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ADAPTIVE NEURO - FUZZY INFERENCE SYSTEM (ANFIS) APPROACH FOR CEREBRAL MALARIA

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ABSTRACT
Cerebral Malaria is a neurological complication caused by the plasmodium falciparum malaria. It is usually associated with coma and asexual forms of the parasites on peripheral blood smears. A systematic approach and an overview perception has been carried out over the years by different researchers, but none has sufficiently introduced an Adaptive Neuro-Fuzzy Inference System (ANFIS) approach for this prediction which has served as the focal aim of this research paper using available parameters and datasets. Matric Laboratory (MATLAB) 7.0 served as the tool of implementation highlighting various views. The ANFIS training was successfully completed at epoch 34, and had an error of 0.0001321 and the test error which was generated by the ANFIS was 0.0002511. The training was accomplished using a constant membership function type with an error tolerance at 0.05.

Keyword: Cerebral Malaria, ANFIS, Membership Function, Training and Testing Errors

1.0 INTRODUCTION

Cerebral Malaria is a neurological complication caused by the plasmodium falciparum malaria. It is usually associated with coma and asexual forms of the parasites on peripheral blood smears (Healthline, 2014, Mycoclinic, 2014, and Right Diagnosis, 2014).

Cerebral malaria (CM) forms part of the spectrum of severe malaria, with a case fatality rate ranging from 15% in adults in south-east Asia (Dondrop et al., 2005) to 8.5% in children in Africa (Dondrop et al., 2010). Clinical signs of acidosis carry a higher risk of death but nevertheless CM accounts for a significant proportion of malaria mortality, as well as the potential for neurological deficits in survivors.

The standard clinical definition of CM centres on a state of unarousable coma partnered with the presence of malaria infected red blood cells in the peripheral circulation and a lack of other potential causes of coma such as other infections or hypoglycemia (Idro, et al., 2005 and WHO, 2010). More recently, ophthalmic observations of retinopathy have been added to this definition in both adults and children to increase the specificity of the clinical diagnosis (Beare et al., 2011 and Maude et al., 2009.)

Most observations of the pathophysiology of disease come from postmortem observations of *Plasmodium falciparum* (Pf) infections, which are thought to account for the vast majority of CM cases, and show a common feature of vascular sequestration of infected erythrocytes (IE) in the brain (MacPherson et al., 1985). There are also some differences, particularly between CM in adults and children, broadly separable into a 'pure' sequestration pattern and IE sequestration with variable (and moderate) vascular pathology. The latter varies from the accumulation of pro inflammatory cells such as leukocytes and platelets to localized vascular damage (Dorovini-Zis, et al., 2009).

With the hallmark of IE sequestration for CM (albeit based on post-mortem studies), investigations into the pathology of disease have looked at the adhesive interactions between IE and host cells, including endothelium, but have also ranged from host genetic studies to clinical measurements of a wide range of systemic and local effectors. So, while we do not fully understand the pathology of CM and suspect that it may have multiple etiologist, we do know that it has some differences to, and some overlaps with, other brain inflammatory diseases and we have information about some of the potential contributions from the parasite and the host that could lead to CM (MedicineNet, 2014 and RightDiagnosis, 2014).

The symptoms of cerebral malaria includes, Fever, Altered state of consciousness, Seizures, Abdominal cramps, Muscle pain, Low blood pressure, headache, Persistent chill, convulsion and coma.

The focal point of this research paper geared towards designing an Adaptive Neuro-Fuzzy Inference System (ANFIS) Approach for Cerebral Malaria.

2.0 MATERIAL AND METHOD

Adaptive Neuro-Fuzzy Inferences System (ANFIS)

Fuzzy inference is a process of formulating the mapping from a given input to an output using the fuzzy set methods. The mapping provides a basis from which decisions can be made, or patterns discerned from a given set of data and information in which there are various forms of uncertainty. Fuzzy inference process includes

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the use of linguistic terms to reason, membership functions, fuzzy logic operators, and if–then rules which connect multiple antecedent(s) with certain degree of membership between 0 and 1.

The fuzzy logical AND, OR and NOT operators are utilized to calculate the degree of firing strength of each rule. AND uses the minimum weight value of all the antecedents, OR uses the maximum value weight of all the antecedents while NOT subtracts a membership function from 1 to give the "complementary" function. The parameters of the fuzzy system are then optimized either manually or by means of an optimization technique which can be time consuming (Garibaldi and Ifeachor, 1999).

An approach for the fuzzy modeling procedure to learn information about a dataset is the adaptive neuro-fuzzy inference system (ANFIS) which has been shown to provide a more accurate result compared to other fuzzy-neuro systems (Mitra and Hayashi, 2000; Madu et al, 2005; Al-Daoud, 2010). In ANFIS, the membership function parameters that best allow the associated fuzzy inference system to track the given input/output data are extracted from the dataset that describes the system behavior. The ANFIS learns features in the data set and adjusts the system parameters according to a given error criterion.

ANFIS framework implements a Sugeno fuzzy inference system based on two fuzzy if–then rules that facilitates learning, adaptation and optimization of results making a system less reliant on expert knowledge (Jang, 1992; 1993; Al-Daoud, 2009).The two fuzzy rules are of the form:
Rule 1: If (x is A_1) and (y is B_1) then ($f_1 = p_1x + q_1y + r_1$).
Rule 2: If (x is A_2) and (y is B_2) then ($f_2 = p_2x + q_2y + r_2$),

where the two inputs, *x* and *y*, are first fuzzified to generate appropriate membership grades using the membership functions for the fuzzy sets, A_i and B_i. $f_i$are the outputs within the fuzzy region specified by the fuzzy rule. p_i, q_i and r_i are the determined design parameters during the training process.

3.0 METHODOLOGY: ADAPTIVE NEURO FUZZY INFERENCE SYSTEM (ANFIS) ARCHITECTURE

The Adaptive Neuro Fuzzy System is one of the several types of Neuro-fuzzy system that combines both the learning capabilities of the Neuro fuzzy system and the explanatory power of the fuzzy inference system. It has 6 layers and each layer comprises of neurons that performs specific function. The fuzzy inference system can be built using the mamandi or the sugeno-tagaki model. The ANFIS uses the sugeno-tagaki model in building the fuzzy inference system.

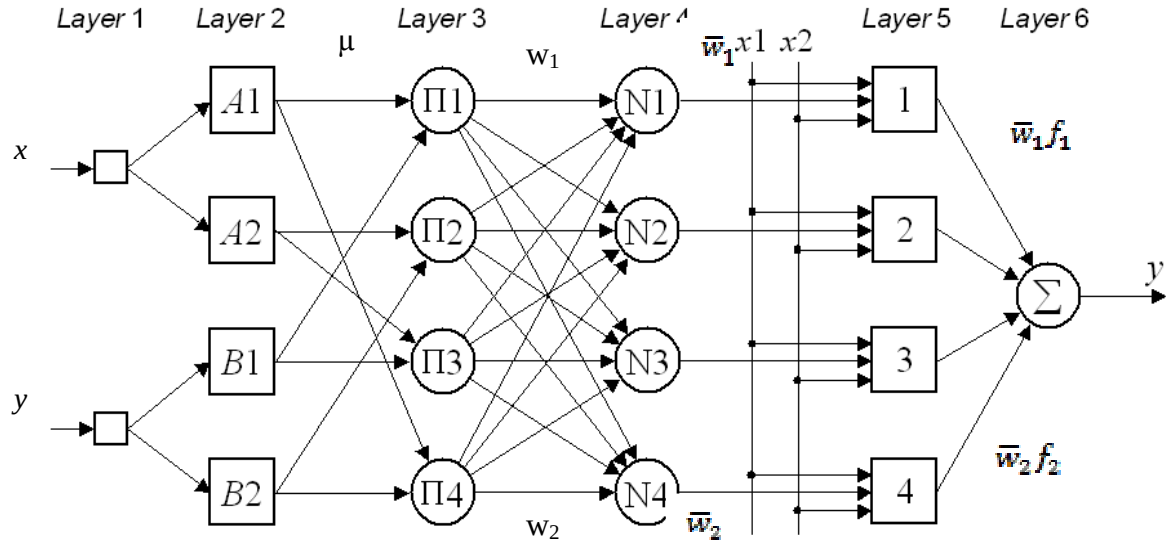

Figure 1: Adaptive Neuro-Fuzzy Inference System (ANFIS) Model for Cerebral Malaria

The ANFIS architecture contains a six layer feed-forward neural network that consists of adaptive nodes represented as squares and fixed nodes represented as circles as shown in Figure 1 (Negnevitsky, 2005).

a. Layer 1: (Input Layer): This is the first layer it is called the input layer.

b. Layer 2: (Fuzzification layer): The second layer of the Adaptive Neuro Fuzzy Inference System (ANFIS) model is called fuzzification layer. It could also be called the membership function layer. In this layer the input coming in from the input layer is mapped to fuzzy set using the bell membership function.

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c. Layer 3: (Rule Layer): The third layer in the ANFIS is called the rule layer. The rules in this layer are built using the sugeno rule fuzzy model. Each neuron in this layer receives the input from the fuzzification layer and computes the output.

$$O_{2,i} = w_i = \mu_{A_i}(x) \times \mu_{B_i}(x) \qquad i = 1,\ 2$$

d. Layer 4 (Normalization layer): The fourth layer of the ANFIS is called the normalization layer. The neurons in this layer receive inputs from the rule layer and calculate the normalization firing strength. This is sent to the fifth layer.

$$O_{3,i} = \overline{w}_i = \frac{w_i}{w_1 + w_2} \qquad i = 1,\ 2$$

e. Layer 5: (**Defuzzification layer):** The fifth layer in the Adaptive-Neuro Fuzzy System is called the defuzzification layer. The neurons in this layer receive it's input from the fourth layer.

$$O_{4,i} = \overline{w}_i f_i = \overline{w}_i (p_i x + q_i y + r_i)$$

f. Layer 6 (Output Layer): the sixth layer of the Adaptive Neuro Fuzzy Inference System is called the output layer. It give the overall out of the Adaptive Neuro-Fuzzy System. It contains a single neuron that performs summation of all the incoming inputs from the fifth layer.

$$O_{5,1} = overall\ output = \sum_i \overline{w}_i f_i$$

4.0 STIMULATIONS AND RESULTS FOR CEREBRAL MALARIA USING MATRIX LABORATORY (MATLAB)

The dataset used for the computer stimulation was retrieved from eight-two case samples were randomly selected from the sample and it contained 76% cerebral malaria cases and 24% free cases. 40% of this data was randomly selected and used to train the system at a cut-off 0.05% the data was trained for 34 epochs while 30% of the dataset was used for testing and 12% was used for checking. The stimulation result is as follows.

Table 1: Membership Function, Training Error and Test Error Representation

S/N	Membership Function	Training Error	Test Error
1.	Bell-curve Membership Function	0.0001321	0.0002511
2.	Triangular Membership Function	0.0082133	0.0075454
3.	Trapezoidal Membership Function	0.0097643	0.0087654
4.	Guass1 Membership Function	0.0054332	0.005143
5.	Guass2 Membership Function	0.0074532	0.005432

The results were gotten using linear membership function an at an error tolerance level of 0.05

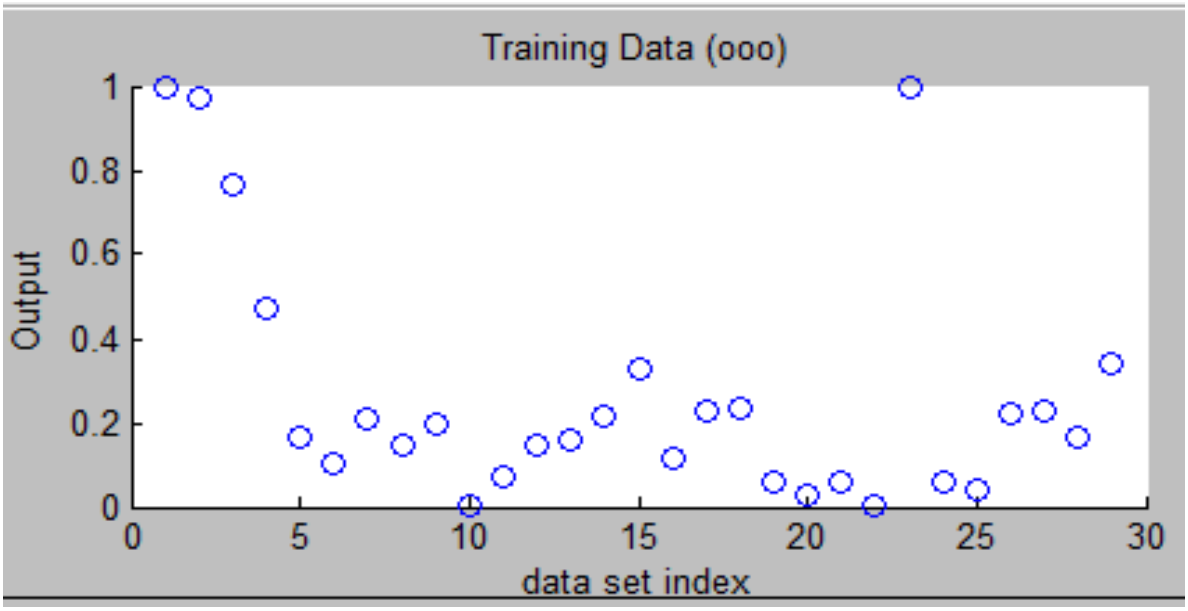

Figure 2: ANFIS Editor showing the training process

The ANFIS training data (Figure 2), showing the partial distribution of training data from 0 to 1 on the output (Y axis) and 0-30 on the input (X axis) respectively.

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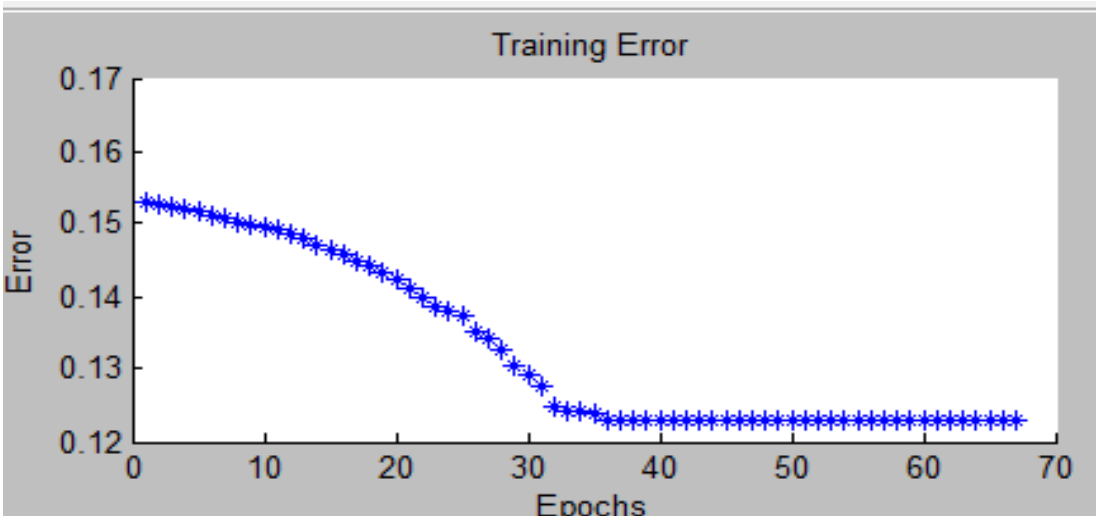

Figure 3: ANFIS Editor showing the training Error

The ANFIS training error (Figure 3) shows the relationship, declining gradually from error 0.15 down to error 0.12 at an epoch of 0- 70 respectively

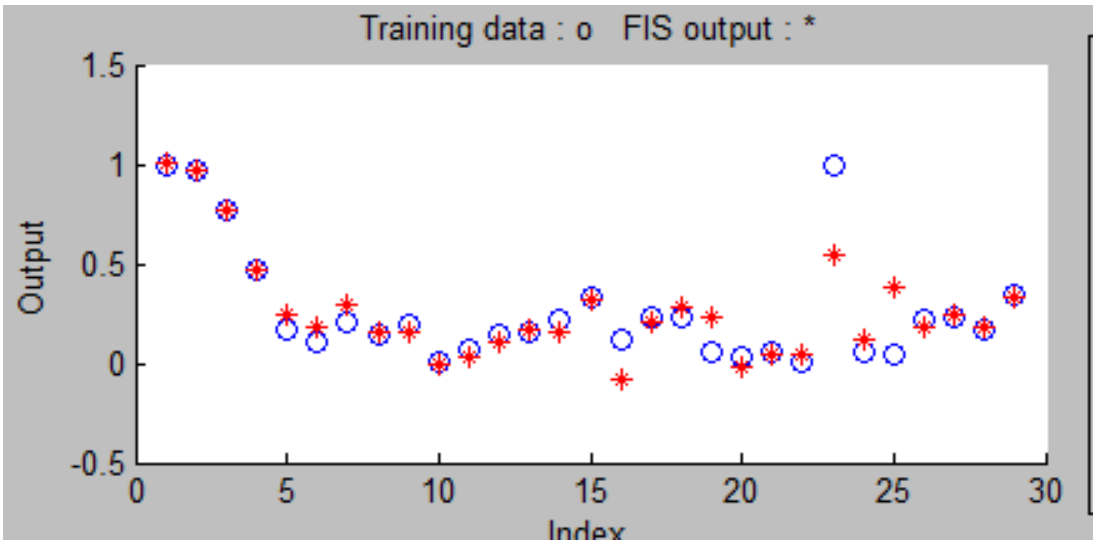

Figure 4: ANFIS editor showing the testing process

The ANFIS test process (Figure 3) shows the relationship, declining gradually from error 1 through 0.5 down to output 0 at an epoch of 0- 30 respectively

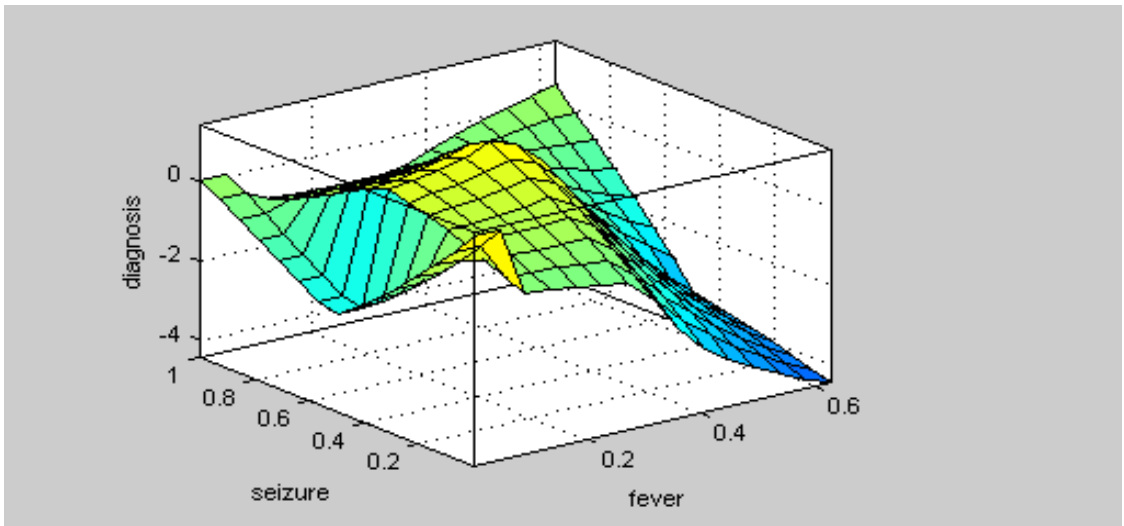

Figure 5: ANFIS Editor showing the surface view1 of fever and seizure to diagnosis

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Anfis surface viewer 1 (Figure5) showing the relationship between fever and seizur as regard ebola diagnsis.

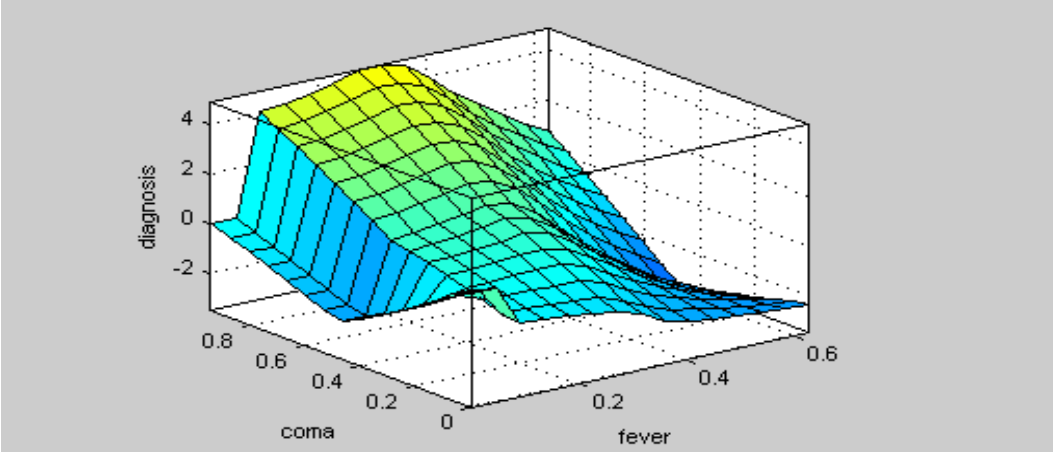

Figure 6: ANFIS Editor showing the surface view2 of fever and coma to diagnosis

Anfis surface viewer 2 (Figure 6) showing the relationship between fever and coma as regard ebola diagnsis.

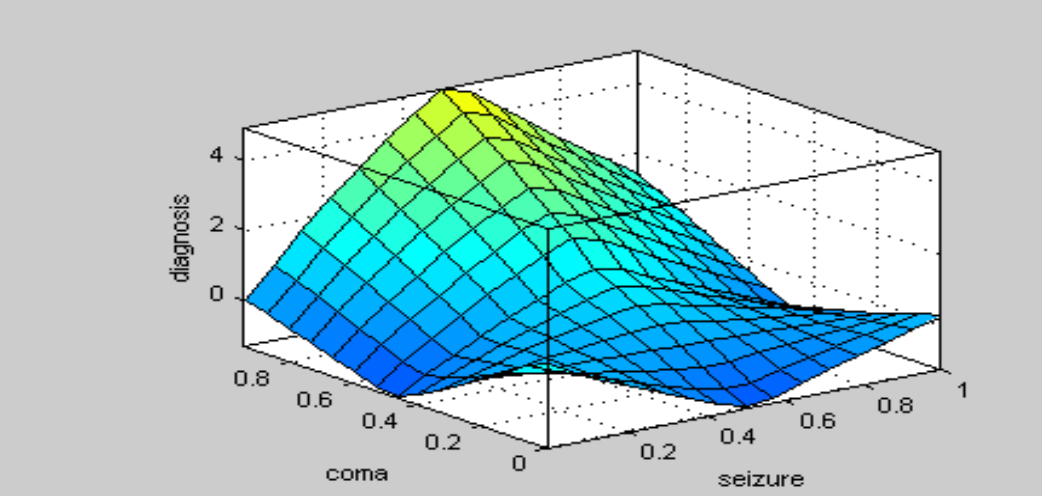

Figure 7: ANFIS Editor showing the surface view 3 of seizure and coma to diagnosis

Anfis surface viewer 3 (Figure 7) showing the relationship between seizure and comma as regard ebola diagnsis.

CONCLUSION

To draw the inference from the experiment it has been clearly shown that the bell curve membership function shows the least training error when used in training the dataset. The training was completed at 34 epochs and had an error of 0.0001321 and the test error which was generated by the ANFIS was 0.0002511. The training was accomplished using a constant membership function type at an error tolerance at 0.05.

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EMERGENCE OF INDIA AS A GLOBAL DESTINATION FOR HEALTH TOURISM

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ABSTRACT
Health tourism is becoming a popular option for tourists across the globe. Health tourism is the concept offered by the best experienced Healthcare professionals at the technologically most advanced medical facilities in complete privacy and for affordable costs. The Healthcare procedure is usually combined with a family vacation. This research paper focuses at the emergence of India as the booming industry for Health Care tourist Destination globally.

Key Words: Health tourism, SWOT, alternative therapies, advantages

INDIA AS A GLOBAL DESTINATION FOR HEALTH TOURISM

INTRODUCTION

India is a developing country and a lot needs to be done before we can call ourselves as a developed country, all we can claim is to be a progressive one. After the dotcom com boom in the nineties we have gone through a lean patch as such. India as an emerging nation needs to grow both from within and outside; in the sense development needs to done both for the Indian Diaspora and at the same time opportunities need to be grasped and developed so that foreign investment pours in.

ORIGIN AND EVOLUTION OF MEDICAL TOURISM

Medical tourism is actually thousands of years old. In ancient Greece, pilgrims and patients came from all over the Mediterranean to the sanctuary of the healing god, Asclepius, at Epidaurus. In

Roman Britain, patients took the waters at a shrine at Bath, a practice that continued for 2,000 years. From the 18th century wealthy Europeans travelled to spas from Germany to the Nile. Since the early nineteenth century, when there were no restrictions on travel in Europe, people visited neighbouring countries in order to improve their health. At first, mere travelling was considered to be a good therapy for mental and physical well being. In the 21st century, relatively low-cost jet travel has taken the industry beyond the wealthy and desperate of travelling to a particular destination to avail the opportunity of the world class Healthcare services

HISTORY OF INDIA'S HEALTH TOURISM INDUSTRY

India has historically been a regional healthcare hub for neighbouring countries such as Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and the Middle-East. Evidence of ancient hospitals offering healthcare facilities funded by local kings and monarchs can be found in foreign traveller's accounts as well as medieval scripts. Most ancient and medieval healthcare centres provided treatment to local and foreign patients almost free of cost. Traditional treatment methods developed from Ayurveda, Yoga, Unani, Siddha and Homeopathy (AYUSH) styles of medicines and practises. During the early mid-Mughal period Delhi was a well-known regional destination for conclaves of physicians and surgeons.

Ancient Indian Hospitals

Period	**Healthcare Centres**
CE 405-411	Charitable dispensaries in Pataliputra
CE 629-645	Hospices on highways across the country
CE 574-879	Dispensaries called Vaidyasalai in the Deccan
CE 1067	15-bed hospital at Tirumakadul, Chingelpet, with physician, surgeon, medicinal herb collectors and attendants for patients
CE 1226	Maternity home-cum-hospital-cum-school in Andhra Pradesh
CE 1325-1352	70 Mughal era hospitals in Delhi and 1,200 employees
CE 1595	Dar-ul-Shifa hospital in Hyderabad on Musi river banks

Sources: IMaCS Research, Hospitals in Ancient India, By DP Agrawal & Pankaj Goyal, Lok Vigyan Kendra, Almora

INDIA AS A GLOBAL DESTINATION FOR MEDICAL TOURISM

Tourism and healthcare, being an integral part of many economies services industry are both important sources of foreign exchange. Globalisation has promoted a consumerist culture leading to the mushrooming of corporate healthcare settings seized with the necessity to maximise profits and expand their coverage. However,

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the constraint lies in the fact that these services can be afforded by a relatively small size of population in developing countries.

Low insurance penetration, lack of standardisation of services, poor information base, ineffective monitoring leading to low quality, high levels of fraud and corruption, misallocation of investments and low efficiency of existing hospitals have impeded effective performance leading to a stagnation of the healthcare sector. In this scenario, corporate interests in the medical care sector are looking for opportunities beyond the national boundaries.

This is the genesis of "Medical Tourism" industry. The term medical tourism refers to the increasing tendency among people from the UK, the US and many other third world countries, where medical services are either very expensive or not available, to leave their countries in search for more affordable health options, often packaged with tourist attractions.

Long waiting lists, decline in public spending and rise in life expectancy and non-communicable diseases that require specialist services are some of the factors directing a wave of medical tourists to more affordable healthcare destinations. Most countries are tapping the health tourism market due to aggressive international marketing in conjunction with their tourism industry. In this rat race, Thailand, Malaysia, Jordan, Singapore, Hong Kong, Lithuania and South Africa have emerged as big healthcare destinations.

India is unique as it offers holistic healthcare addressing the mind, body and spirit. With yoga, meditation, ayurveda, allopathy and other Indian systems of medicine, India offers a vast array of services combined with the cultural warmth that is difficult to match by other countries. Also, clinical outcomes in India are on par with the world's best centres, besides having internationally qualified and experienced specialists. CII believes that India should capitalise on its inherent strengths to become a world player in medical tourism. Instead of adopting a segmental approach of targeting a few states such as Maharashtra, Kerala, Andhra Pradesh, Chennai, efforts are now being made to project "Destination India" as a complete brand ideal for medical tourists. Countries from where people head for India are the UK, Bangladesh, Oman, Sri Lanka, Indonesia, Mauritius, Nigeria, Kenya, Pakistan, etc.

Visitors, especially from the West and Middle East find Indian hospitals a very affordable and viable option to grappling with insurance and national medical systems in their native lands. There are thousands of expatriates without any social security and health insurance cover who usually compare the costs before going for treatment and India has a cost advantage for this segment.

Although, the existing market for medical tourism in India is small, it can grow rapidly if the industry reorients itself to lure foreign patients from all potential regions such as SAARC, Central Asia, Middle East, Africa, Europe, OECD besides the UK and the US. The annual health bill of people from Afro-Asian countries seeking treatment outside their countries is USD 10 billion. If India can even tap a fraction of that market, the potential is enormous. The price advantage is however offset today for patients from the developed countries by concerns regarding standards, insurance coverage and other infrastructure.

The question being asked by many is that how can India become an international destination in healthcare, when the clientele at home is bristling with dissatisfaction. Hence, arises the need to define minimum standards at national level, compulsory registration and adoption of these standards by all providers and regular monitoring and enforcing of such standards at the local level. Quality assessment should combine evaluation of infrastructure as well as outcomes.

An obvious answer to all this is accreditation. This will ensure transparency in the way a hospital performs, and everything from the operating to the cleaning procedures will be monitored, audited and recorded. With an aim to boost the much talked about medical tourism, many corporate hospitals in India are looking to international agencies such as JCAHO/JCI for accreditation. Accreditation will even make tie ups with overseas health insurance agencies such as BUPA and CHUBS easier to route patients to India.

As the medical tourism industry is growing exponentially, government and the private players need to join hands in order to act as a catalyst to build infrastructure for hospitals, create specialty tourist packages to include medical treatment, promote accreditation and standardisation, enable access and tie-ups with insurance companies, provide state of art facilities and improve quality of in-patient care and service to meet the requirements of foreign patients and to attain sustainable competitive advantage.

Many fear about the serious consequences of equity and cost of services and raise a fundamental question on the very existence of medical tourism- why should developing countries be subsidising the healthcare of

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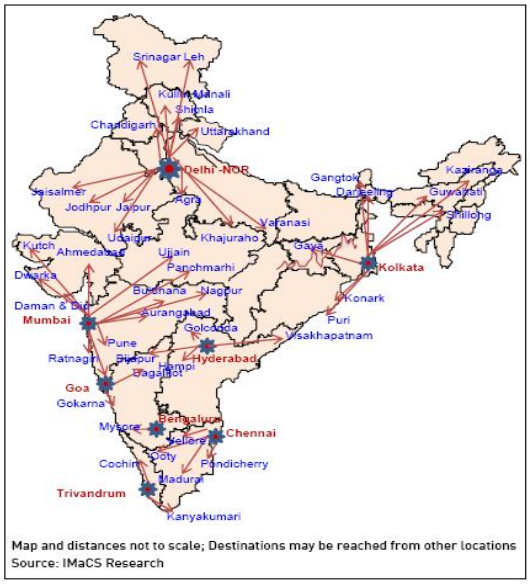
developed nations? For them, medical tourism is likely to further devalue and divert personnel from the already impoverished public health system. However, with good planning and implementation, medical tourism besides being an economy booster can surely help India maintain good cross border and trade relations, exchange of manpower and technology among countries.

Strategies are thus needed not just to project India as a major healthcare destination, but also to create a system to conduct proper market research and feasibility studies in order to quantify the "How many", "From where", "To where", and most importantly the "How" of medical tourism. Only then can we leverage and channelise all efforts in the right direction. In the absence of proper planning, formulation, implementation and evaluation of coherent strategies, the much created hype and all the talk may just go in vain.

ADVANTAGE OF HEALTH TOURISM TO INDIA

- Skilled physicians and specialists, many, with Indian and international experience.
- High quality nursing capability providing high or equivalent standards of medical care as in patient's home country.
- Use of modern medical technology, high-quality implants and internationally accepted medical supplies.
- Strong value proposition on cost, quality of treatment and services.
- Diverse geography with numerous tourism destinations to suit the patient's schedule and health.
- No waiting period for international patients - a key constraint for surgical procedures in home country.
- Unavailability of reliable cure or facilities for treatment in home country.
- Emergence of multi-specialty hospitals in major Indian cities.
- Favourable exchange rates and cheaper international air-travel.
- Widespread use of English Interpreter services also available.
- Use of alternative medicine, wellness and rejuvenation programmes for complete healing.
- Growing local insurance market and tie-ups with international medical/travel insurance providers. Poor coverage in home country.
- International banking and widespread use of plastic money.
- Modern hospital and hotel facilities, good air and surface transport, developed telecommunications network and improving tourism infrastructure.
- Abundant and easily available information on India and, hospitals and tourism industries.
- Indian corporate hospitals are on par, if not better than the best hospitals in Thailand, Singapore, etc there is scope for improvement, and the country may become a preferred medical destination.

MAJOR TOURIST DESTINATIONS NEAR PROXIMITY OF PROMINENT HEALTH TOURISM CENTRES



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MAKING OF A MEDICAL TOURISM DESTINATION

Our healthcare industry has some inherent drawbacks. Lack of standardisation in medical care and cost, lack of regulatory mechanism, infrastructural bottlenecks and poor medical insurance coverage are a few to mention here. On the other hand, tourism and hospitality industries are facing some major challenges to develop the infrastructure and services. Industry and government collaboration in terms of some incentives and creation of soothing environment can further make this endeavor easy for both the service sector. The immediate need is the establishment of health and tourism players consortium to discuss about all these issues and maintain closer interaction and co-ordination to develop medical tourism - a growth engine for Forex earnings.

PRICE COMPARISON OVERVIEW

COST COMPARISON – INDIA VS USA, Thailand, Singapore

Procedure	US	India	Thailand	Singapore
Heart bypass	1,30,000	10,000	11,000	18,500
Heart valve replacement	1,60,000	9,000	10,000	12,500
Angioplasty	57,000	11,000	13,000	13,000
Hip replacement	43,000	9,000	12,000	12,000
Hysterectomy	20,000	3,000	4,000	6,000
Knee replacement	40,000	8,500	10,000	13,000
Spinal fusion	62,000	5,500	7,000	9,000

Significant cost differences exist between U.K. and India when it comes to medical treatment. India is not only cheaper but the waiting time is almost nil. This is due to the outburst of the private sector which comprises of hospitals and clinics with the latest technology and best practitioners.

CONCLUSION

After the dotcom rush India has again got the opportunity to earn billions of dollars with medical tourism. We have all the bases coved in the sense we have the qualified doctors and consultants, we have already developed the trust of people the world over in the past decades and we also have the exotic environment meant for tourism. All that we do need is to make the transition from being a potential destination to a fully rewarding and sound medical tourism destination which is equivalent to or better than any service offered world over.

The question that India will have to handle in the coming years is how to justify giving world class medical care to visitors where as it spends just 1.4 % of its GDP on medical care of its own people. Health of its own people will reflect on the robustness of the general state of the country. So unless this is balanced off the issue of biasness will keep on cropping up.

Time and again we see that the root of all our national issues and problems arise from having an inherently weak infrastructure with poorly executed law and order and political red tape. Compounded with the problem of over population, dwindling natural resources and reckless disregard for the environment we stand at a junction where things can go haywire or they might become extremely successful if we only start resolving them. Currently it is like moving 1 step ahead and then going 3 steps backwards. Medical tourism is based on having a well oiled network of tour operators, medical facilities, hotels, conventional tour packages and infrastructure tools such as electronic connectivity, air network and good sanitation. Only then we can compete with already established markets such as in Thailand, South American states such as Mexico and Costa Rica etc.

Although the situation appears to be grim there is still hope. One step at a time is all that is needed. First and foremost is to have the basic infrastructure in place such as having proper road and rail connectivity, having a good network of airports to all the major states and cities and with the countries from where the potential tourists will arrive such as the US the middle east and western Europe and also the major African and Islamic countries in Asia. Secondly but more importantly there is a need to put forward the information required by the tourists. Aggressive marketing is the only way to go as seen in the case of Thailand, Singapore, and Malaysia

etc. Not only that there should be government authorized websites where people can get all the information regarding surgeries, hotels, cost comparison etc. They have to be developed exclusively for the medical tourism purpose. Twenty four hours helpline, television advertisements, getting information and advertisements published in medical journals and popular magazines etc is a worthwhile investment. We have already seen how successful the ***Incredible India*** campaign is. Based on similar line but exclusively for medical tourism other such campaigns must be developed.

Since India already has the advantage of having highly qualified, English speaking doctors and medical staff it seems just a matter of time when medical tourism will take off in a big way. We have the cost advantage, we have the skills advantage we even have world class facilities and so all we need is a better image, a functional infrastructure and some clever promotional campaign. This is a golden opportunity which we cannot pass up. Not only that the foreign currency that we earn is going to give our own people various benefits. It just seems like a circle in which all the bodies who participate have a win win situation on hand.

The idea of doing this Research was to bring to light how health tourism is the 21st century's golden goose for India. Bringing out all the true facts, the weak points and in general trying to understand the phenomenon of health tourism has been insightful. This research has been laborious since finding out relevant information is difficult and there are very few sources to find it out from.

We can conclude that tourism for India is a once in a life time opportunity and we certainly need to take up on our strong points in order to become the leading nation in this area Atithi Devo Bhava"

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PROPOSAL FOR RESEARCH INNOVATION CAPACITY AS A FACTOR IN THE COMPETITIVENESS OF SOFTWARE INDUSTRY OF JALISCO

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ABSTRACT
The aimof this workis to proposea research to determine anindex to measureinnovation capacityofenterprises in thesoftware industry ofJalisco, based on a survey ofthecompanies in theSoftwareCenterof the State,as well as evaluatingtheinfluence that hasthe capacity for innovationon competitiveness, seeking empirical evidence toanswer thequestion. The mainhypothesis forthis researchis the ability to innovateis a factor thatpositively affectsthe performanceof companies inthe software industry, which is reflected inthe competitiveness ofsector. Themethods usedin this researchare three:innovativeness index(ICI), Linear Regression ModelwithOLSandSoftComputingusingevolutionary algorithms: FUZZYCESAR, the latter something very newwhich puts us inthe forefront of knowledgein methodsit isstill.

Keywords: Competitiveness, Software industry, Innovation.

INTRODUCTION
The economic outlook is forcing companies to rethink their business, as the complexity of theenvironment is causing a progressive decline of many business models considered valid until recently. In some sectors, innovation has become an essential survival factor. But still for some companies, particularly smaller ones, innovation is synonymous with complexity and ignorance, leading to a sense that is exclusive to large companies. The ability to innovate is a resource company like its financial, trade and productive capacities and should be managed in the same manner and with the same importance.

Moving toward a service economy with high added value and an innovation-oriented dynamic industry requires information and communication technologies (ICT) competitive and tightly integrated with other economic sectors. In a globalized economy, built by information and knowledge, the software is a primary tool to solutions for the problems facing industry, academia and government. This is how the software industry offers new opportunities for economic and social development of countries (Secretaría de Economía, 2012).

The Software Industry in Mexico is relatively small and of little commercial development, mainly based on the production of customized software or standard software adaptation to the needs of users). This lack of development of basic software production ofsystems operating systems and applications is expressed in the structure of national accounts of Mexico, which does not have a section that allows socially account the magnitude of the domestic production of such software (Mochi, 2006).

In this context, this research is aimed to analyze the competitiveness of the software industry in Jalisco in function of innovativeness. It is intended to determine an index of ability to innovate to analyze and discuss the application of this indicator to a sample of 44 companies in the State of Jalisco as part of the Center for Software. Likewise there is interest in assessing whether firms with greater ability to innovate have outperformed the market, which is reflected in the sector's competitiveness.

1. PROBLEM
The technological advances that have occurred in recent years have generated and fostered many series of events and processes that many have defined as a new productive or industrial revolution (Dabat, 2002). These events mentioned by Mochi (2006), are related to the emergence of a new stage of capitalist production, which is characterized by the increasing importance of technological innovation and knowledge as a major factor in the creation of value in the context of economic globalization.

In this scenario, the technologies of information and communication technologies (ICTs) have become very important.All this is related to the development and increased use of multifunctional technology: software. This has generated a major industry, the fundamental fields are software engineering and IT services (ISSI), which have a complex structure and require a large capacity for innovation.

The software industry in Mexico and Jalisco is going through a stage of maturation, which is manifested in an increase in recent years. In addition to the generation of active public policies that are aimed at encouraging

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business creation and development of existing ones, the promotion of technology and needed infrastructure (Secretaría de Economía, 2012). As Mochi (2006) argues, the opportunities and challenges of consolidating software industry make clear the need to call in order to exploit the advantages offered by this sector, for insertion into the international economy and development of different sectors of the national economy.

It is also important to consider that as being Jalisco's leading producer of embedded software in the country, then it can be said that, as noted by the OECD for Mexico, is still competing on low value-added niches (OECD 2006), low innovation (Rodríguez 2010) and little expertise. Hence the issues intended to address this research, depart from some work and international sources, out of which it is possible to draw a number of elements to determine an index to measure innovation capacity of a representative group of software industry in Jalisco so it can study this as a factor affecting performance of companies in the sector, reflected in competitiveness.

2. RESEARCH QUESTION

The ability to innovate is a factor affecting the performance of companies in the software industry Jalisco, is making the sector competitive?

3. JUSTIFICATION OF THE RESEARCH

Due to increasing international competition and the integration of technological advances, companies have had to adapt to technological changes to compete in the market. Similarly, companies create resources and therefore require efficient and relevant skills to recognize the potential of innovation and adapt to the needs of companies, allowing them to differentiate themselves from their rivals and becoming more competitive. It is contradictory that despite the importance and rapid growth of the software industry worldwide, there is relatively little scholarship on the topic, there is a lot of work studying the forms of competence, the dynamics of innovation among others, in branches such as automotive, chemical, computer, but there are few who do the same in the industry (Mochi, 2006) software.

The ability to innovate today is a relatively new concept that is considered very important when talking about either competitiveness of a company, industry or country. Given this scenario and considering the paucity of literature on this subject, this research aims to analyze the innovation capability of the software companies of Jalisco and the incidence of the competitiveness of the sector through market performance. The importance of research also lies in the methodology that is made to analyze this situation, since it is intended to define an Index of Innovativeness Capacity of firms and industry likewise analyze the correlation between this index the recorded sales period last applied econometrics and soft computing, this is a totally new method to analyze such situations.

4. RESEARCH HYPOTHESIS

To define the basis on which the research will be addressed, then the variables are described.

A. DEFINITION OF VARIABLES

Independent variable (X0)

X0 = Ability to innovate

Dependent variables (Y0)

Y0 = Competitiveness of the software industry in Jalisco.

Table 1: DESCRIPTION OF RESEARCH VARIABLES.

VARIABLES	DESCRIPTION	INDICATORS
$\mathbf{X_0}$	Ability to innovate	$\mathbf{X_1}$**:**Innovation Capacity Index (ICI)
$\mathbf{Y_0}$	Competitiveness	$\mathbf{Y_1}$**:** Sales

Source: Authors**.**

B. GENERAL HYPOTHESIS

H0: X0 Y0⟶

H0: The ability to innovate is a factor that positively affects the performance of companies in the software industry, which is reflected in the sector's competitiveness.

Whereas Innovation Capacity Index is composed of three factors as described in the following table:

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TABLE 2: FACTORS OF INDEPENDENT VARIABLE

VARIABLES	DESCRIPCIÓN	INDICATORS	DIMENSIONS
X_0	Ability to innovate	X_1: Innovation Capacity Index (ICI)	X_{F1}:Capacity development X_{F2}:Product innovation X_{F3}: Circulation of knowledge

Source: Developed and supported by Yoguel Boscherini (1996).

Three secondary hypotheses were also proposed:

C. SECONDARY HYPOTHESIS

H1: Y1 XF1 →

H2: XF2 Y1 →

H3: XF3 Y1 →

1) H1: The ability to innovate in terms of capacity positively affects sales.
2) H2: The ability to innovate in terms of product innovation positively affects sales.
3) H3: The ability to innovate in terms of the circulation of knowledge positively affects sales.

5. RESEARCH OBJECTIVES

Raised in the directions, the objectives are described below.

A. GENERAL OBJECTIVE

Analyze the competitiveness of the software industry Jalisco depending on the innovativeness of the companies that comprise it.

B. SPECIFIC OBJECTIVES

1) Determine the Innovation Index of the software industry in Jalisco.
2) Analyze the sales of companies in the software industry of Jalisco, according to the Innovation Index.
3) Analyze sales of companies in the software industry Jalisco, depending on the factors that make up the Innovation Index.

SCOPE

This research is a descriptive section, which is intended to describe the behavior of sales, depending on the innovativeness of software companies in Jalisco during the last period for which it has relied on secondary sources.

6. RESEARCH PROPOSAL

A. DESCRIPTION OF THE INVESTIGATION

According to the objectives, the methodology procedure proposed is designed to determine an index of innovative capacity to assess the state of the industry by taking a sample of 44 companies. It is subsequently to be analyzed as an independent variable in a model that seeks to find its relation to sales, using these three methods:

1) Innovation Capacity Index (ICI)
2) Regression Econometrics.
3) Fuzzy logic and evolutionary algorithms.

To determine the Innovativeness Capacity Index (ICI), some factors are considered differentiating between those associated with skills development, product innovation and circulation of knowledge, for which primary sources were used by an instrument applied to 44 companies Software Center of Jalisco.

A. TYPE OF RESEARCH

Following the methodology of Hernández, Fernández & Baptista (2003), there are exploratory studies, descriptive, correlational and explanatory.

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This is a descriptive research of quantitative approach because there are collected data or components on different indicators that measure the ability to innovate and its impact on competitiveness and performance of the companies in the industry to be studied. Besides, to explain the behavior of the sector it is considered sales of the last period. Descriptive research seeks to specify properties, characteristics and important features of any phenomenon under analysis (Hernandez et al., 2003, p. 119). Descriptive studies measure independently rather concepts or variables that refer to and focus on measure as accurately as possible (Hernandez et al, 2003). Likewise, the study has a quantitative approach, since it is necessary to analyze the results and use the proposed methods.

B. RESEARCH DESIGN

Through this research, all the information necessary and required to accept or reject the hypothesis will be obtained. This research type is not experimental, transactional and descriptive. No experimental because itcannot manipulate variables, collecting data will be obtained from the primary sources. Since in a non-experimental study it builds no situation but existing situations are observed not intentionally provoked (Hernandez et al., 2003).

The descriptive transactional designs are aimed to investigate the incidence and the values that manifest one or more variables within the quantitative approach. The procedure is to measure or locate a group of people, objects, situations, contexts, and phenomena in a variable or concept and provide a description (Hernandez et al., 2003). The methods to be used in research are described.

1) INNOVATION CAPACITY INDEX

To test the hypotheses, it is applied the proposed Yoguel and Boscherini (1996) model, with a total of three factors of the innovation capacity index:

a. Capacity
b. Innovative product
c. Circulation of knowledge

Obtaining information through a detailed survey of the Center for Software companies, as well as a wide range of factors, internal and external which have contributed to the research see Table 3.

2) MULTIPLE REGRESSION ANALYSIS

The technique of multiple regression analysis is more suitable for a ceteris paribus analysis because it explicitly allows controlling many other factors that affect the dependent variable. This is important both for testing economic theories and to evaluate the effects of a policy when you have to rely on non-experimental data. Because multiple regression models can accept a variety of explanatory variables that may be correlated, they can be expected to infer causality in cases where the simple regression could not give good results (Wooldridge, 2009).

a. FUZZY LOGICAND EVOLUTIONARYALGORITHMS (FUZZY CSAR)

Today's technology has allowed the industry to collect and store large amounts of information. This information is key factor to the business processes and it is very valuable factor for making business decisions. This need for modeling the behavior of the variables, can be formalized with a database of transactions T containing a set of transactions {t1, t2,. . . , Tn} where each tk transaction containing a set of items, which is commonly known as a set of elements, and is a collection of elements {i1, i2,. . . , Im}. The overall objective is to find interesting patterns, associations, correlations, or causal structures among sets of items.

These relationships are put in terms of association rules. An association rule is a statement $X \rightarrow Y$, where X and Y are disjoint sets of elements. This type of modeling, using rules, has the advantage of being readable without losing the generalization (Sancho, 2011).

A). KNOWLEDGE REPRESENTATION

Fuzzy-Csar evolves a population of association rules, usually referred to as classifiers. At the end of the learning process, the population is expected to capture the strongest and most relevant associations between variables. The user sets the maximum size of the population. This maximum sets an upper limit on the number of relevant associations that can be found, i.e., the maximum; the system will be able to discover as many relevant relationships as the number of classifiers in the population.

Each classifier is a fuzzy rule association and a set of parameters. Fuzzy association rule is represented as: if xi is Ai and Aj ... and Xj is then xc is Ac, where the antecedent contains input variables xi, ..., xj and the consequence is a single variable xc is not present in the antecedent. In presenting this study, each variable is

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represented by a linguistic term or label, Ai, which can be user defined. This structure allows a number of variables to be background, but it requires a single variable as a result. With this strategy, the researcher can search for sets of variables to certain values which make other variable to occur. Rules therefore can be interpreted as a causal relationship between certain values of the variables in antecedent (s) and certain values of the consequent variable. Besides its own association rule, each classifier has two main parameters, support and confidence.

i. Support: is an indicator of the frequency of the rule

ii. Confidence denotes the strength of the association

The Fuzzy-CSAR system is designed to search for rules with high support, i.e., rules that indicate a relationship that can be found frequently, and high confidence, i.e., rules in which the values of the variables in the background determine the value of the variable in the consequent.

Caesar Fuzzy follows a learning scheme to evolve a population of highly relevant standards, from a population of vacuum and learning new training examples as shown. More specifically, the system receives a new training example in each iteration of learning, and then takes a number of steps. First, the system creates the match set [M] with all the classifiers in the population that match the input sample with greater than 0. If [M] does not contain sufficient classifiers, the covering operator is activated to create new classifiers. Then classifiers [M] are organized together candidates from the association.

Each set ofassociatedcandidatesleads to a selection probabilitythat is proportionalto the confidence ofthe averageof classifiersthat belong to thisgroup of associations. The selectedset of association[A] goes through a processofsubsumptionwhich aims toreduce the number ofrules that expresssimilar relationshipsbetween variables.Then, the parameters of all classifiersin[M] are updatedaccording to theinformation provided bythe currentinstance. At the endof the iteration, a genetic algorithm is applied to[A] todiscover newpromisingrules.This processis applied repeatedlyto update the parametersofexistingclassifiersand create newpromisingrules (Orriols Martinez, Casillas& Nick, 2012).

D.MODEL SPECIFICATION

In this sectionthe modeland the methodology appliedin the research,in order tovalidatethe hypothesesaredescribedin detail:

1) H0: The ability to innovate is a factor that positively affects the performance of companies in the software industry, which is reflected in the sector's competitiveness.
2) H1: The ability to innovate in terms of capacity positively affects sales.
3) H2: The ability to innovate in terms of product innovation positively affects sales.
4) H3: The ability to innovate in terms of the circulation of knowledge has a positive effect on sales.

1) HYPOTHETICAL MODEL

With the assumptions posed and the revised theory, it was developeda hypothetical model to be validated in this chapter, so it is important to consider the composition of the variables that was developed under analysis.

a) Dependent variable: Competitiveness

b) Independent variable: Innovation Capacity

Indicators of both variables are:

a) Competitiveness: Sales

b) Capacity for Innovation: Innovation Capacity Index

It is very important to note that the Innovation Capacity Index is composed of three factors:

a) Capacity development

b) Innovative product

c) Circulation of knowledge

Then it is developed the following hypothetical model, where it can be graphically shown the relationship between the variables and hypotheses:

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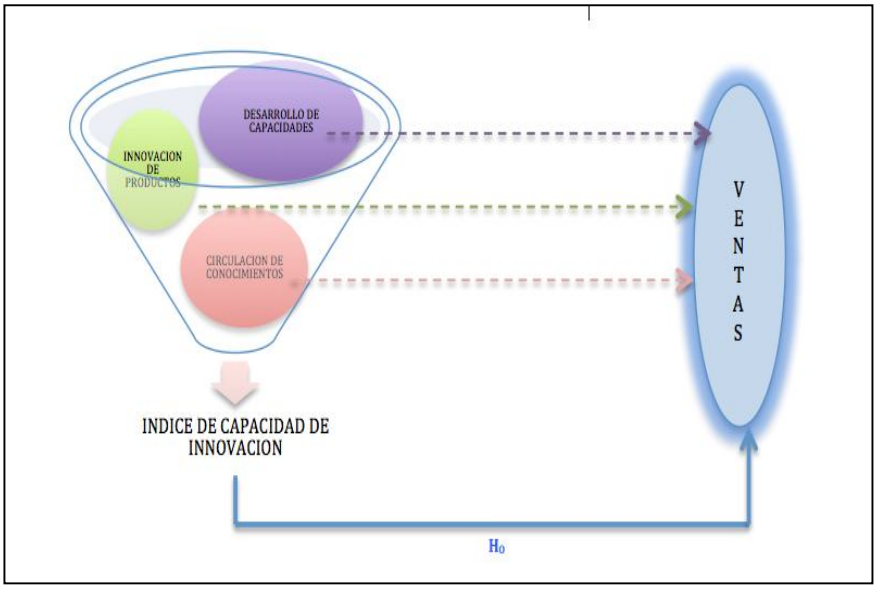

Figure 1: Proposed Hypothetical Model, Source: Author.

E. Operationalizing variable

According to the hypothetical model described, in order to be able to fulfill the objectives and the hypotheses proposed, then the operationalization of variables, which is the starting point to the methodology used in the research proposal, is presented:

Table 3: Operationalization of variables

VARIABLES	DESCRIPTION	INDICATORS	DIMENSIONS	OPERACIONALIZATION
X_0	Ability to innovate	X1: Innovation Capacity Index (ICI)	**X_{F1}:** Capacity development	Capacity
				Quality
				Linkage and entailment
				Development
			X_{F2}: Product innovation	Product development
				Modifications
				Conversion technology
			X_{F3}: Circulation of Knowledge Sharing Training	Share training
Y_0	Competitiveness	**Y_1:** Sales	**Y_1:** Sales	Annual sales

Source: Authors.

1) **Dependent variable**

The data obtained in the survey competitiveness applied to the sample basically covers a question that relates to the sales recorded last period. This indicatorof competitiveness and performance of the sector is key toanalyze the influence of the Capacityto innovateon them.

2) Independent variable

The variableusedin this study asdescribedin Table 4is the ability to innovate in the industry. A variable that is measured by an indexof innovative capacity, which depends on threefactors(Capacity Development, Product Innovationand Circulationof Knowledge) thatwereoperationalizedas shown intable 4.Data obtained from thesurvey ofthe samplebasicallycover eight questions that will bedescribed later, thisindexforinnovative capacity of thesector.

F. Methodological tool

The methodological tool used for this research is a survey that is part of the research project of the student Francisco Raul Leonel de Cervantes Orozco of the Master of Business and Economic Studies by supporting Jalisciencie Institute of Information Technology (IJALTI) in collaboration with the IDIT SMEs. This survey was applied during the first half of 2012, 44 of 52 companies that make up the central state of Jalisco´s software industry (Centro de Software, 2012).

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The survey consists of ten sections:

1) Details of respondent
2) Company information
3) Information about the company founder
4) Type of business
5) Services of the park where it is located
6) Your company in the cluster software
7) Learning Activities Company
8) Innovation
9) Quality
10) Interactions with other local associations

Therefore it is very important to clarify that for purposes of this research is based on the instrument and the data collected, therefore you could say that you are working with secondary sources.

1) INNOVATION CAPACITY INDEX

As part of the research design and to fulfill the objectives and validate hypotheses, the first part of the methodology is the estimation of an index to obtain a proxy value of the ability to innovate. To do this, it is applied the model proposed by Yoguel et al. (1996). This model was described in chapter the theoretical framework in detail. Forthe model application, it was reviewed and made a selection of information obtained from the database that was used for research. The questionsused to measure the variables of the factors that make up the index of ability to innovate, are described below and will be assigned the same weights proposed byYoguel G,etal.(1996).

In the table below, it is shown how the information obtained from the database for research purposes is discussed. It is important to mention that to implement the proposed model and quantify the variables to be studied. An adjustment was made to the responses obtained while it was passed from a Likert scale to a binary, as for the calculation in this research is not relevant the intensity of responses, just the affirmation or denial of these. For example in question 23 of the questionnaire, it is asked: "Assess the importance of the factors of governmental and public for business location in the cluster (training programs and research)."

The possible answers are:

a) Very important
b) Somewhat important
c) Not at all important
d) No answer

Table 4: Weights allocated to factors comprising ICI.

NO. QUESTION BD	QUESTION	VARIABLE	WEIGHT
SKILLS DEVELOPMENT			**0.77**
23	Assess the importance of the factors of governmental and public for business location in the cluster [Training programs and research]	**Training**	**0.25**
34	Do you have any quality certification?	**Quality**	**0.25**
23	Assess the importance of the factors of governmental and public for business location in the cluster [Links with universities and research centers]	**Linkages and bolding**	**0.2**
7	7 Weight of development project leaders.	**Development**	**0.07**
PRODUCT INNOVATION			**0.08**
28	Innovation in product / service [Development of new products / services]	**Product development**	**0.027**

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NO. QUESTION BD	QUESTION	VARIABLE	WEIGHT
	Product Development		
28	28 Innovation in product / service [Amendments of product design / existing services]	**Modifications**	**0.027**
28	Innovation in product / service [Conversion technology products / services (versions for new platforms)] Conversion Technology	**Conversion technology**	**0.027**
CIRCULATION KNOWLEDGE			**0.15**
37	Did you do any of the following activities with others in the industry? [Share Training] Training Share.	**Training share**	**0.15**

Source: Authors.

As mentioned, it is a Likert scalefor the purpose of this researchis irrelevant.Thus, allthose options that representa claimin this case about the importance of the factors of governmental and public tot he location of the company in the cluster, are taken asa positive response, so the value of 1 is assigned as shown in Table 5 where1 is assigned tothe first three options: Very important, important and unimportant.Under the same criterion, it is assigned a value of zero tothe last two options: Nothing major and unresponsive,and that for purposes of this research it is assumed as a denial to the question.

Table 5: Questions to Assess Skills Development

SKILLS DEVELOPMENT		
TRAINING		
23.Assess the importanceof the factors ofgovernmental andpublic forbusiness locationin thecluster[Training programs and research]		
VARIABLE	RESPONSE	WEIGHTING
Very important	1	0.25
Important	1	
Unimportant	1	
Nothing important	0	
No answer	0	
QUALITY		
34. Do you haveanyquality certification?		
VARIABLE	RESPONSE	WEIGHTING
Yes	1	0.25
No	0	
No answer	0	
LINKING		
23. Assess the importanceof the factors ofgovernmental andpublic forbusiness locationin thecluster[Linkages with universities and research centers]		
VARIABLE	RESPONSE	WEIGHTING
Very important	1	0.2
Important	1	
Unimportant	1	
Nothing important	0	
No answer	0	
DEVELOPMENT		
Weight of Project leaders		

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VARIABLE	RESPONSE	WEIGHTING
Yes	1	
No	0	0.07
No answer	0	

Source: Author.

Forthe other two dimensions, the same approach was usedas described in Tables 6and 7; the detail of the questions,the answers and the assigned weightis observed.

With every thing described in this section, it can be applied to calculate the Innovation Capacity Index (ICI), using the following formula:

$$ICI = \frac{\sum_{i=1}^{i=k} fi * \alpha i}{\sum_{i=1}^{i=k} fi}$$

Where:
ICI = Innovation Capacity Index
ai = weights assigned to each factor
fi = Factors components of ICI

Table 6.Questions to EvaluateInnovative Product

PRODUCT INNOVATION		
PRODUCT DEVELOPMENT		
28. Product innovation / service [Development of new product / service]		
VARIABLE	RESPONSE	WEIGHTING
Very important	1	
Important	1	
unimportant	1	0.03
Nothing important	0	
No answer	0	
CHANGES		
28. Product innovation / service [Modifications of product design / services already existent]		
VARIABLE	RESPUESTA	PONDERACION
Very important	1	
Important	1	
Unimportant	1	0.03
Nothing important	0	
No answer	0	
TECHNOLOGICAL CONVERSION		
28. Innovation product / service [Conversion technology products / services (versions for new platforms)]		
VARIABLE	RESPONSE	WEIGHTING
Very important	1	
Important	1	
Unimportant	1	0.03
Nothing important	0	
No answer	0	

Source: Author.

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Table 7: Question to assessthe knowledge circulation

KNOWLEDGE CIRCULATION		
SHARE TRAINING		
37. Did you do any of the following activities with others in the industry? [Share training].		
VARIABLE	RESPONSE	WEIGHTING
Yes	1	
No	0	0.15
No answer	0	

Source: Authors.

Very important to mention that with this model it is possible to obtain an ICI by factor and enterprise, which facilitates this analyzes. Therefore one should consider that:

$$ICI_{TOTAL} = ICI_{DC} + ICI_{INN} + ICI_{CC}$$

Where:
ICI_{TOTAL} = Total Capacity Index Innovation
ICI_{DC} Innovation Capacity Index = capacity development
ICI_{INN} = = Innovation Capacity Index Product Innovation
ICI_{CC} = Innovation Capacity Index circulation of knowledge

1) ECONOMIC MODEL

Using a simple linear regression model (MRLS) to explain the behavior of sales, endogenous variable or dependent variable (and is represented by VTAS) depending on the total capacity index innovation through linear dependence relation:

$$VTAS = \beta_! + \beta_2\, ICI + \mu$$

Since the disturbance term is μ or error.

The goal is to assign numerical values to the parameters $\beta_!$ y β_2. This is, estimating the model so that the fitted values of the endogenous variable result as close to the actually observed values as possible, all with the purpose of validating the General Hypothesis proposed in the research. A model of multiple linear regressions (MRLM) is also suggested to explain the behavior of sales, endogenous variable or dependent variable (and is represented by VTAS) depending on the rate of innovation capacity of the factors to be analyzed (Development capacity, Product Innovation and Circulation of Knowledge) which together are equal to the total ICI.

$$VTAS = \beta_! + \beta_2\, CI_{DC} + \beta_3 ICI_{INN} + \beta_4 ICI_{CC} + \mu$$

Since the disturbance term is μ or error.

This modelis proposedin order totest thehypotheses proposedsecondaryin the research.

2) FUZZYCSAR

Fuzzy-Csar is an evolutionarymethodof unsupervised learning, andaims to uncoverpatterns of informationof interest and besides must bereliable.Fuzzy-Csar is capableof working withouta priori information about the relationships between the processing variables. Thus, the search process is not driven by a relational reference structure (for example, a model), and this feature provides clear benefits when Fuzzy-Caesar applies to new, unusual decision scenarios, such asthe case of research to have a database of low quality (Orriols et. al,2012). It was applied the method to the results of the composition of ICIshownin Table 8was applied, obtaining 34rules that were selected according to their confidence level filtering the rules that have high confidence, i.e.1.0(or 100%) discarding the rest. This means that the rules havea lot of quality.

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Table 8: Resultsof Innovation Capacity Index

ID	VENTAS ANUALES	ICI DESARROLLO DE CAPACIDADES	ICI INNOVACION DE PRODUCTO	ICI CIRULACION DE CONOCIMIENTOS	ICI TOTAL
1	$500,001 a $1,000,000	0.32	0.08	0.00	**0.40**
2	$1,000,001 a $5,000,000	0.07	0.08	0.00	**0.15**
3	$10,000,001 a $20,000,000	0.52	0.08	0.00	**0.60**
4	$500,001 a $1,000,000	0.32	0.08	0.15	**0.55**
5	$1,000,001 a $5,000,000	0.52	0.08	0.15	**0.75**
6	$500,001 a $1,000,000	0.52	0.08	0.00	**0.60**
7	Menos de $500,000	0.77	0.08	0.00	**0.85**
8	$10,000,001 a $20,000,000	0.07	0.08	0.15	**0.30**
9	$10,000,001 a $20,000,000	0.77	0.08	0.15	**1.00**
10	$20,000,001 a $40,000,000	0.77	0.08	0.15	**1.00**
11	$10,000,001 a $20,000,000	0.77	0.08	0.15	**1.00**
12	$10,000,001 a $20,000,000	0.32	0.08	0.15	**0.55**
13	$1,000,001 a $5,000,000	0.52	0.08	0.15	**0.75**
14	Menos de $500,000	0.07	0.00	0.00	**0.07**
15	$1,000,001 a $5,000,000	0.07	0.08	0.00	**0.15**
16	$1,000,001 a $5,000,000	0.07	0.08	0.00	**0.15**
17	$5,000,001 a $10,000,000	0.32	0.08	0.15	**0.55**
18	No sabe	0.52	0.08	0.15	**0.75**
19	$1,000,001 a $5,000,000	0.07	0.05	0.00	**0.12**
20	$20,000,001 a $40,000,000	0.52	0.08	0.15	**0.75**
21	$5,000,001 a $10,000,000	0.52	0.08	0.00	**0.60**
22	$5,000,001 a $10,000,000	0.00	0.00	0.00	**0.00**
23	$1,000,001 a $5,000,000	0.52	0.08	0.15	**0.75**
24	$10,000,001 a $20,000,000	0.07	0.05	0.15	**0.27**
25	$10,000,001 a $20,000,000	0.52	0.08	0.15	**0.75**
26	$5,000,001 a $10,000,000	0.77	0.08	0.15	**1.00**
27	$1,000,001 a $5,000,000	0.07	0.08	0.15	**0.30**
28	No sabe	0.00	0.05	0.00	**0.05**
29	$1,000,001 a $5,000,000	0.52	0.08	0.00	**0.60**
30	No sabe	0.07	0.08	0.00	**0.15**
31	$500,001 a $1,000,000	0.52	0.08	0.15	**0.75**
32	$20,000,001 a $40,000,000	0.07	0.08	0.00	**0.15**
33	$5,000,001 a $10,000,000	0.52	0.08	0.15	**0.75**
34	$10,000,001 a $20,000,000	0.52	0.08	0.15	**0.75**
35	$1,000,001 a $5,000,000	0.25	0.00	0.00	**0.25**
36	Menos de $500,000	0.52	0.08	0.00	**0.60**
37	$500,001 a $1,000,000	0.07	0.08	0.15	**0.30**
38	$5,000,001 a $10,000,000	0.07	0.08	0.15	**0.30**
39	$1,000,001 a $5,000,000	0.52	0.08	0.00	**0.60**
40	$1,000,001 a $5,000,000	0.52	0.08	0.15	**0.75**
41	$1,000,001 a $5,000,000	0.57	0.08	0.00	**0.65**
42	$5,000,001 a $10,000,000	0.07	0.08	0.15	**0.30**
43	Más de $40,000,000	0.77	0.08	0.15	**1.00**
44	No sabe	0.52	0.08	0.00	**0.60**
		0.37	**0.07**	**0.08**	**0.53**

Source: Own elaboration.

C. CONCLUSION

This paper proposes a research method to create an index to measure innovation capacity of firms in the software industry of Jalisco. The research method proposed is based on a survey of the companies in the Software Center of the State, as well as evaluating the influence that has the capacity for innovationon competitiveness. The methods proposed in this research are three: innovativeness index (ICI), Linear

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Regression Model with OLSand Soft Computing using evolutionary algorithms: FUZZYCESAR. The latter evolutionary algorithm is something very new which puts us inthe fore front of knowledge in methods for economic analysis.

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ANNEXA

VALIDITY OF THE ECONOMETRIC MODEL

1.Test for normality of residuals

The classicalnormal linearregressiondeparts from the assumptionthat eachui, is normally distributed with:

Average (media): $E(u_i) = 0$

Variance: $E[u_i - E(u_i)]^2 = E(u_I^2) = \sigma$

Cov(u_I, u_j): $E\{[u_I - E(u_i)[u_i - E(u_j)]\}^2 = E(u_I, u_j) = 0 \;\; i \neq j$

Generally, thereare not made any contrast of normality, since mostof the time thereare availablesignificant samples. Such is the caseof this research.Therefore, todetermine whetherthese assumptions are met, you can use any of the followingtests ortest.

A. Test of Jarque Bera

The Jarque Bera test is based on the residuals obtained by OLS. Through this test for normality, two properties of the distribution of residuals are determined: Skewness and kurtosis (or shoring). In this way, to accept the null hypothesis of normality of residuals, the probability value must be greater than 0.05. Applying this test to the models, the results obtained are shown below in table 9.

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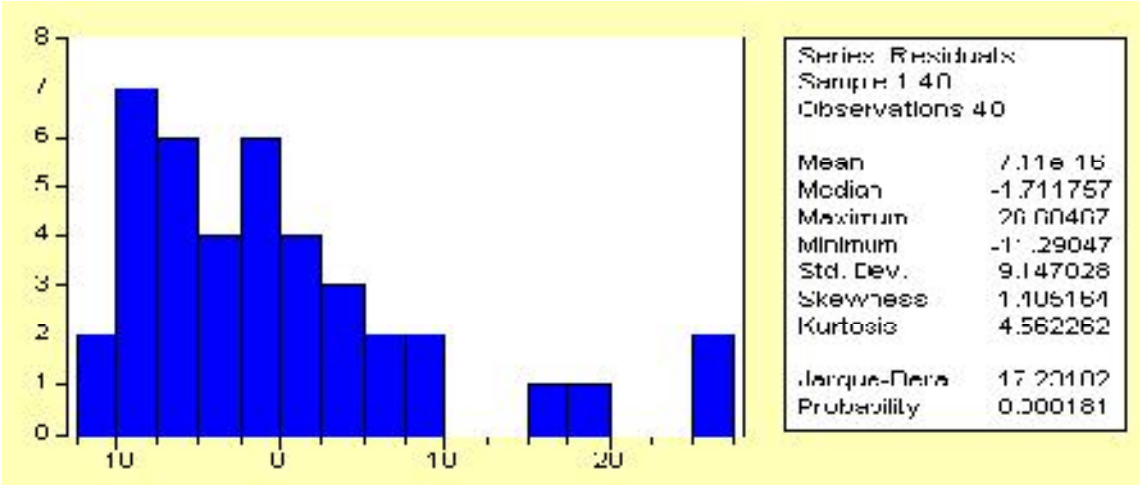
It is found thatthe graphic representation of residuals throughits histogram presents a number of observations in the tails that are not consistent with the low probability that these areas have a normal distribution. Furthermore, the coefficient of sample asymmetry (1.40 and 1.51) respectively is not close to zero as expected, and the coefficient of sampling kurtosis(4.56and 5.13) respectively, far exceeds the value 3. Finally, statistical Jarque-Berarejects the null hypothesis of normality, since its value(17.23102 and23.01057) respectively, generates aprobability of rejecting this hypothesis being truevery small and less than0.05.

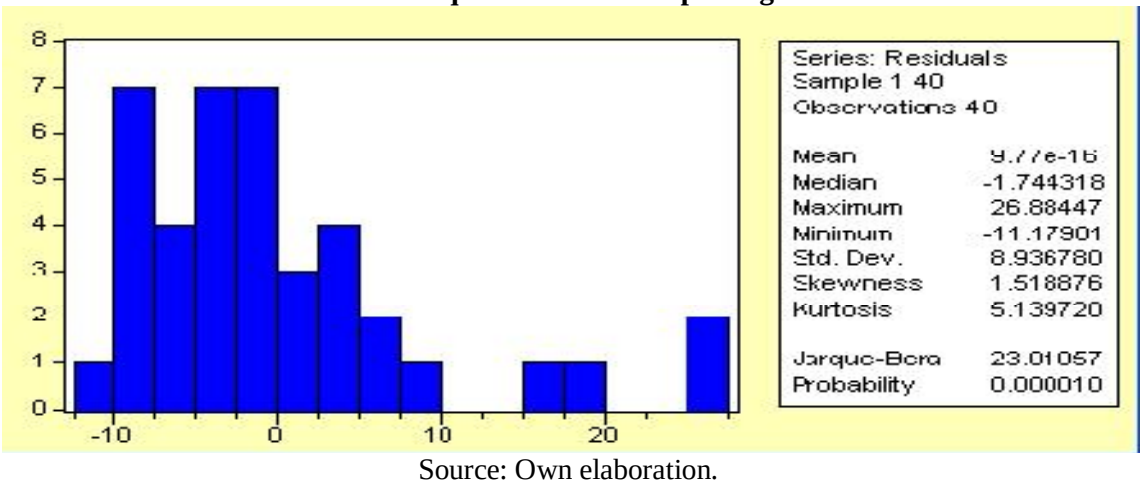
The solution tothe lack of normalityof the disturbances requires a study of possible causes. In general, this not normality can be due to the existence of not typical observations and outliers generating distributions with lack of asymmetry. So it can be mentioned situations in which the model specificationis deficient, as the omission of relevant variables or nonlinearity, aiming for greater distribution of residues that can be detected than normal or strong asymmetries. In these cases, the solution is to introducedummy variables in the model.

Table 9: Test of Jarque-Bera for Simple Regression model.



Source: Own elaboration.

Tabla10: Test of Jarque-Bera for Multiple Regression Model



Source: Own elaboration.

B. **Test heteroskedasticity**

The basic linear regression model requires as a primary hypothesis that the variance of the random perturbations, conditional on the values of the regressors X, is constant. In other words, the conditional variance of *Yi*(which is equal to ui), conditional on X, remains the same regardless of the values taken by the variable X. Algebraically this is expressed as:

$$E(u_i^2) = {\sigma_u}^2$$

There are basically two methods for detecting the presence of heteroskedasticity, graphical method sand numerical contrasts.With in the numerical contrastsamongothers the test of Park, and White Gold feld-Quant. White contrast, despite being similar to the other evidencein its category, seems to be more robust, not requiring prior assumptions such as the normality of residuals (Gujarati, 2003).

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C. Test of White

Is a general way to identify the presence of heteroskedasticity, without making assumptions about the impact ofa particular variableor on the distribution of residues.The following assumptions are considered:

$$H_o: \sigma_1{}^2 = \sigma^2 \ \ para\ todo\ i.$$
$$H_1: nos\ e\ verifique\ H_o$$

The way to make the contrast is based on the regression least squareserrorssquared, which are indicative of the variance of shocks in the face of an independent term, the regressors, their squares and cross products two to two (orsecond order). For example, based on the following model:

$$Y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \varepsilon \quad i = 1 \ldots . N$$

Theauxiliary regressionforthis contrastwould be:

$$e_i{}^2 = \delta_0 + \delta_1 X_{1i} + \delta_2 X_{2i} + \delta_{11} X_{1i}{}^2 + \delta_{22} X_{2i}{}^2 + \delta_{12} X_{1i} X_{2i} + v_i \quad i = 1 \ldots \ldots N$$

The following tables show the results of the White testapplied to the two models used

Table 11: Test of White for Simple Regression

White Heteroskedasticity Test:

F-statistic	2.138199	Prob. F(2,37)	0.132205
Obs*R-squared	4.144158	Prob. Chi-Square(2)	0.125924

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/29/13 Time: 23:11
Sample: 1 40
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	117.5571	77.18444	1.523067	0.1362
ICI	-4.053384	3.267410	-1.240550	0.2226
ICI^2	0.048660	0.030041	1.619777	0.1138

R-squared	0.103604	Mean dependent var	81.57642
Adjusted R-squared	0.055150	S.D. dependent var	155.9284
S.E. of regression	151.5677	Akaike info criterion	12.95198
Sum squared resid	849992.6	Schwarz criterion	13.07865
Log likelihood	-256.0396	F-statistic	2.138199
Durbin-Watson stat	1.884576	Prob(F-statistic)	0.132205

Source: Own elaboration

Table12: Test of White for Multiple Regression

White Heteroskedasticity Test:

F-statistic	0.658887	Prob. F(5,34)	0.656933
Obs*R-squared	3.533434	Prob. Chi-Square(5)	0.618335

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/29/13 Time: 23:13
Sample: 1 40
Included observations: 40
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	47.02804	100.0404	0.470091	0.6413
ICI_CAP	-4.852279	4.009424	-1.210218	0.2345
ICI_CAP^2	0.071131	0.050040	1.421472	0.1643
ICI_INN	-19.07928	73.59054	-0.259263	0.7970
ICI_INN^2	3.484959	8.855858	0.393520	0.6964
ICI_CON	0.590427	3.754279	0.157268	0.8760

R-squared	0.088336	Mean dependent var	77.86938
Adjusted R-squared	-0.045732	S.D. dependent var	160.4538
S.E. of regression	164.0817	Akaike info criterion	13.17609
Sum squared resid	915375.5	Schwarz criterion	13.42942
Log likelihood	-257.5217	F-statistic	0.658887
Durbin-Watson stat	1.767419	Prob(F-statistic)	0.656933

SOURCE: OWN ELABORATION

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As shown in the above tables, heteroskedasticityis confirmed, to the linearized model, through tatistical FandObs*R-square, since both statistical null hypothesis of homoscedasticity has a p value>0.05. In the linear and quadratic models the probability values exceed a level of significance of 5%.Therefore, it must be assumed the presence of heteroskedasticity in these models.

Therefore, it is conclude that the model is not statistically significant, and it is biased to fix this is to include more control variables, which is not possible in this research because the database used.

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INFORMATION ETHICS & WIKILEAKS

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ABSTRACT
Discusses about the nature and meaning of 'Information Ethics' and also discusses about the ethical role of Wikileaks.

1. OVERVIEW

Information Ethics (IE) was born under the somewhat humble and yet privileged tutelage of librarianship. It can be traced back to key figures expressing ethical concerns in university-taught library courses. It was fostered and raised by individuals passionate and insightful in the exploration of their field, individuals who in many ways were ahead of their time, librarians whose groundbreaking work now bears the mark of a global legacy.

While traditional librarianship, introducing the field of Information Ethics in the late 1980's and early 1990's, tended to focus on issues of privacy, censorship, access to information, intellectual freedom and social responsibility, copyright, fair use, and collection development; Computer Ethics, and thus Cyber-ethics (while including many of the above concerns), placed a focus on ethical issues pertaining to software reliability and honesty, artificial intelligence, computer crime, and e-commerce (Froehlich, 2004)[10]. Journalism and Media Ethics, having now also adopted the language of 'Information Ethics', concerns itself with issues as diverse as conflicts of interests, fairness, and economic pressure (Smith, 2001)[18]. Bio-information ethics explores issues of information pertaining to technologies in the field of biology and medicine where the traditional concerns in Bio-ethics such as abortion, organ donation, euthanasia, and cloning form the basis, where questions are posed regarding rights to biological identity, the use of DNA and fingerprints, and equal rights to insurance and bank loans based on genetics (Hongladarom, 2006)[14].

While on one hand, Information Ethics can be viewed as spanning and evolving into and through several separate ethical disciplines, it can be noted that many of those supposedly separate disciplines are merely re-envisioned approaches to the evolution of information itself, and are collectively covered under the rubric of Information Ethics. A pertinent example of this is the adoption of IE into the field of Computer Science, a synthesis that forms Computer Ethics. Computer Ethics in turn, synthesizing with the expanding concerns of ethics and the Internet as well as implications towards artificial intelligence, has synthesized into Cyber-ethics. Thus while Cyber-ethics would claim to stand as a field of concern in its own right, the claim can be made that Cyber-ethics has simply replaced Computer Ethics to compensate for evolving technology, means and implications (Sullivan, 1996)[20].

Drawing a history of the taxonomy of the field concerns itself also with what can be deemed the scions of Information Ethics versus adopted disciplines within Information Ethics. Adopted satellite fields traditionally include the above noted fields of Business, Media and Journalism Ethics, areas of information dissemination dealing with aspects of the ethics of information that don't necessarily pay homage to Librarianship, the esteemed grandparent of the field, but that have been grafted into the 'family', so to speak, through converging ideals. While one can argue that computer ethics arises out of library ethics, since the traditional concerns of library ethics evolved alongside the use of computer technology in libraries, computer ethics also originally arose independently out of computer and IT related disciplines.

The definition of Information Ethics remains in flux, the field itself referred to by Smith as a life-world in process, a "socially constructed reality" (Smith, 2001)[18]. The implications for an inclusive definition of Information Ethics are many, venturing into the realms of philosophical dialectics, metaphysics and hermeneutics, a fact recognized early on by Smith, Floridi, and Capurro, key pioneers of the field. As Smith notes even in the field's infancy, the philosophical implications are as vast as are the implications of a society facing an unchecked technological revolution. Her concern, even then, was that society will not be prepared "to deal with the social, economic, and moral challenges that technological changes present" and that "the human spirit may be exhausted by the information overload and the intrusions of a wired society with technologies uncritically employed" (Smith, 2001)[18].

2. ORIGINS

Inquiring into the foundation to Information Ethics takes us back several decades to the 1940s to Norbert Wiener's work in Cybernetics, who in 1948 published his groundbreaking book Cybernetics: or Control and Communication in the Animal and the Machine. We begin for the purposes of the following history with the

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work of Robert Hauptman, the most common starting point with regard to a narration of the field of IE. A primary text, Ethical Challenges in Librarianship, written by Robert Hauptman, is often cited as the first written account of the field, introducing ethical concerns for information (Hauptman, 1988)[11]. According to Martha Smith, who with Hauptman is a pioneer of the field, Hauptman was the first to use the term 'information ethics' in his work (Smith, 2001)[18], though further exploration reveals an earlier use of the term by Capurro, as outlined below.

Hauptman, after his original publication on Information Ethics, would once again bring up his concerns a couple years later in Ethical Concerns in Librarianship: An Overview, where he incredulously notes the lack of concern for an information ethics, as ironically immortalized in his overview of the situation, where he states that, "As an MLS candidate, I was surprised by this lack of interest in ethical concerns, and so I devised what is now a rather infamous experiment" (Hauptman, 1990)[12].

Martha Smith, a true pioneer of the field, is in many ways the founder of Information Ethics. Of her numerous works, her original Information Ethics stands as the most thorough review of the evolution of Information Ethics from it's origins up until the article's publication in the mid 1990's (Smith, 1997)[17]. Smith reviews the realm of Information Ethics and its growth through the 1990's in another paper written a few years later by the same title where she notes the crux of the concern for an "Information Ethics" as the discrepancy between the rapid increase in technological communications and the uncritical acceptance of such innovations by professionals and laypeople alike.

Smith first started exploring Information Ethics in the late 1980s. In trying to develop a model to visualize her theory, she looked to the newly established field of computer ethics for a point of comparison. While computer ethics encapsulated the direction and the idea that she had in mind for Information Ethics, she knew that her vision entailed more. As she states in looking back on her career, "The scope I had in mind was larger and included not only what was then called "information" but also the world of knowledge including the philosophy of knowledge" (Smith, 2011)[19]. It was in light of reviewing the philosophy of knowledge that she first discovered the philosophy of technology and the philosophy of science. From here she went on to develop her initial model of "five working categories": Access, Ownership, Privacy, Security, and Community, the first theoretical model for an applied ethics for the field.

In her article, The Beginnings of Information Ethics: Reflections on Memory and Meaning, Smith reflects back on her career and experience in the context of offering insight from the early years of the field towards those who would take up the torch. While insightful beyond her time, Smith did not have a smooth career. By the very nature of groundbreaking, of pioneering, she encountered resistance at every turn. Her colleagues often reacted with fear, disinterest and resistance to her ideas and she soon learned to balance deliberation with silence when necessary. Through her career, Smith would be passed on for tenure in several appointments. She would be accused of teaching "Sunday School". Her original vision was so poorly received that her detractors were not even able to objectively and properly qualify her work. Thus she had to fight to even use the term "Information Ethics" when even her supporters insisted she use the term "Library Ethics" instead. Based on her reflections, it is perhaps both disheartening and encouraging to conclude that in order to do what she needed to do she had also to sacrifice much of what she wanted to do (Smith, 2011)[19]. Her sacrifice is both exemplary and affirming of the philosophical standards and ideals underlying the very foundations of Information Ethics and of freedom itself. These same ideals, as explored throughout this thesis, will take the reader from the foundation of library ethics in modern librarianship back through thought and time to ancient Greece where Information Ethics finds its earliest origins in the agora of Athenian democracy through parrhesia, an idea of freedom of speech that posits the authenticity of ethics in the vulnerability of the speaker.

3. LIBRARY ETHICS

While the above history outlines the parameters of Information Ethics as a distinct discipline, the field finds its primordial roots in library ethics whose concerns far predate the inception of Information Ethics, finding their own official origins, at least in the professional sense, in 19th-century librarianship, and their unofficial origins (the crux of the following thesis) in a tradition of library ethics that stretches back to ancient Greece.

While the inception of library ethics into an official code was first laid down in 1930, the consideration of ethics by the American Library Association (ALA) dates back to 1892 where a utilitarian motto was adopted to represent the charge of the ALA, characterized as "The best reading for the greatest number at the least cost" (Preer, 2008)[15]. That basic utilitarian philosophy remains in place to date, though it has been modified over the years to accommodate changing interpretations of its language. Even so, and criticized by David Woolwine for its absolutist language, the Bill of Right's mandate still suggests an allegiance to strict utilitarianism, a dangerous

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scenario that opens the door to the very abuses it so fervently tries to negate. Namely, and especially in our contemporary age of government surveillance and national security, a utilitarian creed of the greatest good for the greatest number becomes a gateway to authorities controlling information, invading privacy and restricting access, all based on "the greatest good" of national security. Woolwine posits that a new philosophy is needed that revamps or replaces the Bill of Rights with a creed more in line with postmodernist idealism (Woolwine, 2007)[21].

Tying Information Ethics to its origins in Library Ethics is the shared foundational philosophy of the interplay between intellectual freedom and social responsibility. As Hauptman posits, "Ethical dilemmas arise when two positive necessary dicta conflict with each other. In librarianship this may occur when the demand for information clashes with an iconoclastic advocacy of individual decision making, the human necessity to bear responsibility, to be accountable for one's actions" (Hauptman, 1990)[12]. This interplay could not be better demonstrated than between the polarization of Hauptman's views and the otherwise prevailing views of most intellectual freedom advocates. While Hauptman places personal ethics (which he equates with societal or 'common sense' ethics) before professional ethics, the general trend in Library Ethics, perhaps more so than any other discipline of applied ethics, is to hold steadfast to a professional code of ethics before and if necessary, against, one's own ethics and personal beliefs. As Preer captures in her Library Ethics, "An ethical mandate to separate personal beliefs from professional responsibilities is inherent in providing the highest level of service and the freest access to information" (Preer, 2008)[15].

While the American Library Association (ALA) and the Canadian Library Association (CLA) mandate strict ethical codes for library and information professionals, unlike law, where one can be disbarred for not adhering to, there is no legal requirement for librarians or information ethicists to follow such codes, nor normally are there prescribed professional consequences for not doing so. To complicate the situation, the applied ethics of information in any given scenario, even when applied according to the same set of professional codes using the same mandates, becomes muddied depending on what side of any particular issue one is standing on.

While the numerous advocates for library ethics and the tales of their struggles paint a fascinating, enlightening and colorful history, the details of such cannot fully be illuminated in the current treatment. The reader is however here directed to Fred Lerner's the Story of Libraries for a complete education. The critical point to take from the above is an awareness of the cultural dialectics, the rise and fall, the waxing and waning of the interplay between humanity and an informational world that now predicates a digital informational culture as portended in the concerns of Information Ethics. As noted above, the events and concerns of the digital age are not new; they are however cumulative in the fulfillment of the historical conflicts between intellectual freedom and information monopoly, a dichotomy whereby a detailed analysis of the wiki phenomenon and collaborative knowledge ethics encapsulates the historical entirety of the tumultuous relationship outlined above.

4. EVOLUTIONS

Current directions in Information Ethics are redefining the scope of the field while building bridges between disparate and seemingly separate aspects of its semantic spectrum. Fascinating implications present themselves towards the evolution of that which currently does, and which can be, encapsulated beneath the umbrella term 'Information Ethics'. It remains to be seen what precise form these evolutions will ultimately take, if indeed there ever is a point where we can put the definition to rest. Where Librarianship has given birth to Information Ethics, Information Ethics has given birth to the Philosophy of Information and angeletics, new foundations to ontology and communication theory, spearheaded by Capurro and Floridi, and in turn, explorations of the Philosophy of Information and angeletics have come full circle to readdress the traditional concerns of librarianship through exploring the philosophical implications of librarianship, namely the relationship between information organization, cataloging, classification, epistemology, and ontology, and all of this precipitated at an intercultural scale (Herold, 2005)[13]. It would appear that as the various strains of the numerous and ever growing disciplines within this yet ambiguously defined field slowly coalesce into a recognized and common sphere, the relationships between those disparate pieces will become ever more intimately entwined, greying borders of black and white into a unified kaleidoscope of semantic possibilities.

Concerns for ethics in an information-driven world have saturated all facets of society and culture. One might say that the field of Information Ethics has gone 'viral' in recent years, globalizing at a speed unmatched by any singular phenomenon in history. Information Ethics has taken up residence even within the halls of the United Nations itself under UNESCO and "info-ethics", a term adopted by UNESCO to refer to their own brand of intercultural information ethics, where the main concerns center around topics such as the digital divide, the information rich and the information poor, and cultural alienation (Capurro, 2008)[2].

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5. UNIFIED APPROACH TO INFORMATION ETHICS

In recent years, "Information Ethics" (IE) has come to mean different things to different researchers working in a variety of disciplines, including computer ethics, business ethics, medical ethics, computer science, the philosophy of information, social epistemology and library and information science. Perhaps this Babel was always going to be inevitable, given the novelty of the field and the multifarious nature of the concept of information itself. It is certainly unfortunate, for it has generated some confusion about the specific *nature* and *scope* of IE. The problem, however, is not irremediable, for a unified approach can help to explain and relate the main senses in which IE has been discussed in the literature. The approach is best introduced schematically and by focusing our attention on a moral agent *A*.

Suppose *A* is interested in pursuing whatever she considers her best course of action, given her predicament. We shall assume that *A*'s evaluations and actions have *some* moral value, but no specific value needs to be introduced. Intuitively, *A* can use some information (information as a *resource*) to generate some other information (information as a *product*) and in so doing affect her informational environment (information as *target*). Now, since the appearance of the first works in the eighties, Information Ethics has been claimed to be the study of moral issues arising from one or another of these three distinct "information arrows" (see Figure 1). This, in turn, has paved the way to a fruitless compartmentalization and false dilemmas, with researchers either ignoring the wider scope of IE, or arguing as if only one "arrow" and its corresponding micro-ethics (that is a practical, field-dependent, applied and professional ethics) provided *the* right approach to IE. The limits of such narrowly constructed interpretations of IE become evident once we look at each "informational arrow" more closely.

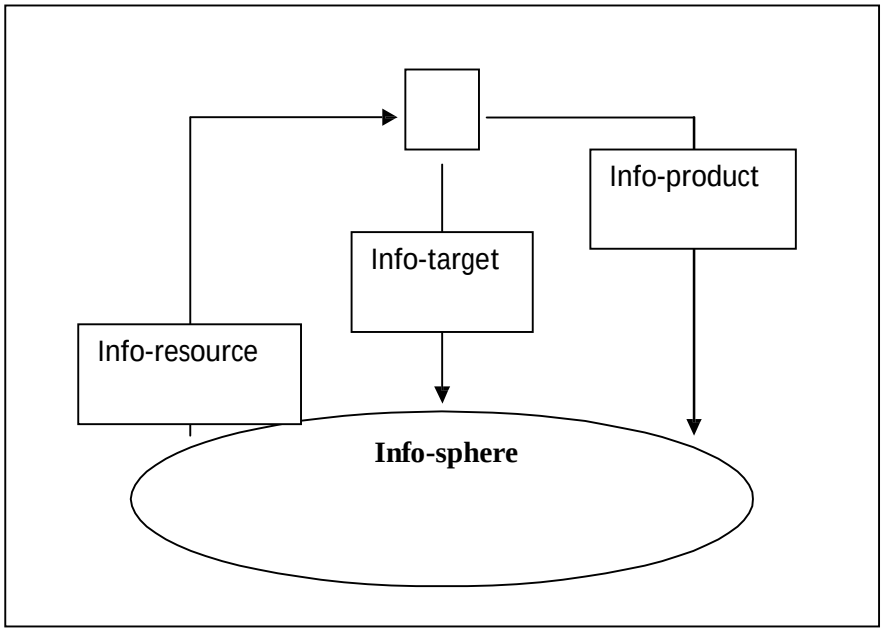

Figure 1 The "External" R(esource) P(roduct) T(arget) Model

5.1 INFORMATION-AS-A-RESOURCE ETHICS

Consider first the crucial role played by information as a *resource* for *A*'s moral evaluations and actions. Moral evaluations and actions have an epistemic component, since *A* may be expected to proceed "to the best of her information", that is, *A* may be expected to avail herself of whatever information she can muster, in order to reach (better) conclusions about what can and ought to be done in some given circumstances.

From a "resource" perspective, it seems that the machine of moral thinking and behaviour needs information, and quite a lot of it, to function properly. However, even within the limited scope adopted by an analysis based solely on information as a resource, care should be exercised lest all ethical discourse is reduced to the nuances of higher quantity, quality and intelligibility of informational resources. The more the better is not the only, nor always the best rule of thumb. For the (sometimes explicit and conscious) withdrawal of information can often make a significant difference. *A* may need to lack (or intentionally preclude herself from accessing) some information in order to achieve morally desirable goals, such as protecting anonymity, enhancing fair treatment or implementing unbiased evaluation. Famously, Rawls' "veil of ignorance" exploits precisely this aspect of information-as-a-resource, in order to develop an impartial approach to justice (Rawls, 1999)[16]. Being informed is not always a blessing and might even be morally

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wrong or dangerous.

Whether the (quantitative and qualitative) presence or the (total) absence of information-as-a-resource is in question, it is obvious that there is a perfectly reasonable sense in which Information Ethics may be described as the study of the moral issues arising from "the triple A": *availability*, *accessibility* and *accuracy* of informational resources, independently of their format, kind and physical support. Rawls' position has been already mentioned. Other examples of issues in IE, understood as an Information- as-resource Ethics, are the so-called *digital divide*, the problem of *infoglut*, and the analysis of the *reliability* and *trustworthiness* of information sources (Floridi, 1995)[4].

5.2 INFORMATION-AS-A-PRODUCT ETHICS

A second but closely related sense in which information plays an important moral role is as a *product* of *A*'s moral evaluations and actions. *A* is not only an information consumer but also an information producer, who may be subject to constraints while being able to take advantage of opportunities. Both constraints and opportunities call for an ethical analysis. Thus, IE, understood as Information-as-a-product Ethics, may cover moral issues arising, for example, in the context of *accountability*, *liability*, *libel legislation*, *testimony*, *plagiarism*, *advertising*, *propaganda*, *misinformation*, and more generally of *pragmatic rules of communication* à la Grice. Kant's analysis of the immorality of *lying* is one of the best known case-studies in the philosophical literature concerning this kind of Information Ethics. The boy crying wolf, Iago misleading Othello, or Cassandra and Laocoon, pointlessly warning the Trojans against the Greeks' wooden horse, remind us how the ineffective management of informational products may have tragic consequences.

5.3 INFORMATION-AS-A-TARGET ETHICS

Independently of *A*'s information input (info-resource) and output (info-product), there is a third sense in which information may be subject to ethical analysis, namely when *A*'s moral evaluations and actions affect the informational environment. Think, for example, of *A*'s respect for, or breach of, someone's information *privacy* or *confidentiality*. *Hacking*, understood as the unauthorised access to a (usually computerised) information system, is another good example. It is not uncommon to mistake it for a problem to be discussed within the conceptual frame of an ethics of informational resources. This misclassification allows the hacker to defend his position by arguing that no use (let alone misuse) of the accessed information has been made. Yet hacking, properly understood, is a form of breach of privacy. What is in question is not what *A* does with the information, which has been accessed without authorisation, but what it means for an informational environment to be accessed by *A* without authorization. So the analysis of hacking belongs to an Info-target Ethics. Other issues here include *security*, *vandalism* (from the burning of libraries and books to the dissemination of viruses), *piracy*, *intellectual property*, *open source*, *freedom of expression*, *censorship*, *filtering* and *contents control*. Mill's analysis "Of the Liberty of Thought and Discussion" is a classic of IE interpreted as Information-as-target Ethics. Juliet, simulating her death, and Hamlet, re-enacting his father's homicide, show how the risky management of one's informational environment may have tragic consequences.

5.4. THE LIMITS OF ANY MICRO-ETHICAL APPROACH TO INFORMATION ETHICS

At the end of this overview, it seems that the RPT model, summarised in Figure 1, may help one to get some initial orientation in the multiplicity of issues belonging to different interpretations of Information Ethics. The model is also useful to explain why any technology, which radically modifies the "life of information", is going to have profound implications for any moral agent. ICT (information and communication technologies), by transforming in a profound way the informational context in which moral issues arise, not only add interesting new dimensions to old problems, but lead us to rethink, methodologically, the very grounds on which our ethical positions are based.

At the same time, the model rectifies the excessive emphasis placed on specific technologies (this happens most notably in *computer* ethics), by concentrating on the more fundamental phenomenon of information in all its variety and long tradition. This was Wiener's position and I have argued (Floridi, 1999a[3], Floridi and Sanders, 2002[8]) that the various difficulties encountered in the philosophical foundations of computer ethics are connected to the fact that the latter has not yet been recognised as primarily an environmental ethics whose main concern is (or should be) the ecological management and well-being of the *infosphere*.

Despite these advantages, however, the model can still be criticised for being inadequate, in two respects.On the one hand, the model is still too simplistic. Arguably, several important issues belong *mainly but not only* to the analysis of just one "informational arrow". A few examples well illustrate the problem: someone's testimony (e.g. Iago's) is someone's else trustworthy information (i.e. Othello's);

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A's responsibility may be determined by the information *A* holds ("apostle" means "messenger" in Greek), but it may also concern the information *A* issues (e.g. Judas' kiss); censorship affects *A* both as a user and as a producer of information; misinformation (i.e., the deliberate production and distribution of misleading information) is an ethical problem that concerns all three "informational arrows"; freedom of speech also affects the availability of offensive content (e.g. child pornography, violent content and socially, politically or religiously disrespectful statements) that might be morally questionable and should not circulate.

On the other hand, the model is insufficiently inclusive. There are many important issues that cannot easily be placed on the map at all, for they really emerge from, or supervene on, the interactions among the "informational arrows". Two significant examples may suffice: the "panopticon" or "big brother", that is, the problem of *monitoring and controlling* anything that might concern *A*; and the debate about information *ownership* (including copyright and patents legislation), which affects both users and producers while shaping their informational environment.

So the criticism is fair. The RPT model is indeed inadequate. Yet *why* it is inadequate is a different matter. The tripartite analysis just provided is unsatisfactory, despite its partial usefulness, precisely because any interpretation of Information Ethics based on only one of the "informational arrows" is bound to be too reductive. As the examples mentioned above emphasize, supporters of narrowly constructed interpretations of Information Ethics as a *microethics* are faced by the problem of being unable to cope with a wide variety of relevant issues, which remain either uncovered or inexplicable. In other words, the model shows that idiosyncratic versions of IE, which privilege only some limited aspects of the information cycle, are unsatisfactory. We should not use the model to attempt to pigeonhole problems neatly, which is impossible. We should rather exploit it as a useful scheme to be superseded, in view of a more encompassing approach to IE as a *macroethics*, that is, a theoretical, field-independent, applicable ethics. Philosophers will recognise here a Wittgensteinian ladder.

In order to climb up on, and then throw away, any narrowly constructed conception of Information Ethics, a more encompassing approach to IE needs to

i) Bring together the three "informational arrows";

ii) Consider the whole information-cycle (including creation, elaboration, distribution, storage, protection, usage and possible destruction); and

iii) Analyse informationally all entities involved (including the moral agent *A*) and their changes, actions and interactions, by treating them not apart from, but as part of the informational environment, or *infosphere*, to which they belong as informational systems themselves (see Figure 2).

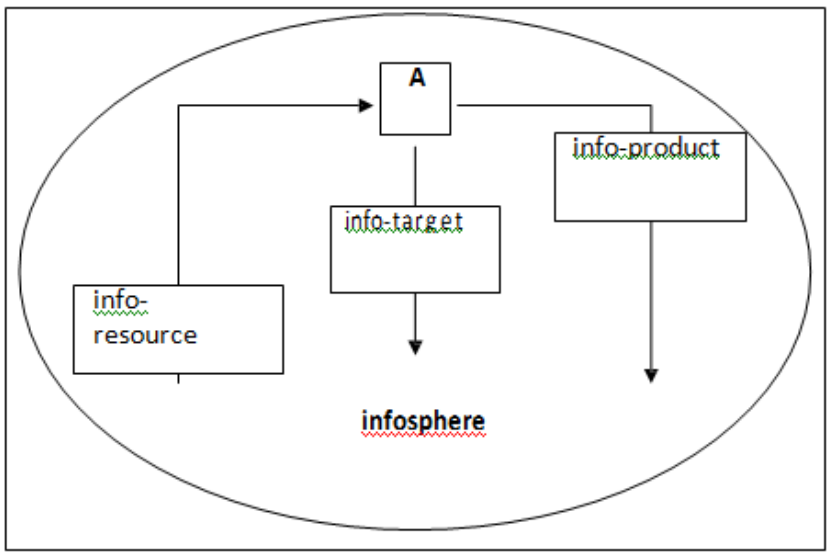

Figure 2 The "Internal" R(esource) P(roduct) T(arget) Model

Whereas steps (i) and (ii) do not pose particular problems and may be shared by other approaches to IE, step (iii) is crucial but involves a shift in the conception of "information" at stake. Instead of limiting the analysis to (veridical) semantic contents – as any narrower interpretation of IE as a microethics inevitably does – an ecological approach to Information Ethics looks at information from an object-oriented perspective

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and treats it as entity. In other words, we move from a (broadly constructed) epistemological conception of Information Ethics to one which is typically ontological.

6 INFORMATION ETHICS AS A MACROETHICS

This section provides a quick and accessible overview of Information Ethics understood as a macroethics (henceforth simply Information Ethics). For reasons of space, no attempt will be made to summarise the specific arguments, relevant evidence and detailed analyses required to flesh out the ecological approach to IE. Nor will its many philosophical implications be unfolded. The goal is rather to provide a general flavour of the theory. The hope is that the reader interested in knowing more about IE might be enticed to read more about it by following the references.

The section is divided into two parts. The first consists of six questions and answers that introduce IE. The second consists of six objections and replies that, it is to be hoped, will dispel some common misunderstandings concerning IE.

6.1 WHAT IS IE?

IE is an *ontocentric*, *patient-oriented*, *ecological* macro-ethics (Floridi, 1999a)[3]. An intuitive way to unpack this answer is by comparing IE to other environmental approaches.

Biocentric ethics usually grounds its analysis of the moral standing of bio- entities and eco-systems on the intrinsic worthiness of *life* and the intrinsically negative value of *suffering*. It seeks to develop a patient-oriented ethics in which the "patient" may be not only a human being, but also any form of life. Indeed, Land Ethics extends the concept of patient to any component of the environment, thus coming close to the approach defended by Information Ethics. Any form of life is deemed to enjoy some essential proprieties or moral interests that deserve and demand to be respected, at least minimally if not absolutely, that is, in a possibly overridable sense, when contrasted to other interests. So biocentric ethics argues that the nature and well-being of the patient of any action constitute (at least partly) its moral standing and that the latter makes important claims on the interacting agent, claims that in principle ought to contribute to the guidance of the agent's ethical decisions and the constraint of the agent's moral behaviour. The "receiver" of the action is placed at the core of the ethical discourse, as a centre of moral concern, while the "transmitter" of any moral action is moved to its periphery.

Substitute now "life" with "existence" and it should become clear what IE amounts to. IE is an ecological ethics that replaces *biocentrism* with *ontocentrism*. IE suggests that there is something even more elemental than life, namely *being* – that is, the existence and flourishing of all entities and their global environment – and something more fundamental than suffering, namely *entropy*. The latter is most emphatically *not* the physicists' concept of thermodynamic entropy. Entropy here refers to any kind of *destruction* or *corruption* of informational objects (mind, not of information), that is, any form of impoverishment of *being*, including *nothingness*, to phrase it more metaphysically.

IE then provides a common vocabulary to understand the whole realm of *being* through an informational *level of abstraction* (see section 6.2). IE holds that *being*/information has an intrinsic worthiness. It substantiates this position by recognising that any informational entity has a *Spinozian* right to persist in its own status, and a *Constructionist* right to flourish, i.e. to improve and enrich its existence and essence. As a consequence of such "rights", IE evaluates the duty of any moral agent in terms of contribution to the growth of the *infosphere* (see section 6.5 and 6.6) and any process, action or event that negatively affects the whole infosphere – not just an informational entity – as an increase in its level of entropy and hence an instance of evil (Floridi and Sanders, 1999[9], Floridi and Sanders, 2001[7], Floridi, 2003[5]).

In IE, the ethical discourse concerns any entity, understood informationally, that is, not only all persons, their cultivation, well-being and social interactions, not only animals, plants and their proper natural life, but also anything that exists, from paintings and books to stars and stones; anything that may or will exist, like future generations; and anything that was but is no more, like our ancestors or old civilizations. Indeed, according to IE, even ideal, intangible or intellectual objects can have a minimal degree of moral value, no matter how humble, and so be entitled to some respect. UNESCO, for example, recognises this in its protection of 'masterpieces of the oral and intangible heritage of humanity' (http://www.unesco.org/culture/heritage/intangible/) by attributing them an intrinsic worth.

IE is impartial and universal because it brings to ultimate completion the process of enlargement of the concept of what may count as a centre of a (no matter how minimal) moral claim, which now includes every instance of *being* understood informationally (see section 6.2), no matter whether physically implemented or not. In this

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respect, IE holds that every entity, as an expression of *being*, has a dignity, constituted by its mode of existence and essence (the collection of all the elementary proprieties that constitute it for what it is), which deserve to be respected (at least in a minimal and overridable sense) and hence place moral claims on the interacting agent and ought to contribute to the constraint and guidance of his ethical decisions and behaviour. This ontological equality principle means that any form of reality (any instance of information/*being*), simply for the fact of *being* what it is, enjoys a minimal, initial, overridable, equal right to exist and develop in a way which is appropriate to its nature. In the history of philosophy, this is a view can already been found advocated by Stoic and Neoplatonic philosophers.

The conscious recognition of the ontological equality principle presupposes a disinterested judgement of the moral situation from an objective perspective, i.e. a perspective which is as non-anthropocentric as possible. Moral behaviour is less likely without this epistemic virtue. The application of the ontological equality principle is achieved, whenever actions are impartial, universal and "caring".

The crucial importance of the radical change in ontological perspective cannot be overestimated. Bioethics and Environmental Ethics fail to achieve a level of complete impartiality, because they are still biased against what is inanimate, lifeless, intangible or abstract (even Land Ethics is biased against technology and artefacts, for example). From their perspective, only what is intuitively alive deserves to be considered as a proper centre of moral claims, no matter how minimal, so a whole universe escapes their attention. Now, this is precisely the fundamental limit overcome by IE, which further lowers the minimal condition that needs to be satisfied, in order to qualify as a centre of moral concern, to the common factor shared by any entity, namely its informational state. And since any form of *being* is in any case also a coherent body of information, to say that IE is infocentric is tantamount to interpreting it, correctly, as an ontocentric theory.

6.6 WHAT ARE THE FUNDAMENTAL PRINCIPLES OF IE?

IE determines what is morally right or wrong, what ought to be done, what the duties, the "oughts" and the "ought nots" of a moral agent are, by means of four basic moral laws. They are formulated here in an informational vocabulary and in a patient-oriented version, but an agent-oriented one is easily achievable in more metaphysical terms of "dos" and "don'ts" (compare this list to the similar ones available in medical ethics, where "pain" replaces "entropy"):

1. entropy ought not to be caused in the infosphere (null law);
2. entropy ought to be prevented in the infosphere;
3. entropy ought to be removed from the infosphere;
4. the flourishing of informational entities as well as of the whole infosphere ought to be promoted by preserving, cultivating and enriching their properties.

What is good for informational entities and for the infosphere in general? This is the basic moral question asked by IE. We have seen that the answer is provided by a minimalist theory: any informational entity is recognised to be the centre of some basic ethical claims, which deserve recognition and should help to regulate the implementation of any informational process involving it. It follows that approval or disapproval of *A*'s decisions and actions should also be based on how the latter affects the well-being of the infosphere, i.e. on how successful or unsuccessful they are in respecting the ethical claims attributable to the informational entities involved, and hence in improving or impoverishing the infosphere. The duty of any moral agent should be evaluated in terms of contribution to the sustainable blooming of the infosphere, and any process, action or event that negatively affects the whole infosphere – not just an informational object – should be seen as an increase in its level of entropy and hence an instance of evil.

The four laws clarify, in very broad terms, what it means to live as a responsible and caring agent in the infosphere. On the one hand, a process is increasingly deprecable, and its agent-source is increasingly blameworthy, the lower is the number- index of the specific law that it fails to satisfy. Moral mistakes may occur and entropy may increase if one wrongly evaluates the impact of one's actions because projects conflict or compete, even if those projects aim to satisfy IE moral laws. This is especially the case when "local goodness", i.e. the improvement of a region of the infosphere, is favoured to the overall disadvantage of the whole environment. More simply, entropy may increase because of the wicked nature of the agent (this possibility is granted by IE's negative anthropology). On the other hand, a process is already commendable, and its agent-source praiseworthy, if it satisfies the *conjunction* of the null law with at least one other law, not the *sum* of the resulting effects. Note that, according to this definition,

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a) an action is unconditionally commendable only if it never generates any entropy in the course of its implementation; and

b) the best moral action is the action that succeeds in satisfying all four laws at the same time.

Most of the actions that we judge morally good do not satisfy such strict criteria, for they achieve only a balanced positive moral value, that is, although their performance causes a certain quantity of entropy, we acknowledge that the infosphere is in a better state on the whole after their occurrence (compare this to the utilitarianist appreciation of an action that causes more benefits than damages for the overall welfare of the agents and patients). Finally, a process that satisfies only the null law – the level of entropy in the infosphere remains unchanged after its occurrence – either has no moral value, that is, it is morally irrelevant or insignificant, or it is equally deprecable and commendable, though in different respects.

8 ETHICAL ROLE OF WIKILEAKS

What is the ethical role of an organization like WikiLeaks? The original mission of WikiLeaks was to throw open the shutters of information monopoly and secrecy, allowing free flow of information into the public sphere. Upon initial consideration, WikiLeaks and its founders seem to have taken a high moral ground, establishing their mission and subsequent actions in critically assessed mores. However the question remains, even today, whether or not WikiLeaks accounts for an ethics within its mission parameters. Since its inception in 2006, WikiLeaks has been used as a vehicle for the unmonitored and unedited release into the public sphere of millions of documents containing the most sensitive and privately held information in the world. For four years WikiLeaks would serve as an open and anonymous portal of publication modeled after the wiki concept, encouraging original source material news while protecting the identities of the individuals submitting confidential information through it. While WikiLeaks has since reverted to a traditional publication model whereby submissions are edited and controlled, it continues to release millions of private and classified documents into the public sphere yearly.

The following thesis will outline, through a four-part history of the field of Information Ethics (IE), a means for exploring the phenomenon of WikiLeaks from a theoretical perspective towards a praxis of applied ethics, establishing an ethics for WikiLeaks by means of its formation amid cultural dialectics arising from specific roots in Information Ethics, and will conceive WikiLeaks as inevitably arising from the same historical dialectics as Library Ethics. Upon establishing its origins in Information Ethics, it will address WikiLeaks within the current state of IE as an evolving and intercultural meta-discipline with an emphasis placed on the ethical and philosophical implications of information and information theory in contemporary information culture.

In order to gage the current practical and philosophical implications of determining an ethics for WikiLeaks, the following thesis will first establish and define ethics under the rubric of collaborative information and knowledge ethics as exemplified by an ethics for the wiki phenomenon, where "content is created without any defined owner or leader…(where) wikis have little implicit structure, allowing structure to emerge according to the needs of the users" (Wikipedia, 2014). Secondly, it will be shown that collaborative knowledge sharing is not a new phenomenon unique to a digital era, but is merely one piece in the ever shifting flow of the life of information, as established by the history of information. Lastly, it will demonstrate, using WikiLeaks and its shifting publication model as paradigm, that all information, however originally collaboratively formed, is eventually monopolized and commodified through controlling power structures. Placing WikiLeaks in its historical context, the following thesis will outline how contemporary information culture, having only just recently shifted from a model of monopolized information flow to collaborative information flow, is set already to return, perhaps prematurely, to a state of information monopoly and control.

Thus, by means of exploration of the ontology debates between Capurro and his working out of message and messenger (via the communication theories of Shannon and McLuhan) and Floridi and his work on an information ecology, and explored alongside applications of whistle-blowing and WikiLeaks, as debated by Žižek and other commentators, the purpose of the following thesis is threefold. Firstly, it will review the current state of IE as an evolving 'meta-discipline' (defined below), and will draw a history of the field, including the establishment of an Intercultural Information Ethics (IIE), of which will be outlined in chapter three. Secondly, it will outline a foundation for collaborative information and knowledge studies and will assign the study of WikiLeaks a part in the evolving taxonomy of Information Ethics under the rubric of Collaborative Knowledge Ethics. Lastly, it will address WikiLeaks within the parameters of information theory, via the history and philosophy of information, where the ethics of information concern more than just privacy and access to information, but also an ontological accountability to the state of information itself.

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8 CONCLUSION

Despite the uncertainties and yet unresolved foundations of the field of IE, it is difficult to argue that Information Ethics as a field is not relevant, in all its facets. Studies in the field are growing exponentially in ways that are barely traceable, all towards a holistic understanding of the nature of the world as informational, with loaded implications towards responsibilities that we ourselves have as agents of an informational ontology. But even with this said, the recognition of the relevance of information ethics in all disciplines, in an ironic sort of way, perhaps nullifies Information Ethics as a discipline that stands apart in it's own field, since the adoption of Information Ethics globally, corporately, scientifically, and philosophically, into all aspects of life, has restructured our understanding of our entire world.

Such contemplations are sobering when placed against the digital evolutions of information societies. While one might consider Information Ethics outside of the current applications of the field, the scope of Information Ethics is established around two considerations, those being the proliferation of information, and the digital vehicle in which it resides. Digital ontology states that "the ultimate nature of reality is digital," a premise that Floridi disagrees with, who favors instead an informational ontology where "the ultimate nature of reality is structural" (Floridi, 2009)[6]. Whether or not the ontological debate is ever laid to rest, and whether or not one agrees to such definitive conceptions of reality, it cannot be denied that the quest to define and classify Information Ethics in its own field of study becomes ever more complicated as it coalesces into a state of digital zeitgeist. If everything is Information Ethics, as Vlatko Vedral's theory of Quantum Information would suggest, then as Elizabeth Buchanan points out, nothing is Information Ethics, a stance that she herself disagrees with (Buchanan, 2011)[1]. Perhaps only time will tell if Information Ethics is a field of inquiry, or simply the recognized zeitgeist.

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SNAG OF RECRUITMENT

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ABSTRACT
Recruitment is the process of searching the candidates for employment and stimulating them to apply for jobs in the organization. Recruitment procedure for Sales Managers in insurance companies is studies. A person with good qualification and well experienced can be recruited after four stages of interview with Branch Manager, Divisional Manager, Human Resource Manager and Regional Manager. Recruitment of candidates is the function preceding the selection, which helps create a pool of prospective employees for the organization so that the management can select the right candidate for the right job from this pool. The aim of the study is to improve the recruitment procedure followed by the insurance companies.

Key words: Recruitment, Insurance companies

INTRODUCTION
Recruitment is the process of searching for prospective employees and stimulating them to apply for jobs in the concern. It is used to describe the attraction of applicants from among whom to select. Recruitment is a positive process as it increases the number of candidates aspiring to take up a job with the organization.

Recruitment or manpower selection process is the first step in the employment of labour and the methods through which labour is brought into industry has much to do with the ultimate success or failure of such employment. Despite tremendous unemployment it is not easy to find the right type of labour. Since workers were drawn from the rural population, in the early days of industrial evolution in India, factories found much difficulty in recruiting the necessary labour due to the reluctance of workers to leave their villages and work in distant towns cut off from their kith and kin. Sometimes they could not adjust themselves to industrial life and eventually returned to their native villages. That is why recruitment has been regarded as the most important function of personnel administration, because unless the right type of people are hired; even the best plans, organization charts and control systems would not do much good.

The Government of India liberalized the insurance sector in March 2000 with the passage of the Insurance Regulatory and Development Authority (IRDA) Bill, lifting all entry restrictions for private players and allowing foreign players to enter the market with some limits on direct foreign ownership.

The opening up of the sector is likely to lead to greater spread and deepening of insurance in India and this may also include restructuring and revitalizing of the public sector companies. In the private sector 14 life insurance and 8 general insurance companies have been registered. A host of private Insurance companies operating in both life and non-life segments have started selling their insurance policies.

Of late the management of insurance companies is finding difficult to maintain the motivation level of their employees. This could be because of deficiencies in its recruitment policies. The study aims in resolving the issue by finding the deficiencies in the existing recruiting procedure and providing alternative solution.

LITERATURE REVIEW
Recruitment is the process of locating and encouraging potential applicants to apply for existing or anticipated job openings (A.Barber, 1998). The HR manager has to key in his/her requirement and profiles of candidates from the company's database (V.S.P. Rao & V. Harikrishna, 2003). There is a growing recognition that recruiting—by itself and irrespective of selection—is critical not only for sustained competitive advantage but basic organizational survival (Taylor & Collins, 2000).

The most suitable candidates may not have been motivated to apply due to several other constraints (D.A. Decenzo, S.P. Robbins, 2004). Search firms may be more interested in persuading a firm to hire a candidate than in finding one who can deliver the results (C.Mc Greary, 1997) Some reports indicate that nearly half of all employees are at least passively looking for jobs, and a sizable minority is continually actively searching (Towers Perrin, 2006). Application may also come from geographical areas that are unrealistically far away (R.Schreyer and J. McCarter. 1998)

Demographics of both the applicant and recruiter seem to play a minor role, although individual differences may be more important. Resume management and candidate sourcing is more commonly outsourced when firms are in seasonal business and have cyclic stuffing needs (P.Mehra, 2001) The promotion and transfer system of course, works best for young executives who are willing to take risks. (A.Vaidyanathan, 2000).

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RESEARCH METHODOLOGY

The study was conducted to improve the recruitment process across different insurance companies in Chennai among the employees of insurance sectors. The results were analysed using statistical tools.

FINDINGS

Category	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1.Salaries are to the Industry standards	8 40%	4 20%	4 20%	2 10%	2 10%
2.Clear carrier growth plan	8 40%	10 50%	2 10%	0	0
3.Forecasting human resources	13 65%	6 30%	1 5%	0	0
4.Influence of goodwill	16 80%	4 20%	0	0	0
5.Candidates interested in insurance field	7 35%	3 15%	6 30%	4 20%	0
6.Information regarding duties is specified	6 30%	5 25%	7 35%	2 10%	0
7.Freshers are disillusioned	4 20%	7 35%	3 15%	3 15%	3 15
8.The difficulties of job should be listed	1 5%	4 20%	5 25%	2 10%	8 40%
9.Recruiting locals brings in more business	9 45%	8 40%	3 15%	0	0
10.Reducing targets increases motivation level	2 10%	3 15%	6 30$	4 20%	5 25%

Employees feel that the salary given to the sales managers match with the industry standards. There seems to be an absolute unanimity among employees about career growth for sales managers. The top management communication to sales managers regarding career growth in organization seems to be very clear. All employees feel that a proper forecasting of human resource is done before deciding on the vacancies. All employees feel that the goodwill of the company has impact on the prospective employees approaching for employment.

Opinion of current employees is that, most of the employees who quit the organization are those who are basically disinterested in the field of insurance. About half of the respondents are of the view that correct information regarding the duties and responsibilities of a sales manager is not conveyed to the candidates at the time of interview. Similarly more than half the number of respondents felt that recruiting freshers to the position of sales managers was a bad strategy. They state the reason as freshers get quickly disillusioned with the prospects of the job and due to which they quit. Recruitment of locals seems to be the antidote suggested by most of the respondents. In order to increase motivation levels of sales managers, reducing targets from thrice their salary to twice their salary may not have an impact according to $3/4^{th}$ of the respondents.

SUGGESTIONS AND CONCLUSION

Candidates who are interested in insurance sector should be recruited. Correct information regarding the duties and responsibilities of sales managers should be clearly specified during interview. Freshers should not be recruited for sales managers. The difficulties in the job should be listed to the candidates to help them while deciding to join or not to join. The exit interview records can be used as a guide for recruitment and retention of employees. The company could use new sources of recruitment such as through consultants or vendors, Paper Adds, pamplets & leaflets, through HR sites like HR link, Citehr and other hr related sites and conducting walk inns instead of the currently used traditional sources.

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THE ROLE OF INFORMAL ECONOMY IN MANAGEMENT OF E-WASTE IN KOLKATA

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ABSTRACT
INTRODUCTION- With the advancement of technology and the rising 'throwaway culture' among the users, the electronic wastes are now becoming a major environmental problem for the world. End-of-life products find their way to recycling yards in developing countries.

OBJECTIVES –The purpose of this paper is to identify the various sources of e-waste generators in Kolkata. It also explores the present scenario of quantum of e-waste generation in Kolkata. It aims to find out the role of informal economy in management of e-waste in Kolkata.

METHODOLOGY –Various sources of e-waste producers are identified and the present scenario of quantum of e-waste generated in Kolkata is explored through secondary sources. The role of informal economy to tackle the e-wastes in Kolkata is analyzed. Primary data are collected through a questionnaire and administered to workers involved in informal sector e-waste management at Chandni Chowk and Princep Street.

RESULTS and CONCLUSIONS –E-waste contains toxic and hazardous substances and chemicals that are likely to have adverse effect on environment and health, if not handled properly. Kolkata has emerged as one of the major generator and recycling places for e-waste. Informal economy plays a crucial role in management of e-waste in Kolkata. Workers of informal economy are engaged in various e-waste activities, without adequate protection and safeguards in recycling workshops in various places in Kolkata.

Key words- e-waste management, informal economy, Kolkata

INTRODUCTION

India's first Wi-Fi city - Kolkata, the biggest and the most important commercial center in the eastern India has a well developed IT Sector and West Bengal was among the first states to have an IT Policy (2000). With the rapid growth of electronic and booming IT sector soon it had joined with other big cities of the world in terms of world's greatest environmental monster- "The Electronic- Waste" or simply the e-waste.

As per Basel Action Network (1992) "E-waste encompasses a broad and growing range of electronic devices ranging from large household devices such as refrigerators, air conditioners, cell phones, personal stereos, and consumer electronics to computers which have been discarded by their users." As per StEP (2005) E-waste refers to "...the reverse supply chain which collects products no longer desired by a given consumer and refurbishes for other consumers, recycles, or otherwise processes wastes."

Due to the lack of governmental legislations on e-waste, standards for disposal and proper mechanism for handling these toxic hi-tech products, mostly end up in recycling yards in developing countries like India and China (UNEP report-2010) , where poorly-protected workers dismantle them, often by hand, in appalling conditions. The UN Environment Programme (UNEP) report- 2010 identifies that, by 2020, computer related e-waste will be four times of 2007 levels. According to a recent survey of Toxic Link- a Delhi based NGO, India now produces approximately 400000 tones of e-waste annually (sources: www.toxicslink.org, 2010). It was estimated that e-waste will exceed 8, 00,000 tones by 2012. (source-www.cpcb.nic.in).

According to Management and handling of Hazardous waste, Rule-1989, a waste is hazardous if it exhibits whether alone or when in contact with other wastes or substances any of the following characteristics identified below-

Corrosivity, reactivity, ignitability, toxicity, high toxicity, infectious property. Unfortunately e-wastes contain a large number of toxic substances like lead, cadmium, mercury, Polychlorinated Biphenyls (PCBs), Poly Vinyl Chloride (PVC), etc, and are likely to create serious problems for the environment and human health if not handled properly. Unfortunately, e-waste falls under this category.

In India due to lack of number of formal sector and awareness among people the informal sector dominates the formal sector in terms of collection and dismantling and plays an important role in e-waste management. 25000-30000 people are involved in this informal economy. (source-toxic link news letter, april-2010).

Though there is a lack of accurate data pertaining to e-waste generation, volume of recycling and the role of informal economy in Kolkata, there is a body of literature devoted to the problem of e-waste.

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SURVEY OF EXISTING LITERATURE

Some of the major works done in this area are noted below:

1.A study made by Toxic Link and Centre for Quality Management System, Jadavpur University in December 2007, (E-Waste: Flooding the City of Joy) revealed that Kolkata and the neighboring Howrah district have become the main hub for e-waste recycling

2. A research conducted by I. Dalrymple and N. Wright R. Kellner, 2007, identified that WEEE has been identified as one of the fastest growing sources of waste in the EU, and is estimated to be increasing by 16-28 per cent every five years. Within each sector a complex set of heterogeneous secondary wastes is created.

3. MAIT with GTZ, (2008) has undertaken an e-waste assessment study, and identifies stakeholders in the e-waste value chain including the profile and practices of the formal and informal recycling facilities in the country

4. Recycling of electronic waste published by R.Anandakrishnan, N.G.Jadhav, R.N.Jagtap, 2008 in the journal Popular Plastics and Packaging states E-waste can not only be mitigated but also it can generate value added products with the help of newer processing technologies and scientific break-through.

5.A survey conducted by KMC and GTZ in Kolkata (2010) disclosed that the unorganized sector has better reach in collection due to the ubiquitous spread of scrap collectors and is also able to offer better prices for the e-waste

OBJECTIVES

The objectives of this paper are classified under the following sub-headings-

- To identify the sources and estimate the volume of e-waste generated in Kolkata
- To assess the role of the informal economy in the management of e-waste in terms of collection, segregation and recycling

METHODOLOGY

The paper is based on primary data collected from the field and from various secondary sources. Due to high rate of obsolesce, the study is restricted mostly on waste generated from personal computer and its peripherals, mobile phones, refrigerators and television sets.

DATA COLLECTION AND DOCUMENTATION

Data for the study was drawn from primary sources i.e. on the basis of unstructured questionnaires administered to workers involved in this service at Chandni Chowk and in Princep street area.

Data are also collected from secondary sources i.e. books, journals, corporate reports and announcements as well as relevant electronic media.
Exploratory survey was conducted primarily to find out the areas, Chandni Chowk and Princep Street where e-waste is handled

The study is authenticated by visual documentations

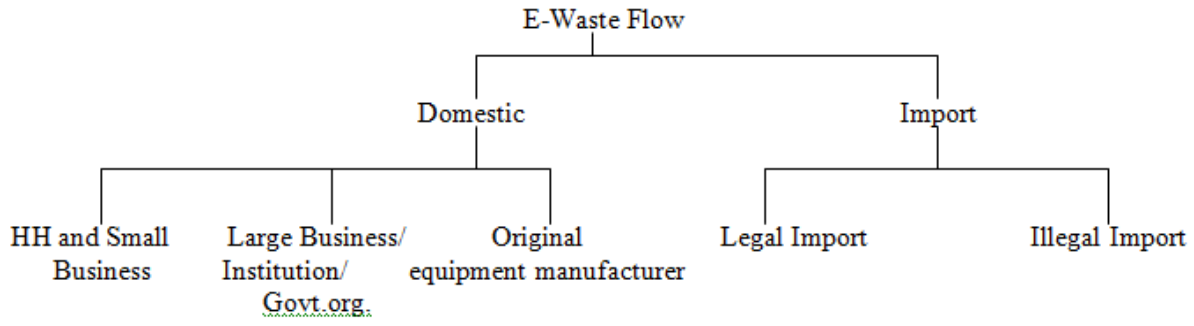
Data processing involved the following methods:
a) Logical deduction

b) Relevant statistical techniques for data analysis

ANALYSIS AND FINDINGS

1. SOURCES OF E-WASTE IN KOLKATA

The following diagram shows the sources of e-waste in Kolkata



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The above diagram is made through primary field study in Chandni Chowk and Princep Street areas and through informal interviews with scrap dealers, Kawadiwalas and with shop owners of electronic goods who have provided exchange offer for old electronic goods. The study made by Toxic link and Center for Quality Management, Jadavpur University, Kolkata (2007) has not found any concrete information on import of e-waste in Kolkata. Though no confirmed details on the mode and quantity could be obtained, the informal sources in the market did reveal that E-waste does land in the Khidderpur port. The import quantity, though not known, is going to increase the load of the waste being recycled in the city. As Kolkata is the main business city of eastern India, e-wastes from other eastern states are also coming in this city and it has become one of the major recycling hubs for e-wastemanagement.

Thus sources of e-waste are of two types-either domestic or imported. Different domestic generators of e-waste are Household, small and large business houses, Govt. organizations, different institutions like schools, colleges, hospitals, banks as well as NGOs.

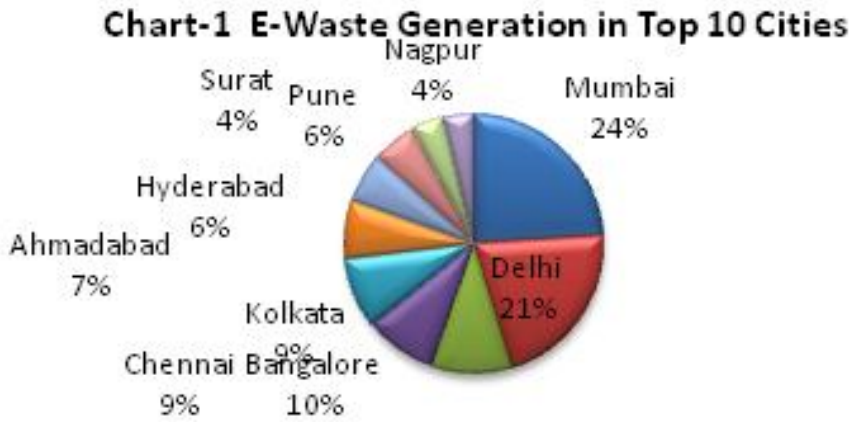
2. VOLUME OF E-WASTE GENERATES IN KOLKATA

As per the study of ASSOCHAM, 2014, India is likely to generate e-waste to an extent of 15 Lakh metric tonnes (MT) per annum by 2015 from the current level 12.5 Lakh MT per annum growing at a compound annual growth rate (CAGR) of about 25%. Of the total e-waste generated in the country, western India accounts for the largest population at 35%, while the southern, northern and eastern regions account for 30%, 21% and 14%, respectively. The top states in order of highest contribution to waste electrical and electronic equipment (WEEE) include Maharashtra, Andhra Pradesh, Tamil Nadu, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab and they contribute 70% of the countries total e-waste generation.(source-Rajya Sabha,2011)

The city-wise ranking of the largest WEEE generators is Mumbai, Delhi, Bangalore, Chennai, Kolkata, Ahmedabad, Hyderabad, Pune, Surat and Nagpur.(source-www.e-waste.in). Based on Table-1, the diagram shows that Kolkata accounted for a 4025.3 tones of e-waste generator in the year 2011 and ranked fifth position.

Table-1 E- Waste Generation in Top Ten Cities

S. No.	City	E-waste (Tones)	S. No.	City	E-waste (Tones)
1	Mumbai	11017.1	6	Ahmadabad	3287.5
2	Delhi	9730.3	7	Hyderabad	2833.5
3	Bangalore	4648.4	8	Pune	2584.2
4	Chennai	4132.2	9	Surat	1836.5
5	Kolkata	4025.3	10	Nagpur	1768.9



A study, titled: 'E-waste: Flooding the city of joy' conducted jointly by Toxics Link and the Centre for Quality Management System, Jadavpur University (2007), disclosed the figure of e-waste generation in Kolkata at 9,000 tonnes annually. The study was restricted to the waste generated from computers and its peripherals, television sets and refrigerators and implied that the figure is much higher if washing machines, cellphones, music players, compact disc/DVD players etc are also added. This study also revealed that around 2898 MT of waste is generated only from computer and its peripherals. Colour TV and refrigerator generated e-waste were 5280MT and 800MT respectively. Only House-hold produced approximately 1030MT of computer generated e-waste annually. The following Table shows the generation of computer related e-waste from various sources-

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Table-2 Annual E-Waste Generation From Computer And its Peripherals

Sector	Annual e-waste generation (MT)
Manufacturing	91
Service	1564
Govt. organization	213
Households	1031
Total	**2898**

Source- Toxic Link

Another study conducted by West Bengal Pollution Control Board, Gtz and ICC Kolkata titled "E-waste Assessment in Kolkata Metropolitan Area"(2010), revealed that KMA generates around 26000 tonnes of annual e-waste annually, of which 9290 tonnes is available for recycling and only 2000 tonnes gets recycled. This annual e-waste is expected to grow up to as high as 50,265 by 2015 and 1, 44,823 tonnes by 2020. Following is the summery of the report-

Table-3 E-Waste by Product Category

Product Category	Potential Annual E-waste % in 2010-11	Expected annual E-waste % in 2015-16	Expected annual E-waste % in 2019-20
Desktop	14.65%	39.20%	63.91%
Notebook	0.51%	1.74%	2.73%
Printers	1.58%	0.78%	0.42%
TV	61.93%	42.17%	23.26%
Mobile	0.42%	0.53%	0.40%
Refrigerator	15.15%	11.70%	7.13%
DVD	5.77%	3.87%	2.15
Total e-waste (Tonnes)	**25999**	**58097**	**144823**

The above study forecasted that e-waste from mobile phones will increase from 110 MT in 2010-11 to 310MT in 2015-16 and will reach at 582MT in 2019-20 in KMA with a CAGR of 429.09%, which is significantly very high. For television and refrigerator the CAGRs are 109.24% and 162.18 respectively. E-waste from desktop stood as 3808 tonnes and it expected to be 92551 MT in 2019-20 with a CAGR of 2330% which is again very high.

3. ROLE OF INFORMAL ECONOMY IN MANAGEMENT OF E-WASTE

Management of e-waste consists of three main steps: i) collection, ii) sorting/dismantling and pre-processing (incl. sorting, dismantling, mechanical treatment) and iii) end-processing (incl. refining and disposal).

The efficiency of the entire system depends on the efficiency of each step and on how well the interfaces between these interdependent steps are managed. In India only 5% of such wastes are handled by formal sector. There are only 138 formal recyclers in India but west Bengal has only one unit namely M/s. J.S. Pigments Pvt. Ltd**.,** Hooghly. There are no other formal recyclers operating in the east (source-toxic link). Due to lack of number of formal sector and awareness among people the informal economy dominates the formal sector in terms of collection and dismantling and plays an important role in e-waste management. I live in north-Kolkata. From my childhood I used to hear the loud voice of *Kawadiwala* for purchasing old banarasi sari, gramophone and old clock. But for the last two-three years the same voice asked for old computer, discarded UPS and for old printer. So, the globalized throwaway culture of electronic goods has also changed the business strategy of the *Kawadiwala*.

Field study with scrap dealers and direct interaction with Kawadiwalas disclosed that the HHs and small business houses preferred to sell their discarded e-goods to kawadiwala at a negotiable price. Whereas various Institutions, Govt. Org. and the large business houses preferred to sell the e-wastes through tenders auction. An interesting fact revealed through field study that the e-goods shop-owners who are providing exchange offer for old e-goods just dumped the e-waste at their godown. They have their fixed scrap dealers who take these goods at a negotiable price and then sell it in the secondhand market or dismantle them by their workers to recover the precious metals or plastics. Thus the Indian E-waste (Management and Handling) Rules, 2011 which disclosed the 'extended producer responsibility'(EPR) by indicating the responsibility of any producer of electrical or electronic equipment, for their products beyond manufacturing until environmentally sound management of their end-of-life products failed.

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As collection is the key factor of e-waste handling, this direct collection helps the informal economy to beat the formal sector. They handled around 95% of e-waste recycled in the country (Source-toxic link news letter, April-2010).

Chandni Chowk and Princep Street are chosen for field work as these two places are the hot spots for secondary electronic goods market and at a time are surrounded by domestic plots. Surveying the Chandni Chowk and Princep Street it is found that the dismantlers receive material that have been purchased directly through an auction or purchased from a larger scrap dealer. The larger scrap dealer received it from the small retailer or directly from the offices or institutions. The small retailers collect them from the *kawadiwala*. Dismantlers work in very tiny units, which are not more than 100 sq feet in area and often on the pavement. Raw materials like plastic, aluminium are removed and kept in different piles. Often women and children are engaged in this job mainly for removing copper from wire. Wage rate is low. No personal protection equipments are used by the workers in the informal units neither is any regard given to safety. The workers are mainly urban poor and most of them are illiterate.

Pic-1 e-waste are piled at Chandni Chowk

Pic-2 informal economy worker at Princep Street

Interesting facts from workers of informal e-waste management have been found as under -

- Out of the 30 respondents only 1 person is having his own unit. Here unit means the place on open pavement of Chandni Chowk where the owner is also worked with other workers.
- 12 people know that these scrap contain hazardous constituents
- Every body denied about any health problem out of their work
- After dismantling they send parts like mother-board to Salkia or Delhi
- Segregated plastics and other metals and sold out separately and often send to Topsia for recycling.
- No open burning of parts has been found out
- They do not disclose their wage rate but said that it depends on the number of goods.
- Hours worked-10-12 hrs.
- Nobody heard about IPR or EPR
- Most of the respondent's family members (21 out of 30) are engaged in the same job. Two families are lived on the pavement of Princep Street and their family members including women and children are involved in the same job.
- 2 out of 30(except the above 1) are self-employed. They purchased and dismantled e-wastes by their own though they were working on footpath.
- The equipments used by them were screw-driver, hammer and pliers
- Working with open hand

Initiatives have been taken by WBPCB to work with the informal sector including training programmes on occupational safety measures and emission control. This will help them work together and benefit from the combined efforts and funds to upgrade their units. On 5th June, 2012 on the occasion of World Environment Day, Toxic Link with WBPCB under the European Union commissioned SWITCH Asia project for Establishing E-Waste Channels to Enhance Environment Friendly Recycling (WEEE Recycle), established

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three e-waste collection points in Kolkata in the form of recycling bins and within 2015 this project established 14 bins at various places in Kolkata.

CONCLUSIONS

E-waste is hazardous if not handled properly. Kolkata has become the main hub for e-waste recycling. Various sources are generating almost 25999 tonnes of e-waste annually and expected to be 144823 tonnes in 2019-20. Informal economy of Kolkata plays an important role in management of e-waste and beats formal e-waste recycling in term of collection, wage rate, transportation, segregation and recycling. The informal workers use primitive methods to extract valuable material from the e-waste components, which bring great damage to their health and local environment. Government should take proper initiative for the informal and formal sector to work together for mutual benefits.

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UNIVERSITY-INDUSTRY-INTERFACE: A CRADLE FOR INNOVATION & INCLUSIVE GROWTH

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"*…the challenge before India is to develop an inclusive model of innovation that will move the country to become not merely a knowledge–producing economy, but a knowledge sharing society that will have relevance in many parts of the world.*"**Sam Pitroda, Chairperson, NIC*.**

ABSTRACT
This paper is based on the assumption that ultimate purpose of any innovation should be to enhance the quality of life of people belonging to all strata of the society. High end technologies lead to innovation but innovation is not limited to technological labs only. Innovation may takes place even outside labs. This paper also present successful stories where both type of innovations have contributed in the upliftment of society. A conceptual model has also been proposed which is depicting hat innovation leads to growth and university-industry-interface provides a platform for this innovation .Few ideas for future studies have also been suggested.

Key words*-Innovation inside lab, innovation outside lab**, university-industry-interface*
**National Innovation Council (India)*

INTRODUCTION
India's total population stands at1.2 billion with literacy rate of 74.04% in 2013. Although Indian economy has achieved a significant growth of 8 percent annually in last few years, there is still large number of people nearly 30% of population that live below-poverty line and survive on less than 1 $ (around 46 INR) in a day. These people usually live in slum areas near the city. Increase in Indian Population over a period of time has also resulted in slum population growth. According to last census in 2011, the slum-dwelling population of India was 42578150.Despite the Government's efforts to build new houses and other basic infrastructure; most of the people living in slum areas do not have electricity, water supply and cooking gas (indiaonlinepages). Other contradicting side of the story is that there is India whose per capita income is projected to soar by 10.4 per cent to Rs 74,920 in 2013-14 as the country becomes a $1.7 trillion economy (Economic Times, 2014).In today's knowledge-based economies, research and development (R&D) is seen as key to economic growth and competitiveness (Patel and Pavitt, 1994). If quality of life of people living in Bharat as well as India has to be enhanced, wealth needs to be created and in the 21st century, wealth creation will increasingly depend on creativity and innovation-based new technology. Hence innovation is need of the hour for Bharat as well as India.

Developing countries like Latvia, Brazil, Cuba, and Uruguay are spending huge amount of money and resources on research and development activities as compared to developed countries, (Goransson and Brundenius,2011).India, becoming more of acknowledge and service based economy; strategic outsourcing of intellectually based systems will help it to grow profits, (Quinn, 1999). But the seriousness of the issue lies in the fact that with gains from innovation comes the 'Risk' of failure, and that may be relational risk or performance risk, Das and Teng (2001). Strategic decisions need to be taken keeping in view the difference between relational and performance risk,(Das and Teng, 1996).

INNOVATION IN INDIA
Innovation is not a new concept for India. In past India has contributed to the 'world-of –knowledge' by giving them the concepts of zero, decimal, plastic surgery, etc. Not only these, the case studies method of teaching has taken its roots from the Indian Panchtantra. India has adopted an altogether different approach in contrast to Sinitic societies (Sen, 1999) and has always followed principles of the egalitarians (Sarkar, 2000; Sen, 1999).Industrialized countries have tried to replicate Silicon Valley 'Indian Model', (Arora et al., 2001).Despite the fact that India has been an early starter, it has not been able to keep pace with other economies of the world.

Today, India has been left far behind with respect to innovation but it is trying to catch up which is proven by the fact that the government of India has declared 2010-20 as 'Decade of Innovation'. Indian Institutes of Technology was a landmark establishment aimed at innovation in science and technology, (Parthasarathi and Joseph, 2004). Organizations like ISRO, DRDO, C-DAC have achieved great milestones in last few years.

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GLIMPSE OF INCREASE IN FOCUS ON RESEARCH IN INDIA

The Gross expenditure on R&D (GERD) in the country has been consistently increasing over the years and has doubled from Rs.24, 117.24 crores in 2004-05 to Rs. 53,041.30 crores in 2009-10. It was tentativelyRs.72, 620.44 crores in 2011-12(See Fig 1), (Research & Development at a glance,2013)

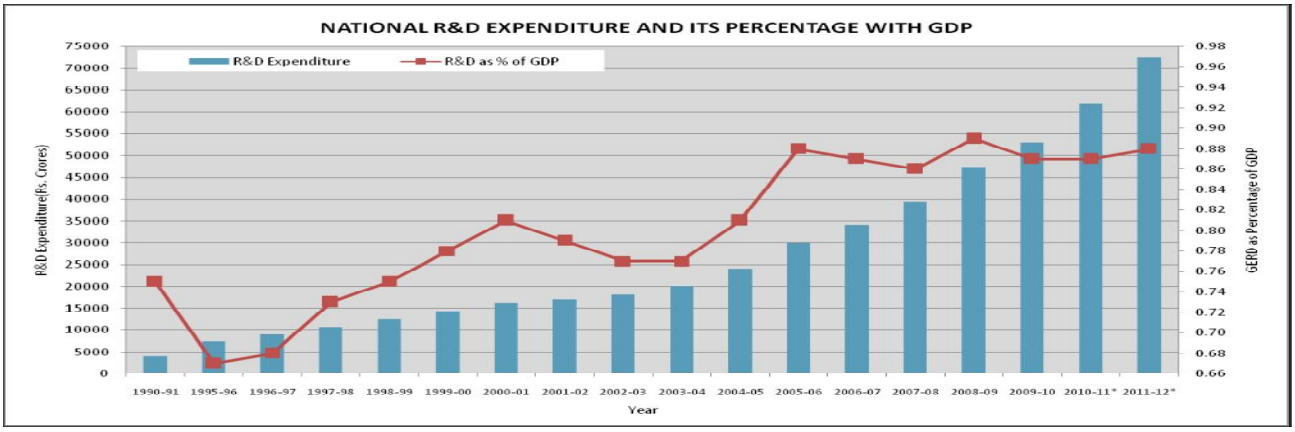

Fig 1: National R&D expenditure, Source: Department of Science & Technology, Government of India.

Further, India's per capita R&D expenditure has increased to Rs. 451/- (US$ 9.5) in 2009-10 from Rs. 217/- (US$ 4.8) in 2004-05.In terms of PPP$, India's GERD increased from 16.6 billion PPP$ in 2004-05 to 30.8 billion PPP$ in 2009-10. It is estimated to be 36.7 billion PPP$ in 2011-12(latest figures are not available as on date).India's share in World GERD increased to 2.4% in 2009-10 from 1.9% in 2004-05. It is estimated to increase to 2.5% in 2011-12(latest figures are not available as on date).

The number of researchers per million population in India increased from 110 in the year 2000 to 164 in 2009.Among the other developed countries, Finland topped the list having more than 7,500 researchers per million population in the world followed by Denmark and Singapore with 6,500 and 6,000 respectively during 2009.

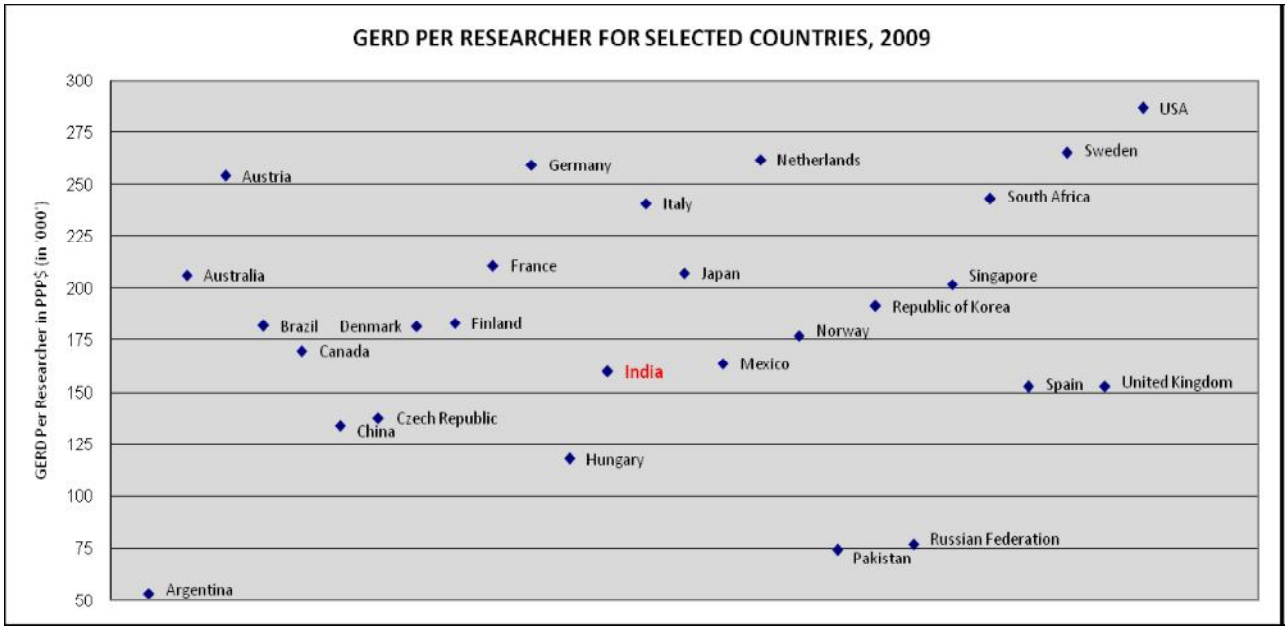

Fig 2: GERD per researcher, Source: Department of Science & Technology, Government of India.

These facts show that India is serious about developing an effective national innovation system, Freeman,(1995)and is following 'systemic approaches' to the study of technology development. However, National Innovation System is being viewed differently by different scholars. According to Freeman (1997) it is a "the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies." Lundvall (1992) was of the opinion that it is "the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge and are either located within or rooted inside the borders of a nation state". Whereas, Nelson (1993) simply sees it as "a set of institutions whose interactions determine the innovative performance … of national firms. It is clear from various definitions that despite having the different verbatim the essence and the components are

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almost same that includes people involved in production, distribution, and applications of various types of knowledge in the Innovation chain of a country. Thus, through National Innovation System India is emphasizing the development of dynamic networks of policies, institutions and people that mediate knowledge flows across national borders and within the country's enterprises(Sinha,2010). In-order to strengthen the innovation system government has come out with National innovation act. It has taken a number of initiatives like New Millennium India Technology Leadership Initiative (NMITLI) of Council of Scientific and Industrial Research (CSIR), Techno-preneur Promotion Programme (TePP) of Department of Scientific & Industrial Research (DSIR), and Innovation in Science Pursuit for Inspired Research (INSPIRE) of Department of Science & Technology, New Delhi, constituted "National Innovation Council" (NInC), launched National Innovation Portal which serves as a single repository for information related to innovators and innovations for prospective innovators and policy makers. National Association of Software and Services Companies (NASSCOM) plays an active role as an interface to the Indian software industry and Indian business process outsourcing (BPO) industry, thus encouraging the growth of the India outsourcing industry (Raghuram, 2009)

NEED FOR INNOVATION

India needs innovation to accelerate its growth and to make growth more inclusive as well as environmentally sustainable. Innovation refers to the exploitation of new ideas or developments so that they can change the way we do things, most often by bringing new, better products, processes, services and practices into the market place. The new idea at the beginning of the innovation pathway can be new to the world, to the country, or merely to one small group of end users. Much of the discussion about innovation gets very confused, however, because the generation of ideas and all the creativity that sits behind that important process – and the ongoing march of science – is often billed as innovation. It is not. It may eventually lead to innovation but until an enterprise (which can be an NGO or a not-for-profit or even a government) changes something in the market place, there is no innovation.

It should be borne in mind that innovations are not just about the products or processes that produce them. They are also important in designing government programmes. The country has a huge backlog of unmet needs in education, health, water, urbanization, and in the provision of other public services. The sum of money required to meet these needs through conventional approaches is enormous and there is doubt about the ability of the existing programmes to deliver. Therefore, innovations are necessary in the approaches to these issues and in delivery mechanisms, along with innovations in products and services. Many innovations arise from scientific advances and technological developments through formal R&D (like Nano car, cheapest voyage to MARS). But many others, such as, innovations in low cost surgeries by Aravind eye hospitals, Coimbatore and Jaipur foot, Jaipur arise outside scientific and industrial laboratories. They arise from new ways of doing things.

The ultimate purpose of innovation should be to enhance the quality of life, to reduce the discomfort. Products (tangible or intangible) are just the mediums through which the ultimate goal is achieved. As discussed in the introduction there are two different worlds existing in India and therefore innovation should be carried out in a way that it touches the lives of the people living in these two different worlds .For this, India needs to adopt two pronged strategy for its innovation program.

Innovation inside the lab-This type of innovation requires lot of investment, technological expertise. This type of innovation has been the forte of the western countries as they are in a position to invest a bigger chunk of GDP in comparison to countries like India which is still struggling with the basic problems of food, water and shelter. But India needs a different model in the form of frugal innovation (See Case 1) For example–Aakash Tablets, Nano car.

CASE 1

Frugal innovation is not limited to low–tech sectors. It can require, or be combined with, frontier science and technology. For example issue of water supply: In India a third of the rural population has access to clean water and penetration of water filters in rural India is less than 1 per cent. An old wedding hall tucked away down a dusty track an hour outside of Pune is an unlikely place for a solution, but this is where to find Tata Chemicals' Innovation Centre. Chief Scientist Dr Rajiv Kumar apologizes for his small facility – they are moving to permanent premises soon – but is quick to point out that the quality of the building doesn't always correlate with the quality of the science. And with some justification, since the Centre is the birthplace of the 'Swach' water filter. At $20, it is 50 per cent cheaper than the cost of its nearest competitor filter, and functions without electricity or running water. A rice husk and silver nano–particle filter developed in collaboration with Massachusetts Institute of Technology cleans up to 3000 liters of water before automatically shutting off – frugal innovation techniques combining seamlessly with advanced technology. With 894 million people

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worldwide lacking access to clean water Tata are increasingly aware of the potential market, and are already exploring opportunities in Africa, Southeast Asia and Latin America.

INNOVATION OUTSIDE THE LAB-India needs more innovations which economical in nature, which produces products and services that, are affordable by people with low levels of incomes without compromising the safety, efficiency, and utility of the products(See Case2). The country also needs processes of innovation that are frugal in the resources required to produce the innovations. A paradigm which bases its assessment of innovativeness on the quantum of expensive inputs deployed—the numbers of scientists, and expenditures on R&D etc.—cannot by definition be frugal. In fact, innovation with expensive resources will tend to produce expensive innovations because the cost of innovation must be recovered in the prices of the products it produces.

For example-low-cost clay fridge which required no electricity or amphibious bicycle, which looks like a regular bike, but has large retractable floats attached to the sides of each wheel which is useful during monsoons. Another striking example is bamboo windmill for around $100 to pump water from a small paddy field. The invention has now been adopted by Gujarati salt workers, who are some of the poorest people in the state, to pump brine water. Petrol-powered pumps consume huge amounts of fuel, at a cost of around $1,000 each year. The wind-powered pump runs at a fraction of the cost (CNN, 2013).

CASE 2

SELCO, a company has made solar power a feasible option for the rural poor and is an excellent example of creating an entirely new service ecosystem around a product rather than developing new product or technology. The conventional policy response to widening access to solar power had been to treat it as a product, with banks subsidized by the government to give loans to customers for purchasing solar panels. But according to SELCO founder, Harish Hande understood that expecting a vegetable seller or cobbler earning just $50–100 a month to save for solar was not realistic. His innovation lies in the fact that he assumed solar power as a service. Instead of relying on subsidies .The source of revenue laid in a pay–per–use model, where entrepreneurs bought the technology and charged customers a tiny cut of their daily cash flow to use it – distributing the solar lights every evening and collecting them the next morning, along with payment. Banks' were skeptical about the profitability of the technology itself. SELCO educated bank managers about its benefits and convince them of its revenue potential so they would lend on it. The second barrier was de–risking the investment. Banks expected regular monthly repayments and were nervous about the risk of lending to lots of individuals as many of whom lacked collateral. SELCO's solution was to act as a guarantor for the credit worthiness of the middleman. While this carries risk for SELCO, dealing with only one entrepreneur who services tens or hundreds of customers reduces SELCO's administration costs, making it still feasible to provide power cheaply. Instead of focusing on developing a new technology, or subsidizing existing technology, SELCO's model allows the full costs of solar power to be covered over time. SELCO has now brought lighting to 120,000 households in Karnataka, and Hande received the 'Asian Nobel Prize' in 2011.

Thus the need of the hour for India is innovation.

ROLE OF UNIVERSITY-INDUSTRY INTERFACE (UII) NURTURING INNOVATION

Factors which are leading the concept of UII to be taken seriously are given by Atlan (1990) and Peters and Fusfeld (1982).From the industry point of view, (1) access to manpower, including well-trained graduates and knowledgeable faculty; (2) access to basic and applied research results from which new products and processes will evolve; (3) solutions to specific problems or professional expertise, not usually found in an individual firm; (4) access to university facilities, not available in the company;(5) assistance in continuing education and training; (6) obtaining prestige or enhancing the company's image; and (7) being good local citizens or fostering good community relations. On the other hand, the reasons for universities to seek cooperation with industry appear to be relatively simple. Peters and Fusfeld (1982) have identified several reasons for this interaction: (1) Industry provides a new source of money for university; (2) Industrial money involves less "red tape" than government money; (3) Industrially sponsored research provides student with exposure to real world research problems; (4) Industrially sponsored research provides university researchers a chance to work on an intellectually challenging research programs; (5) Some government funds are available for applied research, based upon a joint effort between university and industry.

IMPEDIMENTS IN SUCCESSFUL IMPLEMENTATION OF UII IN INDIA

University-industry research cooperation is not new in India but in today's scenario its criticality has increased. The level of interaction remains low in India to the extent that it remains limited to guest lectures and seminars.

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However, it is being recognized that the high degree of benefits exists from successful UII for students and business as well, especially with respect to innovations that take place in labs. But there is a huge gap between what India needs today and what it gets. There is an urgency of filing this gap, Partners (2006).First and foremost lacking is the fact that managers who are the output of Universities and B-schools today are not equipped with human skills and what they learn in university education is quantitative in nature only (Elliot *et al.,* 1994) whereas they are required to be more adept to social change which is an important element of innovation (Smith and Tamer, 1984).Graduates are not sensitized for being socially responsible business leaders (Barker 2010).Faculty which assist in enhancement in knowledge, skills and aptitude of students should be trained and focus on research work. But the sad fact is that from the period 1990 to 2009, Indians had authored only 108 research papers in 40 key academic journals with an average of five research papers in a year (Kumar and Puranam, 2011).Research is done in universities in India to a large extent but not enough evidence is there which shows any benefits to business corporations in real term. Universities are carrying on exploratory rather than innovative research. It is interesting to know that though hugely complementary, academic and industrial entities hold different values and are motivated by different incentives. University faculty is excellent at starting novel things and very poor at completing them in industrial terms. The rewards for starting a novelty are reporting it in publications. But for industry, starting is secondary to finishing in terms of bringing successful products and services to the market. Realizable market value far outweighs novelty. Partly because of the transitory nature of the workforce and partly because the faculty focuses on novel "starts," true production prototypes from which commercial products will be created do not get built. Most universities do not have, and cannot have, pilot plants. As a result, most university-generated innovations do not make it past the early stages.

Then there are the differences in perception. A lot of academics view themselves as selfless workers at the service of humankind, while viewing business/industry as the contaminated world. Industry holds similar negative views of academia, believing it to be populated by people who are disconnected from reality and hold irrelevant—or even dangerous—ideas. While the distrust between academe and industry is less pronounced today than in the past, it certainly still exists. Faculty members think they work very hard. Business executives think academics hardly work. Academics tend to think business people are vastly overpaid. Businesses think academic institutions have very poor business models: they shun growth and charge prices (tuition) well below cost. Yet, on the average, companies survive barely a few decades. Universities mark time in centuries. So one wonders who has the better "business model."

WHAT INDIA NEEDS TO DO?

To avoid this**,** the approach should be to involve industries right from the drafting of syllabi to absorbing the trained students (Ghosh et al, 2007).There should be a value based curriculum keeping in view the need of the industry and society in mind (Patel and Popker, 1998). These kinds of innovative initiatives will appreciate intellectual capital of universities. Focus of universities should be on globalization, leadership, and innovation and at the same time on critical thinking. Further, since the key generators of innovation are research universities and the key implementers of innovation are companies, there is an ever-increasing focus on making the university and industry interface more effective. It's critical to make this connection stronger and more enduring if we want to receive the full benefits of the university innovation machine.

CONCLUSION

Perceived benefits from university-industry collaboration include providing alternative funding channels in an era of constrained financing; access to/or acquisition of state-of-the-art equipment; improved curriculum and training in technology-oriented programmes and problem-solving; enhanced employment prospects for students; supplemental income for academic staff; and clearer contribution of universities to the economy and society, among others (Martin, 2000). Although the benefits are many but they may not be overstated rather a more realistic approach should be followed.

Results of these interactions have been mixed, where some universities have benefited through large research contracts and the commercialization of marketable technology. At the same time there are cases where universities have not been able to tap substantial revenue (Goransson and Brundenius, 2011). Reasons for these are that they have not been able to protect themselves from potential negative externalities like they have not been able to balance competing interests, such as: industry secrecy stipulations and profit-seeking against the traditional university practice of open communication and publication (Clark, 2011); support for basic versus applied, and scientific versus social research (Gulbrandsen and Smeby, 2005); providing industry-specific versus general training; monitoring academic staff time spent on research versus teaching (Kruss, 2008). They must also ensure that research is conducted in an ethical, interest-free way (Hernes and Martin, 2001).

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As it has become evident that innovation is so important for the country to achieve its goals of inclusive and sustainable growth it would not be wrong to conclude that the country needs a central agency to make it happen. But one thing should always be borne in mind that innovation, by its nature, requires freedom and hierarchical control can stifle e it. Therefore, any agency that seeks to stimulate innovation in the eco-system must be clear about its role which is to facilitate and not to manage innovation. Persons in this agency must have the skills and the style to give room to others and not to prescribe. They must lead through their ability to influence and induce change and not by their positional authority. Innovation can be induced in many sectors by 'missionaries' for innovation in those sectors: in industry, education, health, and governance. The role of such missionaries and missions must be to stimulate the innovation eco-system, to ignite innovation, and to induce improvements in the accelerators of innovation in their sectors. Because innovation is so critical to the country's needs of more rapid, more inclusive, and more sustainable growth and since innovation is required in all sectors of the economy.

Bases upon the above discussion the authors propose the following conceptual model (Fig 3).

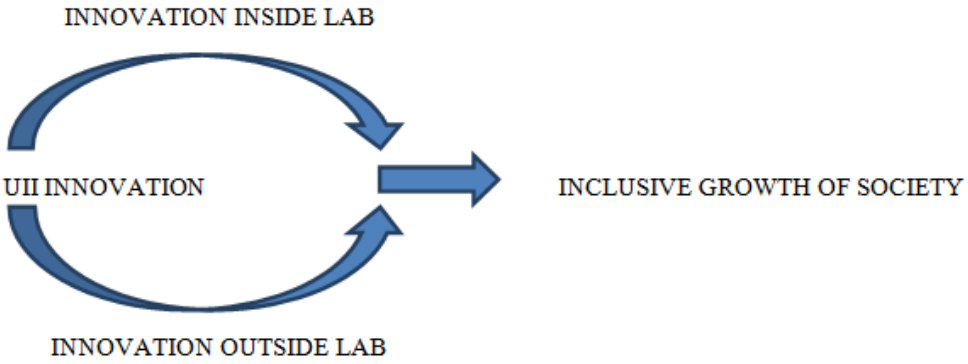

Fig 3: Conceptual Model: UII –Cradle for Innovation& Inclusive growth.

FUTURE SCOPE OF THE STUDY

Since not many empirical studies have been done on university-industry-interface in India, future research may be focused on to find out the status of UII in India, to verify the model proposed in this study, to find out the factors which may further enhance the quality of UII.

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EXPERIMENTAL STUDY ON UPLIFT CAPACITY OF MICROPILE

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ABSTRACT
A micropile is a small-diameter (less than 300 mm) non-displacement pile (drilled and grouted). Micropiles are generally used in underpinning of existing structures, seismic retrofitting, stabilization of slopes and excavation support. Micropiles can be subjected to uplift pressure resulting from seismic loading. Thus Understanding the micropile behavior and predicting the capacity of micropiles under uplift loading are important in foundation design. The objective of this project is to study the effect of spacing in pile groups on the uplift capacity. In this research work experimental model tests were conducted on single micropiles and micropile groups (with 4 and 9 micropile) at different spacing(3D, 4D and 5 D) embedded in cohesionless soil (of relative density 85 %), subjected to pure uplift loading. The experimental tests were conducted on micropiles of 20 mm diameter and 300 mm length, gravity grouted with cement grout having w/c ratio of 0.5 and reinforced with 3.5 mm diameter steel bar. The tests were carried out in a steel tank of 1m x 1m plan area and 1 m height. A typical test setup was made to carry out the testing programs. The load was applied by a hydraulic jack and the pressure was measured by a proving ring. The displacement was measured by two dial gauge. Load displacement curves were plotted and the uplift capacity and the corresponding displacements were obtained by two tangent method. Then the variation of the uplift capacity and the corresponding displacement with spacing were plotted. Block failure were obtained in case of both 4 pile group and 9 pile group in 3D spacing, while the pile groups failed as individual pile in case of spacing 4D and 5D . The shape of the curve also changes significantly with change in spacing.

INTRODUCTION
Micropiles are small diameter piles typically reinforced. The main difference between piles and micropiles is in case of conventional pile most of the applied load is resisted by the reinforced concrete, while in case of micropile structural capacities rely on high-capacity steel elements which resist most of the applied load. The methods of installation of micropiles cause minimal disturbance to adjacent structures, soil and environment. Micropiles can be installed in all type of soil and ground conditions also where access is restrictive. A structure can be subjected to the uplift loading in many situations. It may cause due to seismic loading. The overturning moment caused by the seismic lateral force to the pile cap is typically resisted by the axial resistance of the micropiles. Structures in coastal areas, where ground water level is high, bouncy acts as uplift force, resulting from high water pressure. Sometimes underground structures like subways or underground roads may be built to completely be under ground water table. In this case also the structure may experience high uplift pressure and can damage the structure. Very tall structures like high towers may experience uplift pressure due to overturning moment caused by wind load. Moreover uplift forces sometimes acts on structures built on expansive soil. Therefore study of the behavior of micropile under uplift loading and effect of various parameter on uplift capacity is a important area of research in geotechnical engineering. Micropile is very effective in resisting the uplift loading due to it's special installation process, which causes high grout-ground friction. The still reinforcement transfer the load to the adjacent soil through the cement grout.

PROPERTIES OF SAND
The Sand bed was prepared in a relative density of 85 % in a steel tank of 1m x 1m in plan area and 1 m in height. The properties of the sand are presented in Table 1. The density of the sand was calculated from the maximum and minimum void ratio (i.e. e_{max} and e_{min}). Firstly the inside wall of the tank was covered by plastic. Then the tank was filled by dry sand in layers of 5cm. The 5 cm height was first marked on the plastic in each side, then the required weight of sand was filled and compacted by a rammer. In the same manner the whole tank was filled. After each test, the relative density was checked by the markings on the plastic. Precautions were taken to avoid movement of the plastic.

Table-1 Properties of Sand

Property	Notation	Value
Soil classification	SP	NA
Specific gravity	G	2.65
Uniform Coefficient	C_u	1.64
Grain size (mm)	D_{50}	0.26

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Maximum void ratio	e_{max}	0.88
Minimum void ratio	e_{min}	0.55
Strength parameter	C **Φ** Yd R.D	0.1454kg/sq.cm 30.0° 15.17 KN/m3 50 %

INSTALLATION OF MICROPILE

The micropiles used in this project are 20 mm in diameter and 300 mm in length. To install the micropiles in sand, steel casing of 350 mm length and 18.5 mm outer diameter was used. At the lower end of the casing pipe, plastic a shoe was attached. Then the casing pipes were inserted in the sand by impact on the top of the casing pipe with a wooden hammer keeping the pipe exactly vertical. Then cement slurry of w/c ratio .5 was poured from the top under gravity. At the same time the reinforcement of 3.5 mm diameter bar was placed and the casing was withdrawn slowly placing the grout in position.

To maintain the spacing in pile groups, formworks of thermocol were prepared. Steel wire mess was made as reinforcement in the pile cap and inserted inside the reinforcement of the individual micropiles. Then a Square hook of 8 mm dia bar was attached to the network and the reinforcement bars of individual micropiles were then bent such that the load act through the center of gravity of the pile group. Then the pile cap was filled with concrete.

TESTING PROCEDURE

A testing program was designed to evaluate the uplift behavior of micropile. Single micropile and micropile groups of 4 and 9 piles at spacing 3d, 4d and 5d were tested. The micropile or micropile groups were fixed with the loading arrangement with a hook. Then the load was applied in increment , each increment was kept constant until no significant change in displacement occurred i.e. the difference between two successive readings was less than 0.01 mm per 5 min for three consecutive readings . The hydraulic jack was operated manually, and the load readings were observed all the times. The load was adjusted if there was any significant decrement of load due to displacement.

Loading Arrangement

A typical experimental setup was made for this experiment. The schematic diagram is shown in fig.1. An I section was used over the steel tank, to bear the load. On the steel I section a hydraulic jack of capacity 5 ton was used to apply the load. Over the hydraulic jack, a proving ring was used to measure the load. Two dial gauge was used to measure the displacement.

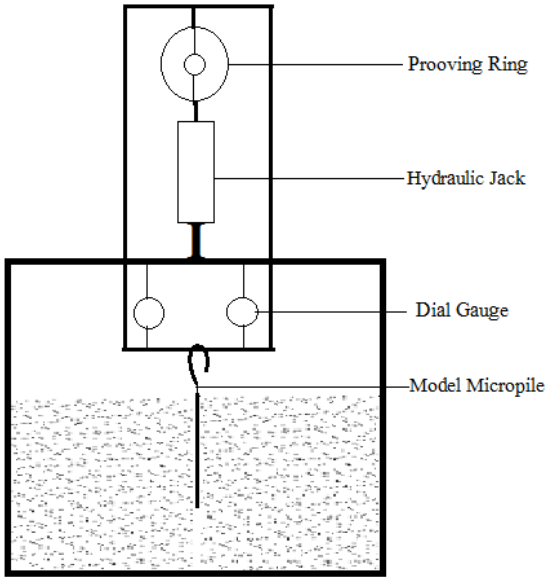

Fig. 1 Loading Arrangement

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LOAD DISPLACEMENT CURVE

Load displacement curves were plotted from the test results. Load (in Newton) on positive X axis and displacement (in mm) on positive Y axis. Here displacement is plotted on positive Y axis unlike load settlement curve, where displacement usually plotted on negative Y axis, but as in this case displacement takes place in upward direction, it is taken as positive. The ultimate failure load and the displacement corresponding to that load were obtained by two tangent method as showed in the following fig. The failure load and corresponding displacements are described in table 2 below.

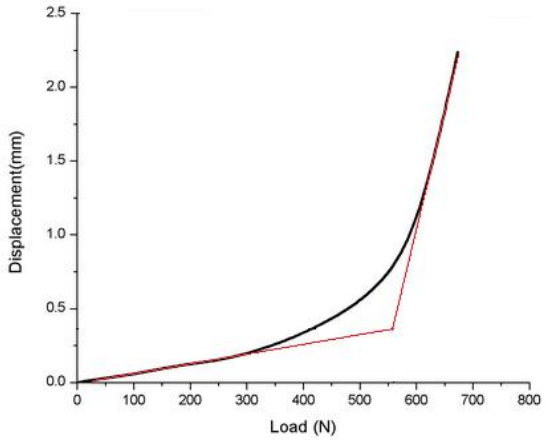

Fig.2 Evaluation of failure load by two tangent method

Table 2. Failure loads and corresponding displacements

No. of piles	Spacing	Failure Load (Newton)	Displacement (mm)
Single Pile	NA	230	3.8
4 Pile group	3D	460	.80
	4D	445	.35
	5D	560	.3
9 Pile group	3D	950	1.2
	4D	880	1
	5D	1120	.8

EFFECT OF SPACING

The spacing between piles in groups affects the failure load, the displacement at the corresponding load and also the load displacement curve significantly. The failure pattern also depends on the spacing. Group failures were obtained while the spacing was 3d in case of both 4 pile and 9 pile group. The load displacement curves are plotted in the graphs below.

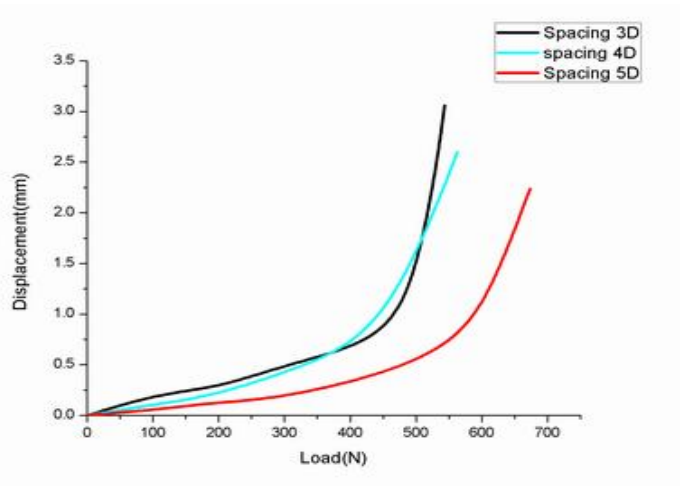

Fig. 3. 4pile groups

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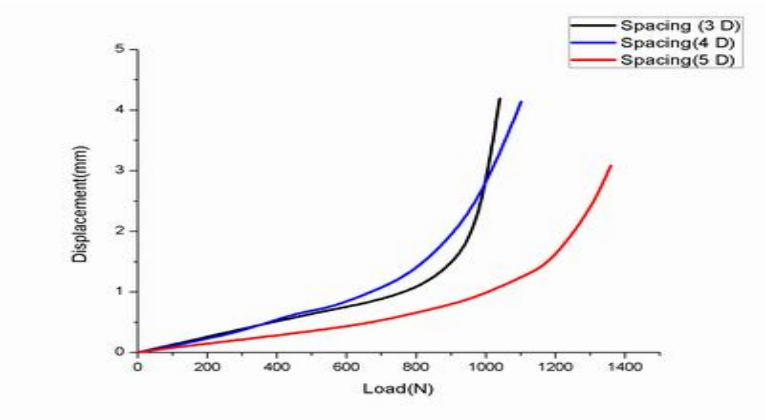

Fig. 4. 9 pile groups

As we can see from the graphs both for the 4 pile group and the 9 pile group , the effect of spacing is almost similar. When the spacing is 3d, a block failure is obtained, and the failure curve is very stiff, i.e. in changes slope very fast. The failure load in spacing 3d is slightly greater than that of spacing 4d. While the micropile groups failed in a higher load and a lower displacement in case of spacing 5d. The micropiles failed as individual micropiles in both 4d and 5d spacing, and the curves are also quite similar.

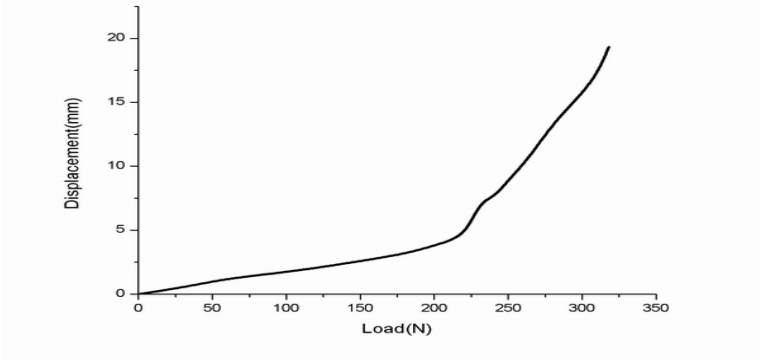

Fig. 5. Single Micropile

The variation of the failure load with change in spacing is also plotted in the following graph.

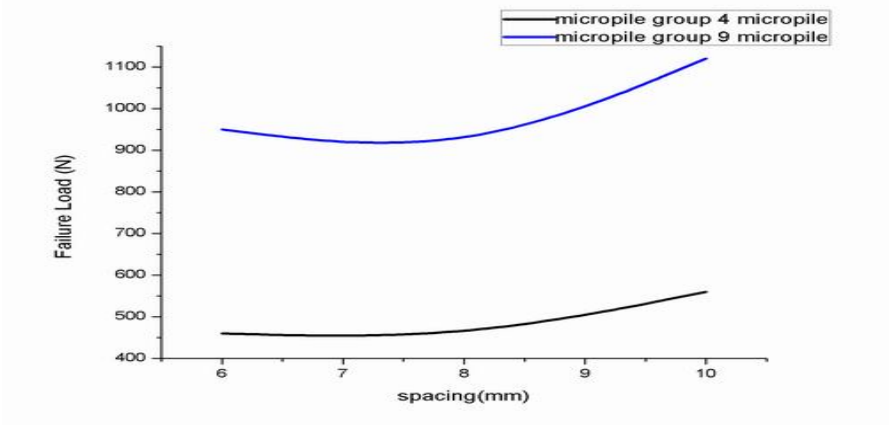

Fig.6. Effect of Spacing on failure load

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AN OVERVIEW: TECHNOLOGY USED IN 4G WIRELESS NETWORK

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ABSTRACT
The development of broadband wireless access technologies in recent years was the result of growing demand for mobile Internet and wireless multimedia applications. Mobile communication plays a most important role in telecommunications industry. The 4G network technologies ensure high speed accessibility through any wireless device by integrating non IP based and IP based devices.

Index Terms: 4G network technologies, LTE, wireless network, WiMAX2.0.

INTRODUCTION

The mobile communication systems and the wireless communication technologies have been improving very fast day by day. Devices continue to shrink in size while growing in processing power. Consumers are demanding more advanced and useful applications. Hence, there is need of capacity improvements in wireless communications.

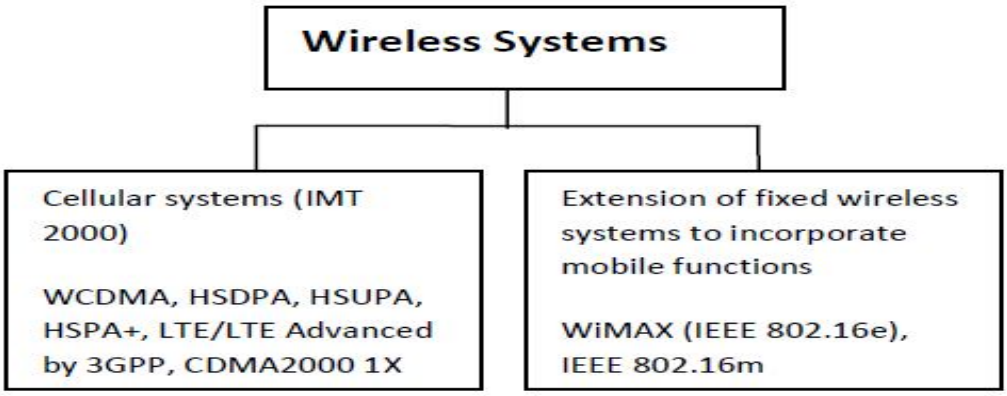

Figure 1: Classification of wireless systems

The existence of 4G Networks in today's technology-driven society is important indicators of advancement and change. 4G, or Fourth Generation networks, are designed to facilitate improved wireless capabilities, network speeds, and visual technologies. The present time is just right to start the research of 4G mobile communications because of:

- Possibility: According to the historical indication of a generation revolution once a decade, and now we are near the end of 3G standardization phase and the beginning of 3G deployment.
- Necessity: according to 3G goals, 3G is necessary but not sufficient to the mobile communication strategy, in which many problems are only partly solved and there are still many problems left to be solved in the next generation, i.e. 4G.

First generation (1G) a wireless network was basically analog cellular systems with circuit switched network architecture. The main challenges of these wireless networks were basic voice telephony, low capacity and limited local and regional coverage. The increased demand for high frequency ranges in the telecommunications sector caused development in analog to digital transmission techniques. In the early 1990s, second generation (2G) , arrived to meet the capacity demands of burgeoning voice plus telephony, text messaging and limited circuit switched data services. By utilizing digital system, the signal can be compressed much more efficiently than analog system, allows transmitting more packets into the same bandwidth and propagates with less power. The third generation (3G) systems integrate voice and data applications. Vendors and operators started seeking ways for determining a new next generation wireless technology i.e. 4G.

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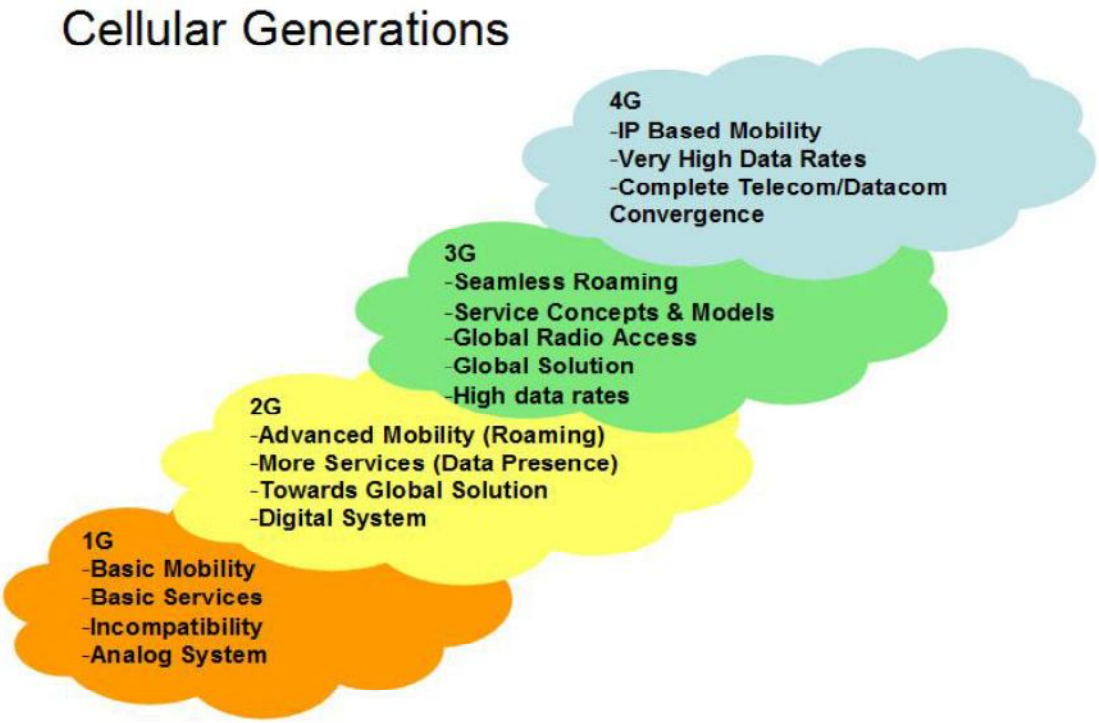
LAYERED VIEW OF CELLULAR GENERATION



ABOUT WiMAX and LTE as NEXT GENERATION TECHNOLOGIES

Due to limitation in QOS and coverage range, Wi-Fi falls short as being wireless technology. The emergent 4G technologies such as WiMAX and LTE are stronger as compared to Wi-Fi. These technologies are having strong QOS and wider coverage. In some key aspect WiMAX and LTE resemble each other including operating in licensed spectrum bands, strong QOS support, wider coverage range.

Long Term Evolution (LTE) technology has been developed by the Third Generation Partnership Project (3GPP) as an improvement to the current Universal Mobile Telecommunications System is sometimes called 3.9G or Super 3G. Based on point-to-multipoint connections, both WiMAX and LTE telecommunications technologies provide broadband wireless service. Through Base Station (BS), mobile subscribers (MS) such as smart phones/laptops get connected to internet, while BS controls the channel access of mobile subscribers. Frequency-division duplex (FDD) as well as time-division duplex (TDD) systems are being supported by both WiMAX and LTE.

It is one of the proposed technologies by ITU in order to feature as 4G LTE, a radio platform technology, provides higher bandwidths with better and faster data rates than HSPA+. LTE has a whole Internet Protocol (IP) network architecture's structure and is intended to support voice, favouring visual or voice blogs online. LTE consists of a net bit rate capacity of approximately 100 Mbit/s in the downlink and 50 Mbit/s in the uplink if a 20 MHz channel is used, theoretically. As LTE is based on the same technology of GSM, it is assumed that it will dominate the market in the coming future. The world's first available LTE-service was opened in Stockholm and Oslo on 14 December 2009, marking beginning of LTE in Scandinavia. LTE Advanced (Long-term-evolution Advanced), formally submitted by the 3GPP organization to ITU-T in the fall 2009, is a candidate for IMT-Advanced standard.

WiMAX, an acronym of "Worldwide Interoperability for Microwave access is an IP based, wireless broadband access technology which can be taken as a developed version of Wi-Fi. The name "WiMAX" was created by the WiMAX Forum, which was formed in June 2001 to promote conformity and interoperability of the standard. The forum describes WiMAX as "a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL It provides maximum data rates of 128 Mbps downlink and 56 Mbps uplink over a 20MHz wide channel. WiMAX is wireless digital communications system, also known as IEEE 802.16. It is proposed for wireless MANs or Metropolitan.

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strong QOS and wider coverage. In some key aspect WiMAX and LTE resemble each other including operating in licensed spectrum bands, strong QOS support, wider coverage range.

WORKING OF WiMAX NETWORK

The IEEE 802.16e-2005 standard provides the air interface for WiMAX but does not define the full end-to-end WiMAX network. The WiMAX Forum's Network Working Group (NWG) is responsible for developing the end-to-end network requirements, architecture, and protocols for WiMAX, using IEEE 802.16e-2005 as the air interface.

The WiMAX NWG has developed a network reference model to serve as an architecture framework for WiMAX deployments and to ensure interoperability among various WiMAX equipment and operators.

The network reference model envisions unified network architecture for supporting fixed, nomadic, and mobile deployments and is based on an IP service model. Below is simplified illustration of IP-based WiMAX network architecture. The overall network may be logically divided into three parts:

1. Mobile Stations (MS) used by the end user to access the network.
2. The access service network (ASN), which comprises one or more base stations and one or more ASN gateways that form the radio access network at the edge.
3. Connectivity service network (CSN), which provides IP connectivity and all the IP core network functions.

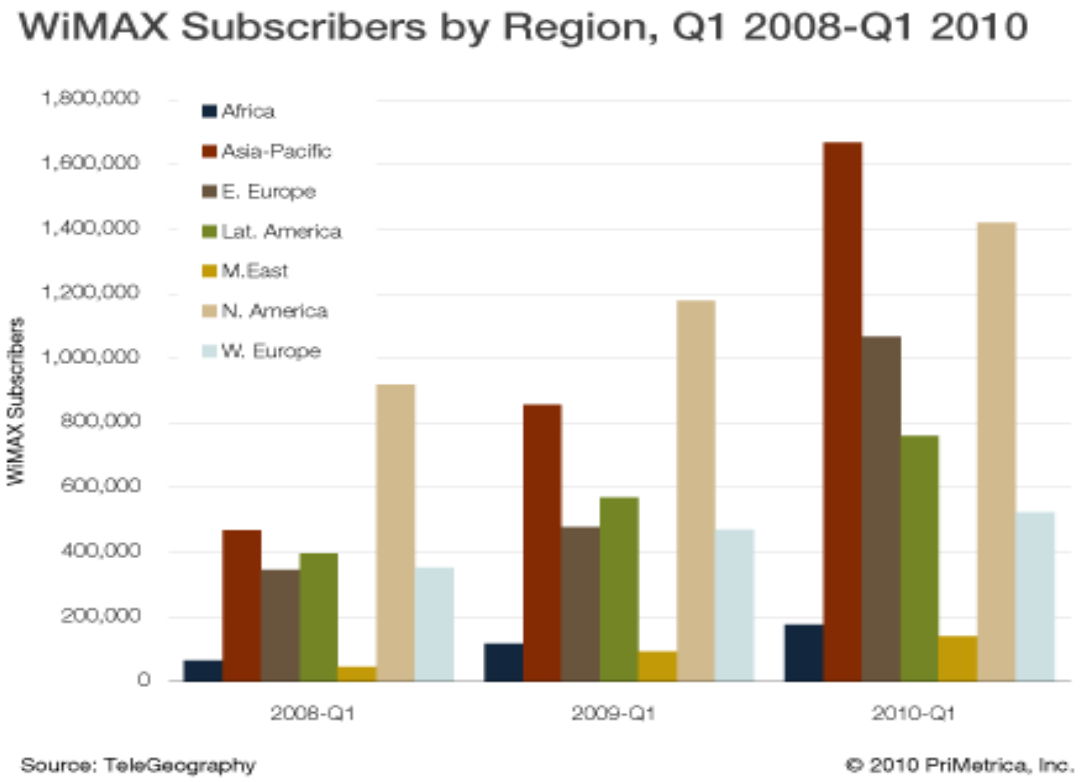

Figure 2. Graph showing the rapid success of WiMAX Network

WORKING OF LTE NETWORK

LTE also has IP based architecture. It is quite different from WiMAX in security mechanism. AKA is LTE authentication method .It cannot meet the enterprise security requirement and authenticate only identity (IMSI) and key in SIM card. An enhanced security method has been proposed which not only authenticate identity and key but also the enterprise certificates.

By using Orthogonal Frequency Division Multiple Access (OFDMA),for the highest category terminals LTE will be able to provide download rates of 150 Mbps for multi-antenna (2x2) multiple-input multiple-output (MIMO) . The non-compatibility of the 3G catering to various services is envisaged for next generation wireless systems .The use of OFDMA technology helps resources to be split into smaller granular units which can be allocated for various services as required. OFDMA is considered vital for achieving high spectral efficiencies in 4G wireless systems because of its ability to integrate well with MIMO technology (also called as MIMO-OFDM).

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USE OF OFDMA IN WiMAX AND LTE

- **Frame Structure**

In WiMAX, frame duration of 5 ms along with time division duplexing (TDD) is used. The frame is partitioned into OFDM symbols (for e.g., 48) of which some are allocated for DL and the rest for UL transmissions. For preamble transmission, the first symbol in the frame is used. Sub channels are formed out of a group of subcarriers, used for control and data transmissions. To convey the DL and UL allocation, the base station (BS) announces a schedule every frame period (i.e., 5 ms). In LTE, sub frames of 1 ms duration is formed by dividing the frame duration of 10 ms. A sub frame is used to formed two slots of 0.5ms duration each. The BS schedules transmissions every 1 ms and the subcarriers formed resource blocks for allocation on the DL.

- **Subcarrier's resource mapping**

In the frequency domain, subcarriers (also referred to as resource elements in LTE) are the smallest granular units and in the time domain, OFDM symbol duration is the smallest granular units. In an OFDM symbol, subcarriers are too large in number to handle in the allocation plane and hence groups of subcarriers are considered together. To minimize the signaling overhead while still achieving granularity in the achievable rates so as to support various services, a group of OFDM symbols are handled together.

- **Frequency Diversity**

In WiMAX, in the PUSC (partially used subcarriers) sub channelization method, by grouping 24 subcarriers sub channels are formed which are present in different parts of the spectrum. This pseudorandom selection of the positions of the subcarriers over the entire band is dependent on the CELL_ID. Diversity based sub channelization method is used to send all the basic control messages.

In LTE, for 7 OFDM symbols a RB (resource block) contains the same 12 contiguous subcarriers. However, to leverage FD (frequency diversity), another RB can be used in the second slot of the sub frame instead of using the same RB in the second part of the sub frame.

- **Multiuser Diversity**

In WiMAX, to achieve multiuser diversity groups of contiguous subcarriers spread out over a few OFDM symbols in the BAMC method. The subcarriers are organized into groups of 9 contiguous subcarriers which are called as bins. A group of four bins are called as a band, each bin has 8 data and 1 pilot subcarrier. In one of these bands, the base station chooses 2 bins and for a BAMC slot it allocates the same bin over 3 consecutive OFDM symbols resulting in 48 data subcarriers. The most popular method needed for WiMAX certification is BAMC sub channelization method.

In LTE, the BTS chooses the RB to be used for sending data to a user. It use the channel feedback from the mobile to schedule a RB for the user in a frame. The channel feedback in LTE sends configuration for the base station for its scheduled downlink. Typically in periodic feedback, 160 ms is the maximum gap between feedback messages and is 2 ms is the minimum duration between feedback messages. In a periodic feedback, the channel status report is requested by the BTS from the mobile. In LTE FD and MUD can be used simultaneously for different users whereas in WiMAX, FD and MUD based transmission cannot coexist in time.

- **Interference Diversity**

In WiMAX, the formation of sub channel depends on the CELL_ID. The different users will have different sub channels. Hence, interference diversity is likely to experience by the user which is likely to give better performance than the dominant interferer case. Note that only in the case of PUSC transmissions interference diversity can be leveraged. For the BAMC transmissions, interference diversity cannot be used. In LTE, to the users RBs are allocated independent of the CELL_ID, across RBs of neighbouring cells the interference on the DL won't be randomly distributed. Thus, in LTE, there is no interference diversity on the DL.

APPLICATIONS

1. 4G will provide for a vast no. of presently nonexistent application for mobile devices.
2. 4G device will differ from present day mobile device in that there will be navigation menus.
3. 4G will provide a seamless network for users who travel & required uninterrupted voice/data communication**.**

CONCLUSION

This paper presented a brief description of path to 4G networks, WiMAX and LTE Network architecture and OFDMA technology. It has been observed that the number of wireless broadband subscribers have passed the

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number of fixed broadband subscribers. So in a world going wireless, the technologies with higher throughputs get importance day by day. For a successful 4G network, coverage and capacity are essential parts. LTE-Advanced and WiMAX 802.16m. The possible candidates for a successful 4G deployments are LTE-Advanced and WiMAX 802.16m. So the technology is, it must be affordable in cost and worth deploying in throughput, coverage and capacity.

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BEHAVIOUR OF JUTE FIBRE REINFORCED CONCRETE BEAM UNDER CYCLIC LOADING

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ABSTRACT
This paper describes the comprehensive reviews of various fibres used in the RC members such as jute, coir, and steel. An attempt has been made to select a suitable fibre that would be easily and naturally available for use in the concrete to enhance the engineering properties such as ductility, shortening drying shrinkage, increasing flexural strength, energy absorption capacity and preventing crack propagation characteristics. However, based on the literature studies, the most commonly available fibre is the jute and economically affordable having good mechanical behaviour. In this review, main focus has been made to identify the behaviour of Jute fibre that enhance the performance of RC members under both static and dynamic loading. In the tropical seismic prone regions, natural fibres are abundantly available; when it is utilized, it reduces the cost of construction and improves performance. Hence effort has been made to utilize naturally available material or different kinds of vegetable fibres which have good mechanical properties required for concrete structure

Keywords: Jute fibre, concrete, properties, crack, ultimate load carrying capacity, technology.

1. INTRODUCTION

A lot of successful reinforced cement concrete framed structures are annually constructed but there are large numbers of them are weak and become unsafe due to changes in loading, changes in uses, changes in configuration. occurrence of natural disaster may also lead to review of engineering notations that make up gradation of structure inevitable.. This review paper describes the behaviour of ultimate load carrying capacity, energy dissipation, and initial stiffness. Improvement of beams with respect to control beam specimen under both cyclic and dynamic loading.

However, concrete is acknowledged to be a relatively brittle material when subjected to normal stress and impact loads, where tensile strength is approximately just one tenth of its compressive strength. As a result for these characteristics, concrete flexural member could not support such load that usually takes place during their service life. Earlier concrete member reinforced with continuous reinforcing bar to with stand tensile stresses and compensate for the lack of ductility and strength. Furthermore, steel reinforcement is adopted to overcome high potentially tensile stresses and shear stresses at critical location in the concrete member. Even though the addition of steel reinforcement significantly increases the strength of the concrete, the development of micro crack must be controlled to produce concrete with homogenous tensile properties. The introduction of fibres is brought in as a solution to develop concrete with enhanced flexural and tensile strength, which is a new form of binder that could combine Portland cement in bonding with cement matrices.

Fibres are most generally discontinuous randomly distributed throughout the cement matrices. According to the terminology adopted by American Concrete Institute(ACI) Committee 544,in fibre Reinforced concrete .

There are four categories namely

- SFRC-Steel Fibre Reinforced Concrete
- GFRC-Glass Fibre Reinforced Concrete
- SNFRC-Synthetic Fibre Reinforced Concrete
- NFRC-Natural Fibre Reinforced Concrete

The inclusion of fibres in concrete is to delay and control the tensile cracking of the composite material. Fibres thus transform inherent unstable tensile crack propagation to a slow controlled crack growth. These cracks controlling property of fibre reinforcement delays the initiation of flexural and shear cracking. It imparts extensive post cracking behaviour and significantly enhances the ductility and the energy absorption capacity of the composite. Concrete made with ordinary Portland cement has certain characteristics. It is strong in compression and tends to brittle. The weakness in tension can be overcome by the use of primary reinforcement rods and to some extend by the inclusion of a sufficient volume of certain fibres. Moreover the use of fibre alters the behaviour of fibre matrix composite after concrete has cracked, thereby improving its ductility. Since the conventional fibres like steel, polypropylene and glass fibres have some limitations, focus on some other alternative materials which are easy to find in the locality is important. Hence natural is one of the most

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important alternatives that can be used for reinforcing the concrete structure. Materials such as Rice husk, Coir, Nylon fibre and Jute fibre result in the form of fibres. Such materials were chosen and properly treated and shaped in the form of fibres or granules and introduced in the concrete beams in critical zone for accessing the properties by testing under middle third loading.

1. 1 Jute Fibre

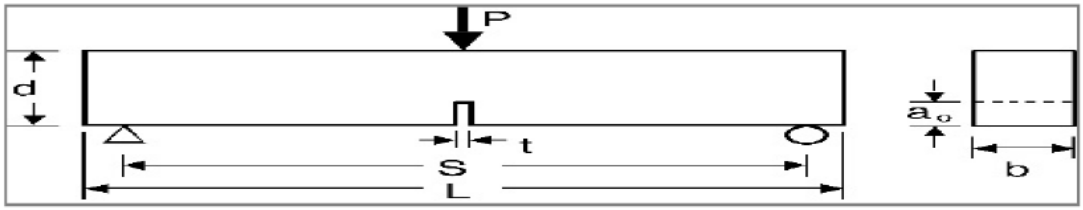
The fibres are extracted from the ribbon of the stem. When harvested plants are cut near the ground with a sickle shaped knife. Jute fibres are available in length up to 8 metre. The diameter of the fibres varies from 20-100µm.They are of different shades varying from light yellow to brownish black in colour. The cross section of these fibres is roughly polygonal in shape and some time with sharply define angles. Different types of Jute fibres are shown in Figure 1

Figure.1 Different types of Jute fibre

1.2 Properties of Concrete Improved by Jute Fibres

- Unlike steel fibre, it makes the RCC Structure light and prevents the rate of corrosion in the reinforcement bar.
- Due to dispersion of short fibres, micro crack formation and propagation can be minimized which enhance mechanical properties as well as durability of the concrete.
- It makes the structure to bear high level static as well as dynamic stress.
- Deformation behaviour of JFRC concrete shows improvement in ductility and reduced shrinkage.
- Impact and fracture toughness of jute fibre concrete are distinctly higher.
- Shrinkage cracks can be eliminated.
- It enhances wear resistance properties of concrete.
- As it absorbs water hence it can be enhance the process of hydration of cement.
- It enhances the ductility of concrete.

To estimate the mechanical properties of fibres, various tests need to be carried out. The three points bending flexural test provides values for the modulus of elasticity in bending, flexural stress, flexural strain and the flexural stress-strain response of the material. The main advantage of a three point flexural test is the ease of the specimen preparation and testing. However, this method has also some disadvantages, the result of the testing method are sensitive to specimen and loading geometry and strain rate. Loading pattern of three point bending test are shown in Figure 2



Figur 2. Beam under three point bending

In case of dynamic loading the term fatigue come which means weakening of a material caused by repeatedly applied loads. It is the progressive and localized structural damage that occurs when a material is subjected to cyclic loading. The nominal maximum stress values that cause such damage may be much less than the strength

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of the material typically quoted as the ultimate tensile stress limit, or the yield stress limit. Fatigue occurs when a material is subjected repeated loading and unloading. If the loads are above a certain threshold, microscopic cracks will begin to form at the stress concentrators such as surface, persistent slip bands and grain interfaces. Eventually a crack will reach a critical size, the crack will propagate suddenly, and the structure will fracture. The hysteresis behaviour can be studied from the load verses displacement curve and the energy dissipation, stiffness degradation can be interpreted. Pattern of cyclic loading are shown in Figure 3

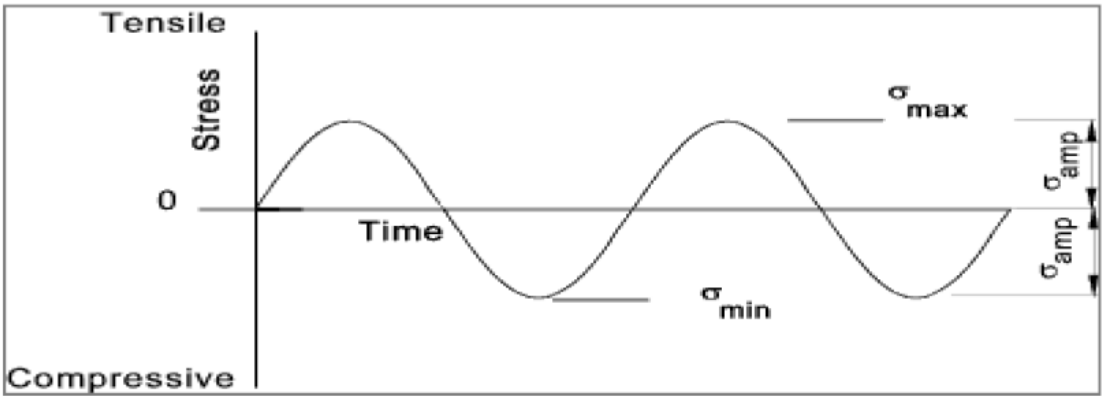

Figure 3. Cyclic Loading pattern

2. LITERATURE REVIEW

However, extensive research has been carried out to know the characteristics of concrete structures under cyclic loading. Various fibres are also used to improve the concrete properties and strength under static and cyclic loading. The use of Jute fibre for strengthening structural properties are well documented, but the effect of these fibre as accumulated on structural behaviour under cyclic loading is yet to get into deep engineering notion. This literature review discusses the technique of structural improvement by using the fibres under static and cyclic loading. This paper also presents the review on the numerical studies of different members using finite element software ANSYS. In the work of M.A.AZIZ and M.A.MANSUR (1) various properties of Jute fibre are studied i.e. given in tabular form:

Table:1 Properties of Jute Fibre

Sl. No	Properties	Ranges
1	Fibre length(mm)	180-800
2	Fibre diameter(mm)	0.10-0.20
3	Bulk density(kg/m^3)	120-140
4	Specific gravity	1.02-1.04
5	Modulus of elasticity (KN/mm^2)	250-350
6	Ultimate tensile strength (N/mm^2)	26-32
7	Elongation at fracture (%)	2-3
8	Water absorption (%)	25-40

Kukreja et.al conducted some experiments and reported that based on the results of three methods such as split tensile test, direct tensile test and flexural test. The split tensile test was recommended for the fibrous concrete. Here also increase in tensile strength and post cracking strength, toughness were reported.

Tensile strength of SFRC was studied by researcher namely S.Ghosh, C.Bhattacharya and S.P Roy and reported as inclusion of suitable short steel fibres increases the tensile strength of concrete even in low volume fractions. optimum aspect ratio was found as 80 and the maximum increase in tensile strength was obtained as 33.14% at a fibre content of 0.7% by volume. Also it was reported that cylinder split tensile strength gave more uniform and consistent results than the modulus of rupture test and direct tension test.

Stress-Strain characteristics of steel fibre reinforced concrete under compression were studied by P.Sabapathi and H.Achyutha .Cube compressive strength and initial tangent modulus of elasticity were obtained and equation of stress-strain relation was also proposed.

M.C. Nataraja et.al have conducted for a study on steel fibre reinforced concrete under compression. Here the behaviour of steel fibre reinforced concrete under compression for cylinder compressive strength ranged from

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30 to 50 N/mm2.The effect of fibre addition to concrete on compressive strength was studied. It was concluded that the addition of fibres increases the compressive strength and toughness.

Sachan and rao studied on behaviour of Fibre Reinforced Concrete Deep Beams. The addition of steel fibres to concrete results in a significant increase in ultimate strength of deep beams. It is also observed that the failure of fibre reinforced concrete beams was more ductile and gradual compared with the failure of plain and reinforced concrete beams.

However a detailed literature study is presented here about the jute fibre and its composite. The distinctive properties of jute fibre reinforced concrete improve tensile and bonding strength, greater ductility, greater resistance to cracking and hence improved impact strength and toughness .thus recent research efforts have been focused in the use of jute fibres, which has got many advantages as well studies on application of jute fibres as a civil engineering construction material were observed in limited literature.

For example, studied have been conducted by Mansur and Aziz on jute fibre reinforce cement composite where test result indicated that a substantial increase in tensile strength, flexural strength and impact strength could be achieved by the inclusion of short jute fibre in cement based matrices. It has also been found that the flexural toughness of the composite could be improved significantly by using jute fibres. However the presence of fibre in composite has very little influence on the compressive strength and also on the young's modulus in tension and compression. Ramaswamy et.al had studied the behaviour of concrete reinforced with jute, coir and bamboo fibre and concluded that these vegetable fibres can be used in a manner similar to other fibre. Improvement in impact strength of over 25% and increased ductility under static loading and considerably lower shrinkage of the order of 50% to 70% compared to those of plane concrete. Comparative study of different fibres on impact test as well as ductility tests are shown in figure 4 and table1. Similarly Aziz et al. studied the mechanical properties of cement paste composites for different lengths and volume fractions of Jute fibre. The authors concluded that the tensile strength and modulus of rupture of cement paste increased up to a certain length and volume fraction; and further increase in length or volume fraction decreased the strength of composite.

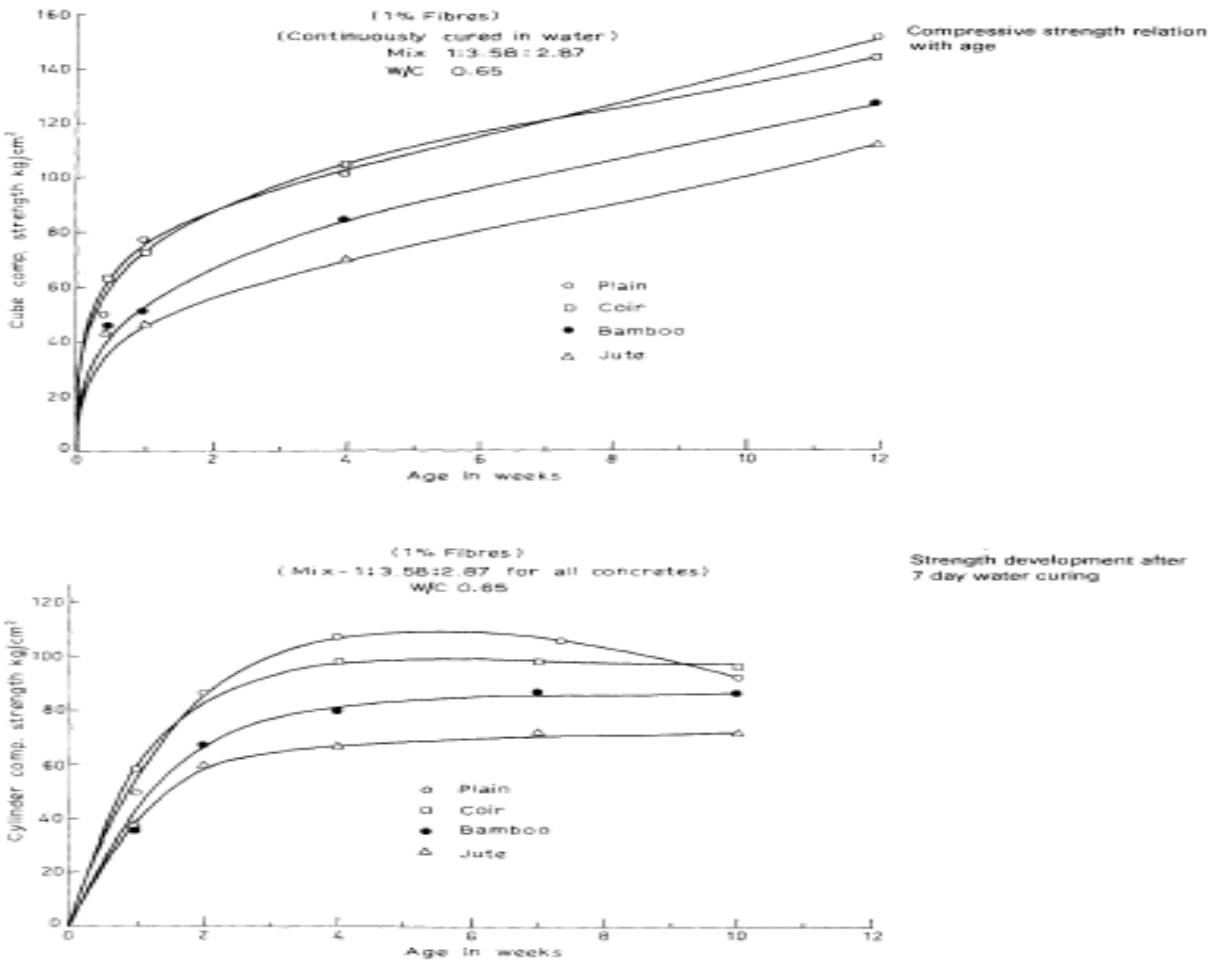

Figure 4. Comparative study on different vegetable fibre(Source.Ramaswamy.et.al,1983)

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Table 2.Impact test results of different fibre(Source-Ramaswamy et.al,1983)

	Average impact energy (kg cm) at first crack on virgin specimens		No. of successive blows for failure	
Type of concrete	slabs	beams	slabs	beams
Plain 0% fibres	240	55	2	3
Jute 1% fibres	290	68	5	5
Bamboo 1% fibres	275	61	3	3
Coir 1% fibres	290	68	4	4
Coir ½% fibres	270	61	4	3

Note: Slab specimens 300 × 300 × 25 mm were simply supported at all four edges and beam specimens 300 × 100 × 25 mm were simply supported only at two opposite short edges.
Each value indicated in the table represents the mean of six specimens.
Weight of drop ball: 5 kg for slabs and 1 kg for beams.
Height of fall: 480 – 580 mm.

Mansul and Aziz reported the use of randomly distributed Jute fibre reinforced cement composites. The studied parameters were the length of fires having lengths (12, 18, 25 and 38 mm), fibre volumes (0, 1, 2, 3 and 4%) and different properties like tensile, flexural, compressive and impact strength of jute fibre reinforced cement paste and mortar. They concluded that the optimum composite was a composite with a fibre length of 25 mm, a fire volume fraction of 2-3%. Cost comparison revealed that this composite was substantially cheaper than the locally available materials.

Choudhury et al. investigated on ductility emphasizing size effect for plain and Retrofitted Beam-Column joint under cyclic loading. Four types of specimens, namely, Beam-column joint with beam weak in shear: control, Beam-column joint with column weak in shear: control, Beam-column joint with beam weak in shear: retrofitted and Beam-column joint with column weak in shear: retrofitted were considered. Cyclic displacement was applied to all the specimens with the help of hydraulic dynamic actuators. Displacement controlled load with a frequency of 0.025Hz was applied to the test specimens. In this paper it was observed that displacement ductility and ultimate load carrying capacity due to retrofitting increases as the specimen size decreases. Large specimen has the least value and small specimen has the largest value. Both displacement ductility and ultimate load carrying capacity followed the principle of size effect for both control and retrofitted specimens. Choudhury et al. examined on energy dissipation with emphasize on size effect for plain and Retrofitted Beam-Column joint under cyclic loading. Two categories of specimens, viz. beam-column joint with beam weak in shear and beam-column joint with column weak in shear along with their corresponding retrofitted specimens were considered. In this paper it was observed that energy dissipation and ultimate load carrying capacity due to retrofitting increases as the specimen size decreases. Both energy dissipation and ultimate load carrying capacity followed the principle of size effect for both control and retrofitted specimens. Energy dissipation per unit volume also increased as the specimen size decreased. Filiatrault et al. evaluates the structural performance under seismic loading, use of natural fibre has been the subject of many research projects in the last recent. Energy dissipation capacity has been used as a measure of the ability of a structural member to withstand cyclic inelastic loading.

Will et al. performed finite element method at university of Toronto, to predict behaviour of structural member. In their work, they were using plane stress rectangular element as a concrete and steel reinforcement. Spring element was used to stimulate between concrete and steel. The author assumed that concrete and steel had linear elastic behaviour and bond slip-relationship exist. They compared finite element analysis result and experimental result, and they conclude that the proposed finite element analysis was able to predict behaviour of the test specimen.

Fillippou et al. made a finite element model to study monotonically loaded reinforced concrete structure. This model was capable of representing crushing and cracking of concrete. They proposed improve model based on cracking criterion, it was derived from fracture mechanics principles. Again they developed a new reinforcing

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steel model, which was embedded inside a concrete element and could account for the effect of bond slip. They performed correlation studies between analytical and experimental result.

Vollum performed numerical study on the behaviour of RC structural member using finite element software ANSYS. In his work, he investigated regarding varying the element size, shear transfer coefficient for open cracks, modelling of reinforcement and load step and convergence criteria.

William and Warnke made a model for analyse triaxial behaviour of concrete using finite element software ANSYS. In their work concrete was modelled using solid65 which has 8 nodded brick element and steel reinforcement was modelled by link elements that were connected to the nodes solid elements.

Choudhary studied on size effect of RC and retrofitted beam column joint using numerical approach. In this work detailed numerical stimulation has been carried out for the purpose of evaluation of appropriate retrofitting strategies using ANSYS software. Both strength based as well as fracture mechanics based criteria are in the identification of failure mode of a structure. The possible modes of failure of beam-column joint have been examined .From the literature review, finite elements analysis served as a very good tool for analysis of beam.

CONCLUSION

Among all the natural fibre, Jute fibre appears to be a promising fibre due to its good mechanical properties. As it is most affordable natural fibre and its superior resistance to cracking and crack propagation. It is clearly seen from the literature that the behaviour of beam is affected by the properties of core concrete. Ductility is desirable in reinforced concrete frames under seismic loading. Ductility is generally achieved by providing closely spaced horizontal ties, but this causes difficulties in placing concrete in densely reinforced portions resulting in bad concreting and heavy weight of structure. To avoid such closely spaced stirrups, confinement characteristics of core concrete has to be improved, which increases the ductility of the core concrete. In this respect, jute fibre reinforced concrete (JFRC) which posses ductility, toughness and tensile strength more than the plain conventional concrete can be considered to replace the plain concrete .It is expected that use of JFRC can eliminate partially or fully the ties ,thus avoiding the congestion of reinforcement. Also there are not lot of cyclic study has been done so far on jute fibre reinforce concrete (JFRC) beam. Hence there is lot of scope for researcher to work in this area.

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BLUE BRAIN - "THE WORLD'S FIRST VIRTUAL BRAIN"

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ABSTRACT
BLUE BRAIN is the name of the world's first virtual brain which means, a machine that can function as human brain. Today, scientists are in research to create an artificial brain that can think, respond, take decision, and store anything in memory. The main aim of this research is to upload human brain into machine. So that man can think and take decision without any effort. After the death of the body, the virtual brain will act as the man. So, even after the death of a person we will not lose the knowledge, intelligence, personalities ,feelings and memories of that man that can be used for the development of the human society.

Keywords: Blue Brain, Human Brain, Knowledge Sharing, Artificial Brain.

INTRODUCTION

No one has ever understood the complexity of human brain. It is complex than any other circuits in the world .To understand Blue Brain first of all we have to understand that why
we need blue brain?

- To upload contents of the natural brain into it.
- To keep the intelligence, knowledge and skill of any person forever.
- To remember things without any effort.

But the big question in front of all is it really possible to create Blue Brain? Yes, now it is possible The IBM is now developing a virtual brain known as the Blue brain. In near years, this would be the first virtual brain of the world.

VIRTUAL BRAIN OVERVIEW

Reconstructing the brain piece by piece and building a virtual brain in a supercomputer—these are some of the goals of the Blue Brain Project. The virtual brain will be an exceptional tool giving neuroscientists a new understanding of the brain and a better understanding of neurological diseases. The Blue Brain project began in 2005 with an agreement between the EPFL and IBM, which supplied the BlueGene/L supercomputer acquired by EPFL to build the virtual brainBlue Brain is a resounding success. In five years of work, Henry Markram's team has perfected a facility that can create realistic models of one of the brain's essential building blocks. This process is entirely data driven and essentially automatically executed on the supercomputer. Meanwhile the generated models show a behavior already observed in years of neuroscientific experiments. These models will be basic building blocks for larger scale models leading towards a **complete virtual brain**.

HOW IT WILL WORK

First, it is helpful to describe the basic manners in which a person may be uploaded into a computer. Raymond Kurzweil recently provided an interesting paper on this topic. In it, he describes both invasive and noninvasive techniques. The most promising is the use of very small robots, or nanobots. These robots will be small enough to travel throughout our circulatory systems. Traveling into the spine and brain, they will be able to monitor the activity and structure of our central nervous system. They will be able to provide an interface with computers that is as close as our mind can be while we still reside in our biological form. Nanobots could also carefully scan the structure of our brain, providing a complete readout of the connections between each neuron. They would also record the current state of the brain. This information, when entered into a computer, could then continue to function like us. All that is required is a computer with large enough storage space and processing power.

NATURAL BRAIN VS. SIMULATED BRAIN

Natural Brain	Simulated Brain
INPUT: Through the natural neurons .In the nervous system in our body the neurons are responsible for the message passing. The body receives the input by sensory cells. This sensory cell produces electric impulses which are received by neurons. The neurons transfer these	**INPUT**: Through the silicon chips or artificial neurons .In a similar way the artificial nervous system can be created. The scientist has created artificial neurons by replacing them with the silicon chip. It has also been tested that these neurons can receive the input from the sensory

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electric impulses to the brain**.**	cells. So, the electric impulses from the sensory cells can be received through these artificial neurons**.**
INTERPRETATIPON : By the different states of the neurons in the brain**.** The electric impulses received by the brain from neurons are interpreted in the brain. The interpretation in the brain is accomplished by means of certain states of many neurons.	**INTERPRETATION:** By the set of bits in the set of register. The interpretation of the electric impulses received by the artificial neuron can be done by means of registers. The different values in these register will represent different states of brain.
OUTPUT : Through the natural neurons	**OUTPUT:** Through the silicon chip.
PROCESSING : Through arithmetic and logical calculations	**PROCESSING :** Through arithmetic and logical calculation and artificial intelligence.
MEMORY : Through permanent states of **neurons.** There are certain neurons in our brain which represent certain states permanently. When required, this state is represented by our brain and we can remember the past things. To remember things we force the neurons to represent certain states of the brain permanently or for any interesting or serious matter this is happened implicitly.	**MEMORY:** Through secondary memory**.** It is not impossible to store the data permanently by using the secondary memory. In the similar way the required states of the registers can be stored permanently and when required these information can be received and used.

REQUIRED COMPUTER HARDWARE

The primary machine used by the Blue Brain Project is a Blue Gene supercomputer built by IBM. This is where the name "Blue Brain" originates from. IBM agreed in June 2005 to supply EPFL with a Blue Gene/L as a "technology demonstrator". The IBM press release did not disclose the terms of the deal. In June 2010 this machine was upgraded to a Blue Gene/P. The machine is installed on the EPFL campus in Lausanne (Google map) and is managed by CADMOS (Centre for Advanced Modelling Science). The computer is used by a number of different research groups, not exclusively by the Blue Brain Project. In mid-2012 the BBP was consuming about 20% of the compute time. The brain simulations generally run all day, and one day per week (usually Thursdays). The rest of the week is used to prepare simulations and to analyse the resulting data. The supercomputer usage statistics and job history are publicly available online - look for the jobs Labelled as “C-BPP”.

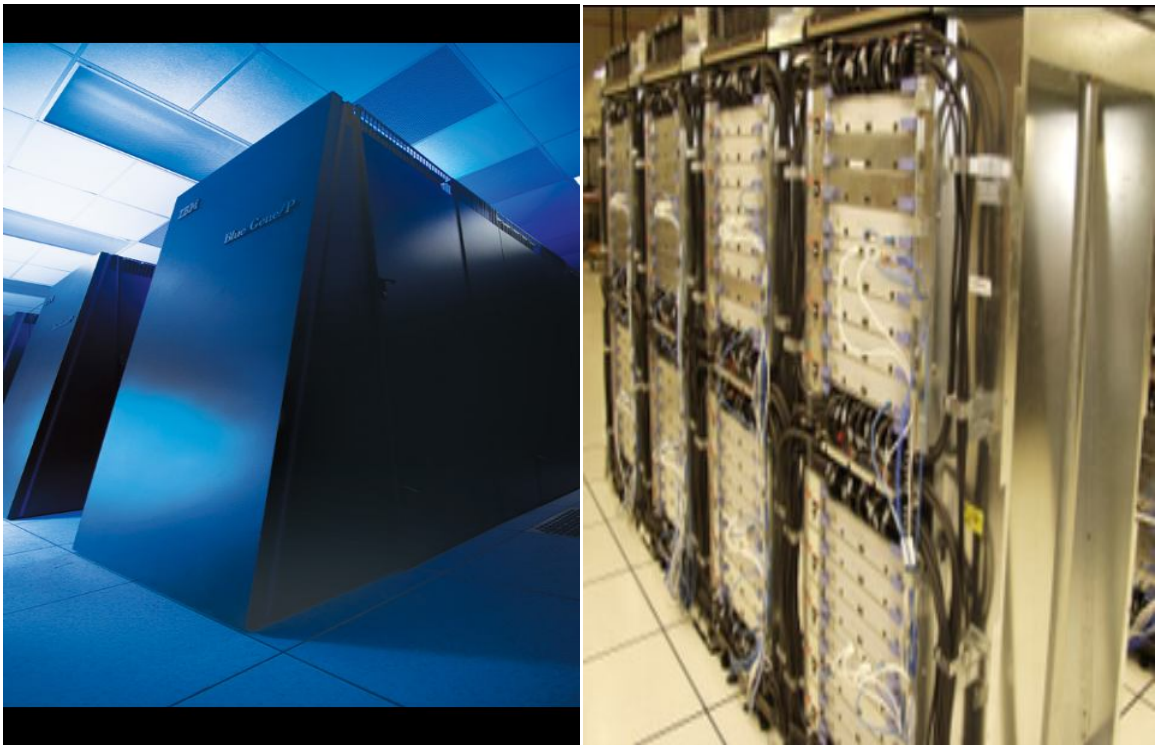

Fig1: Blue Gene/P

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BLUE GENE /P TECHNICAL SPECIFICATIONS:

1.4096 quad -core nodes
2.Each core is a Power Pc 450, 850 MHz
3.Total 56 teraflops,16 terabytes of memory.
4. Four racks ,one row,wired as a 16x16x16 3D torus.
5.One PB of Disk space,GPFS parallel file system.
6.Operating system:Linux SuSE SLES10.

This machine peaked at 99th fastest supercomputer in the world in November 2009

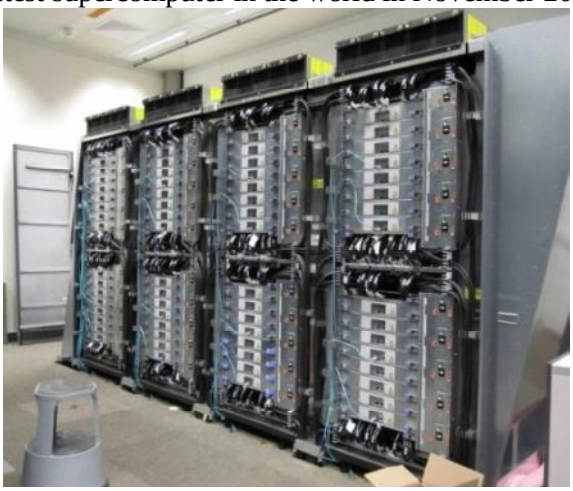

Fig1.1. Blue Brain storage Rack

THE BLUE GENE/L SUPERCOMPUTER

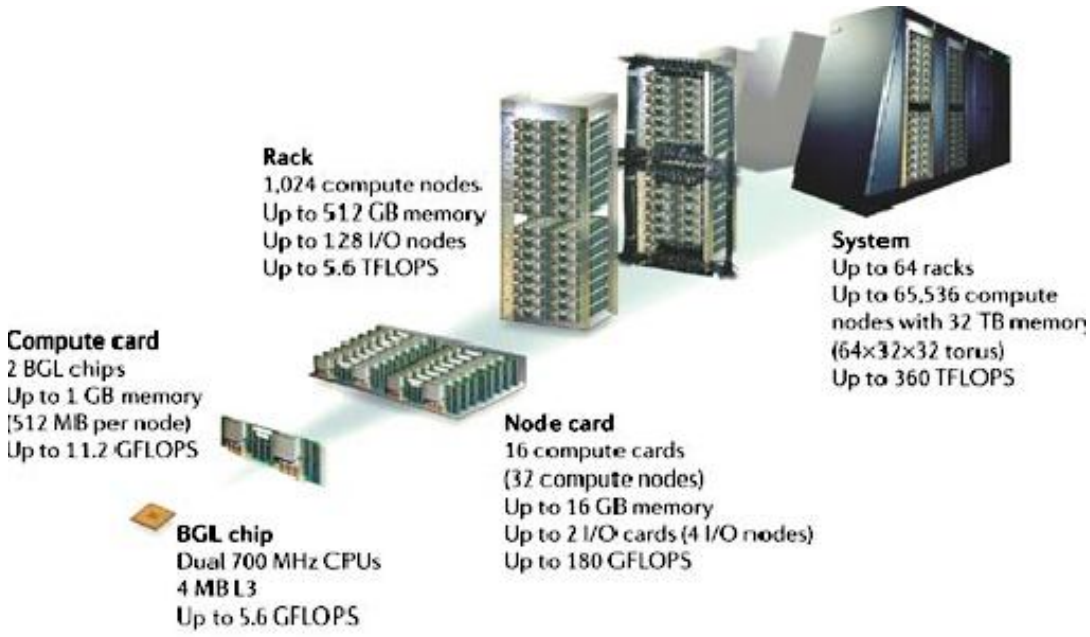

Fig:2-The Blue Gene/L supercomputer architecture

UPLOADING HUMAN BRAIN

The uploading is possible by the use of small robots known as the Nanobots .These robots are small enough to travel throughout our circulatory system. Traveling into the spine and brain, they will be able to monitor the activity and structure of our central nervous system. They will be able to provide an interface with computers that is as close as our mind can be while we still reside in our biological form . Nanobots could also carefully scan the structure of our brain, providing a complete readout of the connectionsThis information, when entered into a computer, could then continue to function as us. Thus the data stored in the entire brain will be uploaded into the computer.

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MERITS AND DEMERITS

With the blue brain project the things can be remembered without any effort, decisions can be made without the presence of a person. Even after the death of a man his intelligence can be used. The activity of different animals can be understood. That means by interpretation of the electric impulses from the brain of the animals, their thinking can be understood easily. It would allow the deaf to hear via direct nerve stimulation, and also be helpful for many psychological diseases.Due to blue brain system human beings will become dependent on the computer systems. Technical knowledge may bemisused by hackers; Computer viruses will pose an increasingly critical threat. The real threat, however, is the fear that people will have of new technologies. That fear may culminate in a large resistance. Clear evidence of this type of fear is found today with respect to human cloning.

WHAT CAN WE LEARN FROM BLUE BRAIN?

Detailed, biologically accurate brain simulations offer the opportunity to answer some fundamental questions about the brain that cannot be addressed with any current experimental or theoretical approaches. Understanding complexity At present, detailed, accurate brain simulations are the only approach that could allow us to explain why the brain needs to use many different ion channels, neurons and synapses, a spectrum of receptors, and complex dendritic and axonal carbonizations.

Applications:

1. Gathering and Testing 100 Years of Data.
2. Cracking the Neural Code.
3. Understanding Neocortical Information Processing.
4. A Novel Tool for Drug Discovery for Brain Disorders.
5. A Global Facility.
6. A Foundation for Whole Brain Simulations.
7. A Foundation for Molecular Modeling of Brain Function.

CONCLUSION

In conclusion, we will be able to transfer ourselves into computers at some point. Most arguments against this outcome are seemingly easy to circumvent. They are either simple minded, or simply require further time for technology to increase. The only serious threats raised are also overcome as we note the combination of biological and digital technologies. While the road ahead is long, already researches have been gaining great insights from their model. Using the Blue Gene supercomputers, up to 100 cortical columns, 1 million neurons, and 1 billion synapses can be simulated at once. This is roughly equivalent to the brain power of a honey bee. Humans, by contrast, have about 2 million columns in their cortices. Despite the sheer complexity of such an endeavor, it is predicted that the project will be capable of this by the year 2023.

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RESEARCH ISSUES IN OUTLIER MINING: HIGH-DIMENSIONAL STREAM DATA

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ABSTRACT
Outlier detection is an important research problem in data mining that aims to discover useful irregular patterns in large data sets. There exist emerging applications of data streams that require Outliermining, such as network traffic monitoring, web click analysis, weather forecasting. However, in high dimensional space, the data is sparse and the notion of proximity fails to retain its meaningfulness. In this paper, we discuss new techniques for outlier detection which find the outliers by studying the behaviour of projections from the data set.

INTRODUCTION
"No universally accepted definition!!!
Hawkins (1980) –An observation (few) that deviates (differs) so much from other observations as to arouse suspicion that it was generated by a different mechanism. Barnett and Lewis (1994) - An observation (few) which appears to be inconsistent (different) with the remainder of that set of data. "

Outlier detection is an outstanding data mining task, referred to as outlier data mining that has a lot of practical applications in many different domains. Outlier mining can be defined as follows: A data stream is an ordered sequence of items that arrives in timely order. Different from data in traditional static databases, data streams are continuous, unbounded, usually come with high speed and have a data distribution that often changes with time. One example application of data stream outlier mining is to estimate outlier in sensor networks. The rest of the paper is organized as follows. Next section gives an overview of the existing approaches to outlier mining. Section gives definitions and properties necessary to introduce the algorithm and an overview of space filling curves. Section presents the method, provides the complexity analysis and extends the method when the data set does not in main memory.

STREAM DATA MODELS
2.1 Stream Data Processing Architecture (SDPA)

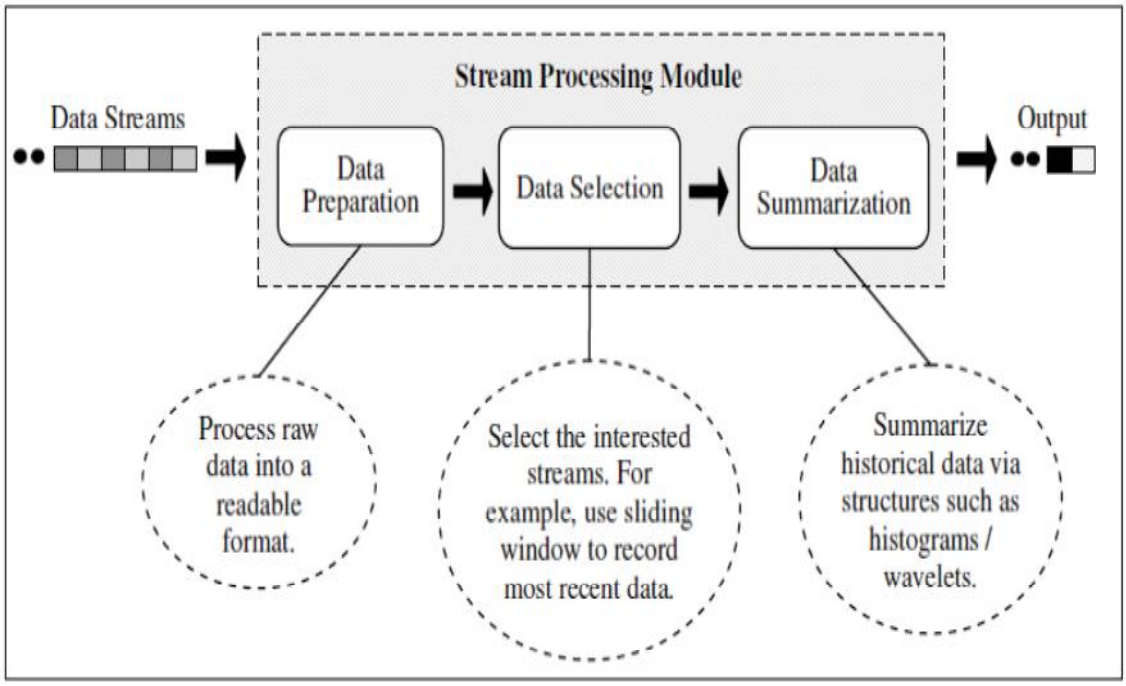

Figure 1. SDPA Architecture

SDPA works in three phases:
1. Data Preparation
2. Data Selection
3. Data Summarization

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2.1.1. Data Preparation

Data preparation includes data formatting and cleaning. Incoming data arrive in raw formats in which many cases cannot be efficiently handled by the DSMS. Hence, an efficient method must be used to transform the data into a format that can be rapidly processed by the remaining subsystems.Data cleaning is necessary to reduce errors and computational overhead of the results. A typical data cleaning task would be to remove invalid data items (e.g., remove negative values when non-negative values are expected) using a simple filtering based method.

2.1.2. Data Selection

The primary goal of data selection is to reduce the size of the total data. Previous works have proposed the following three main methods to address this issue:

1) Sliding window
2) Sampling
3) Load shadding

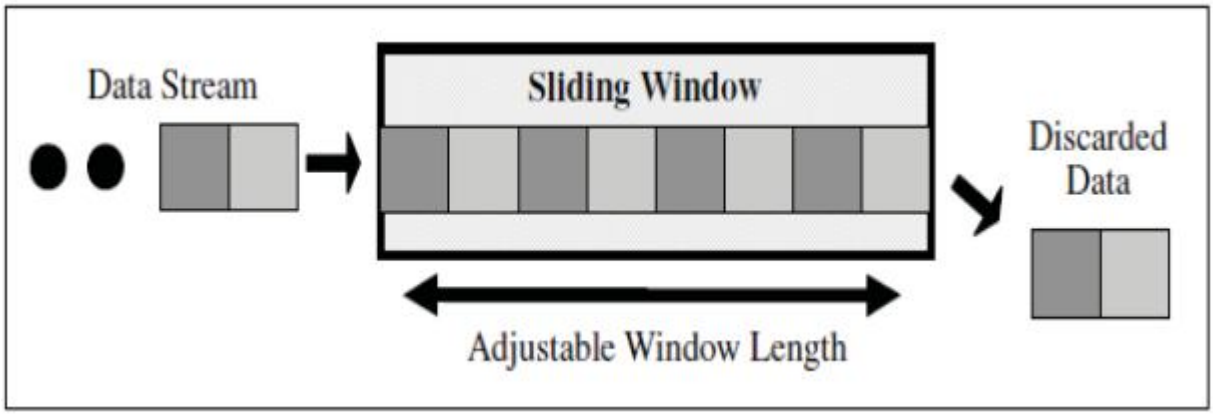

Figure 2. Diagram showing sliding window model [1]

1) **Sliding window:** It's a window of size *L* (can be dynamic) to store *L* most recent data elements. The motivation behind this data structure is the assumption that recent data carry greater significance over old data.

2) **Sampling:** It's a process of assigning a probabilistic value to each data element under selection.The disadvantage is that potentially importantdata items (e.g., outliers) may be missed and hence sampling may not be directly applicable to outlier detection task.

3) **Load Shadding:** It utilizes a similar scheme to sampling except that certain sequence sets of data elements are discarded. This approach has demonstrated its applicability in stream environment where the incoming data.

Motivation: Data often (always) contain outliers. Statistical methods are severely affected by outliers. We have to identify OUTLIER (s) accurately!!!

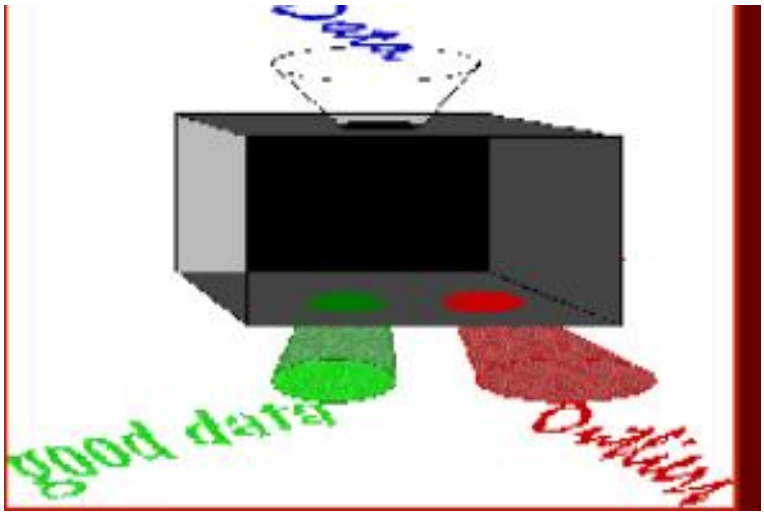

Figure 3: Outliers

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OUTLIERS IN MULTIVARIATE DATA

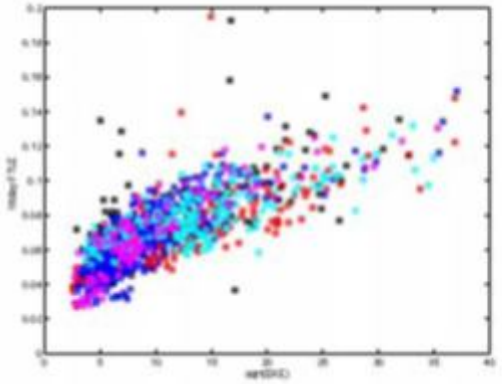

Figure 4.1: Visual tools

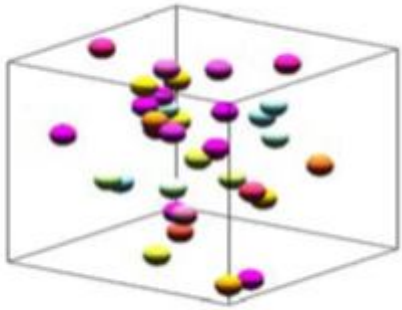

Figure 4.2: Scatter plots and 3D scatter plots.

DEPTH BASED METHOD

Depth is a quantitative measurement of how central a point is with respect to a data set.Mahalanobis depth; spatial Depth; halfspace depth; projection depth, zonoid depth.

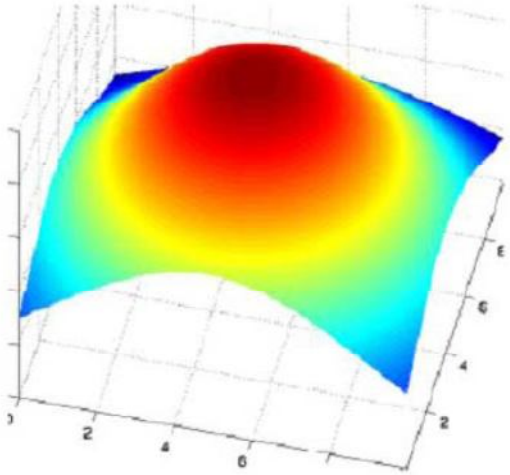

Figure 5: Depth based method

HOW TO SELECT THE WINDOW SIZE IN STREAM DATA PROCESSING

Dealing with data whose nature changes over time is one of the core problems in data mining and machine learning. In this chapter we discuss ADWIN, an adaptive sliding window algorithm, as an estimator with memory and change detector with the main properties of optimality.

We study and develop also the combination of ADWIN with Kalman filters. However, most works along these lines that we know the heuristics and have no rigorous guarantees of performance.

Some works in computational learning theory describe strategies with rigorous performance bounds, but to our knowledge they have never been tried in real learning/mining contexts and often assume a known bound on the rate of change.

A FEW APPLICATIONS OF OUTLIER DETECTION

1. Satellite image analysis.
2. Loan application processing.
3. Motion segmentation.
4. Detection of unexpected entries in databases.
5. Structural defect detection.
6. Discovery of astronomical objects.
7. Fraud detection.
8. Network intrusion detection.

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ADVANTAGES

1) Easily adaptable to on-line / incremental mode suitable for anomaly detection from temporal data.
2) Reduce the set of each iteration.
3) No need to be supervised.

DISADVANTAGE

1) They are not optimized for outlier detection. The outlier detection criteria are implicit and cannot easily be inferred from the clustering procedures If normal points do not create any clusters the techniques may fail.
2) In high dimensional spaces, data is sparse and distances between any two data records may become quite similar.
3) Computationally expensive.

CONCLUSION

In this paper we discussed the issues that need to beConsidered when designing a stream data association rule mining technique. We reviewed how these issues are handled in the existing literature. We also discussed issues that are application-dependent the current stream data mining methods require users to define one or more parameters before their execution. The method works by finding lower dimensional.

Projections which are locally sparse, and cannot be discovered easily by brute force techniques because of the number of combinations of possibilities of combinations of possibilities. Research in data stream association rule mining is still in its early stage. To fully address the issues discussed in this paper would accelerate the process of developing association rule mining applications in data stream systems.

We may consider to either let users adjust online or let the mining algorithm auto-adjust most of the key parameters in association rule mining, such as support, confidence and error rate. .

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INDUSTRIES DECISION MAKING IN SOFTWARE DEVELOPMENT: TEST DRIVEN DEVELOPMENT STRATEGY

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ABSTRACT

In the recent past, the agile methodologies have emerged as one of the most efficient implementations in the modern business environment of software development. Especially Extreme Programming (XP), which is one of the most popular and widespread agile methodologies, proves the emergence of Test Driven Development (TDD). This being relatively new methodology is gaining momentum as a primary means of developing software both in industry and academics. It is based on formalizing the test and to write such a code that can pass the test, which is contrary to process software development. Thus, TDD can be discussed as a technique emphasizing the role of unit testing in improving the quality of the software products. In essence, despite its name, TDD is not a testing strategy, although it can help with building a testing suite. It is actually a code design strategy that helps spotting various defects and even design flaws that testing might not normally uncover.

However, the adoption of TDD faces many challenges due to a good deal of discipline required on the programmer's part. Also it doesn't fit every situation, so developers and programmers have to decide at every step when to apply it and when something else. Furthermore, there has been anticipation over the increase in time, cost, effort etc. required writing the unit tests. Partial or no documentation also brings difficulties for the developers in understanding the software. Overall this leads to programmers being divided about the adoption of TDD approach.

To overcome some of these problems, a new approach is suggested removing inherent complexities. The user requirements are fragmented up to their atomic level in the initial stage itself, thus enabling better understanding of the software to be developed which gives several benefits. Initial stage documentation enables developers to know the various inputs, outputs, complexity, purpose and time required for various fragmented requirements, thus yielding a better understanding of the software product. The test suite thus obtained is more reliable, reusable and extendable. Initial tracing of errors further reduces the cost. The extent to which the software performs its intended functions gets increased thus yielding a more correct, simple and precise software to the requirements. An often-cited tenet of software engineering, in concert with the cost of change, is that the longer a defect remains in a software system the more difficult and costly it is to remove. With TDD, defects are identified very quickly and the source of the defect is more easily determined. Thus, the suggested approach in TDD gives better software where complexities of software development are removed.

Keywords: Test-Driven Development (TDD), Software Engineering, Software Quality, Software Development, Extreme Programming.

1. INTRODUCTION

Agility has become today's buzzword when describing a modern software process. Agile software engineering combines a philosophy and a set of development guidelines. The philosophy encourages customer satisfaction and early incremental delivery of software; small, highly motivated project teams; informal methods; minimal software engineering work products; and overall development simplicity. The development guidelines stress delivery over analysis and design (although these activities are not discouraged), and active and continuous communication between developers and customers. Software engineers and other project stakeholders (managers, customers, end-users) work together on an agile team: a team that is self-organizing and in control of its own destiny. An agile team fastens communication and collaboration among all who serve on it.

It encourages team structures and attitudes that make communication among team members, between technologists and business people, between software engineers and their managers more facile. Effective methodologies for managing software risk and producing quality software are beginning to take root in corporate world. For instance, the practices under the umbrella of "Agile Methodologies" are winning converts. Widespread anecdotal evidence and practitioners experience testify to "Agile" practices producing an order of magnitude or more reduction in bugs over traditional methods. In particular, among these practices, Test-Driven Development (TDD) stands out. According to a research conducted in 2001, XP has the largest (38%) market share among all agile methodologies [4, 17]. Test Driven Development (TDD)[18], has gained added visibility recently as one of the control techniques of XP [2, 7, 8, 14]. It is an opportunistic and disciplined software

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development practice having early reference of use in the NASA Mercury Project in the year 1960's and is being used sporadically for decades [3, 15]. TDD is counterintuitive; it prescribes that test code be programmed before the functional code those tests exercise is implemented. Practicing TDD means designing software such that it can be tested at any time under automation. Designing for testability in TDD is a higher calling than designing "good" code because testable code is *good* code. In fact TDD goes by various names including test-first programming, test-driven design, and test-first design [6].

2. TDD APPROACH IN PRACTICE

In TDD, the typical testing approach is to code, debug, and code some more i.e. in this approach, test cases are written first, before any application code is developed [9, 20]. The developers write code and additional test cases until all the tests pass. An important rule is "If you can't write a test, for what you are to code, then you shouldn't be thinking about coding" [19]. One can say that TDD techniques emphasize the role of unit testing in improving the quality of software products [1]. In essence, despite its name, TDD is not a testing strategy, although it can help with building a testing suite [11]. It is actually a code design strategy that helps spotting various defects and even design flaws that testing might not normally uncover [5, 14]. In TDD, the customer tells the requirement, a test case is made according to that requirement, the developer starts coding and the requirement is not met until the

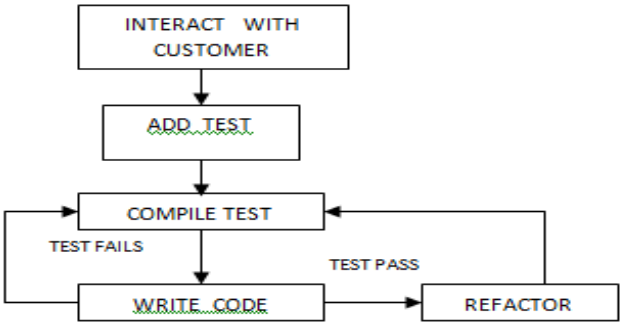

Fig.1: TDD Model

test is done successfully. When one requirement is completed, refactoring process starts which further improves the design and quality, after that another test is made according to the requirement of customer and this process goes on. The model of TDD is shown in Fig.1.Sometimes people new to TDD or who have never been involved with an actual agile project feel that the unit tests form 100% of the design specification but the reality lies in the unit test which forms a bit of the design specification leading to better integration testing. Further, the agile community is very clear about the need for acceptance testing, user testing, system integration testing, and a host of other testing techniques. Uniformly all the team members have to take up the TDD approach but if some people aren't doing so, then either they need to start afresh or need to be motivated for adopting the TDD approach. Some developers are misguided and they feel that incremental unit testing breaks the flow. Fact is that as soon as one starts writing unit tests, the tests are found to define the application in many ways. One's creative work is largely wrapped up in designing and implementing the tests; the application coding becomes a series of manageable steps, incrementally adding small chunks of code to make the new tests pass.

SATISFIED STAKEHOLDERS

Defect rate is just one small measure of quality. With respect to business stakeholders, one finds that they are satisfied, often more delighted, and that they could deliver just they were asked for each iteration. Even those features that competing companies thought were too complex are also implemented through this improved TDD model. Thus, business requirements are captured in a better way, and then code is provided for that, which is a critical reason for the success of corporate world dealing with software development products.

3. REVIEW OF COMPLEXITIES FACED DURING TDD IMPLEMENTATION

In the fast pace business world of today where competition and technology are at their zenith, software development companies need to improve their process standards. As an effort to this, although TDD has gained recent attention, there are very few empirical studies on its effects that one knows of. The word "driven" used in TDD focuses on how TDD informs the analysts and drives them to take various analysis, design and programming decisions. TDD assumes that the software design is either incomplete or at least very pliable and open to evolutionary changes. Only recently researchers started to investigate effectiveness of TDD and other agile practices and less research is available on the broader efficacy of TDD i.e. still TDD is in its infancy stage. So a lot more work needs to be done in this area to make TDD a great success and for its worldwide acceptance. The various shortcomings, which still exist in the TDD model, are briefed below.

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3.1 DOCUMENTATION FOR PROCESS OF SOFTWARE DEVELOPMENT

This technique encourages less documentation, as it does not mark any specified phase for requirement analysis and design [10]. This results in a lot of difficulties for the developers in contrast to traditional process method for software development. Less documentation is also quite problematic in proper understanding of the software, its testing and maintenance. There has always been a need of proper design document on the basis of the requirements of the users. The problems related to less documentation that the software developers and the users face in this TDD model are still to be fully addressed.

3.2 SOFTWARE QUALITY AND PROGRAMMER PRODUCTIVITY

Developers are continuously applying some form of TDD on software processes for several decades, but they got only mixed results on external quality and programmers' productivity and couldn't get the resultant effects. To date, efforts have just been focusing on TDD as a technique to lower defect density, but have not specifically emphasized on software quality and programmer productivity through this approach.

3.3 EXTENSIBILITY AND REUSABILITY

The suite of automated unit test cases obtained via TDD is not so much perfect that it could be a reusable and extendable asset to improve the software system process over the lifetime. The test suite is also unable to form the basis for quality checks and to serve as a quality contract between all members of the team. So there is a need to conduct empirical studies to evaluate TDD's effect on software design, quality and to examine characteristics such as extensibility, reusability and maintainability**.**

3.4 MAINTENANCE COST

TDD cannot be considered as the best approach to software development when it comes to the long-term maintenance costs of the resultant application as the availability of a large number of unit tests does not fully support code refactoring. Also unit tests do not play much role in supporting program understanding as the traditional documentation aids and the tests are not too much maintainable themselves. These are important points that underscore the current lack of objective evidence to support to the benefits of TDD over a product's entire life cycle. Also a vast majority of cost and effort for a product is expended during post development maintenance, so it is critical to know if TDD really produces better results than other software engineering practices. A panel session was also set in which the panelists discussed the impact of TDD on long-term software maintenance costs, including software maintenance, software testing, program redocumentation, program understanding and empirical studies [12]. The desirable outcome from this inaugural panel session was a motivational agreement to develop a community of interested researchers willing to work on this problem and further to evaluate the effects of TDD.

3.5 EXTERNAL SOFTWARE DESIGN QUALITY

The experiments are being conducted both in industry and in academia to see the effects of TDD, but for some programmers transitioning to the TDD mindset is difficult and some of them are unsatisfied due to the statistical results. The survey results of experiment showed that 47% programmers thought of TDD as a practice to promote simpler design [8].

3.6 INTERNAL SOFTWARE DESIGN QUALITY

None of studies to date, except one examined the internal quality of software developed with TDD [13]. Perhaps this is because external quality is easier to measure by counting external test pass rates while internal quality is somewhat more subjective and prone to much debate. It was further concluded that a broader base of programmers will reveal the validity of the observations reported in this work. Thus, better focus on the effects of TDD on internal design quality with some additional concepts will better emphasize the essence of TDD as a design mechanism and will help dispel misconceptions of TDD **as** just a testing approach**.**

3.7 PRODUCTION COST

Sometimes during the software development process, the unfragmented user requirements make the developer getting stuck into hours of debugging. The code doesn't pass the test and the bug is not removed. This is where the cost increases and it may even cross the cost of traditional process development life cycle models. This issue of cost still needs a lot of things to be addressed and to be done on this topic.

3.8 CODE COVERAGE

The transition from unit to system level testing is also challenging for TDD [20]. Low-level tests that pass trivially can provide significant code coverage, giving a false sense of security in the code's quality. In addition, product features often span components, creating feature interdependencies. For that reason, a better strategy is to exercise code according to feature. Code coverage from such tests might be a better measure of quality.

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Another difficulty with TDD is maintaining test code. TDD results in a high ratio of test to production code, so a system change is likely to affect the test code as well.

4. SUGGESTED APPROACH OF TDD REMOVING COMPLEXITIES

The suggested approach helps solving above-mentioned complexities to a great extend and provides better understanding of the software problem to be developed further. According to this approach, the developer fragments the requirements to its atomic level before starting the codes, to enable better understanding of the client requirements of the software to be developed. The approach takes this into account and model is given in Fig.2.

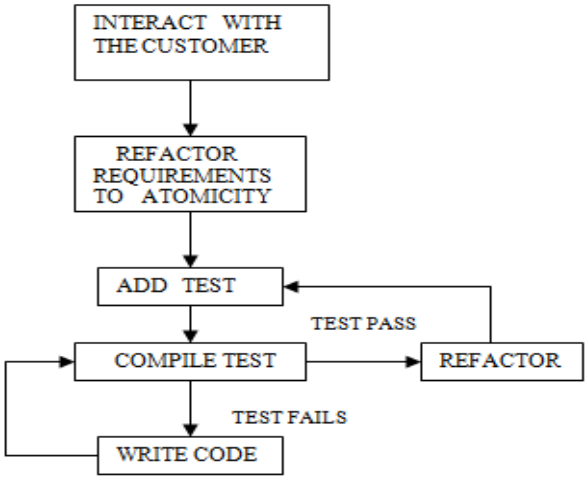

Fig.2: New Suggested TDD MODEL

The fragmented requirements are documented in their atomic level in the initial stage itself, and with each piece of atomic fragmented requirement, each and every related relevant detail is added e.g. various inputs, outputs, purpose, complexity, time, cost etc. i.e. now fragmented requirements have their full documentation with them. This approach certainly provides advantages over the TDD practice being followed.

5. COMPLEXITIES REMOVAL DERIVED FROM THE SUGGESTED APPROACH OF TDD

The suggested TDD model is able to ease out some of the complexities over the already existing one. It marks significant improvement in software quality. Various design aspects like internal and external design are also improved with a better test suite of fragmented requirements. Further, cost and documentation issues are also addressed and show improvement through this approach.

5.1 DOCUMENTATION FOR PROCESS OF SOFTWARE DEVELOPMENT

After the customer gives a requirement, it is documented in a proper way. It tells that how long it will take to complete the task, what are the inputs and outputs, what is the complexity of the specific requirement and time allocated for the requirement. Initial remarks about the requirement are documented properly i.e. what is it, how long will it take to test it, and what will be the cost of its test, etc are revealed. What the test is, how it works, how long it takes to fully test the code and what the cost is, etc details are also revealed. Thus, this approach allows storing all the above-mentioned things along with the tests, thus forming documentation, which will be helpful in understanding the software.

5.2 SOFTWARE QUALITY AND PROGRAMMER PRODUCTIVITY

Breaking down the requirements upon their atomic level increases the chances of identifying defects early and thus leading to better software code quality. Improving the quality of the test suite obtained after following the suggested approach further improves the effectiveness of TDD. Clarity and accuracy of documentation and the conformity of operational environment further get improved.

5.3 EXTENSIBILITY AND REUSABILITY

The test suite obtained improves the design and the testing skills of the software process to be developed, thus enabling the developers to produce a more reliable, reusable and extendable product.

5.4 COST

As the errors are searched in lesser space than the earlier approach, the fragmented requirements here and the test-suite leads to easy and fast tracing of errors. Even if the error is not removed, the process could be repeated recursively to remove it. With this amendment, the cost reduces tremendously.

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5.5 EXTERNAL SOFTWARE DESIGN QUALITY

The software developed in this manner has lower computational complexity and improved external code quality. Further, programmers also report less time involved in developing the code after fragmentation leading to improved programmers' productivity. Thus, it can be considered as an essential strategy yielding such an emergent design.

5.6 INTERNAL SOFTWARE DESIGN QUALITY

The software product thus obtained is easier to modify, enhance and reuse. Thus, productivity and reusability, which serve as indirect measures of internal quality, get improved.

5.7 SOFTWARE DESIGN QUALITY AND RELIABILITY

The extent to which software performs its intended functions gets increased and the chances of failures get reduced. Thus, fragmenting requirements to their atomic level, leading to a more correct, simple and precise software system will increase reliability.

5.8 CODE COVERAGE

Fragmented requirements with properly documented user needs provide a far better test suite. This enables developers to have a better control over the code to be developed, thus providing a better quality product. Thus, by conducting multiple case studies on this suggested approach, the benefits of complexities removed will be better understood in respect of software quality and programmer productivity. This TDD approach could also be incorporated into the undergraduate curriculum in a way to improve students' ability to design and test. This approach could help students enter software organizations with increased discipline and improved software design and testing skills, increasing the software engineering community's ability to reliably produce, reuse and maintain quality software.

6. CONCLUSION

Agility has gained added visibility and interest in the software construction industry in the last few years. It gives a reasonable alternative to conventional software engineering for certain classes of software and certain types of software projects. Extreme Programming (XP) is one of the most popular and widespread agile methodologies where Test Driven Development style has been derived from it and gained importance as a reasonable alternative to conventional software development. It is a relatively new approach to software engineering, involving the iterative construction of test cases that pass the test and then leads to application code. It emphasizes the role of unit testing in improving the quality of software products and has raised a substantial amount of interest among software programmers in the recent past. Researchers started conducting studies on the effectiveness of the TDD practice. Some looked at TDD as a practice to remove defects and examined defect density as a measure of software quality. One of the studies reported a correlation between the number of tests written and productivity. Attempt to provide a mechanism to reduce the cost of testing and to propose some steps in documentation were also made. Although TDD has gained attention among the software programmers, but there are a very few empirical studies available on this topic. Also, some of the programmers are still unaware of this field and some have little hesitation in adopting this new approach. This may be due to some of the complexities, which are faced, in its successful usage. There are no specified phases of requirement analysis and design, which gives rise to very less or even no documentation. Documentation is quite helpful in proper understanding of the software and also for its testing and maintenance. Empirical studies are being conducted continuously on defect density, external code quality etc. The clarity in understanding and application has some hesitations due to inherent complexities.

To solve some of these shortcomings, a new approach has been suggested in this paper. The approach is in fragmentation of the user requirements up to their atomic level in the initial stage itself, thus enabling better understanding of the software to be developed. Initial stage documentation enables developers to know the various inputs, outputs, complexity, purpose and time required for various fragmented requirements, thus yielding a better understanding of the software product. Chances of identifying the defects early increases, leading to better software code quality. The improved test suite provides better design and testing skills of the software to be developed. Better external code and a reduced computational complexity helps providing a software product with improved external design quality. Improved test suite of fragmented requirements increases the chances of catching the errors and leads to reduction in cost. The product thus obtained is more reliable, reusable and extendable thus improving the overall effectiveness of TDD. Therefore, this new approach provides a way to remove some of the complexities already existing in the TDD model. Thus giving a better, practical and simplified approach to the TDD methodology being used recently in software development technique with great many benefits. The encouragement of teamwork and pairing practices in TDD lead to

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programmers sharing a common view of the software. Programmers bring various skills to a team when working together, to build on each other's strengths (e.g. brainstorm or criticize, abstraction skills or analysis/ prediction skills, formalization or an ability to find good examples, etc). TDD also tries to avoid problems of wishful thinking about the quality of software by driving the development with sufficient tests. Thus, all this helps in improving the effectiveness of software industries to a large extend.

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IMPACT OF SOCIAL NETWORKING SITES ON PRESENT TECHNICAL EDUCATIONAL ENVIRONMENT

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ABSTRACT
In the present era, social networking sites like Facebook, What's app, Orkut, YouTube are becoming the centre of attraction among youths. Even every age group is now using these SNS because of their various features that increases social interaction with the whole world. These SNS have great impact on youth as it provides communication to our dear ones. As these SNS are spreading their roots deep in the market, it is also responsible for providing employment, marketing, personal growth and sharing of information In this paper authors are mainly focusing on Technical Educational development of youth through SNS.

Keywords: SNS (Social Networking Sites), Technical education, Social Media Tools.

INTRODUCTION
The world has been changed rapidly by the evolution of technology, and this evolution has resulted the technology as a best medium to communicate as well as exploring the wide area of knowledge through social networking sites. Social networking sites are defined as online community of internet users where different users registered themselves in these sites, create their profiles including their activity, likes, mutual interests and wants to communicate with other users. SNS technology has emerged in past few years, it has now emerged as mass online activity. SNS's were mainly developed as a platform that provides social interaction i.e. allows individual to meet strangers. In past few years when SNS's were newly arrived in the internet, people used to spend maximum part of their time in communicating with their friends acquaintances, but later this huge platform emerged with the features of technical forums, discussions on debatable topics[4] with a pool of opportunities that provided a new and most efficient platform for rise of technical education . The first known or Origin of Social Networking Website is SixDegrees, this site was first issued in 1997 and it was the first site to allow its users to create profile pages and send messages and with the advent of time internet users met MySpace, Facebook and Bebo.

Emerging studies on SNS finds that teenagers are the most prolific users of SNS. They spend a considerable amount of time in checking their id's in social networking sites like Facebook, my space, twitter, what's app etc. Features provided by these SNS like wall post, status update, likes, tagging, tweeting attracts every age groups including youth. SNS are giving a huge contribution in the field of technical education.

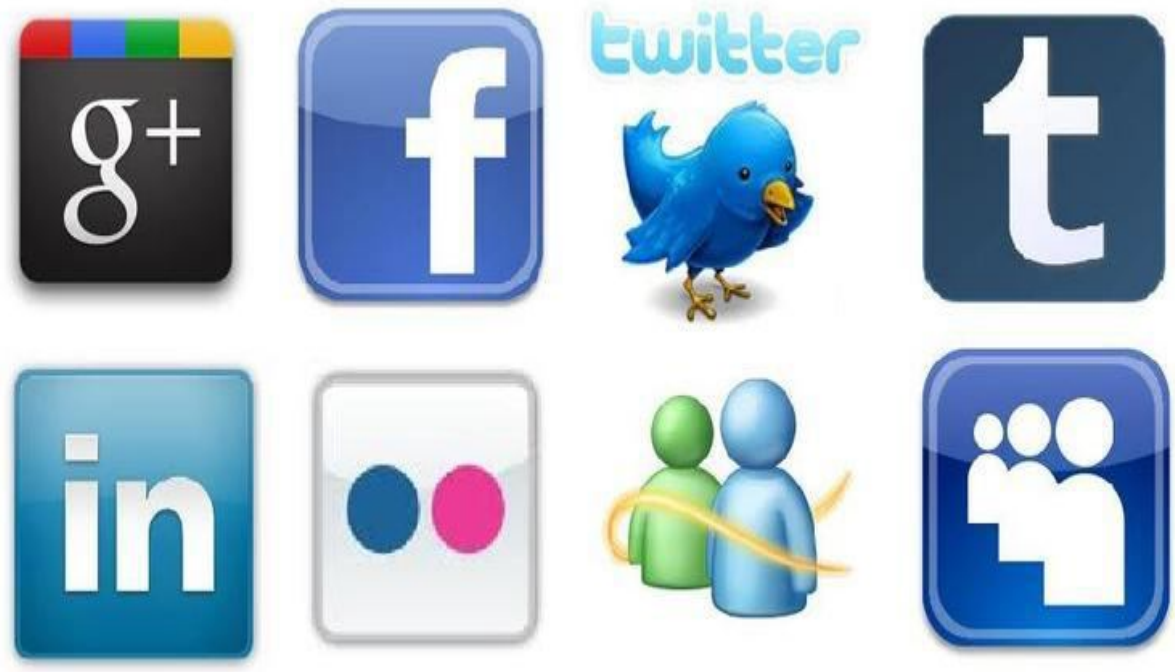

Fig.: Various Social Networking Sites on Internet

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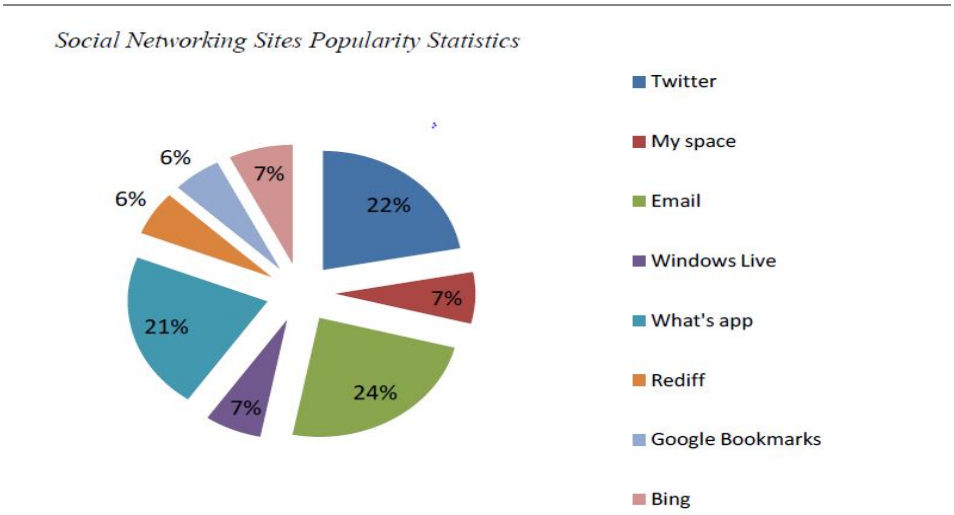
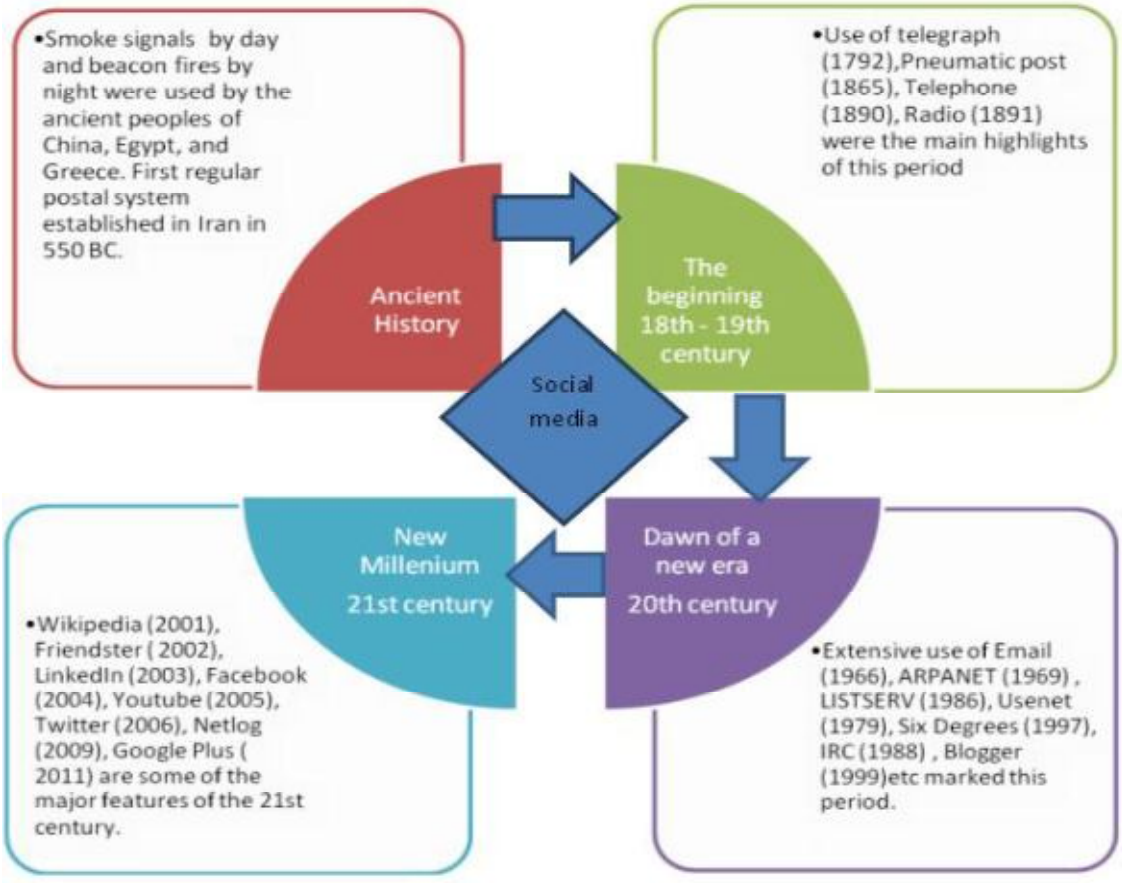


Fig.: Our High Level statistics showing Social Networking Sites Popularity

As per our statistical study through the chart defined in Fig, we can conclude that in the past few years in which SNS has become emerged a lot in the market, Facebook is holding the top position and twitter is getting 2nd most popular social media .

HISTORY OF SOCIAL MEDIA

When we think of social media, the we generally think of facebook and twitter. However, in reality it is more than that. The earliest ways to send messages over long distances were probably both audio and visual. People used to communicate smoke signals by day and beacon fires by night in ancient China, Egypt, and Greece. Drums were used in many parts of the world to extend the range of the human voice for communication as well. The seeds of social media were sown during 550 BC when the regular postal system was established in Iran where horse riders and horse-drawn wagons carried mail. Usually, mail consisted of governmental dispatches and was delivered from one place to another. The evolution of social media can be gauged from Figure



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SIGNIFICANCE OF SNS FOR TECHNICAL EDUCATION

A. Social media constitutes a large amount of educational stuff that plays a vital role in the field of technical education. In the research paper "Online Social Networking Issues Within Academia and Pharmacy Education" published on 2008 has discussed that Facebook is a tool that helps to make good tie up among educational personnel's as well as college mates that helps them directly or indirectly in steeping towards education.

B. The use of online libraries through social networks is also another milestone in the field of technical education by SNS. Activities of youth like tweeting, blogging, instant messaging enhances student involvement. Those students who do not actively participate in class can interact through social networking services by using educational portals, blogs and by contacting with technical professionals. SNS allows participants just in time learning and higher level of engagements as SNS are making learning interactive for students. Interactive learning can change their mind sets towards education and study.

C. SNS are moving towards educational community and forums where technical professionals interact with student's queries. These forums or online technical assistance are becoming boon for students as they are getting knowledge in their form. Students are less prone to formal way of study through books, day by day the new generation is developing smart ways of learning which is making him so dynamic and things or concepts related to their subjects are getting inter related with the idea of using social networking sites as a revolutionary way of studying.

D. The concept of e learning in technical education is truly served through SNS's where social media have increased the potential and powered this independent way of learning among students as it allows members to participate in a learning environment where learning process can occur interchangeably from both inside and outside of the classroom. This benefit makes successful use of SNS in technical education.

E. Availability of large online courses in web and even in SNS is ensuring flexibility in technical education, where large number of online courses are available in these sites and even various technical institutions are trying to be centre of attraction of students for getting enrolled in their interested course by providing time and space flexibility in technical education.

F. Social networking supports research and development (R&D). As we know researchers creates new knowledge by using existing knowledge, activities involved in Social Networking Environment like Brain Storming, Idea Exploration, Informal Exchange and cross – fertilization. It allows researchers to collect various views and knowledge from outside of their traditional "Friends circle".

SOCIAL MEDIA TOOLS IN THE FIELD OF TECHNICAL EDUCATION

A. Blogs:- Social media tools are changing the educational landscape through various SNS tools from which Blogging comes first. Blogs are most established and well understood tools in Social media tools. Blogs are widely used as a informative display and interactions. In Institutional level, blogs are widely used to show updates regarding events, upcoming seminars, webinars, research press releases. Blog of a specific academic group or individual shares research updates, updates about latest technologies, national conferences schedule and opinion in specialist field(such as Oxford's Internet Institute Editor's Blog).

B. Real time chat and instant messaging:- Instant Messaging and real time text or video chat offers more personal and more private space to discuss in educational matters. Instant Messaging allows users to chat through text with other user's on short text based updates in technical education and real time face to face interaction is provided through video chat. Tools like Adobe Connect, IBM Lotus Live use real time chat concepts to use online Seminars, Workshops, tutorials and discussion Sessions. Real time audio and video chat tools like Google+, Skype, What's app can be a good alternative for voice tutorials.

C. Status Broadcasting:- Status Broadcasting can be defined as sharing of mini updates like images, URL, Geographic information etc. Twitter is the best known example of this tool which represents mini updates. Many status sharing tools provides RSS feeds that enables status update automatically. Example: University of Edinburgh Polopoly team[3] uses a twitter account, @uni_ad_polopoly to feed key issues into their support page.

D. Image, audio and video sharing:- Images, audio and video sharing can be very effective for learners as well as communicating with professional colleagues. Images of study material can be shared more easily and efficiently through like Picasa web albums. Audio and video lectures are another choice to make education interactive. Tool in tweeter like TwitPic can be used for image sharing through SNS. Example of this tool implementation can be found in the school of Visual Arts in New York, which uses an extremely active

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Facebook page to share exhibition images and Artwork by students. Vimeo, UStream, are dedicated areas of web where Educational Organizations can share longer videos and build a richly customized form of knowledge.

MAIN ADVANTAGE OF SOCIAL MEDIA

Sharing of ideas : Social networking sites allow users to share ideas, activities, events and interests within their individual networks. Web based social networking services make it possible to connect people who share interests and activities across political, economic and geographic borders.

Tool of communication : Social networks are increasingly being used by teachers and learners as a communication tool. Teachers create chat rooms, forums and groups to extend classroom discussion to posting assignments, tests and quizzes, to assisting with homework outside of the classroom setting. Learners can also form groups over the social networking sites and engage in discussion over a variety of topics.

Bridges communication gap : Social media bridges the distance among different people. It offers platforms for online users to find others who share the same interests and build virtual communities based on those shared interests. With the availability of social media technologies and services, content sharing and user interaction has become relatively easy and efficient.

Source of information : Content generating and sharing sites serve as sources of information for various topics. Users can search for content, download and use the content available on these sites free of cost.

Important marketing tool : Social media is widely used by most of the firms/organizations to market their products/services in the society. The companies resort to social networking sites to generate opinions on the existing and future products that are available in the market. This is an excellent marketing strategy undertaken by most of the companies to draw consumers and elicit public opinion. Such comments or opinions help the organization to redesign their products. Such social networking and user appraisal sites are an important way of promoting products and generating opinions.

Important customer interaction tool : Social Media Networking is perfect for customer interaction, customer feedback, and customer support. New business contacts can be obtained for networking purposes.

Important crisis communication tool : When the major forms of public relations tool fail , social media can be used extensively to communicate with the general public regarding any crisis situation that might have gripped the nation or any organization. But it is important to remember that while social media can have a positive impact during natural disasters, it can have a less favorable effect during business crises, in which case, corporate communication teams need to understand how they can use social media to their advantage. Communications landscape has changed thanks to social media, especially during times of crisis. For instance after the earthquake in Japan in March, 2011, millions of people logged on to YouTube and twitter to post messages and videos and also to check out updates about the devastating natural disaster.

Low Costs/ Cost effective : It is cheaper to use online social networking for both personal and business use because most of it is usually free. Unlike in other forms of media like electronic or print, one has to pay a certain amount of money for a news item to get published. A person can scout out potential customers and target markets with just a few clicks and keystrokes.

Less time consuming: Social media is an effective time management medium of communication both for business as well as for academic purposes. One can post a message or browse for any information at the click of a button. This is an added advantage in comparison to print and other electronic media like television and radio, Though one can get the updates in television, yet social media channels provide impromptu information and connection with the people that matters most. However, in spite of being an important tool of communication.

DISADVANTAGE OF SOCIAL MEDIA

Intrusion into privacy : Social Networking are part of everyday life and for many of us a primary way in which we keep in touch with friends and family. Privacy is a huge problem in such networks. This becomes a serious issue when the users are targeted on the basis of their location, age etc. leading to kidnapping and murder. Very often it has been seen that most of the people who have opened accounts in social networking sites does not reveal their true identity leading to fake personal information and misleading people. The younger lot are at a serious danger of being misleaded by such people. Problems of harassment, cyber stalking and online scams can frequently be seen in day to day affairs.

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Breakdown in familial ties : When people get addicted to social networking sites, there is a breakdown in the family ties. This is because the person gets hooked on the sites for communication with friends. Youngsters specially feel free to discuss their problems and share stories with their peer rather their parents or close relatives. So, in the long run, the close bond with the immediate family breaks down.

Reduction in worker productivity : Frequent usage of social media can have an influence on worker productivity. Employees may waste valuable time using Social Media Networking.

Slightly Impersonal : Social media will never be able to beat the advantage of dealing with consumers face-to-face, yet many organisation still come make it seem like they don‘t really care about their followers by using things such as auto DMs on Twitter. When an organisation auto DMs a new follower it makes it seem like they don‘t not have time to have a quick look at the followers profile for a few seconds. It is far better to say nothing than to send an automated, uncaring message to a potential custom.

CONCLUSIONS

SNS (Social Networking Sites) are no more emerging as a way of social interaction between people of different community, different lands, different mind sets but it is now becoming as the most prominent way of smart learning which includes social as well as educational welfare of today’s youth. In this paper we have introduced various active participation or role of SNS in the field of technical education through the real time snapshots that provides us a strong basis to make use of SNS not only as a tool for social interaction but as an emerging technology which can provide a best and efficient way of learning i.e. smart learning, In a nutshell we can say that these sites are emerging as a boon for technical education. for adolescents that do have access, different motivations shape theirchoices of technologies and the different choices have different outcomes. The needto expand the social network and to diversify entail greater use of forums and chatrooms, which results in diversification and increase of network size; but this is at theexpense of closeness to face-to-face friends, at least in the short run. The need to behighly involved with the face-to-face peer group and to increase belonging drives theuse of IM, SMS and social networking sites, resulting in a higher perceived closenessto members of the peer group, and greater ability to coordinate joint activities.

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SOLAR POWER PLANT AND ELECTRICITY IN INDIA

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ABSTRACT
A Solar Thermal Electricity generating system also known as Solar Thermal Power plant is an emerging renewable energy technology, where we generate the thermal energy by concentrating and converting the direct solar radiation at medium/high temperature (300ºC – 800ºC). The resulting thermal energy is then used in a thermodynamic cycle to produce electricity, by running a heat engine, which turns a generator to make electricity. Solar thermal power is currently paving the way for the most cost-effective solar technology on a large scale and is heading to establish a cleaner, pollution free and secured future. Photovoltaic (PV) and solar thermal technologies are two main ways of generating energy from the sun, which is considered the inexhaustible source of energy. PV converts sunlight directly into electricity whereas in Solar thermal technology, heat from the sun's rays is concentrated to heat a fluid, whose steam powers a generator that produces electricity, It is similar to the way fossil fuel-burning power plants work except that the steam is produced by the collected heat rather than from the combustion of fossil fuels. In order to generate electricity, five major varieties of solar thermal technologies used are:

** Parabolic Trough Solar Electric Generating System (SEGS).*

** Central Receiver Power Plant.*

** Solar Chimney Power Plant.*

** Dish Sterling System.*

** Solar Pond Power Plant.*

Most parts of India, Asia experiences a clear sunny weather for about 250 to 300 days a year, because of its location in the equatorial sun belt of the earth, receiving fairly large amount of radiation as compared to many parts of the world especially Japan, Europe and the US where development and deployment of solar technologies is maximum. Whether accompanied with this benefit or not, usually we have to concentrate the solar radiation in order to compensate for the attenuation of solar radiation in its way to earth's surface, which results in from 63,2 GW/m2 at the Sun to 1 kW/m2 at Earth´s surface. The higher the concentration, the higher the temperatures we can achieve when converting solar radiation into thermal energy.

Keywords: Solar radiation, Solar Electric Generating System (SEGS), hybrid systems, attenuation.

1. INTRODUCTION

The National Solar Mission is a major initiative of the Government of India and State Governments to promote ecologically sustainable growth while addressing India's energy security challenge. It will also constitute a major contribution by India to the global effort to meet the challenges of climate change.

In launching India's National Action Plan on Climate Change on June 30, 2008, the Prime Minister of India, Dr. Manmohan Singh stated:

Our vision is to make India's economic development energy-efficient. Over a period of time, we must pioneer a graduated shift from economic activity based on fossil fuels to one based on non-fossil fuels and from reliance on non-renewable and depleting sources of energy to renewable sources of energy. In this strategy, the sun occupies centre-stage, as it should, being literally the original source of all energy. We will pool our scientific, technical and managerial talents, with sufficient financial resources, to develop solar energy as a source of abundant energy to power our economy and to transform the lives of our people. Our success in this endeavour will change the face of India. It would also enable India to help change the destinies of people around the world."

2. SOLAR THERMAL POWER PLANTS

Solar thermal power plants produce electricity by converting the solar radiation into high temperature heat using mirrors and reflectors. The collectors are referred to as the solar-field. This energy is used to heat a working fluid and produce steam. Steam is then used to rotate a turbine or power an engine to drive a generator and produce electricity.

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All CSP plants are based on four basic essential systems which are collector, receiver (absorber), and transport/storage and power conversion. Parabolic Trough, Solar towers, Parabolic Dishes and Linear Fresnel Reflectors are the four main technologies that are commercially available today. The details are given below:

Fig. 1: Solar Thermal Technologies

3. SOLAR TOWERS

A circular array of heliostats concentrates sunlight on to a central receiver mounted at the top of a tower. The heliostats tack the sun on two axes. The central receiver can achieve very high concentrations of solar irradiation thus resulting in extremely high temperature for the operating fluid. A heat-transfer medium in this central receiver absorbs the highly concentrated radiation reflected by the heliostats and converts it into thermal energy, which is used to generate superheated steam for the turbine through the Rankine cycle. Brayton cycle systems are also under testing because of the higher efficiencies. Spain has several solar tower systems operating or under construction, up to 20 MW capacity.

4. PERFORMANCE OF SOLAR POWER PLANTS

The performance of solar power plants is best defined by the Capacity Utilization Factor (CUF) , which is the ratio of the actual electricity output from the plant, to the maximum possible output during the year. The estimated output from the solar power plant depends on the design parameters and can be calculated , using standard softwares. But since there are several variables which contribute to the final output from a plant, the CUF varies over a wide range. These could be on account of poor selection /quality of panels, derating of modules at higher temperatures, other design parameters like ohmic loss, atmospheric factors such as prolonged cloud cover and mist.

It is essential therefore to list the various factors that contribute to plant output variation. The performance of the power plant however depends on several parameters including the site location, solar insolation levels, climatic conditions specially temperature, technical losses in cabling, module mismatch , soiling losses, MPPT losses, transformer losses and the inverter losses. There could also be losses due to grid unavailability and the module degradation through aging. Some of these are specified by the manufacturer, such as the dependence of power output on temperature, known as temperature coefficient. The following factors are considered key performance indicators:

5. GENERAL INFORMATION: WHAT ARE THE ENERGY TRENDS IN INDIA?

To better understand the current situation in India and the future of the renewable energies market, it is important to look at the trends in energy consumption, growth of the current grid, and the availability of transportation and equipment used there

In line with additions to installed capacity, total generation by public utilities increased rapidly, from 5106 GWh in 1950 to 264,231 GWh in 1990/91, registering an annual growth rate of 10.4 percent over this period. Until the 1980s, the growth rate in hydro and thermal generation was comparable, but during the 1980s, hydro generation increased at a rate of only 4.4 percent compared to a growth rate of 11.6 percent in thermal generation.

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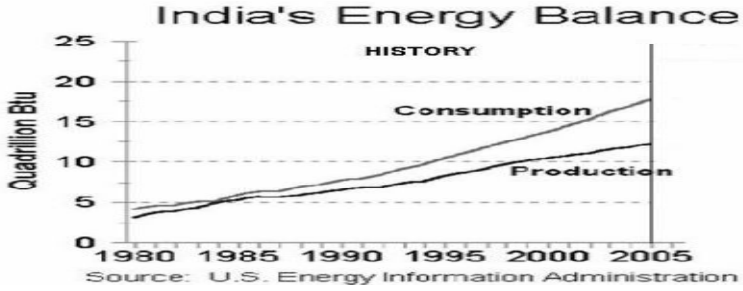
Since thermal generation is based on burning coal or oil, increases in CO2 emissions, which damage the environment and affect global warming, accompany this growth. As the graph below shows, it also increases the dependence on imports, which will continue into the future unless the policy changes.

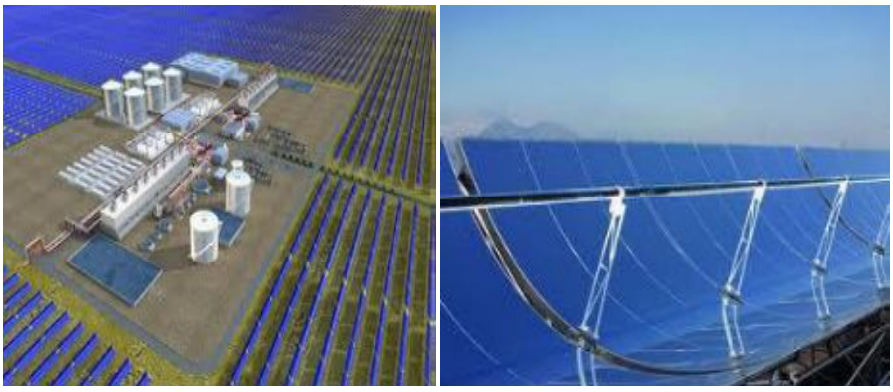
A. Energy consumption and production up to 2005

Since the 1980's, and still currently, India has encountered a negative balance in overall energy consumption and production. This has resulted in the need to purchase energy from outside the country to supply and fulfil the needs of the entire country. As we will demonstrate later, the Government is more sensitive to renewable energy potential and has started to put reforms and projects, incentives and legislation in place to convince investors and companies to make the shift. These will be discussed in a later section.



India has had a negative Energy Balance for decades, which has forced the purchase of energy from outside the country.

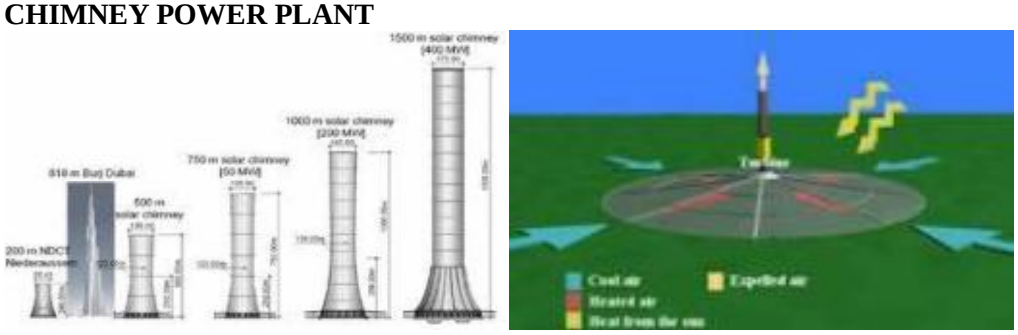
6. PARABOLIC TROUGH SOLAR ELECTRIC GENERATING SYSTEM



Although many solar technologies have been demonstrated, parabolic trough solar thermal electric power plant technology proves to be one of the major renewable energy success stories of the last two decades. Among all the solar energy systems, parabolic troughs are one of the lowest cost solar electric power options available today and have significant potential for further cost reduction.

For example, nine parabolic trough plants, totaling over 350 MWe of electric generation, have been in daily operation in the California Mojave Desert for up to 18 years. These plants provide enough solar electricity to meet the residential needs of a city with 250,000 people. They have demonstrated excellent availabilities and have reliably delivered power to help California to meet its peak electric loads, especially during the California energy crisis of 2000-2001 (near 100% availability during solar hours). Although parabolic trough technology is the least cost solar power option, it is still more than twice as expensive as power from conventional fossil fueled power plants at today's fossil energy prices in the United States.

7. SOLAR CHIMNEY POWER PLANT



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Basically solar chimney power plant is the combination of solar and wind energy, in which solar energy is used to heat the air and making air less dense, moves up with particular velocity and rotates the wind turbine. Ambient air is drawn into the glass collector. This is warmed by solar energy and rises up the chimney. The current of rising warm air drives a turbine and the turbine is set at the base of chimney and drives the electrical generator .The Solar Chimney Power Plant (SCPP) is part of the solar thermal group of indirect solar conversion technologies i.e. involving more than one transformation to reach a usable form.More specifically, a natural phenomenon concerning the utilization of the thermal solar energy involves the earth surface heating and consequently the adjacent air heating by the sun light. This warm air expands causing an upward buoyancy force promoting the flow of air that composes the earth atmosphere. The amount of energy available due to the upward buoyancy force associated with the planet revolution is so vast that can generate catastrophic tropical cyclones with disastrous consequences. Thus, the SCPP is a device developed with the purpose to take advantage of such buoyancy streams converting them into electricity. For that, a greenhouse – the collector – is used to improve the air heating process, a tall tube – the chimney – promotes the connection between the warm air nearby the surface and the fresh air present in higher atmosphere layers and a system to convert the kinetic energy into electricity

8. SOLAR MANUFACTURING IN INDIA

One of the Mission objectives is to take a global leadership role in solar manufacturing (across the value chain) of leading edge solar technologies and target a 4-5 GW equivalent of installed capacity by 2020, including setting up of dedicated manufacturing capacities for poly silicon material to annually make about 2 GW capacity of solar cells. India already has PV module manufacturing capacity of about 700 MW, which is expected to increase in the next few years. The present indigenous capacity to manufacture silicon material is very low, however, some plants are likely to be set up soon in public and private sector. Currently, there is no indigenous capacity/capability for solar thermal power projects; therefore new facilities will be required to manufacture concentrator collectors, receivers and other components to meet the demand for solar thermal power plants.

9. SOLAR ENERGY

Because of its location between the Tropic of Cancer and the Equator, India has an average annual temperature that ranges from 25°C – 27.5 °C. This means that India has huge solar potential. The sunniest parts are situated in the south/east coast, from Calcutta to Madras.Solar energy has several applications: photovoltaic (PV) cells are placed on the roof top of houses or commercial buildings, and collectors such as mirrors or parabolic dishes that can move and track the sun throughout the day are also used. This mechanism is being used for concentrated lighting in buildings.

Photovoltaic (PV) cells have a low efficiency factor, yet power generation systems using photovoltaic materials have the advantage of having no moving parts. PV cells find applications in individual home rooftop systems, community street lights, community water pumping, and areas where the terrain makes it difficult to access the power grid. The efficiency of solar photovoltaic cells with single crystal silicon is about 13 % - 17%. High efficiency cells with concentrators are being manufactured which can operate with low sunlight intensities

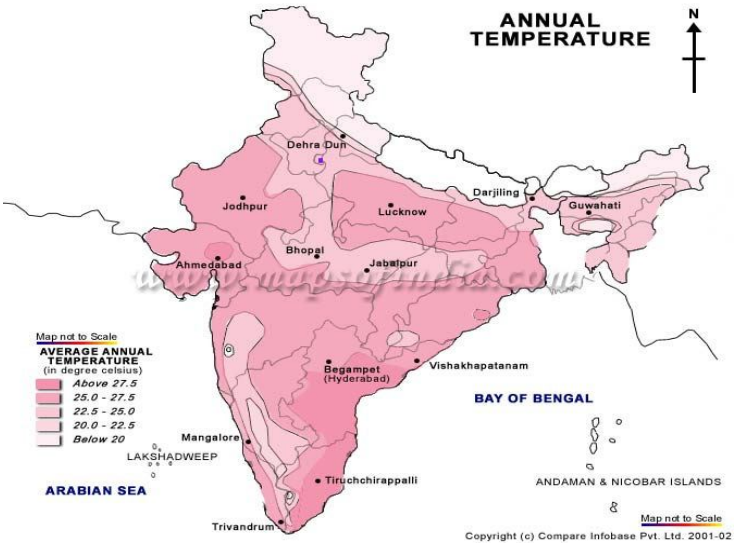

Fig. 2 Annual temperature in Bangalore

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India has an expanding solar energy sector: 9 solar cell manufactures, 22 PV module manufactures, and 50 PV systems manufacturers. Therefore, technology resources exist in country and a growing market would lead to job growth in country

Fig. 3 Location : INDIA

10. ELECTRICITY ACT 2003 AND STIPULATIONS REGARDING NATIONAL ELECTRICITY PLAN

The Electricity Act, 2003 provides an enabling legislation conducive to development of the Power Sector in transparent and competitive environment, keeping in view the interest of the consumers. As per Section 3(4) of the Electricity Act 2003, CEA is required to prepare a National Electricity Plan in accordance with the National Electricity Policy and notify such Plan once in five years. The draft plan has to be published and suggestions and objections invited thereon from licensees, generating companies and the public within the prescribed time. The Plan has to be notified after obtaining the approval of the Central Government. The National Electricity Policy stipulates that the Plan prepared by CEA and approved by the Central Government can be used by prospective generating companies, transmission utilities and transmission/distribution licensees as reference document.

11. NATIONAL ELECTRICITY POLICY AND STIPULATIONS REGARDING NATIONAL ELECTRICITY PLAN

The Aims and Objectives of the National Electricity Policy are as follows:

- Access to Electricity - Available for all households in next five years
- Availability of Power - Demand to be fully met by 2012. Energy and peaking shortages to be overcome and adequate spinning reserve to be available.
- Suppl of Reliable and Quality Power of specified standards in an efficient manner and at reasonable rates.Per capita availability of electricity to be increased to over 1000 units by 2012.
- Minimum lifeline consumption of 1 unit/household/day as a merit good by year 2012.
- Financial Turnaround and Commercial Viability of Electricity Sector.
- Protectio of consumers' interests.

As per the Policy, the National Electricity Plan would be for a short-term framework of five years while giving a 15 year perspective and would include:

- Short-term and long term demand forecast for different regions.
- Suggested areas/locations for capacity additions in generation and transmission keeping in view the economics of generation and transmission, losses in the system, load centre requirements, grid stability, security of supply, quality of power including voltage profile, etc; and environmental considerations including rehabilitation and resettlement.
- Integration of such possible locations with transmission system and development of national grid including type of transmission systems and requirement of redundancies.

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- Different technologies available for efficient generation, transmission and distribution.
- Fuel choices based on economy, energy security and environmental considerations.

The Policy also stipulates that while evolving the National Electricity Plan, CEA will consult all the stakeholders including state governments and the state governments would, at state level, undertake this exercise in coordination with stakeholders including distribution licensees and STUs. While conducting studies periodically to assess short-term and long-term demand, projections made by distribution utilities would be given due weightage. CEA will also interact with institutions and agencies having economic expertise, particularly in the field of demand forecasting. Projected growth rates for different sectors of the economy will also be taken into account in the exercise of demand forecasting.

12. SUMMARY AND CONCLUSION: COULD INDIA MEET ALL ENERGY NEEDS WITH RENEWABLE ENERGY?

India is a nation in transition. Considered an "emerging economy," increasing GDP is driving the demand for additional electrical energy, as well as transportation fuels. India is a nation of extremes. Poverty remains in areas with no energy services, while wealth grows in the new business hubs.Coal fired generation currently provides two thirds of the generation capacity, and hydropower supplies the other third. Yet, India is blessed with vast resources of renewable energy in solar, wind, biomass and small hydro. In fact, the technical potential of these renewables exceeds the present installed generation capacity.

Unique in the world, India has the only Ministry that is dedicated to the development of renewable energies: the Ministry of New and Renewable Energy. This bodes well for the acceleration of renewable development throughout the nation -- both to meet the underserved needs of millions of rural residents and the growing demand of an energy hungry economy. The development and deployment of renewable energy, products, and services in India is driven by the need to:

- Decrease dependence on energy imports
- Sustain accelerated deployment of renewable energy system and devices
- Expand cost-effective energy supply
- Augment energy supply to remote and deficient areas to provide normative consumption levels to all section of the population across the country
- And finally, switch fuels through new and renewable energy system/ device deployment.

In a report on the Indian economy by Deutsche Bank, in which countries were ranked by attractiveness for outsourcing and off-shoring, India came in #1, well ahead of China.

India is currently experiencing strong economic growth, while at the same time attempting to extend modern power services to millions still in poverty. Expanding electrical capacity is essential. Renewable energy remains a small fraction of installed capacity, yet India is blessed with over 150,000MW of exploitable renewable.

It makes sense to the authors that all efforts and investment should consider accelerating these sustainable energy resources before committing to the same fossil fuel path as western nations. The fossil fuel strategy will surely bring price volatility from dwindling supplies and added pollution from carbon combustion.

Tapping India's wind, solar, biomass, and hydro could bring high quality jobs from a domestic resource. Extending the electric grid between all states, and ultimately between neighbour nations will expand international trade and co-operation on the subcontinent.

13. ADVANTAGES

- Solar thermal electric power collectors provides a practical, scalable solution to one of the greatest challenges of our times.
- It can provide reliable, night and day electric power at market prices without carbon emissions
- It has availability that closely matches human energy requirements by hour and by season
- It uses less land than coal mining and transport.
- It is quick to implement.
- It is available widely around the planet, not just in a few countries.
- It has enormous primary.

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- A potential advantage of solar thermal systems is the ability to produce electricity when sunlight is weak or unavailable by storing solar heat in the form of molten salt. energy resource which is inexhaustible over time.

14. CONCLUSIONS

Solar Photovoltaic and thermal power plants will play an important role in the overall energy supply. The grid parity is likely to be achieved around 2017-2020.

Solar radiation data is available from several sources including satellite simulations. The data collection and simulation is a complex procedure and can have inaccuracies varying from 3 to 20%. The most reliable data is ground measured with accurate instruments.The performance (Capacity utilization factor) CUF depends on several factors including the solar radiation, temperature, air velocity apart from the module type and quality, angle of tilt(or tracking), design parameters to avoid cable losses and efficiencies of inverters and transformers. There are some inherent losses which can be reduced through proper designing but not completely avoided.

Thin film modules will perform better than the crystalline modules in high temperature zones. The estimated capacity factor varies from 16 to 20% in various parts of the country. At most locations in Rajasthan and Gujrat it is around 20%. In overall most of the places it is around 19% .In some places where the CUF is around 18%, it is advisable to increase to 19% by adding 50 KWp of modules for every MW of capacity to compensate for the inherent losses in the system. This will require an additional investment of Rs.40 to 45 Lakhs per MW.

The modules show degradation in power output through years of operation. It is observed that quality modules is very important in determining the extent of degradation. The improvements in technology and quality assurance have reduced this degradation considerably. Several manufacturers are proposing extended warranties although with a safety of margins. Based on the results of past studies and trends, one can fairly assume degradation of maximum 0.5% per year from 3rd year of deployment. This can also be compensated by addition of 5 KW of modules per year from 4th year to 24th year of operation requiring an expenditure of Rs.4 to 4.5 lakhs per year at current market rates.

It would be desirable to monitor the solar plant installations and build up database for future work. It is also recommended to carry out a detailed study for several locations with active involvement of IMD database

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THE PREDICTION OF FATIGUE LIFE OF ASPHALT PAVEMENT

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ABSTRACT
Till now there is no pure mechanistic model available to predict the fatigue life accurately of asphalt pavement due to various complexities involving non-linear visco-elastic property of bitumen[B. Shane Underwood and Y. Richard Kim,2013],heterogeneous nature of asphalt pavement[Francisco Thiago S. Aragão1; Yong-Rak Kim,2011], healing property of bitumen[Yong-Rak Kim; D. N. Little, P.E., F.ASCE; and R. L. Lytton, P.E., F.ASCE,2003], uncertainty in traffic loading distribution and rest period, lateral distribution of wheel path in the roads[Haung,Pavement analysis and design,2004], temperature effect and bituminous aging[Various fatigue models,mechDonald W. Christensen, and Ramon Bonaquistbanistic, 2012; Lu Sun1; W. Ronald Hudson, P.E., F.ASCE; and Zhanming Zhang 2003] attempts to predict fatigue life considering probabilistic approach, but they don't consider all the variable inputs that may affect the fatigue life. Monte Carlo simulation is also done for considering material properties and traffic load distribution in flexible pavement design [Deepthi Mary Dilip1 and G. L. Sivakumar Babu, M.ASCE,2013;Nur Yazdani1 and Pedro Albrecht, M. ASCE,1987]. In this paper various issues related to the fatigue distress consideration will be discussed and scope of improvement will be provided by using ANN.

Keywords: Fatigue life, Prediction, ANN

INTRODUCTION
Asphalt material's fatigue characteristic plays an important role in pavement design as it governs the required thickness of asphalt to structurally support heavy vehicles. The thickness of the asphalt layer is a major contributor to the cost of construction. So it is important not to overdesign asphalt layer thickness for economical point of view and also not to under-design for pavement management point of view. This defines the importance of development of an appropriate fatigue model to predict the fatigue life for asphalt materials accurately and it is the aim of this study to develop a fatigue model using Artificial Neural Network.

The mechanistic-empirical (M-E) design approach is adopted for the design of pavement structure by a number of organisations around the world (SIPCL 1978, AUSTROADS 1992, Asphalt Institute 1999, IRC 2012, NCHRP 2004). In the M-E approach, fatigue and rutting are generally considered as primary modes of structural failure. The current practice for obtaining fatigue life is discussed below-
Simple form of the fatigue equation can be represented as,

$$N_f = K_1 \left(\frac{1}{E}\right)^{K_2} \left(\frac{1}{\varepsilon}\right)^{K_2} \quad (1)$$

Here N_f is the fatigue life in terms of standard axle load repetitions, k_1,k_2 and k_3 are the regression constants. This equation is generally developed using OLSE regression analysis of the field and/or the experimental data and the procedures are mentioned briefly in the following:

For a field situation, the strain values of different newly constructed pavements are either measured with the help of strain measuring gauges or obtained computationally when the pavement cross-section details are known. The fatigue life is obtained by counting the number of equivalent standard axle load repetitions the respective pavement undergoes before failing due to fatigue. Field fatigue failure is defined by some specific level of fatigue cracked area at the surface.

For a laboratory situation, fatigue testing is done generally on asphalt beam samples of rectangular cross-section, and the number of repetitions it takes for reduction of the bending stress level by a pre-specified amount (for constant strain amplitude testing) is noted. For constant stress amplitude testing, the number of repetitions it takes for increase of the bending strain by a prespecified amount is noted.

NEURAL NETWORK
Neural network is one of the important components in Artificial Intelligence (AI) and a useful tool in machine learning. It has been studied for many years in the hope of achieving human-like performance in many fields, such as speech and image recognition as well as information retrieval. A preliminary definition of neural network is given by Kevin Gurney in his course package (1999) as follows – "A Neural Network is an interconnected assembly of simple processing elements, units or nodes, whose functionality is loosely based on

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the animal neuron. The processing ability of the network is stored in the inter-unit connection strengths, or weights, obtained by a process of adaptation to, or learning from, a set of training patterns."

The power of neuron comes from its collective behavior in a network where all neurons are interconnected. The network starts evolving: neurons continuously evaluate their output by looking at their inputs, calculating the weighted sum and comparing to a threshold to decide if they should fire. This is highly complex parallel process whose features cannot be reduced to phenomena taking place with individual neurons.

One observation is that the evolving of ANN causes it to eventually reach a state where all neurons continue working but no further changes in their state happen. A network may have more than one stable state, and it is obviously determined (somehow) by the choice of synaptic weights and thresholds for the neurons.

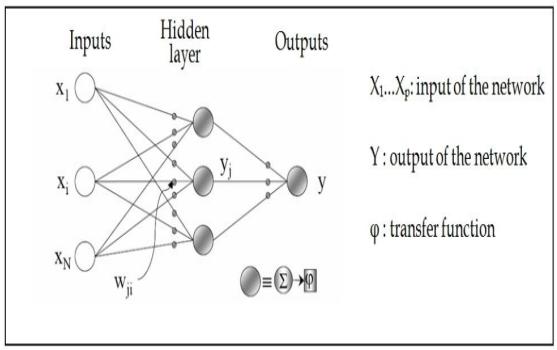

FIG:NEURAL NETWORK

CRITICAL DISCUSSION

Cumulative damage accumulation in fatigue failure is considered as important phenomenon and most current pavement damage models are based on linear damage hypothesis known as Miner's hypothesis. The Planger-Miner linear hypothesis can be represented as

$$\sum_i^N \frac{n_i}{N_i}=1$$

n_i = Number of stress cycles applied at stress level S_i

N_i =Number of cycles to failure at stress level S_i

Some limitations of equation can be identified as follows

●It is a linear cumulative function, while fatigue distress development follows a distinctly non-linear path.

●It does not take sequence of loading into account, many small loads followed by a large load can have less of an impact on fracture propagation than the opposite sequence where a large load is followed by smaller loads due to stress accumulation.

●The equation does not take probabilistic nature of damage into account. Every load has a probability to cause additional damage. Under the Planger-Miner hypothesis each load causes additional damage.

The second issue is related to the fatigue failure consideration in the laboratory. One important aspect concerning asphalt fatigue testing is the choice of failure criterion. Usually, no material related fatigue criterion is ever considered (Judycki 1991). As fatigue tests are run until the stiffness has decreased to a chosen level, often 50%of the initial one, traditional methods normally show no sign of real failure. It has been argued that for general controlled strain testing ,the stress amplitude will continuously decrease, resulting in an approach of stiffness towards zero (Judycki 1991; Ullidtz et al. 1997). However, for many materials, it has been shown that a critical value of a material property, such as stiffness, stress intensity factor ,energy release rate, exists at which a process of instability may occur. When such a parameter, which often depends on temperature and loading conditions, reaches the critical value, a rapid failure of the material occurs (Lemaitre 1992). In the literature, attempts to determine failure criteria for asphalt mixtures based on observations of rupture and theoretical arguments are described. Pronk (1995) used, for bending beam tests, a failure criterion based on a dissipated energy concept which was assumed to be related to the end of the crack initiation process. Based on uniaxial testing, Lee (1996) came to the conclusion that the 50% decrease in pseudo-stiffness is a valid failure criterion irrespective of the test conditions used. Di Benedetto et al. (1996) suggested 25% decrease in stiffness, corrected for thermal and thixotropic effects, as the failure criterion. The validity of different failure criteria

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proposed may be restricted to specific types of materials and structural problems, and verifications over a broad range of test conditions are necessary.

SCOPE OF IMPROVEMENT

Now coming to the formulation of fatigue equation it is noticed that except the mechanistic fatigue models based on fracture mechanics, the M-E fatigue models use linear regression considering critical stress or strain and asphalt concrete stiffness modulus as input parameters. Strain, € and modulus, E are not independent material properties. So linear regression formulation involving these two parameters as input parameters are not statistically correct. Moreover accuracy of linear regression methods is questionable when the number of input variables are many. For these limitations and some other advantages multi layered neural network modeling is proposed to be used for modeling fatigue equation and shift factor. The advantages of neural network are-

- In non parametric sampling study in statistics and predicting distribution neural network is very helpful.
- Asphalt being a visco-elastic material linear regression method cannot predict its behavior accurately. As multi-layered neural network can predict nonlinear data efficiently, it is thought to be more useful.

CONCLUSION

Fatigue cracking so as the prediction of fatigue life of asphalt material is a complex task and researchers have been using different approaches to deal with the issue. In this paper various qualities of Artificial Neural Network is discussed and from those points it can be concluded that it can be used in prediction of fatigue life of asphalt material quite effectively.

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RESEARCH ON i - CLOUD TECHNOLOGIES

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ABSTRACT
i- Cloud computing usually consists of front -end user devices and back-end cloud server .This gives users to access a large volume of storage on cloud. In this project, the user can upload file from mobile or PC to the cloud storage. These files will automatically synchronize to the user's devices when they are connected to internet. So, user files can be viewed from anywhere by any device. In the existing system, we need to download files manually. This paradigm provides the user to synchronize data automatically between devices. We are implementing this paradigm for window platform.

Keywords: i-cloud, cloud computing, Apple's i-cloud, cloud technology, photo, Grid computing.

INTRODUCTION

i- Cloud Computing is evolving as a technology for sharing information [1].i- Cloud Computing provides users to access resources through Internet from anywhere without worrying about any maintenance or management of actual resources. Besides, resources in cloud are very dynamic. This service allows the users to wirelessly back-up their data from devices to Sky Drive and retrieve them, instead of doing manually using Zune software [1].

This paper is specifically for windows platform. This is similar to i-Cloud application as i-Cloud Computing is evolving as a technology for sharing information [1]. Cloud Computing provides users to access resources through Internet from anywhere without worrying about available in IOS. Sky Drive is cloud storage provided by Microsoft. It provides users to access all his/her file in Sky Drive and also allow to create or edit and upload the files to the Sky Drive [1].This paper develops a Windows Mobile application and Windows Desktop application, so that whenever the user modify or update a file, it will be automatically synchronized to other devices as shown in figure 1.

Figure 1 Data syncing using cloud storage

In this paper, the user is provided with an interface to create .txt files and edit .txt, .ppt, .pptx, .doc, .docx, etc. User can update these file along with photos. The User is also provided with an interface capturing and uploading photo dynamically to his Sky Drive account.

I. LITERATURE SURVEY

A: I-Cloud for IOS

I-Cloud is an application available in IOS platform. This service allows user to store information or data and allows the user to download from multiple device[2] For i-Cloud, Apple Inc. Provides only 5 GB free storage, whereas Sky Drive provides 7 GB free storage [2].

B: Evernote

Evernote is an application for all operating system like Windows, IOS, etc. This application allows user to create, edit, update and delete notes only. [3] It doesn't support other document file types like .ppt, .pptx, .doc, .docx, etc. It does not provide an interface to upload photos [3]. In Evernote application we cannot upload photo dynamically from camera.

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SYSTEM ARCHITECTURE

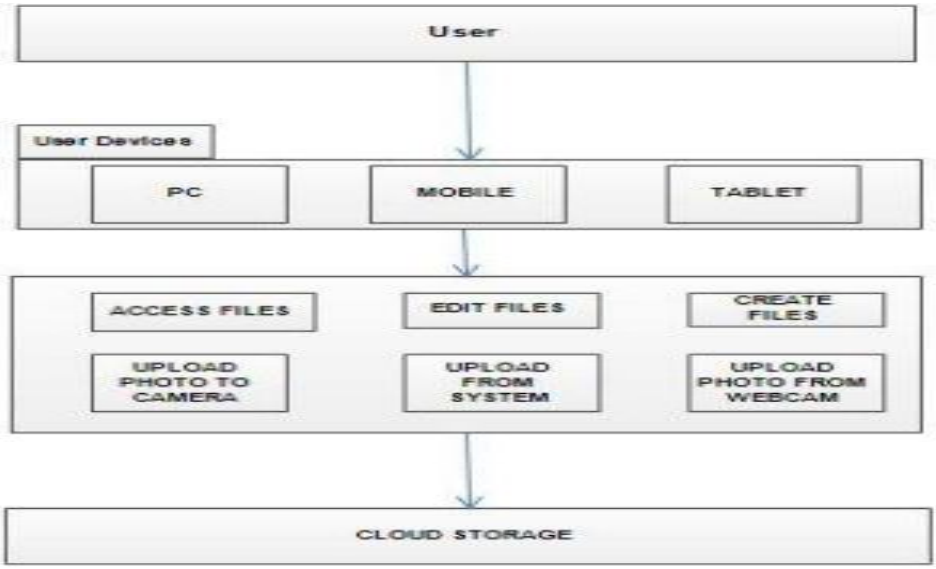

Fig.2 System Architecture

The Figure 2 will give a brief explanation on how the user interacts with the application. The user should first login to Sky Drive account. Once the authentication is valid the user is provided with an interface of viewing all his/her profile data. User can also create a new file or update an existing file. This paradigm is implemented in both Windows mobile and Windows Desktop application so that whenever the user modifies the data, the change is updated in other devices. The User is provided with an interface of creating new .txt files which is not present in windows phone7 operating system [3]. Whatever the user creates or updates will be synchronized automatically to other devices also.

This Architecture contains user, user devices, interface to edit or create and cloud storage. User is the person who uses the interface. User devices are the platform in which user can access data [3]. User interface is developed to give the user to access or modify data. This interface provides the user to create a new file, upload a file, take a picture, upload a picture present in the system and even upload picture taken directly from camera or web –cam. This interface is implemented in all the windows platforms s that when -ever the file is modified or changed then it will be synchronized to other devices. These files are stored in a cloud database so that the user can access data from anywhere. Sky drive used as the i- cloud storage to store the files. The user should get authentication to Sky Drive before using the interface. Then the user is provided to edit or modify data.

II. IMPLEMENTATION

A. Mobile Application

Authentication: The user should login to SkyDrive with his/her valid credentials. This application will check whether the user is valid or not and proceed with authentication. Figure 3 shows the sign in interface.

Fig.3 Authentication

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Photo Upload From Camera: This interface provides the user to upload photo directly from camera app in Windows phone and webcam in Windows Desktop. So this reduces the memory space of the user and gives access to the user from anywhere.

Create Notes And Upload : This interface provides the user to create new notes and upload it to the SkyDrive. This will also provide an interface to edit the existing notes also. User can also edit PPT, DOC as a shown in Figure

Figure 4 Documents Upload View

B. Desktop Application

1) Photo Hub: This is a desktop interface provided to the user for his/her laptop, pc and tablet. This will show all the photos present in user Sky Drive in thumbnail view and provide the feature to upload the photo from the system and webcam as shown in Figure 5

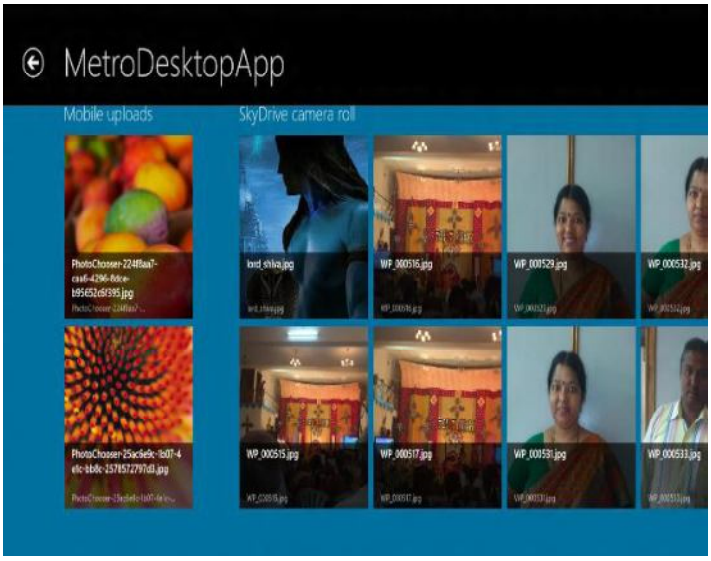

Fig.5: Metro mobile view

2) Document Hub: This interface will show all the document (.ppt, .pptx, .doc, .docx, .txt,etc.). The user can edit the data or create a new file and upload it to SkyDrive as shown in figure 6.

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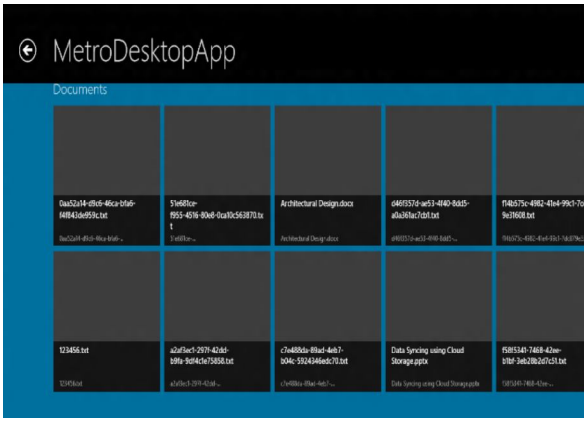

Figure 6 :Metro Document View

III. RESULTS AND DISCUSSION

The authentication to user is being performed by getting the user credentials, it's being failed because Microsoft does but not give a direct access to Sky Drive. Even to connect the application to the Sky Drive, the developer requires a client id provided by Microsoft. Without the client id the app cannot retrieve user data from Sky Drive [7].

CLOUD COMPUTING DEPLOYMENT MODEL

This is a new model concept that can be divided into the following four famous models (but thermight be other models that can be drawn from them) [4]:

□□Public: Services and resources are reachable to the public by using the internet. This environment emphasises the advantages of rationalization (as a user has the ability to utilize only the needed services and pay only for their use), operational simplicity (as the system is organized and hosted by a third party) and scalability. The main concern in this type of cloud environment is the security; since this environment is accessible to the public and user data in one stage is hosted by a third party.

□□Private: Services and resources are reachable with in a private institute. This environment temphasises the advantages of integration, optimization of hardware deals and scalability. The main concern is the complexity, as this environment is organized and hosted by internal resources. Security is not a main issue compared to the public i- cloud as the services are reachable only through private and internal networks.

□□Community: Services and resources of this type are shared by various institutes with a common aim. It may be organized by one of the institutes or a third party [4].

□□Hybrid: This type combines the methods from the private and public clouds, where sources can be used either in a public or a private cloud environment [4]. The advantages and the concerns are a mixture of the earlier type. Another cloud technology which has become very popular recently is called Green Cloud Computing. Its aim is to reduce resource consumption and yet fulfil quality of service needed and hold the resources switched off as long as possible. "The advantages of such techno logy are lower heat production and power saving by employing server consolidation and virtualization technologies; since active resources (servers, network elements, and A/Cunits) that are idle lead to energy waste.[4]

BACK UP FILES

In addition to syncing your files, purchases, and data to iCloud, you can back up your iOS devices to it. This counts toward your *Backu*free 5GB storage limit. To back up your iPhone, iPod, or iPad, open its Settings app and navigate to *iCloud > Storage & p.*

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Enable the *i-Cloud Backup* option, and your device automatically backs up accounts, documents, settings, and the Camera Roll album to i- Cloud whenever the device is plugged into a power source, connected to Wi-Fi, and asleep (locked). You can also force an i-Cloud backup at any time by going to *Settings* > *i-Cloud* > *Storage & Backup* and tapping the *Back Up Now* button (which turns into Cancel Backup while a backup is occurring). If you ever need to restore your device, you can do so over the air, with the i-Cloud backup working in tandem with your iTunes and App Store purchases so you can get your device back to where it was. A note: You may not be able to restore certain purchases—for example, some movies and TV shows—internationally due to licensing restrictions; check your country's terms and conditions to be sure. (For more on i-Cloud backup, see "Mobile Backup" in the "Work With i-Cloud" chapter.)

Apple's i-Cloud

Apple is one of the leading information technology companies around the world. It has many competitors so the need to stay up-to-date with technology and have new and frequent programs and products out on the market is necessary. One of Apple's newest programs is called i-Cloud. A cloud computing program is defined as, "…a type of computing that relies on *sharing computing resources* rather than having local servers or personal devices to handle applications" (Web pedia). Basically with i-Cloud you can manage, view, and use all applications and sources from one device to another as long as you are backed up through i-Cloud. There are many competing cloud computing services and programs that have surfaced in the last year that Apple is up against.

Cloud computing has been around for a few years now but consumers are recently having access to it. In the article, *A Critical Review of Cloud Computing: Research, Desires, and Realities,* the authors noted that, "Around 2007 the term cloud computing began to be used to reflect the use of the Internet… to connect to such devices" (Venters & Whitley, 2012,). There are many name brand companies such as Apple, Microsoft, and Google that all have their own form of cloud computing. Greg Notes stated, "After 6 years of rumors, Google finally launched Google Drive; Microsoft has significantly improved its Sky Drive; and Apple is pushing i-Cloud on all sorts of i-Devices" (Notes, 2012). These are just to name a few of the major brand name companies carrying cloud services.

CLOUD TECHNOLOGY

There has been much discussion in industry as to what cloud computing actually means. The term cloud computing seems to originate from computer network diagrams that represent the internet as a cloud. Most of the major IT companies and market research firms such as IBM [4], SunMicrosystems [4], Gartner [5] and Forrester Research [6] have produced whitepapers that attempt to define the meaning of this term. These discussions are mostly coming to an end and a common definition is starting to emerge. The US National Institute of Standards and Technology (NIST) has developed a working definition that covers the commonly agreed aspects of cloud computing. The NIST working definition summarises cloud computing as:

A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction [4].

Figure :- provides an overview of the common deployment and service models in cloud computing, where the three service models could be deployed on top of any of the four deployment models.

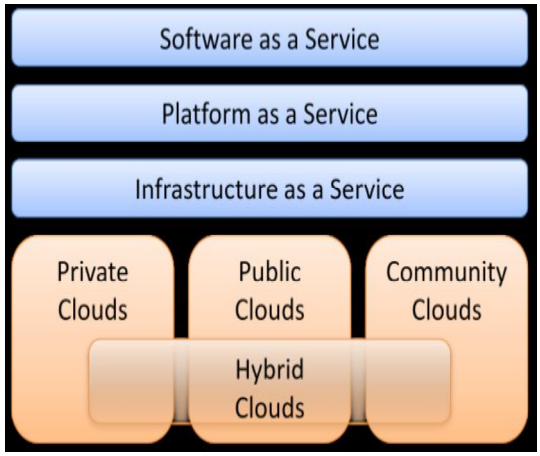

Figure : Cloud computing deployment and service models

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GRID DEFINITION

While still there are several different conceptions upon the definition of the grids Ian Foster has indicate [6] a definition of the Grid as "a system that coordinates resources which are not subject International Journal on Cloud Computing: Services and Architecture (IJCCSA),Vol.2, No.4, August 2012 15centralized control, using standard, open, general-purpose protocols and interfaces to deliver nontrivial qualities of service".

Nowadays, it can be clearly observed that Clouds are the latest paradigm to emerge that promises reliable services delivered through next-generation data centres which are built on virtualized compute and storage technologies [7].

The popularity of different paradigms varies with time. The web search popularity, as measured by the Google search trends during the last 12 months, for terms "cluster computing", "Grid computing", and "Cloud computing" is shown in Figure 2. From the Google trends, it can be observed that cluster computing was a popular term during 1990s, from early 2000 Grid computing become popular, and recently Cloud computing started gaining popularity [8]. The following points are adopted from [9]:

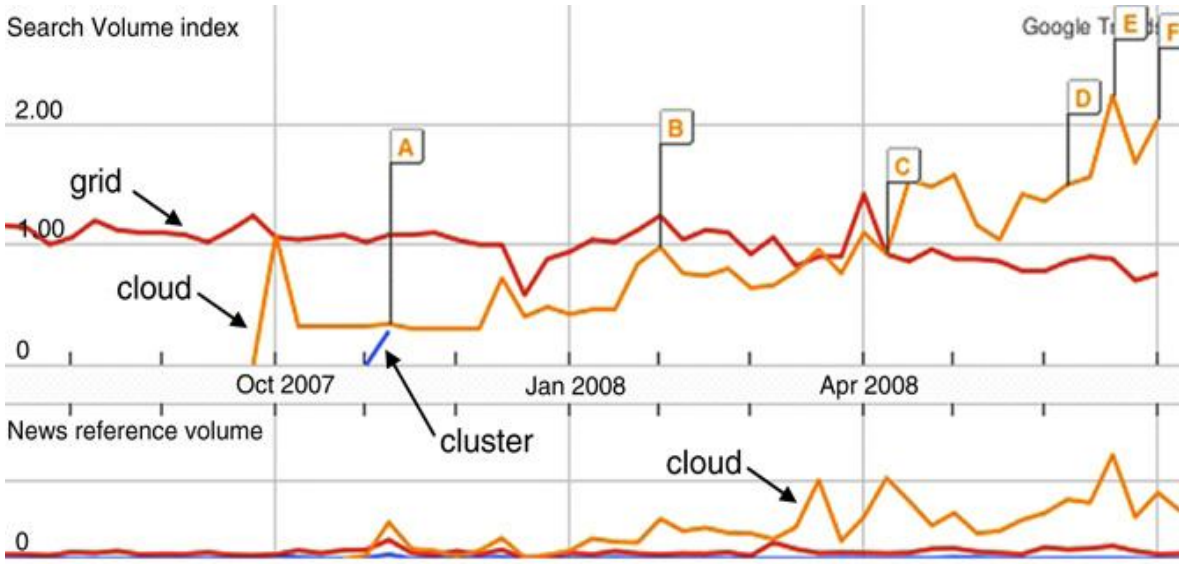

Fig: Cloud Computing, Cluster computing.

CONCLUSIONS

Artifacts were found that showed i-Cloud was enabled on both devices. Multiple p- lists recognized that i-Cloud was enabled on the iPod and the Mac Book. There was little evidence showing the two devices were connected to each other through i-Cloud. Instead, artifacts were found on each device that shared the same data through the i-Cloud-synced applications. It was more difficult to find an artifact that showed synchronization between the two devices through i-Cloud. In spite of that, the calendar and address book applications did share the same internet addresses to i-Cloud. Therefore, these applications linked to the same space on i-Cloud regardless of what device they were found on originally.

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