroded strengthening. It is possible to use precautionary steps to reduce the cracking that appears in buildings. Structural and non-structural cracks can be categorized as cracks. Samples with standardized defects had been best handled at the facet containing the illness. Structural cracks normally may be located in wall, columns or the beams and its miles purpose by using lifeless masses or different forces that carried out on it. Other than that, terrible soil bearing, terrible production web page and overloading may additionally motive structural cracks to be formed as nicely defined by [16]. According to Of and Mosque 2018 [16] expressed as non-structural cracks will occur in the building substances due to internal stresses. Usually, tensile, compressive and shear cracks are the structural cracks that can be seen. If any of the imposed tensile loads are not preserved by the structural factors, then cracking will occur within the tensile. There are usually few gaps in slab and beams. In addition, shear cracks were also subjected to the causes. If the fabric's compressive electricity is less than the hundreds levied, then it will manifest the compressive cracks. Columns usually have problems of this kind. Furthermore, many varieties of cracks can occur within the concrete surface including transverse and longitudinal cracks, surface and map crazing, long-length shrinkage drying, plastic cracks and early thermal contraction.

IV. BIOLOGICAL CRACKS REPAIR TECHNIQUE

According to Van Tittelboom et. al. 2016 [17], two traditional restoration methods were used to determine the precipitation form of bacterial CaCO3. A2-factor epoxy resin (Sikadur52) and a 2-issue cement-sure mortar (Sika Top 111) were used to repair cracks. The specimens are rendered dust-unfastened and clean by using a soft brush before the remedy. Close the crack, a tape changed into applied at a range of about zero.5 cm, so a small sector around the crack could be impacted by the repair cloth in the handiest way. The epoxy resin and the mortar are arranged in accordance with the consumer indicators. The 2-thing epoxy resin was injected inside the crack by the use of an injection needle.

Table 1: Scholars studies on characteristic of several cracks

No	Type of Crack	Characteristic	Author(s)
1	Transverse	Transverse cracks are the most common and dangerous cracks, as they can reduce the cross section of a structure and thus reduce its structural strength. Transverse cracks are perpendicular to the beam structure's longitudinal axis.	[18]
2	Longitudinal	Longitudinal cracks can affect the torsional ability of a structure. Longitudinal cracks are parallel to the beam structure's longitudinal axis.	[18]
3	Shear	Shear cracks have an angle around the beam structure's longitudinal axis.	[18]
4	Surface Crack	Research has shown that surface cracks are more important than subsurface cracks in the dynamic behavior of structures.	[19]
5	Plastic Shrinkage	Hard concrete shrinkage can be divided into three main categories: drying shrinkage, plastic shrinkage, and ending genous shrinkage. Drying shrinkage strongly depends on the environment's humidity and the concrete's water – cement ratio. The evaporation of water produces suction in the pore fluid as wet concrete dries, which causes the concrete to contract. Plastic shrinkage in early age occurs when the level of water evaporation from the concrete surface reaches its bleeding rate, resulting in high capillary pressure near the surface.	[20]

6	Fatigue	While the tiredness mechanism in concrete is not clearly understood due to the heterogeneous composition of the material, studies have shown that tired concrete loading initiates the growth of microcracks at internal flaws locations. Fatigue crack propagation in concrete relies on the relationship between the growth of the microcrack which facilitates further cracking and the aggregate crack bridging which prevents further cracking. Concrete structures can take more than one million cycles to collapse, depending on the degree and direction of pressure. Fatigue cracks, however, can cause excessive deformations, large crack widths, and debonding reinforcement all of which can result in severe structural failures.	[21]
7	Map Crack	Also known as pattern crack, this type of crack. It is common in any of the concrete structures to be seen. The main cause of this crack is due to expansion due to alkali-silica reaction (ASR) and concrete layer drying and shrinking. It can be avoided by stopping liquid from being added or finished while bleeding still occurs	[18]

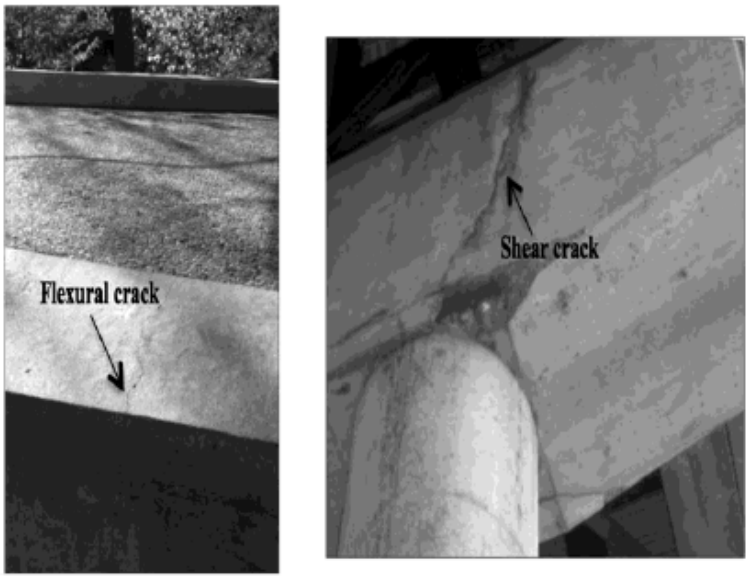

Figure 1. Left: a flexural (transverse) crack in concrete; right: a shear (slant) crack in a concrete beam [22]

The cement-certain mortar (grout) became implemented the use of a spatula. The samples with sensible cracks, received from the splitting check, were treated on both facets. Samples with standardized cracks had been simplest dealt at the aspect containing the crack. Cracks had been also repaired via the use of CaCO3 precipitating bacteria. Within the preceding research, B. Sphaericus (BS) strains are isolated by a biocatalytic ureolytic calcification reactor from calcareous sludge. Six unique traces are outstanding from their morphology. The distilled strains were deposited with the serial numbers LMG 222 55 till LMG 222 60 on the BCCM tradition series in Ghent. Because of its most desirable CaCO3 precipitation ability, the strain LMG 222 fifty-seven was selected for the treatment of the samples [23]

A. Epoxy-Injection Method

The tensile, compressive and binding strength of epoxy compounds is very strong. But, when used as bonding or binding materials for cement, they can be used to repair mortars. The cost of epoxy concrete is forbidden and cracks as slim as 0.05 mm can be bonded by epoxy injections. It is an impressive towel

to patch cracks because they have outstanding residences that are resistant This approach has been efficiently used within the restore of cracks in constructing, bridges, and other styles of concrete structures (Doshi, 2018). Epoxy compounds have compressive, tensile and bond strength in their entirety. But, when used as bonding / binding agents for concrete such as epoxy cement, they can be used to repair mortars, the price is forbidden and cracks as slim as 0.05 mm can be confined by epoxy injections. It is notable material for servicing cracks because they have superb homes inclusive of resistant towards water percipience, immune to fracture formation and their superb gluey houses. This technique has been used efficiently inside the restoration of cracks in bridges, building, and other forms of concrete constructions. By using the restore technique to clean the cracks, the first real step is to smooth the fracture that have pollutants along with oil, first-class particles, dirt or grease and such pollutants prevent the epoxy percipience into the cracks to be rectified. surface cracks must be sealed by using sealing of surface. It is used to avert leakage of the epoxy earlier than it is gelled. This can be done by adding an epoxy, polyester or other suitable fastening substantial to the crack floor and permitting it to be hardened. By installing the venting and entry ports, when the v-grooved cracks form drill holes are made within the 20 mm diameter groove apex of the v-grooved phase is below. Furnishings including pipe nipples are added into the holes. If cracks are not v-grooved, the concrete face over the crack to be bonded. By epoxy mixing, it is carried out either via non-stop strategies or batch. The adhesive additives are premixed in batch mixing in compliance with manufacturer's orders, typically the use of mechanical stirrer, such as paint mixing paddle. The liquid adhesive components bypass through metering and driving pumps before passing through an automatic mixing head in the continuous method. Crack repair can achieve with the following strategies that are epoxy-injection routing, grouting and sealing bendy sealing by stitching, , drilling, offering additional reinforcement and plugging, grouting, prestressing steel, dry packing overlays autogenously recovery surface coatings.

Figure 2: Repair of cracks by Epoxy-injection method [24]

B. Grouting Method

By filling the Portland cement grout in the affected areas, cracks in thick concrete wall and gravity dams can be repaired. This approach has been shown to be advantageous in stopping water leakage, but It will no longer structurally bind broken sections. The very first step in this approach is to use air jetting or water jetting to clean the concrete alongside the crack, install grout nipples at suitable intervals, seal with sealant between the seats, flush the crack to smooth it and test the seal and grout the whole area. Additionally, plastic agreement cracks can be used to enhance the grout's homes. Silicates, urethanes and acrylomides are chemicals used for grouting. In contrast to concrete grouts consisting of solid particle suspensions in a liquid, two or more chemical substances are combined to form a gel, foam, or stable precipitate. In moist conditions and in very first-rate fractures, chemical grouts can be used. But with some drawbacks for gel time control. (Doshi, 2018). By using two techniques of grouting cement from Portland to repair cracks in any chosen area. Liquid solution or Slurry is called grouting injection into a form of rock or soil. The substance injected is called the grout. The Ordinary Portland Cement use for grouting is as per IS: 269 and as per IRS Concrete Bridge Code, sand and water should be. Admixtures can be applied with the Divisional Engineer's approval to offer non-shrinkable homes and improve grout float capacity. The weight ratio of water-cement for the grout is 0.4 to 0.5, the decrease ratio should be used if the crack width exceeds 0.5 mm. Pressure grouting gear is used in the cracks to pump grout. Air Compressor is used with three to four cum per minute capacity. The pressure of grouting will be two to four kg per square of Healing for fourteen days has to be done after grouting centimeter. All the grouting gear which involves the slurry and mixing drums, tubes, nozzles, etc. must wash completely to prevent equipment damage. After the completion of the work, it must be completely checked in cost by the Engineer and stored under observation after grouting for a duration of six months or more for its conduct. Its time eating method, though, but it's widely used as it gives higher results. The product of the grouting technique will restore the cracked part and increase its strength.

V. POTENTIAL USE OF EM IN CONCRETE REPAIR

The thinking of Effective Microorganisms (EM) used to be developed by using Professor Teruo Higa, University of the Ryukyus, Okinawa, Japan. EM consists of combined cultures of really useful and plausible microorganisms that can be utilized in concrete as an admixture to expand physical, mechanical and chemical homes of the concrete which limit building defects. EM carries selected species of microorganisms including predominant populations of lactic acid microorganism and yeasts, and smaller numbers of photosynthetic bacteria, actinomycetes and other sorts of organisms. These are compatible with one another and can coexist in liquid culture. Cycling and produce bio energetic compounds such as vitamins, hormones and enzymes that stimulate concrete strength. Harmful microorganisms are those that can induce diseases, stimulate no longer proper concrete and produce poisonous and putrescent materials that adversely have an effect on concrete strength. An extra unique

classification of really helpful microorganisms has been cautioned by Higa which he refers to as "Effective Microorganisms"or EM. EM is now not a substitute for other management practices. EMC is a product from Effective Microorganisms (EM). EM had broad functions such as in agriculture, environmental treatment, household usage, medicine healthcare, disaster treatment and construction industry. In agriculture, EM technological is how makes it possible to increase crop yields to twice or three instances what they are at present, and to do so except the use of agricultural chemical compounds or artificial fertilizers. Thus, Higa stated "I trust I have identified a way of tackling and solving the essential hassle of the food supply and second it lies in making use of the tiny creatures I called it as nice microorganisms". The attainable of EM to aid in resolving issues of environmental air pollution is structured upon the action of two types of microorganisms: zymogenic EMs, wonderful microorganisms which produce the anti-oxidizing agents known as antioxidants, and sure synthesizing lines of anaerobic microorganisms. Apart from that, EM is additionally in a position to stop the "Sick House Syndrome" especially for the newly constructed building. Adding EM in concrete has already been practiced in Japan. This research has shown that plausible wonderful microorganism can minimize building defects and extend concrete strength. This lookup additionally suggests what kinds of building cracks, crack restore technique and software of viable high-quality microorganism in concrete. Costs contribute to major percentage of total construction costs[25].

In the preceding lookup [13] confirmed that concrete with 5% EMC admixture indicates a more suitable strength compared to the control set. The 1-day compressive power for 5% EMC admixture is able to obtain 53.07% of the attribute power (30MPa) compared to the manipulated set which is only done 36.53% of the characteristic energy (30MPa) in 1 day. These effects are charming to the construction enterprise at which the formwork elimination procedure can be shortened, and this subsequently expedites the complete development period. In pre-cast industry, high early electricity is crucial. This is mostly due to the tight schedule and the restricted framework in the casting yard. High strength of concrete enables the contractors to eliminate the formwork early and proceed to the next casting. In tradition, in order to gain high early strength, the contractors will add chemical admixture to the concrete which is fantastically highly-priced compared to EMC. Moreover, the uses of chemical admixtures are no longer environmentally-friendly. The low 1-day compressive strength for the instances with 25% EMC and beyond are frequently due to the hydration processes which used to be interrupted via EMC as concrete is in alkaline whereas EMC is in acidic state. The 28-day compressive energy of concrete with 5% EMC (43.17MPa) is capable to beautify the Grade C30 concrete by 43.90% compared to the designed characteristic strength. The contractors will normally add chemical admixtures into concrete in order to obtain higher compressive power which is now not environmentally-friendly and cost-effective. Leakage of chemical admixtures may motive pollution or hazards to the environment, but leakage of

EMC will not having troubles due to the fact Effective Microorganisms (EM) science was once firstly formulated to decorate the boom of vegetation in the agricultural enterprise and catastrophe treatment. Hence, even although EMC leaks to the environment, it will now not possess any hazard to the surroundings however in contrasts, it will benefit to our surroundings as advisable microbes observed in the food industries are used in EM and the cloth is made locally. The oblique tensile electricity of the concrete and the addition of EMC had a positive relationship generally. The tensile strength develops more rapidly than the compressive strength and is typically about 10 to 15 percentage of the compressive electricity at a while of up to about 14 days, falling to about 5 percentages at later. By adding EMC, the tensile power is in a position to achieve 10.27MPa in 50% EMC which is 34.23% of sketch compressive strength. 50% of EMC is capable to enlarge the oblique tensile strength by means of 68.09% when compared to the control set are numbered with Roman numerals. Include a note with your final paper indicating that you request color printing.

VI. RESULT AND DISCUSSION

The major objective of the potential effective microorganism is to reduce the cost of construction and at the same time ensure safety or serviceability of the building over the life cycle. Paudel 2008 [26] revealed that the cost of construction is increasing by 50 per cent over the normal inflation due to hike in the cost of conventional building materials and labor. There is an imperative need to utilize potential effective microorganism technology options leading to cost-effective results. The market survey was carried out on the cost implications of building component without EM and cost implication of introducing a mixing culture with EM. Two major building components such as concrete and paint were compared and contrast with EM and without EM in table I & II respectively. Table 1 shows the cost implication of building component without the EM while 2 presents the cost implication of introducing a mixing culture with EM only.

The study involved five selected projects. From the results presented in the table it could be deduced that the cost per meter square of adding EM to achieve the objective of self-healing of crack not more than 3mm is achieved. From the result it can be deduce that the cost adding to achieve the desired objective is very minimal. The results are further shown the following graph.

Table 2: The cost implications of using concrete and skim coat without EM Building Components

A. COST OF BUILDING COMPONENTS					
Project	Area (M^2)	Concrete (RM)	Cost/M^2	Skim Coat (RM)	Cost/M^2
A	21,007.65	2,179,494.24	103.75	-	-
B	33,473.04	4,112,316.00	122.85	880,792.00	26.31
C	39,010.00	5,732,031.40	146.94	104,212.81	2.67
D	31,919.42	4,403,449.40	137.96	827,277.80	25.92
E	6,295.04	1,392,173.44	221.15	21,888.00	3.48
Average cost per m2			146.53		14.59

Table 3: : Cost implication of introducing EM

B. COST OF MIX CULTURE IN BUILDING COMPONENTS					
Project	*Area (M^2)*	*MC in Concrete*	*Cost/M^2*	*MC in Skim Coat*	*Cost/M^2*
A	*21,007.65*	*102,593.61*	*4.88*	*-*	*-*
B	*33,473.04*	*180,280.00*	*5.39*	*6,384.85*	*0.19*
C	*39,010.00*	*217,189.84*	*5.57*	*561.31*	*0.01*
D	*31,919.42*	*219,333.27*	*6.87*	*9,431.54*	*0.30*
E	*6,295.04*	*64,774.98*	*10.29*	*300.96*	*0.05*
		C. Average cost per m2	*6.60*		*0.14*

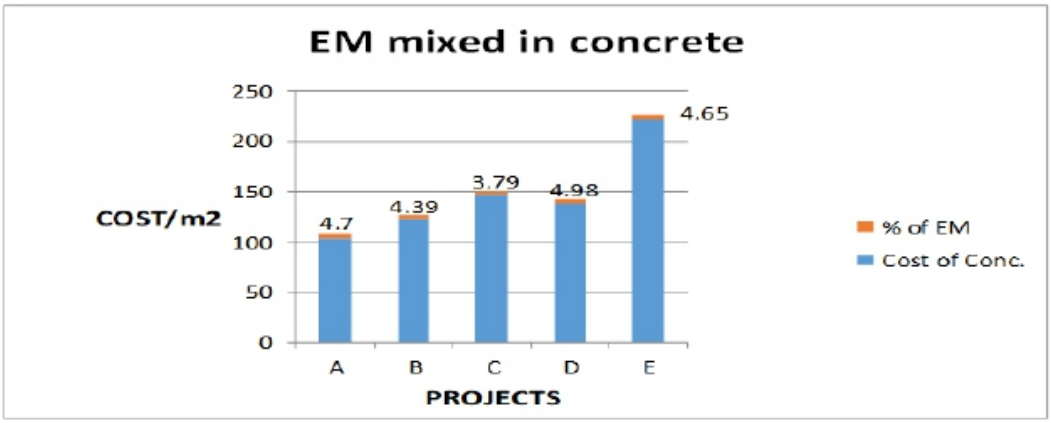

Figure 3: Assessment of introducing EM to concrete

The outcome of the analysis from the survey carried out on the five projects as shown in table 1 and 2 which indicates that the cost implication of using EM as remedies for cracks in building component is very minimal and affordable. The results indicate that the average cost of concrete work and EM is 146.53 and 6.6 respectively. This implies that EM is only 4.50% of the overall mixture in concrete. In the same veins the average cost of skin coat and EM is RM14.59 and RM 0.14 which means the EM in the remedies component is only 0.96%. Figure 3 shows the details of the concrete and EM in graphical illustration for all the five projects. The prices of inclusion of EM are shown as a percentage of the concrete component with an average figure of 4.5% and 0.96% for the concrete and skin coats elements respectively. The cost of EM at various projects is low and at the same time provides significant benefits in terms of strength, green material and minimizes cracks on plastering.

VII. CONCLUSION

The research was carried out to investigate the potential effective microorganism and its application in concrete that can help to reduce the building defects and improve building strength and durability. Potential Effective Microorganism generally enhances the mechanical properties of concrete. If this mixing culture apply to structural component of the building the compressive, tensile and flexural

strength of potential effective microorganism concrete is greater than the normal concrete respectively. The potential effective microorganism also provides high tensile strength. A lot of cracks such as flexural, transverse, surface, map, shear, longitudinal, plastic shrinkage crack also reduced by potential effective microorganism. Potential effective microorganism not only reduces building defects but also increases building strength and minimizes the construction cost. The admixture of potential effective microorganism in concrete is environmentally friendly and offers a relatively cheaper and better concrete admixture. Previous study shows fermentation is the main concept in EMC in which the process will not produce harmful substances. It can be concluded that it is more economical to add less than 5% of EM to building component in order to enhance compressive, tensile and flexural strength as well as provide the self-healing quality in case of cracks that is within 3mm. It is also used by popular traditional technique which is epoxy-injection method and grouting for crack repair.

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A Mixed Stream of Viscoelastic Liquid Through a Porous Medium is Situated in a Vertical Channel with Permeable Walls

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A B S T R A C T

We examined the completely developed mixed convection flow of a visco-elastic fluid via a porous medium in a vertical channel with a permeable wall. The non-linear control equations have been resolved using the conventional disturbing method for the speed and temperature domain. Graphs will be used to detail the effects on speed and temperature of the viscoelastic Reynold number, the cross flow parameter, the number of Grashof , and Prandtl temperature.

Keywords: Viscoelastic fluid, porous medium, flow, vertical channel, mixed convection.

I. INTRODUCTION

Many recent papers have been published on the issue of convective fluid flow in saturated porous media. The interest in understanding pores material transport processes is growing thanks to the growth of geothermal technologies, high-quality insulating buildings and cold stores, increased interest in energy efficient drying methods. The nuclear industry also has an interest in the assessment of heat dissipation in hypothetical accidents and in the effective insulation of a nuclear reactor. None of us have examined the convective flux of the mixed viscoelastic fluid, fully developed in a permeable vertical flux through a porous fluid. In the vicinity of the porous medium, the flow of non-Newtonian liquids finds essential applications in improved oil extraction, filtration, insulation systems and development of composites, etc. Some of the studies [1] can be mentioned here. The combined effects of viscosity changes and convective cooling in an unstable nano-fluid circulation via a permeable tube were studied by Kamiset et al. [2] later, according to a Buongiorno method. In a vertical porous tube, Singh [3] investigated thermal radiation with a viscous-elastic sliding mixed MHD mixture. Idowu et al [4] studied the dynamic stream of MHD in an oblique magnetic field between the two infinite parallel flat surfaces. In a porously saturated porous channel, Falade et al. [5] analyzed the MHD oscillating present. Recently studied heat and mass transfers in the non-Newtonian MHD fluid on the infinitely vertical porous plate were made by Raghunat and Siva Prasad [6]. Saleh et al. [7], which focused on observations of reversal of convective flows.

II. MATHEMATICAL FORMULATION

As shown in figure 1, we use the laminar convection stream of viscoelastic fluids in a permeable vertical flow through the porous matrix. The rate of injection on one wall shall equal the level of suction on the other wall. The x-axis has to be paralleled by a rectangular (x and y) coordination unit, but it crosses the walls of the channel opposite the x-axis. At a constant temperature of T_1 the left side (i.e. Y = 0), the right side of the wall (i.e. at y = h) is retained every time $T_1 > T_2$ is possible.

The stream is theoretically stable and fully developed, i.e. zero cruising speed. The continuity formula then comes down to $\partial u / \partial x = 0$.

Rivlin-Ericksen constitutive equation can be modeled on viscoelastic fluids

$$S = -pI + \mu A_1 + \alpha_1 A_2 + \alpha_2 A_1^2 \qquad 1$$

Scalar pressure p, μ, α_1 and α_2 surface constants, commonly referred to as viscosity, elasticity and cross-viscosity coefficients, are the places where the Cauchy stress sensor is found. The product constants of a particular liquid can be calculated by viscometric fluxes.

A_1 and A_2 are tensors from Rivlin-Ericksen, showing the degree of distortion and acceleration respectively A_1 and A_2 are set by

$$A_1 = \nabla V + (\nabla V)^T \qquad 2$$

$$A_2 = \frac{dA_1}{dt} + A_1(\nabla V) + (\nabla V)^T A_1 \qquad 3$$

$$\mu \geq 0, \quad \alpha_1 > 0, \quad \alpha_1 + \alpha_2 = 0 \qquad 4$$

Visco-elastic liquids are called second-degree liquids when they are modeled by Rivlin-Ericksen. Dunn and Rajagopal are known for their detailed description of the properties of second-degree fluids. In the context of dissipative inequality (Clausius-Duhem), Rajagopal and Gupta [8] study thermodynamics and generally agree that Helmholtz's special free energy must be at least balanced. From the thermodynamic consideration that they assumed.

According to the approach of Boussinesq, the basic equations of momentum and energy control such a stream

$$\rho v_0 \frac{du}{dy} = -\frac{dp}{dx} + \mu \frac{d^2u}{dy^2} + \alpha_1 v_0 \frac{d^3u}{dy^3} - \frac{\mu}{k_0} u + \rho g \beta (T - T_0) \qquad 5$$

$$v_0 \frac{dT}{dy} = \alpha \frac{d^2T}{dy^2} \qquad 6$$

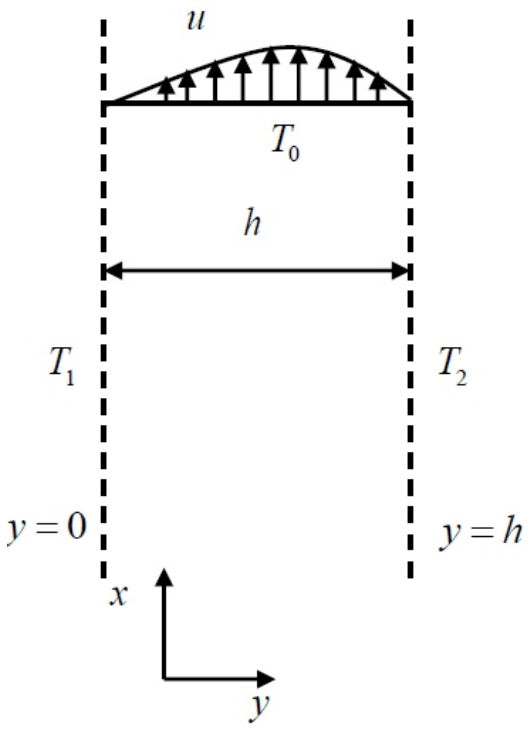

Fig.1 The physical model

The limits shall be determined by

$$u(0)=u(h)=0,\quad T(0)=T_1,\quad T(h)=T_2 \qquad 7$$

Presentation of the following parameters

$$\bar{y}=\frac{y}{h},\qquad \bar{u}=\frac{u}{U},\qquad \theta=\frac{T-T_0}{T_2-T_0}$$

We obtain

$$kR\frac{d^3u}{dy^3}+\frac{d^2u}{dy^2}-R\frac{du}{dy}-\frac{1}{Da}u+\frac{Gr}{\mathrm{Re}}\theta+A=0 \qquad 8$$

$$\frac{d^2\theta}{dy^2}-R\,\mathrm{Pr}\frac{d\theta}{dy}=0 \qquad 9$$

The appropriate dimensional limit conditions are defined by

$$(0)=u(1)=0,\quad \theta(0)=r_T,\quad \theta(1)=1 \qquad 10$$

III. SOLUTION

The BVP solution of first order (4) - (6) is considered for the small ones. Because the formula implies that (1) is only extracted from the first order of magnitude, the disturbance solution must therefore be reasonably logical and reasonable if the terms remain the same magnitude. We write

$$u = u_0 + ku_1 \quad (11)$$

$$\theta = \theta_0 + k\theta_1 \quad (12)$$

By replacing and limiting equations (11) and (12) in (8) and (9) and assimilating them with comparable powers of, we obtain the

3.1 Zeroth-order system (k^0)

$$\frac{d^2u_0}{dy^2} - R\frac{du_0}{dy} - \frac{1}{Da}u_0 = -\frac{Gr}{\mathrm{Re}}\theta_0 - A \quad (13)$$

$$\frac{d^2\theta_0}{dy^2} - R\,\mathrm{Pr}\frac{d\theta_0}{dy} = 0 \quad (14)$$

Together with boundary conditions

$$u_0(0) = u_0(1) = 0, \quad \theta_0(0) = r_T, \quad \theta_0(1) = 1 \quad (15)$$

By replacing and limiting equations (11) and (12) in (8) and (9) and assimilating them with comparable powers of, we obtain the

3.2 First-order system (k^1)

$$\frac{d^2u_1}{dy^2} - R\frac{du_1}{dy} - \frac{1}{Da}u_0 = -R\frac{d^3u_0}{dy^3} - \frac{Gr}{\mathrm{Re}}\theta_1 \quad (16)$$

$$\frac{d^2\theta_1}{dy^2} - R\,\mathrm{Pr}\frac{d\theta_1}{dy} = 0 \quad (17)$$

Together with boundary conditions

$$u_1(0) = u_1(1) = 0, \ \theta_1(0) = 0, \quad \theta_1(1) = 0 \quad (18)$$

3.3 Zero th Order (or Newtonian Fluid Solution)

We get the solution of the equations (13) and (14) with the limit conditions (15),

$$\theta_0 = \frac{\left(1 - r_T e^{R\,\mathrm{Pr}}\right) + \left(r_T - 1\right)e^{R\,\mathrm{Pr}\,y}}{\left(1 - e^{R\,\mathrm{Pr}}\right)} \quad (19)$$

$$u_0 = c_1 e^{ay} + c_2 e^{by} + \frac{Gr}{\mathrm{Re}}\left(f_1 - f_2 e^{R\,\mathrm{Pr}\,y}\right) + ADa \quad (20)$$

3.4 First-order (or Second-grade solution-fluid)

Eq. Resolution. (3.7) we obtain with the appropriate limit conditions

$$\theta_1 = 0 \quad (21)$$

The formula (20) and (21) are replaced. (16) The resulting correlation with the appropriate conditions is then resolved

$$u_1 = c_3 e^{ay} + c_4 e^{by} - f_6 y e^{ay} - f_7 y e^{by} + f_5 e^{R\,\mathrm{Pr}\,y} \qquad 22$$

Finally, up to first order and are the disturbance solutions

$$\theta = \frac{\left(1 - r_T e^{R\,\mathrm{Pr}}\right) + \left(r_T - 1\right) e^{R\,\mathrm{Pr}\,y}}{\left(1 - e^{R\,\mathrm{Pr}}\right)} \qquad 23$$

$$u = \left(c_1 + kc_3 - kf_6 y\right) e^{ay} + \left(c_2 + kc_4 - kf_7 y\right) e^{by} + \frac{Gr}{\mathrm{Re}}\left(f_1 - f_2 e^{R\,\mathrm{Pr}\,y}\right) + kf_5 e^{R\,\mathrm{Pr}\,y} + ADa \qquad 24$$

Please note that our findings, and those from Aung and Worku were reduced.

IV. DISCUSSION OF THE RESULTS

In order to see the effects of Da, k, R, Pr, Gr, Re and r_T on the velocity u , we have plotted Figs. 2-10. Darcy number's Da effect on u for A =1 , k = 0.02, r_T = 0.5, R = 5, Grash of number Gr =1,Pr = 2 and Reynolds number Re =1 is shown in Fig.2. The velocity u increases with the increase Da are noticed. Fig.3 shows the viscoelastic parameter k effect on for cross flow parameter R = 5, r_T = 0.5, A =1 , Da = 0.1, Grash of number Gr =1, Pr = 2 and Reynolds number Re =1. With an increase in k the velocity u decrease is observed. The peak velocity is shifted from the edge by the increased value of the viscoelastic parameter. For's influence cross flow parameter R on u for Pr = 2, Grash of number Gr =1, 1 Da = 0.1, r_T = 0.5, k = 0.02, A = 1 , and Reynolds number Re =1 is presented in Fig.4. The velocity is reduced when an increase cross flow parameter R is observed. Fig. 5 shows the effect of the number of Prandtl Pr on u for cross flow parameter R = 5, A =1 , Da = 0.1, Grash of number Gr =1, k = 0.02 , rT = 0.5, and Reynolds number Re =1. It is found that as the number of Prandtl increases, the acceleration increases. The effect of the number of Grash of on u for Da = 0.1, r_T=0.5, k = 0.02, Pr = 2 , cross flow parameter R = 5, A =1 ,and Reynolds number Re =1, is presented in Fig.6. It is observed that as the number of Grashof increases the frequency increases.

Fig.7 shows the effect of the number of Reynolds on u for Grash of number Gr =1,Pr = 2,k = 0.02 , Da = 0.1, r_T = 0.5, cross flow parameter R = 5, A =1and Reynolds number Re =1. It is noted that as the number of Reynolds increases, the velocity decreases. The effect of the parameter of the wall temperature r_T on u for Grash of number Gr =1,Pr = 2 k = 0.1, Da = 0.1, cross flow parameter R = 5, A =1, and Reynolds number Re =1is shown in Fig.8. It is observed that with rising velocityu , r_T Increase. Fig.9 displays the temperatureθ effect R for r_T = 0.5 and Pr = 2 . It is observed that, on the rise cross flow parameter R , the temperature θ decreases. The effect of the number of Prandtl on the temperature for r_T=0.5 and cross flow parameter R = 5 is shown in Fig. 10. That's right. The temperature θ decreases as the amount of

Prandtl number Pr increases. Fig.11 shows the effect of r_T on temperature effect for cross flow parameter $R = 5$ and Prandtl number $Pr = 2$. The temperatureθ is observed to rise with an increase in r_T.

V. CONCLUSIONS

In a vertical channel with permeable walls we investigated the fully developed mixed convective flux of viscoelastic through a porous medium. For the velocity and temperature fields, the non-linear equations are determined using traditional disturbance techniques. As it increases or decreases as it rises or decreases, the area of velocity increases. As it decreases with increase or decrease, the temperature range increases as well.

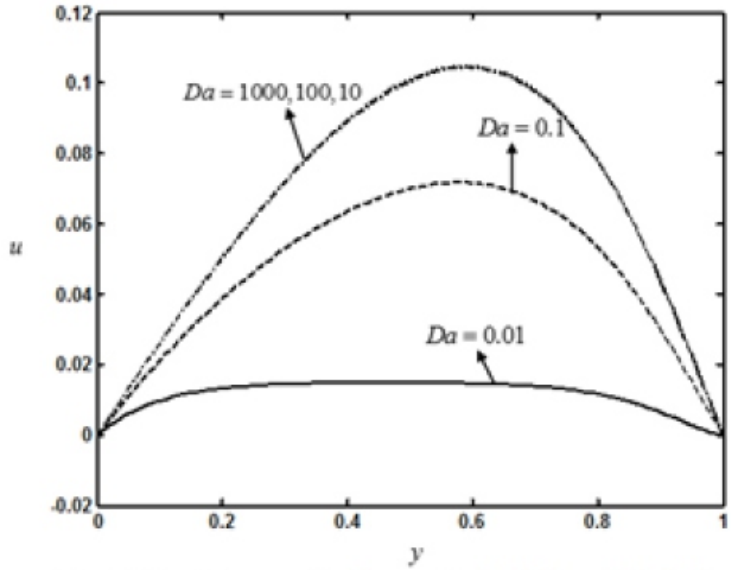

Fig. 2. Effect of Darcy number Da on u for $k = 0.02, r_T = 0.5, R = 5, A = 1, Gr = 1, \Pr = 2$ and $\mathrm{Re} = 1$.

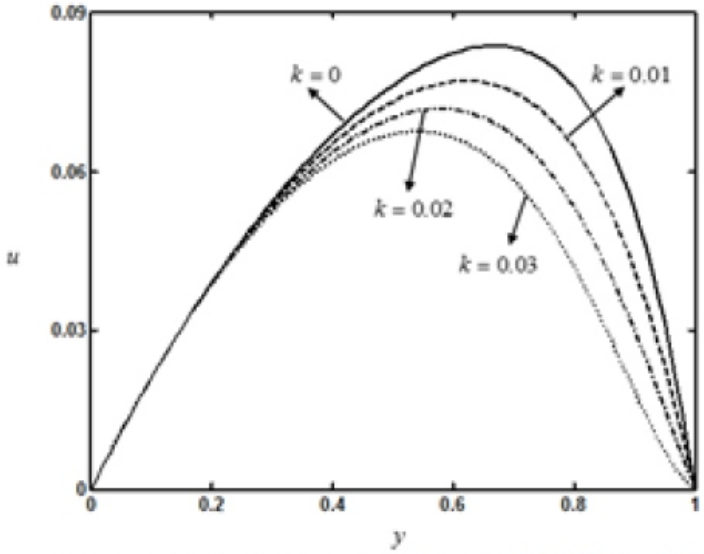

Fig. 3. Effect of viscoelastic parameter k on u for $Da = 0.1, r_T = 0.5, R = 5, A = 1, Gr = 1, \Pr = 2$ and $\mathrm{Re} = 1$.

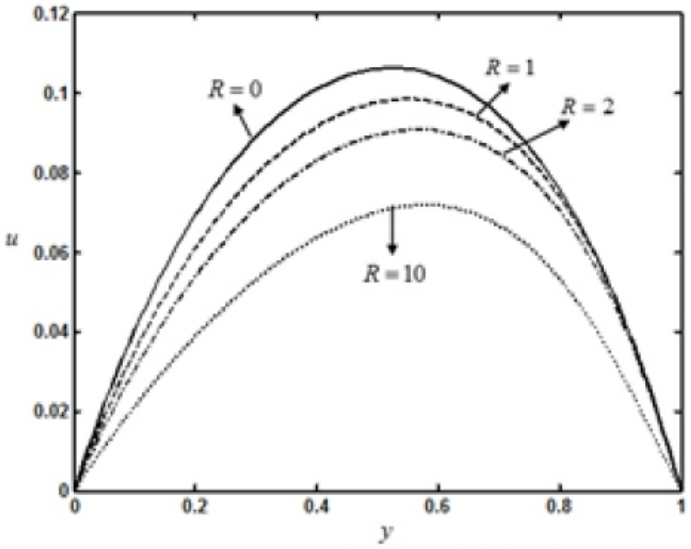

Fig. 4. Effect of R on u for $Da = 0.1, r_T = 0.5, k = 0.02, A = 1$ $Gr = 1, \Pr = 2$ and $\mathrm{Re} = 1$.

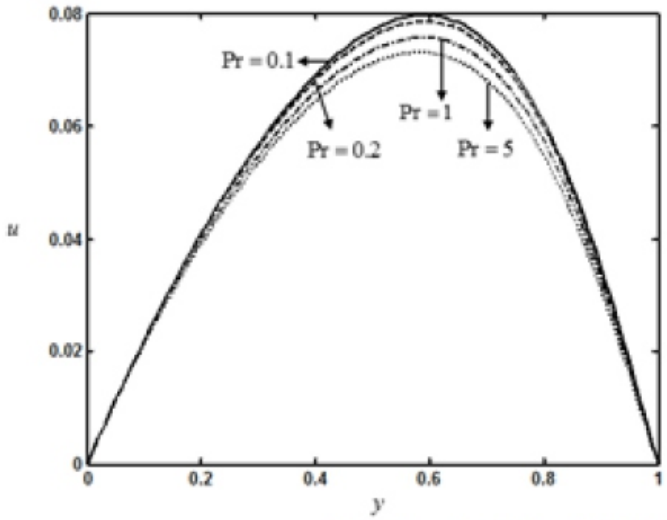

Fig. 5. Effect of Prandtl number Pr on u for $Da = 0.1, r_T = 0.5, R = 5,$ $A = 1, Gr = 1, k = 0.02$ and $\mathrm{Re} = 1$.

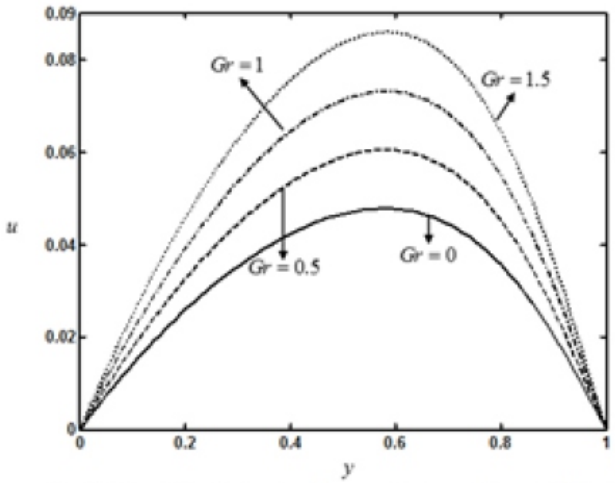

Fig. 6. Effect of Grashof number Gr on u for $Da = 0.1, r_T = 0.5, R = 5,$ $k = 0.1, A = 1, \Pr = 2$ and $\mathrm{Re} = 1$.

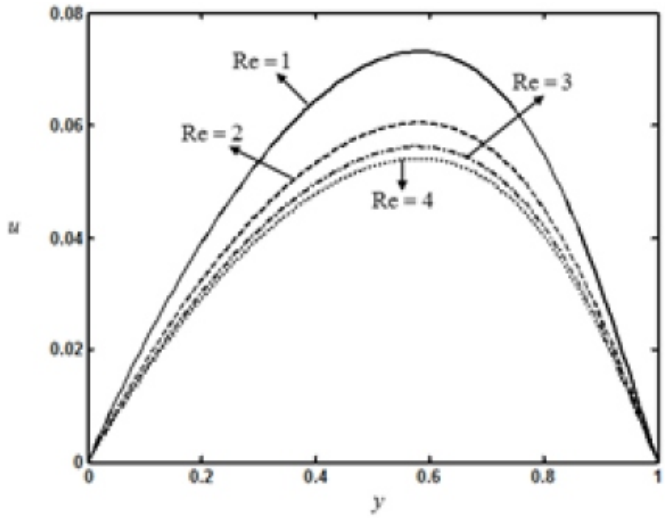

Fig. 7. Effect of Reynolds number Re on u for $Da = 0.1, r_T = 0.5, R = 5, Gr = 1, \Pr = 2, A = 1$ and $\mathrm{Re} = 1$.

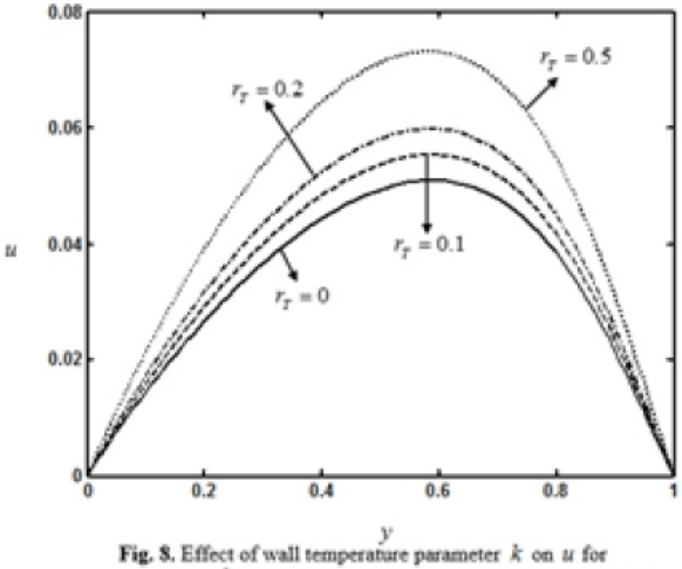

Fig. 8. Effect of wall temperature parameter k on u for $Da = 0.1, k = 0.1,\ R = 5,\ A = 1, Gr = 1, \Pr = 2$ and $\mathrm{Re} = 1$.

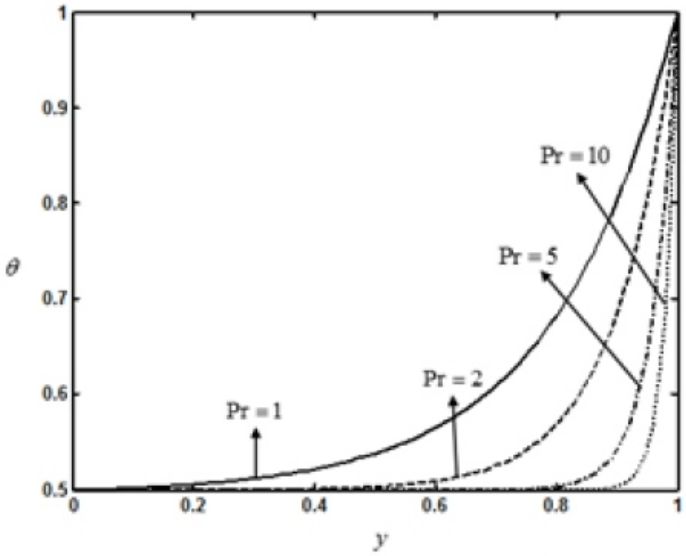

Fig. 10. Effect of Pr on θ for $r_T = 0.5$ and $R = 5$.

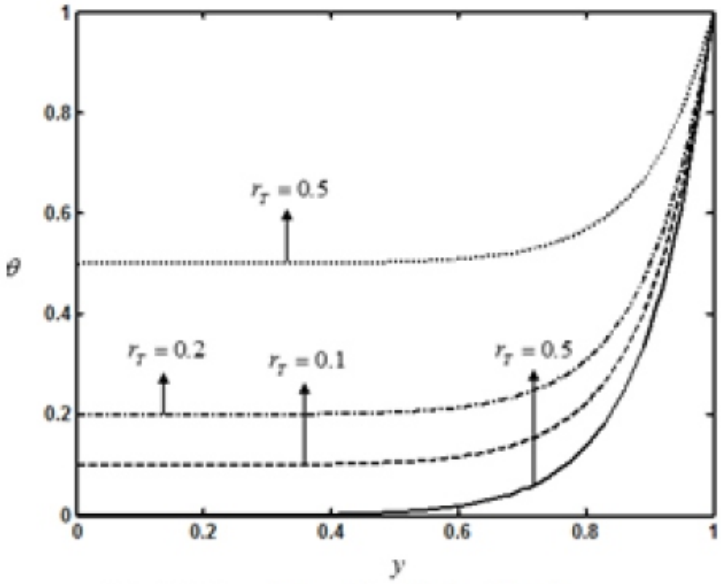

Fig. 11. Effect of r_T on θ for $R = 5$ and $\Pr = 2$.

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Socio-economic Initiative of the Government and its efficacy on Tribal Women

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A B S T R A C T

It is a well-known reality that involvement of women in the development process is of utmost important as they comprise one-half of the world population. As per the world scenario, women's share in relation to working hour is 60% which form 30% of the official labour force. Thus the share of contribution of the women to the world economy is 50 percentages (Department for International Development). Similarly the women in the tribal society constitute half of the tribal population. In the Indian constitution, the welfare state is enshrined with a view to ensure social justice to the most underprivileged class, particularly the scheduled tribes. Since the beginning of the 1st five year plan, the tribal administration has gained impetus and to ensure an integrated approach as well as policies for the amelioration of the tribal women, area development approach like Tribal Sub-Plan area, etc. The present study makes an assessment of the governmental efforts in different field taken for tribal upliftment with special reference to their women specific impact as well as the overall absorption, response and impact on the targeted tribal area. It is based on empirical study of two primitive tribes of Rayagada and Keonjhar district.

Key words: Government initiative, Government absorption, primitive tribes, scheduled tribes, tribal women, tribal upliftment

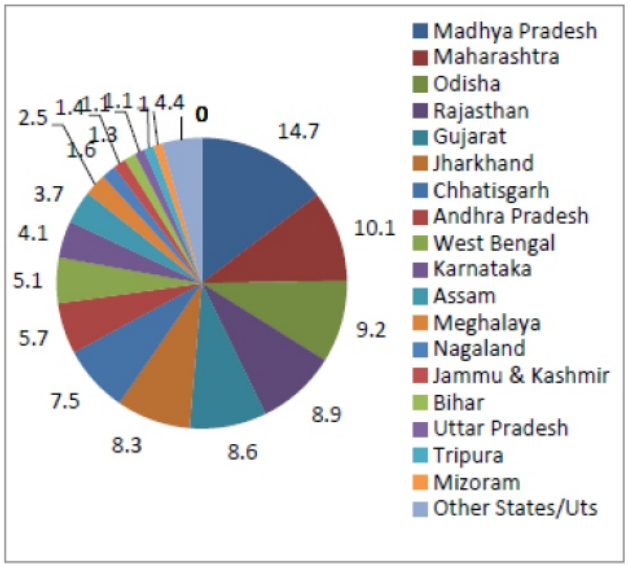
I. INTRODUCTION

Scheduled Tribes constitute an important portion of Indian population. They stand for geographically isolated, marginalized and economically poor in India. As per the 2011 census, the scheduled tribe population comprises 8.6% of the country's total population. Generally the areas where scheduled tribes inhabited are inaccessible, remote forest and hilly areas confined to geographically isolated islands.1 According to the latest census of 2011, 705 ethnic groups in India are notified as schedule tribes, which is a total of 10.42 crores of the population that is 8.6% of the overall population. Of this only 1.04 crores i.e., 9.9% of the total tribal population lives in the urban areas where as the rest 90% are still dependent on the rural economy. There has been a substantial increase in tribal population from 30.1 million in 1961 to 104.3 million in 2011. But when seen as a proportion of the total population, the change is from 6.9% in 1961 to 8.6% of the overall population in 2011, which is only an increase of 1.7% over these 50 years (GOI, 2013).

Indian tribes are mostly concentrated in the Central part of India and the North-east region of the country. According to 2011 census, these states in the central part of India in descending order are Madhya Pradesh, Maharashtra and Odisha consisting of 14.69%, 10.08% and 9.2% of the tribal population

respectively. The other states in this region are Rajasthan consisting of tribal population (8.86%),Gujarat having (8.55%),Jharkhand consists of (8.29%), Chattisgarh(7.5%) and Andhra Pradesh consist of 5.7% of the tribal population. In the North east region, the tribal are mostly concentrated in Assam, Mizoram, Nagaland, Meghalaya, Manipur, Tripura, Arunachal Pradesh and Sikkim.

Figure-1 State/UTs Share of STs to total ST Population of India



Source: Primary Census Abstract for total Population, SC & ST, 2011

Numerous policies and programmes have been adopted as well as implemented for the socio-economic development of the tribal areas since the colonial period. Special provisions and strategies were reflected in the form of the Scheduled Districts Acts of 1874, the Indian Education Commission of 1882, Government of India Act of 1919 and 1935, where focus was given on special development of the tribal communities in general and tribal women in particular. Women have always formed an inseparable part of society and culture. They are more compatible with the natural order. In the tribal socio-economic set up, women occupy a dominant role as compared to their male counterparts. The male and female workers' ratio to the total population is 5:1, whereas for tribal population it is 3:1.The contribution of tribal women to their family starts from childhood and continues unrelieved throughout their life. Women in tribal society act as a major part in agricultural activity, collection of fire wood, roots , vegetables and tubers which supplement their family diet and rearing livestock. In this way, women's initiative is leading in tribal family affairs (Rao, 2006). Hence involvement of tribal women in the development process is of utmost important as they comprise one-half of the total tribal population. They are the backbone of the village economy in general and of foothill villages in particular. But in the process of development, they are deprived of availing the benefits of development programmes. Now time has come when women have to be directlyconcernedabout the extension programmes of the government. They must be reckoned as an important asset of the tribal society.

In India there are 75 Particularly Vulnerable Tribal Groups (PVTGs) identified and distributed in 14 states and one Union Territory of India. Odisha is the only state in the eastern region which has 8 districts having more than 50% of ST population after the north eastern states of Mizoram, Nagaland and Arunachal Pradesh in ascending order(according to census,2011). Similarly Odisha has the largest number of PVTGs consisting of 13 among the states and UTs of India. They are the Bonda, Birhor, Didayi, PaudiBhuyan, LanjiaSaora, Hill Kharia, Mankirdia, KutiaKondh, Dongria Kondh, Juang, ChukutiaBhunjia, Lodha and Saora. The tribes selected for the present study (Juang and the Dongria Kondh) belongs to the PVTGs group based in the districts of Keonjhar and Rayagada which are located in the declared schedule areas of the state.

II. REVIEW OF LITERATURE

Dutta (2002), reveals about the feasibility of the governmental schemes regarding the improvement of the standard of living of women in India. He views that women are still considered as the misery of society, the unwanted liability. Till today, the attitudes of tribal parents have not changed regarding girl child education. Basically they prefer to send them to work place to earn for their family rather than send to school. The main root at the back of this situation is poverty. That's why various policies and programmes have failed to achieve the best result for this community.

Mohapatra (2006), made an extensive analysis of the various tribal development problems in Odisha where he observed that during the plan periods, a considerable development of medical and public health facilities have taken place in these areas. But these benefits have not been compatible with the facilities provided because a vast proportion of the people did not avail these services due to superstitions and local hearsay. In fact, in most tribal societies, people believe that diseases are caused by hostile spirits and must be treated by spirituality and therefore prefer traditional medicine men rather than qualified doctors. Similarly, a majority of doctors are also reluctant to go to the interiors and serve in tribal areas.

Mohanty (2000), undertook a study on "Development of Scheduled Caste and Scheduled Tribes in Independence India: Leads and Lags". The author has explained the execution of the government plans expenditure for scheduled cast and scheduled tribes for the period of the five year plans to look at whether the scheduled tribes are benefited or not. He revealed that many protective measures have been undertaken for the development as well as the welfare of the scheduled tribes such as shifting cultivation, forest, rehabilitation of displacement families, land alienation, bonded labour etc.in order to ensure political and socio-economical justice. It has been observed that most of the tribal population is under below poverty line and those who are living in the remote deep jungle region have not benefited by the government development schemes. The author suggests that, it is necessary to review all the accessible government schemes to stop loopholes and make strict provision for restoration of alienated land to

scheduled tribes. He concluded that right now there is no appropriate assessment and monitoring of the scheduled cast and scheduled tribes development programmes. Hence, it leads to poor implementation and the target groups do not get the benefits.

Mohanty (2007), in his article reveals that due to shortage caused by decline of traditional forest based deeds pulls the tribals into the web of indebtedness and bondage. Once the Juang incurs debt from a private moneylender, he is automatically trapped in a net from which he can't escape out easily. Hence it leads to land alienation and loss of all assets he owns. It has been observed that the tribal and their children live and dies in debt. The author opined that this type of situation have changed at present due to the implementation of the tribal development programmes and introduction of Nationalized Banks and Self Help Groups (SHGs).At present, the Juang borrow more from the Baitarani Gramya Bank than the moneylenders. But the implementation of Micro credit through SHGs has not made the life of Juang easy till today. They are still incurring debt from the local moneylender due to lack of awareness.

Routray.S (2015), 'The Status of Women among the Dongria Kondh' reveals in his article that the Dongria Kondh woman enjoys a high status in their social life. In case of marriage and family bequeath, they have a significant status. It has been observed that a person having more than one wife is considered rich in the society due to additional manpower. Hence women assist in the enhancement of the social and economic prestige of men. In various aspects of social life, the Dongria Kondh women enjoy high status and freedom like in the selection of a husband/life partner, seeking of divorce and so on. But in case of political and ritual sphere, they have low status. Hence for the all round development of the Dongria Kondh women, all developmental programmes should be enhanced.

III. OBJECTIVES

The present study has the following specific objectives:

1. To understand the evolution of government programmes for the upliftment and welfare of the tribals.
2. To examine and find out various socio-economic development factors responsible for tribal women in the study area.
3. To assess the efficacy of development programmes on the creation of additional income and employment of the sample households.

IV. METHODOLOGY

The study is based on both primary and secondary sources of data. The secondary data are collected from various sources highlighted the impact of tribal developmental programmes on their overall socio-economic status in the state. The primary data are collected by structured questionnaires to analyse the

socio-economic status of the tribal households. Although the sample selection is based on the population of the primitive tribes who are concentrated in the hilly landscape of these tribal districts, the selection of the sample units is done randomly.

The sample units are the women members of these households, preferably occupying a prominent position in the family which is purposely chosen to know the status and role of women in these households. While collecting information, the investigator had a hill-walking task from these tribal belts due to many factors. The primary among this was the massive communication barriers not only due to the unfriendly landscape but also the language gap. To overcome this gap the investigator stayed among them to build an informal rapport after which they could be made to reciprocate to the queries by overcoming their nonbeliever attitude towards support members. The information is collected as is delivered by them with all their raw expression of the awful status in many cases. The author thus used the method of participant observation to get a real picture of their socio-economic condition with focus on their developmental programmes and its consequences. For the purpose of data analysis various statistical and econometric tools has been used like regression, multiple logistic regression etc. as per the requirement.

V. TRIBAL DEVELOPMENTAL PROGRAMMES:

In the Post Independence Period, some eminent personalities like Thakkar Bapa, Jaipal Singh and few others played a major role in reshaping the tribal welfare and protective measures for the communities. Consequently, series of Constitutional Provisions in the form of constitutional safeguards, Articles and schedules have been included in the Indian Constitution for the development and welfare of the tribal communities. As per the constitutional provisions, the National Commission for Scheduled Caste and Scheduled Tribes have been appointed to safeguard the social, economic and political interests of the tribals. To protect their exploitation, the Protection of Civil Rights Act, 1955, the Scheduled Caste and Scheduled Tribes (Prevention of Atrocities) Act, the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights)Act, 2006, etc. has been implemented.

After Independence, Indian constitution has taken several provisions to protect the interest of the scheduled tribes in Articles 15 (4), 16 (4), 46,243 M, 243ZC and 244; the 1st and 2nd provisions to 275 (1), Articles 334,335,338A, 339 (1) and the 5th and 6th schedule. The then Prime Minister, Nehru once said, "It is my dream to see each tribal family happy, educated, healthy and with sufficient income. To realize this dream, it is not sufficient to only have integrated interventions, but is also necessary to monitor the impact of these interventions on each tribal family. I wish to see every family reap the benefits of the 10-Point Programme that has been specifically designed by the government for them." As per the Bhuria Committee Report, the PESA (Panchayat Extension to Scheduled Areas) Act was passed

by the Parliament with regard to the socio-economic development as well as welfare of the tribals. Some special and supreme powers in regard to the governance of the scheduled areas have been vested in the hands of Governor under the 5th schedule. The main objective of PESA is to recognise the Gram Sabha as a chief unit of governance and people have the power to control over their own as well as community resources and preserve their tradition and dispute decision.

During the five year plans, many policies and strategies have been developed by the government of India for the upliftment of the tribals. In the 1st five year plan, focus was given on the provision of additional financial assistances through a community development approach to deal with the plight of tribals. At the end of the plan, about 43 Multi-purpose Tribal Development Projects (MTDPs) were developed and sustained till the end of the 2nd five year plan. During the 3rd five year plan, a different strategy was developed known as "Tribal Development Blocks."At the end of the 4th five year plan, the number was increased to 504. But this strategy was failed to identify the tribal population who were living outside the 'Tribal Development Blocks'. In the 5th five year plan period, the identification process of majority blocks were covered which later comprised of 194 ITDS/ITDPs in the country. The present Tribal Sub Plan (TSP) was initially developed by Expert Committee set up by the Ministry of Education and Social Welfare in 1972. Thus during the 5th five year plan period, more effort was made for an integrated development approach in planning for tribals in Blocks. During Medium Term Plan, having population of 10,000 with more than 50% tribal living in adjacent areas was taken up for intensive development under "Modified Area Development Approach". Likewise, the government of India formed micro-projects in isolated pockets for improvement of primitive tribes.

In Odisha, a separate department named Backward Classes Welfare Section (BCWS) was established in 1948. A Tribal Advisory Council was formed in 1950 to advice government for the development and welfare of the Scheduled Tribes and Areas which is envisaged in Para 4 of the 5th schedule. According to the Scheduled Area order, Sundargarh, Koraput, Mayurbhanj, Kandhmal and Gunjam were scheduled in 1950. After that in 1977, as per the revised Scheduled Area order, more areas of Odisha were declared as Scheduled Areas. Now they are included in the Tribal Sub-Plan covering 118 blocks out of 314 blocks of Odisha. Under Article 275 of the constitution, there are provisions for grant-in-aid from the consolidated fund of India to state government for implementations of various developmental programmes to promote the welfare of the scheduled tribes as well as to raise the administration level of the Scheduled Areas to the general level.The government of Odisha has established 17 Micro Projects in the name of Primitive Tribal Groups (PTGs). This Micro Projects assist the PTGs with regard to education, agriculture, health, drinking water, road connectivity, animal husbandry, etc. The Odisha Government is also planning, implementing and monitoring Odisha Tribal Development Society (OTDS) which is under SC and ST Development Department. The OTDS intends to engage one "Technical Expert

(Capacity Building & PLET) in OTDS state office at Bhubaneswar to assist in various stages of project formulation, convergence of resources, planning, monitoring and evaluation. It focuses on empowering the tribals and enabling them to enhance their food security, increase their income and improve their overall income.

This paper makes an assessment of the governmental efforts in different field taken for tribal upliftment with special reference to their women specific impact as well as the overall absorption, response and impact on the targeted tribal area. The total number of declared ITDPs/ITDAs in India is 193 covering 2 UTs and 18 states. At present there are 259 MADAs and 82 numbers of clusters. Odisha has the highest number of ITDAs/ITDPs at 22 as well as MADAs at 46. It has the third most numbers of clusters at 14 after Maharashtra (24) and Andhra Pradesh (17).This reflects not only the tribal significance in terms of number but also their significance in terms of vulnerability and backwardness necessitating focused approach for their upliftment.

Government Schemes for the Upliftment of Tribal And Tribal Women In The Study Area And Survey Outcomes

The government both at the central and the state level runs several schemes for empowering the tribal women socially, economically and politically. While some of the schemes are directly targeted towards the women many other are meant for tribal in general with angle towards women centric issues. Some of these schemes which are directly operating in the study area with their target, objectives and achievements as well as the ground situation as brought out by the survey outcomes are mentioned below.

A. Education Related Schemes:

Education is considered as an important basis for all types of cultural, social and economic development (Sen, 1994) that boost the human resource and economic scenario of a nation (UNFPA). Moreover, investment in education especially on women brings out an enhanced status through better economic conditions, strong decision-making power, the rise of self-confidence, control over resources, relaxation on physical mobility, effective husband wife communication and self-sufficiency in old age (Mason, 1998). As education is considered as a stepping-stone to social and economic development of the tribal community, Govt. has been taken utmost efforts to improve their educational standard. Special facilities have been provided to the tribal students through the provision of free education with free boarding facilities, free text books and uniforms. For the improvement of tribal education, special focus has been given under District Primary Education Programme, Kasturba Gandhi Balika Vidyalaya, Residential Ashram School, PREM, Mid-day Meal Scheme and NavodayaVidyalaya. Similarly to provide quality education to the tribal students, 100 Model Residential Schools (Ekalavaya Model School) are set up by

the Govt. of India in 20 states from class VI to class XII under article 275 (1) of the constitution. The prime objective was to enable them to avail the reservation facility in higher and professional level as well as job in govt. and public sectors. As per 2011 census, the literacy rate in the state is nearly 73% indicating an increasing trend but for STs, it is only 52.24% which lag behind the Average Literacy Rate (ALR). To bridge this literary gap, the Govt. of Odisha is taking genuine steps on the literacy ground. Some of these schemes which are directly operating in the study area are mentioned below.

i. PREM:

People's Rural Education Movement is a compassionate, non-political, secular and non-government organization functioning for the upliftment of Scheduled Tribes and other marginalized communities of Odisha and India. In 1984, under the society's registration FCRA act of India, PREM was registered as a voluntary organization. The primary objectives of PREM's developmental programme are: i)to spread education among the rural masses, ii) to improve health care facilities, iii) to execute livelihood initiatives in the inaccessible areas, iv) to make capacity building for good governance and v) to promote and protect the rights of children among marginalized communities.

ii. Mother Tongue Based Multilingual Early Childhood Education (MT ML ECE) :

This programme is one of the model initiatives of the PREM which started in tribal areas of Odisha in 2007. Under this programme, PREM is providing home based care to 0 to 2 years children. MT ML ECE programme providing support to 2 to 6 years of children. It has been seen that since 2007 to till date, 7333 tribal children of four tribal dominated districts of Odisha have working under this programme. Now they have successfully transited to primary and central schools. It has been also seen that due to the implementation of this programme, there is no single drop out among these children in the school. Hence, this model has been appreciated and taken up by the government. Juang community is one of the most primitive and vulnerable tribe in Keonjhar district where a high proportion of Juang children are deprived of early childhood and primary education, quality health as well as livelihood support. With this backdrop, PREM initiated a project on holistic development of children of Juang communities. It has taken 35 villages covering 2034 households constituting 8666 population. PREM has been operated in Banspal block of Keonjhar district in collaboration with Bernand Van Leer foundation since October 2012. The main goal of this programme is to create a conducive environment for Juang children for their holistic development by providing mother tongue based multilingual early childhood education, health, nutritionfacilities at the community level. The project also taken different stakeholders like children, youth, women, different development committees, and members of the Juang Farmer's cooperative society at grass root level and create a linkage with the Panchayat, block and district level.

iii. Anganwadi:

The women and Child Development (W&CD) department had launched this programme in association with Bernand Van Leer Foundation (BvLF), 2017. It introduced a model of mother tongue-based multilingual early childhood education in 12 tribal districts of Odisha. The main objectives of this programme are i) to enhance the learning environment, ii. Demonstrate better language proficiency and iii. Make successful transition to primary schools.The districts covered under this programme are Keonjhar, Rayagada, Sundargarh, Kalahandi, Gunjam, Malkangiri, Sambalpur, Gajapati, Koraput, Kandhamal, Nuapada and Mayurbhanj. It imparts in 10 tribal languages including Juang, Kuvi, Santhali, Bonda, Kui, Koya, Oram, Saura and Kisan.

iv. Government Ashram Schools in Tribal Areas:

Ashram schools are residential schools which impart education up to the secondary level to children belonging to Scheduled tribes. Since 1990-91, the Ministry of Tribal Affairs has been implementing a central scheme known as ashram school in tribal sub plan areas. Under this centrally sponsored scheme, the state government is qualified for the establishment of girls Ashram Schools for 100% funding and Ashram schools of boys in non-Naxal tribal areas for 50:50 ratios.The main objective of the scheme is to provide residential schools for STs including PTGs in an environment conducive to learning and to increase the literacy rate among the tribal students as well as to bring them at par with other population of the country.

v. Kasturaba Gandhi Balika Vidyalaya:

In August 2004, this scheme was introduced by the govt. of India. Then it was integrated in the Sarva Shiksha Abhiyan programme to provide educational facilities for the dropout and never enrolled children between the age group 10-14 yrs children of SC/ST/OBC and minority groups and families who are under abject poverty. Its objectives are to ensure access and quality education to the girls of disadvantaged group of society by setting up of residential schools with boarding facilities at elementary level and merged with SSA programme from XIth five year plan, Ist April 2007. In this scheme, there is provision for residential facility and other academic support to be provided to the girls enrolled mainly from the dropped out section in the area concerned.

Survey Outcomes on Educational Status in the Study Area:

Though it is found that the tribal who are adults have less or no education (as observed 8% for the tribal women in the study area, of which 86% have education up to lower primary level only), but they are found to provide education to their children. However this could be achieved only due to the government's education related schemes operational in the study area.

Table I: Educational Status of the Tribal Children in the Study Area:

Percentage of Tribal Household with children attending school		If Yes , are you able to afford the educational cost	
Yes	No	Yes	No
83.50%	16.50%	4.30%	95.70%

If not able to afford the educational cost, place where the children gets the education from:

	Govt.schemes/Anganwadi	Provisions by NGOs	Informal Education	Any other (KISS)	Both Govt. Schemes & NGOs
Overall tribal population	67.50%	7.90%	0.90%	3.7	20%
Keonjhar	61.90%	0.20%	1.9	2.90%	31.40%
Rayagada	72.70%	13.60%	-	4.60%	9.10%

Source: Survey outcomes

It is found from the above table that near about 84% of the sample households are sending their children to the school. In Rayagada district, the enrolment of tribal children in Govt. Ashram School and Anganwadi is around 72.7% which is more than the percentage of enrolment in Keonjhar district which is 61.9%. The percentage of overall enrolment in both Govt. schemes and NGOs is 20%. As regards informal education, the above survey shows that the enrolment percentage is very poor. It is found from this study that from both the sample district, about 3.7% of tribal students are studying in KISS (Kalinga Institute of Social Sciences) , a residential school in Bhubaneswar. About 95.7% of the households have opined that they are not able to afford the educational cost of their children due to abject poverty.

B. HOUSING RELATED SCHEMES:

i. Mo Kudia:

For the year 2008-09, the state government has launched Mo Kudia schemethose who are valid poor but the name does not in BPL list may also be allotted a house. According to the rule, preference will be given to the following categories.

a) The poor women who are in distress, physically challenged, victims of domestic violence, women headed households, leprosy and AIDS patients will be eligible to get a house. b) The poor victims of fire or flood can be considered. c) The tribal households whose houses have fully collapsed due to elephant menace can be considered. d) The primitive tribes (PTGs) may be given priority without instating on title of land.

ii. Indira Awaas Yojana (IAY):

IAY, the star scheme of the Ministry of Rural Development, Govt. of India has been revamped to PradhanMantriAwaasYojana (Grammen). The household poor families and those living in less than two kutcha rooms as per SECC-2011 survey are eligible for availing housing assistance to construct minimum of 2554 meter of house.

C. EMPLOYMENT RELATED SCHEMES:

MGNREGA:

The National Rural Employment Guarantee Scheme (NREGA) which has now been renamed as Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) by the Govt. of India on 7th September, 2005. It was enacted in 2005 to provide minimum 100 days guaranteed wage employment in every financial year to the rural households who want to do unskilled manual work that includes creation of productive assets in the village such as wells, tanks, ponds and roads etc. This scheme ensures that at least one third of the stipulated work have to be allotted to women.

Survey Outcomes Related to Employment Status in the study Area:

The tribal women are active participants in the income generation in their households. Almost 100% of them are found to be employed in one or more activities so as to earn an income for their household. This included their role in farming, mostly aiding their male family members in these activities and also many of them are found to be engaged in the labour work of their tenants. Aside they are found to collect the MFPs for sale in the market with most of these women spending almost 3 hours a day in the forest for these purposes. In addition to these, 62% of these tribal women are also found to be working in different SHGs in the study area in the preparation of broom sticks, Palua, pineapple juice and turmeric which they collect and process for marketability. Again 94% of these women also are found working in the MGNREGA to add to their income.

Table-III: Implementation of Governmental Scheme for Tribal

District	Working in SHGs		If yes, activities		Working under		Do you get equal wages?		
	Yes (%)	No (%)	B.S & PP (%)	B.S & TP (%)	Yes (%)	No (%)	Yes (%)	No (%)	Don't Know (%)
Keonjhar	61.6	38.4	9.6	52	93.6	6.4	74.4	-	19.2
Rayagada	55.2	44.8	44	11.2	72	28	40	1.6	30.4
Total	58.4	41.6	26.8	31.6	82.8	17.2	57.2	0.8	24.8

Source: Field Survey B.S-Broom sticks preparation, PP-Palua preparation, TP-Turmeric preparation

It is found from this table that about 58.4% of the sample households have been working in Self Helf Groups. Out of this, near about 27% of the households are involved in broom stick preparation and Palua preparation. Approximately 32% of the households they are involved in broom stick preparation as well as turmeric preparation. It is also seen from this study that 82.8% of sample households are working under MGNREGA and out of which 57.2% agreed that they are getting equal wages compared to their counterparts. But around 25% of households do not know whether they are getting equal wages or not.

Table-II: Assessment of Benefit from the Governmental Schemes (As Per Response) In Percentage

District	Yes	No	To some extent	Don't know
Keonjhar	20	2.4	59.2	18.4
Rayagada	24.8	11.2	46.4	17.6
Total	22.4	6.8	52.8	18

Source: Field Survey

This table reveals that out of the total sample households, 22.4% of the households agreed that they are benefitted from the governmental schemes and around 53% are getting the benefit to some extent. But 18% of the sample households do not know whether they are benefitted from the government schemes or not. Very poor percentages of households (6.8%) are not getting any benefit from the government schemes.

D. HEALTH RELATED ISSUES OF THE TRIBAL:

Tribal women's health status is very poor compare to other caste and religion in Odisha. Both the government, central and state has been implementing several health related programmes for the tribal women. Yet they are suffering from serious health problems. It has been seen that the problem of tribal women in Odisha differ from a particular place to another place due to their historical background, geographical location, culture and the process of social change. Basically they are lacking nutrition, pure drinking water and sanitation which have a direct impact on their reproductive health causing maternal mortality and high rate of fertility. Chronic energy deficiency is very high among the PTG of Odisha (ICMR, 2003). Though different health related programmes like Integrated Child Development Programme (ICDS) and National Rural Health Mission(NHRM) are functioning in their area yet they are not getting the real benefit.

For promoting the health status of tribal population by reducing mortality and morbidity, Odisha Health Strategy 2003 has advocated various programmes related to health. According to the report of the Odisha Health Strategy, the tribal community generally suffer from malaria, anaemia, STD, genetic disorders

like G6PD deficiency, sickle cell which are also nutritional deficiency diseases. The analysis reveals that the health status of tribal population of Odisha are worse than the national average with the infant mortality rate at 84.2, under five mortality rate at 26.6, underweight children at 55.9, anaemia in children at 79.8 and women with anaemia at 64.9 per 1000 (Ota & Mohanty,2015).

To improve the percentage of institutional deliveries and reducing the rate of infant and maternal mortality, a special health programme was launched 'Amo Sankalp' in September, 2016. It was a challenging task to motivate the pregnant tribal women to go for institutional delivery. In the 1st phase, 817 remote villages were provided health services. Out of this, 162 villages are selected as nodal points where integrated village health and nutrition days have been observed. Under this programme, different services such as ante-natal and post-natal check-up for the mother, screening and weight measurement of the children as well as malaria testing have been done from time to time. Now, the number of delivery point has increased from 25 to 38 along with all infrastructures for safe delivery. At the same time, post-natal check up of both the mother and the new born child has been done. In Rayagada district, 11 MaaGruha (Maternity waiting Home) has been made for expectant mothers who are in inaccessible areas with certain critical situations. They are shifted to these homes for a few days before delivery and kept there for at least 7-10 days with care. Then they shifted to nearby hospital for delivery. Now-a-days, the administration has introduced motorcycle ambulance service in areas where normal ambulances cannot reach (Pattnaik,P. 2018).

Survey Outcomes on Health and Hygiene Status in the study area:

However, though government has provided the above health care facilities, following is a brief outcome of the survey result in the study area.

Table- IV: Health Status of Sample Households

Health Status:						
% of Households suffering from any type of diseases		Type of diseases				
Yes	No	Malaria	TB	Sickle cell	Anaemic	Any other
28%	72%	7.20%	4.80%	4%	10%	2%

Health Care Accessibility:							
Faced any difficulty in accessing the health care facilities:		If yes, then what type of difficulties faced:					
		A. Financial					
		B. Distance					
		C. Communication					
		D. Others					
Yes	No	A	A&B	A, B &C	A, B&D	B & C	A & C
100%	Nil	52%	20.80%	9.20%	0.80%	2%	15.20%

Source: Field Survey

The health status of tribal household is poor and especially it is very poor among the primitive tribal groups who are the habitant of inaccessible areas. It is found from table IV that about 28% of the sample households are suffering from any type of diseases. Mostly they are suffering from chronic anaemic (10%), malaria (7.2%) and TB (4.8%). Their habitation in inaccessible areas along with illiteracy, ignorance, superstition and unhygienic way of life aggravates their adverse health status. There is still a high dependence on the traditional system of healing categorised as 'home remedy' in table as shown in Table V The absorption of only allopathic care as a modern system of health care is only among 6% of the population which is not only due to its inaccessibility but also its high cost as well as dis-trust towards it. It is also observed that 100 percent of the sample households are facing some problems in accessing the health care facilities with the constraints ranging from financial problems, distance and communication, gender factors, non-awareness etc.

Table -V: Type of Medicine Preferred:

1	1,2	1,2,3	1,2,4	1,3	1,3,4	1,4	2,3	3	3,4
4.80%	6%	11.20%	3.20%	14%	18%	22.40%	6%	6%	8.40%

Source: Field study *1.Ayurvedic 2.Homoepethic 3.Allopathic Home Remedy

Another major cause of their poor health condition is the lack of proper sanitation practices in the area. None of the household is found to have toilet facilities in their household. In response to the survey queries, 65% of the household are found to be unaware of any governmental schemes to provide them the access to toilet facilities in their area. While the rest are found to be aware but don't access as they anticipated some side cost aspects and that it is not completely free.

Almost all of the households opines that they do not prefer any such toilet system in the house as that would be unhygienic and also because they do not have access to sufficient water (Table VI).

Table VI: Sanitation Practices:

% of HH with toilet facilities	If no, why did not take assistance of Government schemes			
Yes	No	It is not completely free	Don't know about such scheme	Don't want to access it due to shortage of water
Nil	100%	Nil	64.40%	35.60%

Source: Field Survey

This clearly points to the fact that the tribal are still to adopt the ongoing changes and have complete lack of awareness about the benefits of the modern medicines or sanitation facilities. It also points to the fact that these areas are still inaccessible by the ongoing governmental schemes.

VI. ACTS AND POLICIES FOR TRIBAL PROTECTION AND THEIR IMPACTON TRIBAL LIFE:

A. The Orissa Scheduled Areas Transfer of Immovable Property (By Scheduled Tribes) Regulation, 1956:

This act which extended to all the scheduled areas of the state with immediate effect provided the following policies to protect the ST: i)a person of the ST cannot transfer through mortgage, sale, exchange, lease or make any such dealing with land in or not in his possession to any other person who is not a member of the ST, ii) such mortgages can only be made to any other member of the ST or to the financial institutions of the government to take loans for agricultural purposes, iii)it declared any such transfer which existed prior to the enactment of this act as null or void, iv) It cannot be transferred if post transaction the size of the agricultural land reduced to 2 acres and this limit was 5 acres for un-irrigated land and v) wherever such transfers had taken place, it had to be restored to the ST owner of the land or his legal heirs or to any member of the ST in consultation with the competent authority of the government designated for this purpose in case of death of its legal owners, within two years of the commencement of this act.

B. The Bonded Labour System (Abolition) Act 1976:

This act declared all activities pertaining to forced labour under any contracts, custom, pacts etc. as null and void and its practice in any form to be an offence punishable under law. It thereby frees all victims of this bonded labour system from any debts to be paid to their creditors and also restoration of any property, land or assets mortgage under such agreement to its owner.

C. The Orissa Money Lenders (Amendment) Act,1975:

This act which amended the existing 'The Orissa Money Lenders Act, 1939', and became effective from twenty-second September, 1975. This act defined 'debtor', to be the person who has taken the loan and would include 'his successor in interest or surety'. While it defines the 'money-lender', as the person other than a bank or cooperative society with loan advancement as his business'. This act provided for the following: i. compulsory registration of all money lenders to be maintained by the Sub-registrar to have certificate issued in their name to be able to carry on the business. This certificate had to be renewed after every 5 years. If anyone is found doing money lending business without registration, then he can be punished under law with imprisonment or fine or both, ii. the documents of these moneylenders to be monitored by any sub-divisional officers/ Tehsildars which is under their jurisdiction to find their activities is in accordance with the act or not,iii. The interest rate was strictly regulated to be less than or equal to 9% for secured loans and less than or equal to 12% for unsecured loans. Any violation with regard to this policy would be an offence punishable by law by way of refund of double the amount

charged to the debtor by the offending moneylender, iv.any mortgaged property for the debt taken earlier stands discharged if it is already 7 years from the day of mortgage. On discharge all documents has to be returned to the owner or to his successor. In case of no claimant within a period of 12 years, the property would be attached to the state government, v. it declared any proceeding by the money lenders regarding the loan advanced to an 'indigent debtor', to be null or void from the very date of enforcement of this act, where an 'indigent debtor', referred to a debtor owning less than two and half acres of land and having farming and allied activities as his only source of income or it may refer to a landless agricultural labourer.

Due to all these political implementation and non-implementations, the tribal , most of whom are in fact owner of huge areas of land have been forced to lead a life of poverty and deprivation on their very own highly valued land, or are being driven from it to struggle for survival. Illiteracy, ignorance, lack of awareness about their own rights inflamed by governmental lack of appetite to safeguard them have driven these most earliest protestors of colonial autocracy to live as beggars on their own independent country.

D. Panchayat (Extension to the Scheduled Areas) Act,1996 or the PESA Act:

Odisha is among the ten states where the PESA Act is applicable to its scheduled areas. It was meant to extend the 73rd amendment i.e., granting absolute authority to the panchayats(Gram Sabhas) to deal with all tribal related issues like ownership and market valuation of MFPs, regulating money lenders and their activities by maintenance of their record, controlling and managing local resourceslike minerals, water bodies, conserving land and forest areas etc., preventing land alienation, banning the intake of intoxicants etc.It also declared any acts/policies as null or void if its provisions were inconsistent with that of the PESA act.

There are 76 districts in the country which are affected by Left Wing Extremism (LWE) of which 32 are PESA districts of the 'Red Corridor', region extending over significant parts of Odisha, Bihar, Jharkhand, Andhra Pradesh and Chhattisgarh.

E. Forest Rights Act, 2006:

This referred to the Scheduled Tribes and Other Traditional Forest dwellers(Recognition of Forest Rights) Act, 2006, which was effective from 1st January, 2008 provides for granting the tribal both individual as well as community rights for tenure-ship over the forest land where they had been inhabiting for generations. It grants them the right to own and live in their possessed forest land, to collect, consume or sale minor forest products, rights over products of water bodies, pastoral lands, titles to pattas, lease or grants on forest land issued by the state government or any local body as well as

occupancy of either earlier occupied land from where they had been displaced or providing for alternative land for these displaced people.

Table-VII: Status of Implementation in Odisha under the FRA,2006 as on 30/11/2016

	Number of claims received upto 30/11/2016	Number of titles distributed	Number of claims rejected	% of titles distributed over number of claims received	Extent of forest land for which titles are distributed(in acres)
Individual	6,18,384	3,99,996	-	-	5,98,524.34
Community	13,433	5,513	-	-	2,83,884.97
Total	6,31,817	4,05,509	1,50,133	64.18	8,82,409.31

Source: Annual Report, 2016-17

Both the FRA and the PESA acts are meant to aid in tribal development through empowering them with rights and self-governance for fructifying these granted power. However apart from poor implementation, many activities of the state is in direct violation of these acts. These issues are related to state occupancy over tribal areas for mining, reserve forest declaration, developmental projects like dams, industries etc. which have displaced large number of tribal forcing them to live a nomadic life without settlement.

Table VII shows the status of implementation of the FRA, 2006 in Odisha which reflects about 36% of the claimants yet not received their titles over their claimed land or forest. It is to be mentioned here that there are many areas which are yet to be surveyed to assure the tribal rights meaning that these figures are only for the surveyed area and that also not yet fully completed.

The truth cannot be denied that though self-governance is important but however many other factors have to be considered. Firstly most of the tribal are ignorant about the ongoing changes in terms of the actual valuation of their land, trees, MFP etc which leaves them exposed to exploitation as a ongoing process due to the nexus between the influential members in the tribe (consisting mostly of money lenders, migrants who had exposure with the external world and others) under a garb. Also most of the acts and policies are found not to be operative or poor/no implementation because of the dichotomy between the tribal belonging to different age groups. While mostly the older generation are found to resist any interference and want to allow them continue with their way of life, the youth feels that the state should take initiatives to provide them better occupation which can enable them to earn more and improve their standard of life. The solution should be a development path within the purview of their own culture and tradition by empowering them with ways to unleash the potential of the resources both

tangible(like land, water, forest, orchards, animals etc.) and intangible (like skill of making basket, mats, shawls, earthen utensils, spices, art form etc).

Table VIII reflects the sharp violation/non-implementation of the existing acts and policies meant for safeguarding the rights of the tribal as mentioned above among the tribal in the study area. This throws light on not only the ground reality that even after years of existing of these acts and policies the tribal's exploitation and deprivation still continues in different forms and this demands immediate focused attention to plug these loopholes and safeguard the tribal interest.

Table VIII: Ground Realities Reflecting Violation/Non-implementation of Tribal Protection Acts/Policies

Survey Findings:			
Keonjhar District	**% of Households**	**Rayagada District**	**% of Households**
Land given in mortgage to Private Moneylenders	16%	Land given in mortgage to Private Moneylenders	-
Getting Paid in Kind for labour given	17.60%	Fruit bearing Orchard given in mortgage to Private Moneylenders	28%
Getting paid nothing for labour given	3.20%	Getting Paid in Kind for labour given	35.20%
Paying interest rate more than 10%	31.20%	Getting paid nothing for labour given	9.60%
Getting less for their MFP	80.80%	Paying interest rate more than 10%	43.20%
		Getting less for their MFP	91.20%
Total	% of Households	Name of the act(s)/policy(ies) violated/Not implemented	
Land given in mortgage to Private Moneylenders	16%	The Orissa Scheduled Areas Transfer of Immovable Property(By Scheduled Tribes) Regulation, 1956:	
Fruit bearing Orchard given in mortgage to Private Moneylenders	28%	The Orissa Scheduled Areas Transfer of Immovable Property(By Scheduled Tribes) Regulation, 1956:	
Getting Paid in Kind for labour given	26.40%	The Bonded Labour System(Abolition) Act 1976:	
Getting paid nothing for labour gi	12.80%	The Bonded Labour System(Abolition) Act 1976:	
Paying interest rate more than 10%	37.20%	The Orissa Money Lenders (Amendment) Act,1975:	
Getting less for their MFP	86%	1.Forest Rights Act, 2006:	
		2.Panchayat(Extension to the Scheduled Areas) Act,1996	

Source: Compiled based on the collected data

Lands are found to be given in mortgages to private money lenders in gross violation or non-implementation of the Orissa Scheduled Areas Transfer of Immovable Property (By Scheduled Tribes) Regulation, 1956.Similarly it is found that many tribal owners possess land of less than two acres as they have transferred their land which is again a violation of the above stated law.

The tribal are found engaged as bonded labourers to repay their debt taken by them or is a continuation of debt taken by their forefathers i.e. 'borrowed debt' and are often paid in kind and in most cases are found not to be paid at all in abject violation/non-implementation of the Bonded Labour System(Abolition) Act 1976.

The poor tribal are also found to be still taking loans from private money lenders at exorbitant rate of more that 10% violation the Orissa Money Lenders (Amendment) Act, 1975. Their admission that they are not getting a reasonable price for their MFP is again a non-implementation of the FRA as well as the PESA Act as many of them admitted of not knowing the price that has been fixed without the involvement of their Panchayat members. The role of the state in most cases have reduced to being just another stakeholder in the interest like land, forest etc or as a negotiator between different interested parties to these assets/resources, instead of a focused motive to restore or safeguard the tribal's interest. This has affected the implementation or realization of the fulsome effect of many acts and policies meant for tribal development.

VII. RESULTS OF TEST OF ASSOCIATION

The following section attempts to find the association between tribal incomes and their food expenditure, non-food expenditure, expenditure on education and expenditure on health.

Table IX: Test of Association between Tribal Income and Some Selected Variables for the Overall Tribal Population

	$\chi 2$ value	d.f (at 5%)	Result
Income and Food Expenditure	56.3	8	Associated
Income and Non-Food Expenditure	26.9	8	Associated
Income and Expenditure on Education	19.3	8	Associated
Income and Expenditure on Health	11.88	8	Not Associated
Income and Tribal debt	4.72	8	Not Associated

Source: Own calculation (in SPSS,version 24)

Note: 1. $\chi 2$ tabulated value for 8 degree of freedom(d.f) at 5% level of significance is 15.5)
2. R=refers to rejection of the null hypothesis and A= refers to the acceptance of the null hypothesis.

Table IX shows the chi square test of association outcomes between tribal household monthly income and some selected socio-economic variables for the overall tribal population. It is observed that income shows an association with the tribal expenditure on food and non-food items as well as education.

However it is found not to be associated with health as well as their overall household debt. However a district wise analysis of the same association throws more insight into the focus required in each district. While in Keonjhar the income is found to be strongly associated with their food and non-food expenditure as well as their health expenditure, it is found not associated in case of their expenditure on education and with their overall debt.In case of Rayagada, there is observed a non-association of their income with all the selected variables i.e. food and non-food expenditure, health and overall debt. It is found to be associated with only their expenditure on education.

Table X: District wise Test of Association between Tribal Income and Some Selected Variables

Districts	Keonjhar			Rayagada		
	χ2 value	d.f (at 5%)	Result	χ2 value	d.f (at 5%)	Result
Income and Food Expenditure	68.91	8	Associated	10.628	8	Not Associated
Income and Non-Food Expenditure	30.78	8	Associated	14.946	8	Not Associated
Income and Expenditure on Education	11.91	8	Not Associated	22.567	8	Associated
Income and Expenditure on Health	35.22	8	Associated	11.866	8	Not Associated
Income and Tribal debt	3.301	8	Not Associated	7.954	8	Not Associated

Source: Own calculation (in SPSS,version 24)

Note:1.χ2 tabulated value for 8 degree of freedom(d.f) at 5% level of significance is 15.5)
2. R=refers to rejection of the null hypothesis and A= refers to the acceptance of the null hypothesis.

So in between the tribal dominated districts, there also exists a wide variation in terms of their socio-economic status which necessitates a focused approach towards Rayagada so as to uplift to the minimum level of the other tribal dominated districts. Schemes and programmes targeted at all the tribal in general may achieve its target but the underlying inequalities will continue. So this requires a target approach of the developmental programmes depending on the socio-economic features of the tribal in each district.

Table XI: Test of Association between Tribal Income and Some Selected Variables Based on Ownership of Income Yielding Land Assets

For Tribals Owning Income Yielding Land Assets			For Tribals NOT Owning Income Yielding Land Assets	
	χ2 value (8 d.f, 0.05)	Result	χ2 value (8 d.f, 0.05)	Result
Income and Food Expenditure	35.79	Associated	33.411	Associated
Income and Non-Food Expenditure	18.84	Associated	25.416	Associated
Income and Expenditure on Education	9.705	Not Associated	15.069	Not Associated
Income and Expenditure on Health	8.684	Not Associated	9.761	Not Associated
Income and Tribal debt	2.315	Not Associated	13.212	Not Associated

Source: Own calculation (in SPSS,version 24)

Note:1. $\chi 2$ tabulated value for 8 degree of freedom(d.f) at 5% level of significance is 15.5)

A test of association is conducted by categorizing the sample in terms of tribal households who has ownership to income generating land assets and those who do not have such ownership. The above table XI shows this test of association results between income and the tribal's food, non-food, education , health and debt expenditure .It is observed that there is association between income and food expenditure as well as between their income and non-food expenditure. No association is found between their income and their expenditure on education, health and debt for both the categories of tribal examined. Even in terms of absolute income, the range of maximum and minimum monthly income of the households is found to be higher for the tribal with no income yielding land assets at Rs.7500 whereas it is Rs. 6000 for the category of tribal possessing these income yielding land assets.

The probable reasons for these observations may be:

The low income from their land and most of them are found to have mortgaged their land.

Most of their transactions are in kind with the middlemen thereby the actual price is subdued.

Being high in debt they use most of their produced crops to repay their debt or for self consumption.

Though they own land but most are fragmented making them agriculturally inefficient.

The low income earned by these tribal households is mainly consumed by their food and non-food expenditure leaving them with no surplus for saving and other activities.

The non-association between the tribal income and education is being supported by regression analysis also. Education is found to be significantly related with education in case of indebtedness. The reason may be that most of the tribal who are educating their children beyond higher secondary are found to have taken loans with or without mortgaging their land asset, while those below it are found to be dependent on government provided educational facilities in the study area. The same sort of relationship is observed in case of health facilities where the tribal either depended on governmental facilities if accessible in terms of physical, economic or cultural barriers or is found to be still relying in their own traditional healing practices within their community. The non-association between their income and indebtedness may be mainly due to the fact that they took loan with or without mortgaging their land and are mainly found to be repaying it in kind as their income yielded no surplus with each household displaying a deficit budget.

VIII. REGRESSION ANALYSIS

Regression analysis is made to find the factors influencing the tribal income using the following model as shown below:

Income = f(Indebtedness of the household, Literacy, family size, Continuity of work in a year)

These various factors taken for finding this relation are described as follows:

Literacy: It has been taken in terms of the number of completed years in school and educational institutions above school. Say till completion of primary education, it is 5 years (1 to 5 standard) and 7 (for upper primary), 10 for completion of secondary education and 12 for higher secondary completion and others.

Family size: This is a very important component influencing the tribal household income. This is because of the very features of their family structure with most of them living in joint families ,joint ownership of property, taking responsibility of all members of the family particularly the old and the children and also having higher fertility rate.

Continuity of work: The work structure of the tribal is found to be multifarious. This is because many of them do not own land on which to cultivate for their own consumption as well as surplus for sale. Most of them who owns land are found to have mortgaged it for various purposes giving them no revenue of sucking the revenue earned in repaying their debt.In this background the tribal are found to be engaged in a number of activities to add to their income as no particular source give them enough to concentrate. Again the jobs being unorganised and seasonal, continuity of the work throughout the year assumes a great significance in influencing the overall income of the tribal.

Indebtedness of the tribal household: This is a very important factor influencing the tribal income and in turn being influenced by it. As shown under indebtedness analysis, the tribal's income is eroded away due to a high indebtedness of 90% of the household which in turn leads to further indebtedness.

Table XII: Regression results of Factors Influencing Tribal Income (overall tribal population)

	Coefficient	t statistics	p-value
Intercept	1962	3.15	0.0018
Indebtedness of the household	0.027	2.343	0.02
Literacy	-20.5	-0.36	0.72
Family Size	178.37	3.104	0.002
Continuity of Work in a year	2.985	2.152	0.032
R2 = 77% and F=51.4			
t value at 10% level of significance is 1.64			

Source: Own calculation

Tribal income is found to be very low, as pointed earlier the entire sample could be grouped within a maximum of Rs.10000 income per month. Another major feature of their income is that they make most

of their transactions in barter which makes it difficult to estimate the actual income or expenditure. The commodities transacted also cannot be enumerated in terms of the current market price of the products because the price is also found to be much lower and volatile than the prevailing market price. So the income variable taken above is their actual cash income per month. Table XII shows that for the overall tribal population their income is highly influenced by indebtedness, family size and the continuity of work in a year which are found to be highly significant at 10% level of significance. However literacy level is found to be not only insignificant but also negatively related. Some of the possible reasons for these findings are analysed:

i. The tribal are found not to be engaged in any particular economic activity giving them reasonable return due to non availability of such opportunities. To increase their overall income they are found to be involved in multiple activities. Thus other major reasons for this is their high level of indebtedness which forces them to tap as many sources of income generating activities are available and accessible to them.

ii. Continuity of work is one of the major factors influencing their overall income because of the above stated reasons of no specific adequate source of income. So other then farming which are seasonal in nature, they are engaged in several other activities of which the governmental employment schemes and other SHGs are important components.

iii. Larger family size prompts them to work for more income for supporting them.However, they consider them as source of added economic units aiding in earning and increasing the overall household income and so prefer large size families.

iv. They are found to be mostly engaged in severe manual activities sparing them no scope for education and rather are found to have a trade-off with their time of involvement with income generating activities.

Table XIIIhighlights some of these factors which are found to be influencing their income categorizing the sample in terms of their ownership of income yielding farm land which is a major component of the tribal portfolio. The result has been tested at 10% level of significance whose tabulated value is 1.64.

Table XIII: Regression results of Factors Influencing Tribal Income (in terms of ownership of Land)

Tribal household owning Income Earning Land Assets				Tribal Household Not- Owning		
	Coefficient	t statistics	p-value	Coefficient	t statistics	p-value
Intercept	3007.32	2.367	0.021	1670.77	2.305	0.022
Indebtedness of the household	0.014	0.609	0.544	0.033	2.404	0.017
Literacy	17.97	0.153	0.878	-27.02	-0.416	0.678
Family Size	75.59	0.581	0.563	205.01	3.18	0.002
Continuity of Work in a year	0.7006	0.259	0.795	3.47	2.074	0.039
R2= 53% F= 22.02						
R2 =59% F= 54.19						
t value at 10% level of significance is 1.64						

Source: Own Calculation

Table XIII shows that except the intercept coefficient, none of these factors are significant in influencing the tribal income for those who own income yielding land assets, tested at 10% level of significance. However in case of the tribal who do not own any income earning land assets, it is found that the results vary in accordance with the observations made above for the overall tribal population, which is the high significance of the indebtedness of the tribal household, family size and continuity of work in a year while showing an insignificant and negative relation with their literacy level. This observation is due to the fact that most of the tribal household is found to have no ownership to income yielding land assets (which is 75%) relative to only 25% of the household who have access to this important asset. So this influences the relation of the factors to their income of the overall tribal population.

IX. CONCLUSIONS

After decades of planning the tribal still shows inaccessibility to adequate health and educational facilities. They have to mortgage their valuable assets, mostly land being prime in this to get access to higher education of their children or to meet any health related contingencies. Due to non-awareness, procedural delays, legal obligations etc. the tribal are still dependent on private sources to borrow money, which often leads to their exploitation to the extreme of getting deprived from their land assets. Violation of all major acts is observed to different extent with respect to mortgaging of immovable properties to private money lenders, bonded labour related acts, acts related to prevention of money lenders' exploitations, forest related acts and policies among others as observed above.

The tribal are still found to be leading a vulnerable life inflicted with poverty and indebtedness. Though governmental schemes has been targeted at their upliftment but as the overall analysis show their absorption still is unsatisfactory and has dire need of being more streamlined and vigorous. The tribal income is found to be significantly related to their indebtedness, family size and the continuity of work. While these variables are found to be non-significant for tribal households with ownership to income yielding land assets, the same variables are found to be significant for the tribal households having no ownership to income yielding land assets. This point to the significant role played by land assets to the tribal life. Owning a source of income asset do give them an edge in earning income with less dependence on availability of external sources of income generating activities.

A district wise analysis shows a wide variation in terms of their socio-economic status in between the tribal dominated districts which necessitates a focused approach towards Rayagada so as to lift it to the level of the other tribal dominated districts. Schemes and programmes targeted at all the tribal in general may achieve its target but the underlying inequalities will continue. So this requires a target approach of the developmental programmes depending on the socio-economic features of the tribal in each district.

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6	VISION	Vol. No. XXXIV No-1, (January-March,2014)	The Impact of Deforestation on the Socio-economic life of Tribal Women with reference to Juang Women of Keonjhar District in Odisha	ISSN-2249-9857	
7	ANVESA (An Interdisciplinary Research Journal of Fakir Mohan University)	Vol. 8, Issue 1&2, (Dec,2013), pp.111-118	Tribal Indebtedness	ISSN-0974-715X	

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