

ISSN: 2321-4155

Journal of Indian Research

Volume 7

Number 1&2

January-June, 2019



Mewar University Knowledge to Wisdom



JOURNAL OF INDIAN RESEARCH



Mewar University

A Quarterly Journal of Multidisciplinary Research

Volume 7 || Number 1&2 || January-June, 2019 || ISSN : 2321-4155

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Abstracts and Indexing

https://nkrc.niscair.res.in, www.drji.org, www.worldcat.org www.isid.org, www.scholar.google.com

Cover Design : Manishankar

Publisher : Mewar University, Gangrar, Chittorgarh, Rajasthan

Printer : M.K. Printers, 5459, New Chandrawal, Kamla Nagar, Delhi-110007

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CHAIRPERSON'S MESSAGE

India's energy policy is facing two major challenges. On the one hand, Indian economy is expanding fast while on the other, the population is still growing. The demand for energy consumption is very high. There is a big gap between energy consumption and energy production which needs to be filled. The supply of cheap and sustainable energy is important for the growth of any country. Energy security for any country demands that the present and future energy needs should be met in such a way that all people can benefit from energy, and there is little impact on the environment. Energy security approach should be on the basis of long term sustainability.

Renewable energy is obtained naturally from the environment. Renewal energy includes solar, biomass, wind, hydropower, geothermal, etc. Renewable energy is very beneficial due to their negligible ecological impact compared to fossil fuels. Renewable energies are quickly becoming inexpensive as well as efficient for a long term use. India has set itself a target of generating 175 gigawatt (GW) of electricity through renewable sources of energy by 2022. India is already the fifth-largest producer of solar energy & sixth largest producer of renewable energy in the world.

There are enough resources available to generate renewable energy in India specially solar energy due to 1800 to 2200 hours sunshine in a year. Renewable energies are also compatible with the dream of self-reliance at the village state level. So there is a need to adopt them in a big way in the country. The gap between increasing demand and supply in the energy sector in the country can be reduced. We have to make adequate arrangements to create renewable energy, but also have to make institutional changes so that the local energy needs can be met with sustainable energy resources for the people. I am happy to see that scholars from Mewar University have contributed their evaluation studies on solar energy in the current issue of the journal. I extend best compliments to the team for bringing out another splendid issue of the journal.

Achere Jame anding

Dr. Ashok Kumar Gadiya

EDITORIAL

The current issue of the *Journal of Indian Research* has technology as focal theme. **L** The first paper is by two young faculty of Mewar University, Yuvraj Singh Ranawat and Suraj Kumhar. In their paper, "General Review on Impact of Solar Energy in *Rural Development of India*", duo have extensively dealt with the interdependence of electricity and other parameters of modern development. Yuvraj and Suraj writes that "about 1.6 billion of world populations have no access to electricity of which about 80 per cent of those people live in rural areas of developing countries of South Asia, Central America and South America." Within India there are around 25,000 villages located in remote and inaccessible areas and hence could not be electrified through conventional grid extension in India. Ministry of New and Renewable Energy (MNRE) therefore launched the 'Remote Village Electrification Programme' (RVEP) to electrify such remote villages by installing solar photovoltaic (PV) home lighting systems in all the States. Based on the evaluation study carried out by the National Council of Applied Economic Research (NCAER) in six states, viz. Assam, Meghalaya, Jharkhand, Odisha, Madhya Pradesh, and Chhattisgarh, authors argue about the benefits accruing from this programme.

They found that "solar home-lighting system in the remote village can influence the life of people very significantly for the better. Substantial reduction in expenditure on kerosene has been found in the households of all income groups due to solar homelighting system. This scheme is mostly benefiting women and children. Women find it easy to do household activities whereas children get enough light to study at night. Crime rate has also been declining due to availability of light in the village. Most of the beneficiaries of solar home-lighting system are very happy with the functionality of the system.

The impact of the solar home lighting system is also significant in the case of performance of school going children. A large number of beneficiaries have reported that there is significant improvement in their children's education.

Next paper is from a young Kashmiri research scholar, Sayed Nasir Hasan. Hasan in his short write up on "Artificial Intelligence with Big Data and Utilization of Apache Spark Application" introduces Apache Spark with emphasis on application development leveraging the MLIB (Machine Learning in Spark) library.

Professor S.R. Magare *et al.* have conducted a field survey on earthworm species in Satpuda mountain area, North Maharashtra, India and studied their ecology and diversity for vermin-composting. The team suggests that degradation and decomposition of agricultural wastes and industrial waste can be done effectively by earthworms. Though there are more than 500 species of earthworm listed in India, the team studied only four species of earthworms *-Drawida willsi*, *Perionyx excavates*, *Eudrillus eugeniae* and *Eisenia foetida*. All four can be used for vermi-composting. The next paper is on new method of composting. Satish K. Ameta *et al.* has worked out a new way of composting one of the widespread weed in India in their paper, *"Vishishta* Composting: *A* Tool for Combating Against Congress Grass (*Parthenium Hysterophorus* L.)." The team writes how after noticeable occurrence of *Parthenium* in Pune (Maharashtra) in 1955, it spread like a wildfire throughout India. This weed grows luxuriantly in wastelands, public lawns, orchards, forestlands, flood plains, agricultural areas, urban areas, overgrazed pastures, industrial areas, playgrounds, roadsides, railway tracks and residential plots. Drought and subsequent reduced pasture cover create the ideal situation for the *Parthenium* weed to establish itself. *Vishishta* provides an effective, less laborious and can prepare compost in a shorter duration. They have advised further work on the *Vishista* composting method on the fields, so that farmers can also practice it without any doubt, fear and hesitation.

There are two papers on online job and e-commerce. Another interesting paper is on digital justice. Sunil Kumar Saroha and Uttam Anand from Kunming Science and Technology University, Kunming, China have contributed a short essay on , *Digital Justice: Reflections in the "Black Mirror.*" They reflect over how digital technologies are increasingly penetrating the State structure in the name of technology initiatives aimed at increasing justice and efficiency without compromising the values of freedom and security. They foresee a bleak future where the machine under the name of "Computer" might decide who should live, who and how should be punished. Mechanization of penalization would impinge upon basic concept of justice. The paper ignites the liberal spirit of inquiry into the modern concept of justice in the coming age of smart machines, Internet of Things(IOT) and Big Data analytics.

I hope the scholars would be greatly benefitted from the content of the current issue. We wish to provide platform to such innovative thinking over interface of technology and social sphere.

> **Niraj Kumar** Honorary Editor

GENERAL REVIEW ON IMPACT OF SOLAR ENERGY IN RURAL DEVELOPMENT OF INDIA

Yuvraj Singh Ranawat* Suraj Kumhar**

ABSTRACT

Around 25,000 villages are located in remote and inaccessible areas and hence could not be electrified through conventional grid extension in India. Ministry of New and Renewable Energy (MNRE) is implementing the 'Remote Village Electrification Programme' (RVEP) to electrify such remote villages by installing solar photovoltaic (PV) home lighting systems in all the states. An evaluation study was carried out by National Council of Applied Economic Research (NCAER) in six states, viz. Assam, Meghalaya, Jharkhand, Odisha, Madhya Pradesh, and Chhattisgarh.

The functionality of the system varies across the states and across the seasons. During rainy season on an average one luminaire works 2 to 3 hours. During winter and summer on an average one luminaire works 4 to 5 hours. However, performance declines over the years. Use of kerosene is reducing in rural areas. Nearly 53 to 69 per cent of sample population reported that there is significant improvement in their children's education, and 37 to 78 per cent reported that there is improvement in the standard of living after the installation of solar lighting. Beneficiaries now spend more time on income generating activities. Crime rate has also declined due to availability of solar street lights in the village.

Keywords: Commission on Sustainable Development (CSD-9) Home-lighting, Kerosene, rural electrification.

INTRODUCTION

Rural electrification was not considered a basic human need like water and food in the past. A number of recent studies provide insight into how rural electrification helps in the betterment of rural society in various ways. A study conducted by the World Bank for 11 countries reveals that rural electrification results into great benefits such as improvements of

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health facilities, better health from cleaner air as households reduce use of polluting fuels for cooking, lighting and heating, improved knowledge through increased access to television and better nutrition from improved knowledge and storage facilities from refrigerator [1].

According to the Global Network on Energy for Sustainable Development (GNESD, 2007) without adequate supplies of affordable energy, it is impossible to improve health, education and reduction of poverty. About 1.6 billion of world populations have no access to electricity of which about 80 per cent of those people live in rural areas of developing countries of South Asia, Central America and South America. In 2001, the Ninth session of the Commission on Sustainable Development (CSD-9) gave special attention to energy. It concluded that "*Energy is the central in achieving the goal of sustainable development*" [2].

Due to lack of electricity, use of kerosene as well as candles for lighting is common in rural areas. A study by Kaplin, [3] showed that burning of candle for a few hours in a closed room results in lead concentrations sufficient to cause foetal damage or to harm the mental development of children. Lead poisoning can lead to behaviour changes and damage internal organs, especially kidneys. Children in rural areas spend significant portion of their time in household's activities in day time. They do not have light to study at night. A few hours of electricity to study at night students can result in major improvements in their performance [4]. Women in rural areas spend 2-6 hours a day for collecting firewood due to lack of electricity [5]. Therefore, rural electrification may be considered as basic necessity to improve socio-economic condition in rural areas. Reference [6] provides an assessment of the social significance of rural electrification with solar energy in Kenya. In Kenya, only about 4 per cent of rural households were connected with electrical grid in the early 1980s. As of now, solar electricity has emerged as a key alternative to grid-based rural electrification in Kenya. The significance of solar electrification in Kenya, therefore, is closely linked to its role in supporting rural–urban connections for Kenya's rural middle class.

The study highlights show electric light from solar lighting plays a minor role in supporting direct income generation activities in rural Kenya. Given the distribution of ownership of solar systems, nearly all of these productivity gains are captured by rural middle class families. Solar photo-voltaic (PV) plays a more substantial role in supporting the use of electric light for key social activities such as evening time study by children. Solar electricity in Kenya is widely used for households' applications such as television, radio and cellular telephone charging that helps improve communication. Reference [7] focuses on how application of PV light for rural electrification helps in increasing rural income as well as the living standards of the rural poor. The basic applied forms of solar PV in rural Bangladesh are solar home-lighting systems installed in households and local market/bazaar (haat). Seven solar modules of 50 WP each, divided into two groups, were installed in two suitable locations of the market. The battery banks and controllers accompanying each group were placed close to two respective solar panels. Similar systems were subsequently installed, serving business such as grocery shops, restaurants, barber shops, tea houses and doctors' clinics.

The success of solar PV micro-utilities is attributable to several factors. These include the acceptability of a daily tariff structure and the rate of five taka, as well as proper marketing that explains the solar-energy-based system's capabilities, benefits, and constraints in comparison

to other available options to potential users. Benefits of the system also accrue because of the use of local institutions. An agreement, which was signed with the Bazaar Management Committee, includes the terms and conditions of the service, maintenance procedure, payment, and financial details of the users. The training of a technician to take care of the system on behalf of the collective is viewed favorably by users. Reference [8] explains the impact of renewable energy for changing the socio-economic status of women. It is not easy to improve the position of women in the society, unless their level of income increases. Poverty alleviation can be realised by the introduction of renewable energy system in a sustainable way. The most important point is the possibility of income generation. This can take place in many ways. The activities may lead to the start of small- and medium-sized enterprises. One example could be picking up of seeds from oil bearing plants. The seeds can be sold in the market. Women can also do the processing and can make and valorise side products like soap.

The linkage between energy and Millennium Development Goals (MDGs) are well established and agreed upon by the international community [9]. The UN Millennium Project also noted that a pre-requisite for meeting the MDGs is to reduce the share of the global population that does not have access to basic levels of electricity, as well as the population reliant on traditional solid fuel for cooking, to no more than about one billion people by 2015. This Energy vision foresees improved access to modern energy for about 1.5 billion. A few other studies have specially looked at the role of energy in achieving these goals, even though energy is not a specific MDG [10]. Most of these studies have been geared towards looking at the energy needs of the poor and the role energy plays in achieving the MDG [11].

A study by George, et al. finds that rural electrification plays a critical role on family planning practice in rural Nigeria [12]. Two communities of Bonny and Kula were chosen to study because of the similarity in their population, terrain and climate. Fishing is the major source of livelihood of the people in both these areas. In addition, small scale farming activity is carried out in both places but on a part time basis. There is neither processing nor manufacturing activity in the two areas.

Bonny has regular electricity whereas Kula community does not have electricity at all. The data reveals that family planning is practiced more in the electrified community than the non-electrified one (Kula), and there has been a significant decline in fertility.

The extent of electricity consumption of a country is one of the indicators of socioeconomic development. Per capita electricity consumption in India is the lowest in the world. In India, about 579 million people, that is 35 per cent of world's population, is living without access to electricity. The Ministry of New and Renewable Energy (MNRE) of Government of India, has been implementing the Remote Village Electrification Programme (RVEP) in all the states. An evaluation study was carried out by NCAER in six states, viz; Assam, Meghalaya and Jharkhand in 2008 [13] and in Odisha, Madhya Pradesh and Chhattisgarh in 2010 [14].

OBJECTIVES

In this paper an attempt is made to assess (a) the functionality of the solar PV system provided to households and (b) social impact of the programme on the beneficiaries in villages in the states of Assam, Meghalaya, Jharkhand, Odisha, Madhya Pradesh, and Chhattisgarh.

Methodology

The household's survey was carried out by NCAER in 2008 and 2010, to collect information from about 10,000 households from 371 villages spread over 41 districts in Assam, Meghalaya, Jharkhand, Odisha, Madhya Pradesh, and Chhattisgarh. Two well structured questionnaires were developed. One was canvassed at village level and the other at beneficiary household level to assess the functionality of the systems, the pattern of installation of the system and the impact of the programme. Focus Group Discussions (FGDs) were also organised to assess the impact of the programme in rural beneficiaries' households in some selected villages. FGD is a method of qualitative study used for capturing information not covered in the structured questionnaires.

SURVEY RESULT

The solar home lighting system has been provided through solar power plant and through solar photovoltaic individual home lighting system. In Meghalaya and Chhattisgarh, the solar light has been provided through solar power plant, whereas solar photovoltaic individual home lighting system has been provided in Jharkhand, Assam, Odisha, and Madhya Pradesh.

Functionality of the System

Proper functionality of the system is determined by taking into consideration many factors such as module capacity, module installation, fixing of luminaires inside the house, fixing of cable, etc. If the module and luminaires are installed properly and fixing of cable from charge controller to module is also proper, then one CFL can provide light up to 10 hours during a day in normal weather conditions. Two CFL luminaires can provide light up to 4–5 hours a day. One of the major advantages of solar home lighting system is that energy can be stored in battery for two to three days, if the lights are used scarcely. In the present study, an assessment has been carried out to check the duration of light received by the beneficiaries during different seasons.

Functionality of the system in winter

During winter the functionality of the luminaires looks moderate as only 2 to 14 per cent reported getting light less than three hours in Assam and Jharkhand. About 53 per cent of beneficiaries in Madhya Pradesh reported receiving light between 3–4 hours per day in winters, whereas only 20 per cent reported receiving light between 3–4 hours in Assam and Meghalaya. Except in Madhya Pradesh, majority of beneficiaries reported receiving light for more than four hours in winter season. The performance of the systems is better in winter and summer because of abundant sun shine. On an average, luminaires work for 4–4.5 hours during winter season.

Functionality of the system in summer

The functionality of the system seems to be very satisfactory in summer as 75 to 91 per cent of beneficiaries reported getting light for more than four hours in Assam and Jharkhand. On an average, luminaires work for 4.4 to 4.8 hours per day during summer.

IMPACT EVALUATION

Expenditure on Kerosene

The survey results highlight that the monthly expenditure on lighting has reduced substantially after Solar Home Lighting System in all the sample states. The beneficiary households have continued to use kerosene for other purposes than lighting the room after the installation of solar PV systems in the households, but in smaller quantity. The expenditure on lighting has reduced by more than half in Meghalaya, Assam and Jharkhand. The reduction of expenditure on lighting is relatively less in Madhya Pradesh, Odisha and Chhattisgarh.

Multiple activities are being carried out in the beneficiary households during the time when electricity is available in the evening such as cooking, teaching children and studying, recreation and other household activities. We also asked them to assign the highest rank (1) the activity where maximum time was spent when the light was available at home. About 58 per cent in Jharkhand ranked 1 on teaching children and studying whereas 60 and 45 per cent of beneficiaries ranked 1 for the same in Assam and Meghalaya, respectively (NCAER, 2008, p. 52). This finding is further supported as 64, 69 and 53 per cent of beneficiaries reported that there is significant improvement in their children's education in Jharkhand, Assam and Meghalaya, respectively. Similarly, 28, 52 and 34 per cent of beneficiaries reported that there was significant improvement in their children's education in Odisha, Madhya Pradesh, and Chhattisgarh, respectively. About 52, 55, 37, 42, 78 and 48 per cent have reported minor improvements in standard of living after installation of solar lighting system in Jharkhand, Assam, Meghalaya, Odisha, Madhya Pradesh, and Chhattisgarh, respectively. Convenience in household work due to installation of solar PV system has been well recognised. The level of satisfaction is more visible as 49, 60, 75, 48, 39 and 35 per cent have reported 'significant improvement' in household work in Jharkhand, Assam, Meghalaya, Odisha, Madhya Pradesh and Chhattisgarh, respectively.

Income Generation Activities

Solar home system has been considered very good as it carries many external benefits. It can help create new sources of income in the households. The survey finds that only two to three per cent among the beneficiaries reported that new sources of income generation activities have opened up after getting solar light system. As a consequence, the monthly household's income has gone up by 5 per cent in Jharkhand. However, the increase in income after installation of solar light is not significant in other states.

Impact Assessment from Focus Group Discussions

In order to assess the involvement of the beneficiary households in the solar home lighting programme and the type of benefits and satisfaction realised by the households, FGDs were organised in all the six states during the survey among both women and men separately. The group discussions proved extremely useful in eliciting a range of information, which further supports the quantitative information. In all, 33 FGDs were organised in the six states.

Summary of Focus Group Discussions

Some of the participants among women said that they do households activities in the evening, such as grinding of rice, weaving cloth, etc. During day time they go for wage work.

Indirect income earning activities are also taking place due to availability of light. The women beneficiaries are highly satisfied with the system, because it makes it easier for them to cook at night and finish their household's chores comfortably. Some of the participants said that their kerosene consumption has decreased by 60 to 70 per cent after installation of the solar home lighting system. A few participants said that poor households in their village have totally stopped buying kerosene. Before installation of the solar streetlights in the village, wild animals like leopards, bears, etc. would frequently enter the village and hunt cattle and would many times attack children. But After the installation of streetlights, they have stopped entering the village. People freely move around even after it gets dark. One woman in Morigaon district of Assam said, '*I can stay at home alone in the evenings now. Earlier I had to call somebody from the neighbourhood to stay with me because of fear from the tiger, when my husband was not at home. The crime rate was high at night. Snake and insect bites were common in the village. Now such incidents have reduced."*

A few participants in village Bangaura (Chhattisgarh) said that in their village children used to study up to primary level only before getting the solar light. But after getting solar light some of the children are studying in the middle level. This implies that drop-out rate has decreased. FGD participants in Nayapara village (Chhattisgarh) said that the school teacher and forest guard were not staying in the village due to lack of electricity. But now the school teacher and forest guard are staying in the village.

A few of the participants in village Dheba, Kashdol, and Diahampara in Chhattisgarh said that after getting solar light, looking after old and sick people became easier. Social gathering, dancing, and singing also take place in the evening. Some of the participants said that they could look after their domestic animals better in the evening due to availability of light. They also collect 8–10 solar home lights for marriage ceremony and other social gatherings. A few participants in Chhattisgarh said TV used to be like a dream for the villagers. But now they watch cricket matches on TV.

A few participants, however, said that households in the village spend some more time on activities such as making *bidi* and plates out of leaves, rope and weaving, which helps in improving the household's income.

CONCLUSION

The present study shows that solar home-lighting system in the remote village can influence the life of people very significantly for the better. Substantial reduction in expenditure on kerosene has been found in the households of all income groups due to solar home-lighting system. This scheme is mostly benefiting women and children. Women find it easy to do household activities whereas children get enough light to study at night. Crime rate has also been declining due to availability of light in the village. Most of the beneficiaries of solar home-lighting system are very happy with the functionality of the system.

The impact of the solar home lighting system is also significant in the case of performance of school going children. A large number of beneficiaries have reported that there is significant improvement in their children's education.

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ARTIFICIAL INTELLIGENCE WITH BIG DATA AND UTILIZATION OF APACHE SPARK APPLICATION

Sayed Nasir Hasan*

ABSTRACT

Among various type of applications in Artificial Intelligence, Big Data has emerged as a source of new opportunities. Various design considerations exist in this relatively new field where parallel processing frameworks can be engaged in a more economical fashion. Unlike traditional data sources, Big Data applications present their own unique challenges in order to appropriately harness the utility of open source frameworks including Apache Spark and design patterns predicated on the Directed Acyclic Graph. By embracing this new paradigm, parallel processing can be effectively leveraged to support development at a level of scale and performance that was not possible earlier.

Keywords: AI (Artificial Intelligence), Big Data, Apache Spark, Hadoop, Acyclic Graph

INTRODUCTION

While large scale applications have already existed before the advent of Big Data, the difference today is that as opposed to requiring large scale computing activities with record amounts of money spent on supercomputer architectures; this work is now performed on commodity machines and programmed without any specific knowledge of parallel processing at the architecture level. This technology has ushered 'supercomputer' applications to an era of accessibility [1]. Correspondingly, as database architectures have begun to thrive in, Big Data operations, large scale Data Warehouses have also become easier to manage, where issues of programming around index structures for the purpose of efficiency has been greatly reduced. Within this landscape Artificial Intelligence can realize renewed potential as new categories of problems are now able to be easily prototyped as compared to past efforts [2].

Hadoop and more recently Apache Spark has emerged as a popular framework for largescale data analysis on the cloud [3][4]. However, among applications that cannot be easily expressed within a sequential fashion, programming patterns derived from Directed Acyclic Graphs have existed as a programming design restriction. This has resulted in the consideration of design patterns for not only leveraging this technology but deriving any level of utility.

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In comparison to earlier platforms for Artificial Intelligence as well as Data Analytics, a number of considerations exist in the design of an Apache Spark application which motivate concern for the shape and size of one's data [5][6]. While the developer is abstracted from the parallel architecture in Apache Spark, it is still important to invest substantial effort in the initial data architecture. In many cases, by employing best practices, there are substantial benefits that exist for not only performance but for the means of successful implementation.

Within such type of considerations, the article on Artificial intelligence with Big Data, presents an introduction to the Apache Spark framework that allowing users to follow with examples directly running them on instances within Amazon Web Service. Within the context of these examples, specific consideration will be given for application development and examination of opportunities that exist in this forward moving framework.

DEVELOPMENT CONSIDERATIONS

Scala has emerged as the dominant language of Apache Spark due to a number of reasons including existence as the core architecture development language, strong functional programming support and ease of use [6]. Interest has also proliferated in the use of PySpark, mostly due to legacy application code, programmer familiarity and overall acceptance as a core data science development language [7]. The R programming language has had some interest for similar reasons as well as Java, with some interest in recent efforts of the port of the Julia language to the Apache Spark platform [6].

Recent updates to Apache 2.0 have presented some confusion regarding the application of RDD Vs. Data Frames and Data Stores. While Data Stores were initially presented as the next level of refinement to the core RDD architecture by supporting complete schema based support and specialized performance in specific configurations, it only maintains a very specialized niche application with Data Frames existing as the recommended data structure. Data Frames also exist as a preferred means of implementation over RDDs though they remain an important component of Apache Spark as it exists as a foundational data structure from which both Data Frames and Data Stores have been derived [6].

Spark has presented a substantial advantage in supporting the administration of applications that are agnostic of any particular hardware architecture, allowing even simplified versions that can be run in demonstration mode on the smallest of computers including Raspberry PI [7]. While being constrained with memory limitations, such flexibility in architecture allows for opportunities in terms of providing a suitable learning environment.

MAJOR CHALLENGES IN DEVELOPMENT

In legacy applications that have been ported to Apache Spark, a number of challenges exist in data preparation among highly normalized data structures. In such instances, a level of pre-processing in which a denormalized database are implemented, mimicking the Kimbal-influenced design of denormalized data warehouses. In such cases, by supporting this as a level of ETL, operations requiring persistent data within an application due to excessive joints within a distributed architecture are avoided thus allowing for a successful implementation [9].

Additional problems exist in the context of working with Spark Windowing where

performance can rapidly decline in the instances where windows that are defined within the distributed framework are not capable of appropriately containing the activity within a specific node. In such cases it is a function of the data architecture, volume and window of the time series.

Finally, in development, design constraints have to be closely scrutinized in cases where substantial code needs to be re-developed in order to support the development in the Spark architecture. In such instances, it is important to address the application of a functional based paradigm in order to leverage the parallel processing environment.

CONCLUSION

The purpose of this paper is to make aware experienced software professional / engineer / researcher who have some familiarity with the Big Data technology. This paper is a tutorial on Apache Spark with emphasis on application development leveraging the MLIB (Machine Learning in Spark) library. Apache Spark should also be compared against (competitive/ complementary) technologies including Scikit learn. An understanding of Spark Architecture, Scala Spark Fundamentals. Data structures including Resilient Distributed Datatypes (RDDs), Data Frames and Data Stores, MLIB, Spark Windowing Analytics and case studies of the implementation of Apache Spark on the Raspberry PI platform can make technical experts well conversant with the application dimension of this new technology.

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ECOLOGY AND DIVERSITY OF EARTHWORMS FROM SATPUDA MOUNTAINS

S.R. Magare* V.R. Borane** B.R. Shinde***

ABSTRACT

Ecology and diversity of earthworms used for vermin-composting are studied from Satpuda Mountain area around Taloda Tehsil in North Maharashtra was studied during 2016-2017. Study area comprises 16 collection spots in about 204 sq km zone of Satpuda mountain area, North Maharashtra, India. A total of 244 individuals belonging to four different species i.e., Drawida willsi, Perionyx excavates, Eudrillus eugeniae and Eisenia foetida were observed from 16 collection spots in eight different localities. North Maharashtra is allied zone of Western Ghats. Eisenia foetida were more in numbers while Drawida willsi are comparatively less. Changes in species composition and abundance are related to natural site variations. The Shannon's diversity index shows maximum diversity index with four numbers of species is 1.15 in undisturbed area (UD) with evenness value 0.83and 1.32 in moderately disturbed area (MD) with evenness value 0.95. These earthworms are quite common in valley areas among Satpuda mountain belts, evergreen forests and where soil is mostly moist and rich in humus. They prefer alkaline moist soil with litter. Need for biodiversity conservation is emphasized.

Keywords: Alkaline soil, decomposition, degradation, evergreen forests, industrial waste, Shannon's diversity index, soil moisture, vermin-composting.

INTRODUCTION

Biodiversity is one of the main life- supporting system of various ecosystems. Earthworms are soft bodied burrowing animals which in the vast majority of cases turn soil into a valuable organic fertilizer. Earthworms are exquisite wonders of nature linked with human need since historic times and are known as friends of farmers. Diversity

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of earthworms is concerned with integral part of human life. Earthworms with their peculiar food, feeding and burrowing habits are best converters of nature and can be used commercially for farming (Sheilds, 1971). The survey of Earthworm species in Satpuda area provides crucial information on ecology of the region. Nowadays the biotic fauna is greatly threatened by various human activities. North Maharashtra comprises Satpuda mountains ranges and forest zone close to Western Ghats. More than 4,200 species of oligochaetes are known in the world (Kumar, 2000). The estimated number of earthworm species in Indian subcontinent is around 67 genera and 509 species. Earthworms are conveniently being employed for bioremediation like degrading and decomposing the agricultural and industrial wastes (Ghosh *et.al.*,1999)

Some species of earthworm's like, *Eudrillus eugeniae* and *Eisenia foetida* are being used for composting in most of the countries. In India, in addition to these, two more species, namely *Perionyx excavants* and *Perionyx sansibaricus* are also used for the vermicomposting. *Eisenia foetida* is perhaps world's most widely used species of earthworm for vermicomposting (Graff, 1974). Julka *et. al.* (2009) reported 590 species of earthworms from various parts of India, but at the same time there is paucity of information regarding the distribution and composting the paucity of information on Earthworm species and severity of threat to them in WG, the need of the hour is to make an inventory and to study the distribution pattern of them. These results prompted me to make survey of Earthworms used in vermin-composting to fill up the lacuna of survey of Earthworms from Satpuda Mountain area around Satpuda mountain area of Taloda Tehsil of Maharashtra, India.

MATERIALS AND METHODS

An extensive survey was made from different vegetation types. Forests, rocky mountains, marshy places, moist soil, agricultural lands, horticultural Zones gardens, roadside dense vegetation, river-sides, grasslands and paddy fields. In particular banana and cabbage cultivation area, vermin-culture centre area and nurseries were also surveyed during different seasons of the year 2015-2016 from Satpuda mountain area around Taloda Tehsil of North Maharashtra, India. The preliminary studies carried out at Taloda, Kothar, Bijari and Dhadgaon from mountain area and from Khapar, Akkalkuwa, Prakasha and Shahada studied from plane area at the baseline of Satpuda Mountains which had higher density of animals. Collection was easier due to greater accessibility and relatively loose and moist soil. In some areas inside fallen leaves of trees in forest with decaying matter, earthworm species were collected and maintained in vermiculture centre, Satguru Gandhul Khat Prakalp, Taloda.

From each site a quadrant of 1x1 meter was taken as the unit for population estimation of the earthworms. The earthworms found in these quadrants were collected manually by hand picking, using gloves to prevent infection. The earthworms were counted quadrant wise and species wise. The mean was calculated for each species and the number calculated for actual earthworms' population per quadrant area. The shape, colour and habitat of the earthworms from these collection sites were recorded for further morphological studies. Specimens were washed and identified from reputed references and Vermi culture centre, Satguru Gandhul Khat Prakalp, Taloda. (earthwormsofindia.com)

From the survey sites, the soil parameters and atmospheric temperature are recorded. The time spent in minutes and visited area of survey in square kilometres was recorded in searching the earthworms. Study was carried out from 16 collection sites of eight different places in Satpuda Mountain area in North Maharashtra. Calculations for diversity assay was done using Shannon-Weiner index (H,) formula,

$\mathbf{H'}=-\sum \mathbf{Pi} \mathbf{x} \mathbf{In} (\mathbf{Pi}),$

Where Pi=proportion of individual species. The Shannon's index follows the same pattern as that of species richness.

RESULTS

Satpuda Mountain area is located around Taloda Tehsil is in North Maharashtra which is an allied zone of Western Ghats in India. A total of 244 individuals of different earthworms belonging to four different species i.e. *Drawida willsi, Perionyx excavates, Eudrillus eugeniae* and *Eisenia foetida* were collected from 16 collection spots in eight localities distributed along Satpuda Mountain area around Taloda Tehsil in North Maharashtra.(Table 1). Areawise species inventory of earthworm species from Satpuda mountain area is presented in Table 1. The species-wise composition of earthworms comprising in four different families are 40.16 % species from *Lumbricidae* family, 30.73 % from *Eudrilidae* family, 18.44 % from *Moniligastridae* family and showed very less species composition i.e. 10.65 % in *Megascolecidae* family. Actual time spent was 936 minutes in searching the earthworm species from 16 collection sites distributed in an area of 204 square kilometres of Satpuda mountains in North Maharashtra. (Figure 1)

Sr. No.	Site of Collection	Eisenia foetida	Eudrillus eugeniae	Drawida willsi	Perionyx excavates
1.	Taloda	12	07	06	02
2.	Kothar	25	06	04	04
3.	Bijari	19	09	05	02
4.	Dhadgaon	22	14	03	03
5.	Khapar	06	04	05	02
6.	Akkalkuwa	03	16	08	05
7.	Prakasha	03	07	08	05
8.	Shahada	08	12	06	03
	Total	98	75	45	26
	Mean	12.25	9.37	1.76	3.25
	SD	8.71	4.20	2.73	1.28
	Variance (o2)	66.43	15.48	1.65	1.43

Table 2: Area-wise Species inventory of Earthworms from Satpuda mountain area



Figure 1: Actual area searched and Time Spent

Species Diversity

Four different species of earthworms used mostly in vermin-composting were found from 16 different sites, which are randomly scattered in Satpuda mountain area of North Maharashtra. These are *Drawida willsi, Perionyx excavates, Eudrillus eugeniae* and *Eisenia foetida*. Species richness of the two sites varied moderately. Species richness is greater in UD sites than MD sites. The maximum number of species observed are that of *Eisenia foetida* whereas the species *Perionyx excavates* were found in very less numbers. The occurrence of these worms was reported from various sites, representing humid, shady and rocky places of forests, fields and gardens. The greater density and species richness accounted in UD area. The Shannon's diversity index shows maximum diversity index with four numbers of species is 1.15 in undisturbed area (UD) with evenness value 0.83 and 1.32 in moderately disturbed area (MD) with evenness value 0.95. (Table 2)

Sr.	Species	Family	Number of Individuals	
No.			UD	MD
1.	Eisenia foetida	Moniligastridae	78	20
2.	Eudrillus eugeniae	Lumbricidae	36	39
3.	Drawida willsi	Megascolecidae	18	27
4.	Perionyx excavates	Eudrilidae	11	15
	Total		143	101
	Mean		35.75	25.25
	SD		30.07	10.40
	Variance (o2)		678.18	81.18
	Shannons Diversity index		1.15	1.32
	Evenness		0.83	0.95

 Table 2: Species inventory of Earthworms in Undisturbed (UD) and Moderately disturbed (MD) sites of Satpuda Mountain area of North Maharashtra.

Soil Parameters

To study the ecology of earthworm species, an account of soil parameters from study site was made. Most of the earthworms prefer low temperature i.e. 24°C to 26°C and soil rich in organic carbon. In rainy season, they inhabited area around soil surface to a depth of around 4-6 cm. They are abundant in moist and humus rich soil. Earthworms were few in orchards and more in mountain area. There are dissimilarities in soil parameters of study site preferred by different species of earthworms. (Table 3)

Sr. No.	Locality	Soil Temp. (°C)	РН	Electri- cal Con- ductivity (Ds/m)	Relative humidity	Organic C %	Total N %	Avail- able S (PPM)
1	Taloda	26	6.59	0.99	64.35	6.32	0.05	38.57
2	Kothar	24.56	6.55	0.6	87.28	3.76	0.09	28.47
3	Bijari	25.01	7.06	0.71	84.22	3.08	0.39	41.16
4	Dhadgaon	25.52	7.04	0.68	78.04	4.49	0.08	53.21
5	Khapar	26.18	6.78	1.04	62.37	5.68	0.4	50.18
6	Akkalkuwa	26.14	5.58	0.88	61.04	5.13	0.62	28.52
7	Prakasha	24.52	6.5	0.64	86.05	3.39	0.12	21.12
8	Shahada	26.45	7.11	0.78	52.23	6.05	0.24	26.02

Table.3: Soil parameters from study sites

DISCUSSION

North Maharashtra is an allied zone of western Ghats, which is an important global hot spot of biodiversity in India. Nowadays overcrowding, overgrazing, overexploitation of natural resources and deforestation causes destruction of habitat. From the present study it appeared that the abundance of earthworm species from the UD and MD sites was quantified from different habitats of 16 sites of eight different localities. The earthworm fauna of North Maharashtra is rich, but earthworms used in vermin-composting are still unexplored therefore work on ecology and diversity of earthworms to describe the fauna of earthworms used in vermi-composting from 16 sites of 10 localities was adjourned with four genera and four species, belonging to four families. The earthworms used in vermi-composting are more in undisturbed zone than in moderately disturbed zone, i.e.in plane area. The mean density of Earthworms was 35.75 in UD zone and 25.25 in MD zone per square kilometre. Much variation was observed in MD site than UD sites.

Degradation and decomposition of agricultural wastes and industrial waste can be done effectively by earthworms (Ghosh *et.al.*, 1999). In India, the earthworm species, namely earthworms from Northern Indian states have been studied by Neena Dhiman and Battish (2006). *Perionyx excavants* and *Perionyx sansibaricus* are also used for the vermi-composting. *Eisenia foetida* is perhaps world's most widely used species of earthworm for vermi-composting (Graff, 1974) Julka *et. al.* (2009) reported 590 species of earthworms including species used

in vermi-composting from various parts of India. The four species of earthworms i.e. species *Drawida willsi, Perionyx excavates, Eudrillus eugeniae* and *Eisenia foetida* explored in present work are also used in vermi-composting.

In present work earthworm diversity and their abundance is reported from plane and mountain area i.e., from undisturbed and moderately disturbed zones of Satpuda mountains North Maharashtra of India. Total 244 individuals belonging to four different species were studied from 16 collection spots in eight different localities. The Shannon's diversity index shows maximum diversity index with four numbers of species is 1.15 in undisturbed area (UD) with evenness value 0.83 and 1.32 in moderately disturbed area (MD) with evenness value 0.95. These earthworms are quite common in valley areas among Satpuda, mountain belts, evergreen forests and in orchards where soil is mostly moist and rich in humus. They prefer alkaline moist soil with litter.

ACKNOWLEDGEMENTS

Author is thankful for the Principal, A.S.Mandal's, C.H.C.Arts, S.G.P.Commerce and B.B.J.P. Science College, Taloda, Dist- Nandurbar for providing laboratory facilities and Prof. A.K.Patel for encouragement.

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VISHISHTA COMPOSTING: A TOOL FOR COMBATING AGAINST CONGRESS GRASS (Parthenium Hysterophorus L.)

Satish K. Ameta* Naresh Kumar** Pankaj Kumar Teli***

ABSTRACT

Parthenium hysterophorus L., is a noxious plant, inhabits many parts of the world including America, Asia, Africa and Australia. It is an invasive species and causes deleterious effect over human and animal health. Through the Vishishta composting method, Parthenium weed can be composted along with rock phosphate, Trichoderma viride fungi culture powder and different organic wastes such as cow-dung, sawdust, cow dung ash, dried fallen leaves and wheat straw. This paper discusses the new method to control the spread of this weed.

Keywords: Biological control, dermatitis, *Trichoderma viride* fungi, *Vishishta* composting *Parthenium* weed.

INTRODUCTION

Parthenium hysterophorus L., is a noxious plant, that inhabits many parts of the world including America, Asia, Africa and Australia. Parthenium hysterophorus L. is a fast maturing, erect and much branched annual herb. This noxious invasive species is considered to be one of the worst weeds currently known. Parthenium hysterophorus L., commonly known as carrot weed, white top or Congress grass in India and it belongs to the Family Asteracae (compositae). It is most popularly known as Gajar Ghas due to its appearance like carrot plant. The origin of Parthenium weed is considered to be from Mexico, America, Trinidad and Argentina. It is a widely held belief that the seeds of this weed came to India with grains imported from USA under the US PL 480 scheme, also known as "Food for Peace" which

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is a food assistance programme of the US Government. After noticeable occurrence of *Parthenium* in Pune (Maharashtra) in 1955, it spread like a wildfire throughout India. It grows luxuriantly in wastelands, public lawns, orchards, forestlands, flood plains, agricultural areas, urban areas, overgrazed pastures, industrial areas, playgrounds, roadsides, railway tracks and residential plots. Drought and subsequent reduced pasture cover create the ideal situation for the *Parthenium* weed to establish itself. Due to its high fecundity a single plant can produce 10,000 to 15,000 viable seeds and these seeds can disperse and germinate to cover large areas. Although *Parthenium* weed is capable of growing in most soil types, it is most dominant in alkaline, clay loam soils.



Figure 1: Parthenium hysterophorus L. weed

This is a weed of global significance responsible for severe human and animal health issues. It has been reported to cause skin rashes (dermatitis) on those parts of the body that come in contact with the weed on a regular basis, watery eyes, swelling and itching of the membranes of the mouth and nose. Allergy-prone people are particularly susceptible to both the dermatitis and respiratory problems. The weed is unpalatable to livestock so its invasion results in grazing shortages. If it is mixed with fodder, it taints meat and milk. It produces allelopathic substances that deter other plants from germinating and growing near it and hence can take over native grassland and improved livestock pastures as well as the understorey in woodlands. Thus, it is a big threat for biodiversity as well. Looking at the multitude of harms caused by *Parthenium* weed, its management is necessary to prevent future problems.

Various mechanical, biological and chemical methods have been used for its prevention, eradication and control, but without much success. Manual uprooting of *Parthenium* before

flowering and seed setting is the most effective method. This is easily done when the soil is wet. Uprooting the weed after seed setting will increase the area of infestation. Pulling a plant in flower will aid in the dispersal of pollen grains. Ploughing the weed, before the plants reach the flowering stage may be effective. If one talk about available chemical methods, then a large number of chemicals has been tried for this purpose, out of which glyphosate, atrazine, and metribuzin were found promising. In open wasteland, non-cropped areas, along railway tracks and roadsides, the spraving of a solution of common salt (Sodium chloride) at 15-20% concentration has been found effective. Several insects and pathogens have also been tried from time to time. The leaf-feeding beetle Zygogramma bicolorata and the stem-galling moth Epiblema strenuana are widely used to manage Parthenium. Z. bicolorata is now widely used in India to control it. Other major bio-control agents used are Listronotus setosipennis (stem-boring weevil), Semicronyx lutulentus (seed-feeding weevil), Bucculatrix parthenica (leaf-mining moth), Conotrachelus albocinereus (stem-galling weevil) and Carmenta ithacae (rootboring moth). Some another recent development in the biological control of Parthenium is the use of a rust fungus, Puccinia abrupta var. partheniicola. Uredospore suspensions from 3-week old pustules of the rust have been applied to the foliage of *Parthenium* and a consistent control has been achieved. This fungus is now being evaluated for development as a mycoherbicide. Pathogens like Fusarium pallidoroseum and Oidium parthenii also show good efficiency as biological control agents.

Although we can control the weed through the aforesaid discussed methods to some extent but the available chemical or mechanical control measures are neither feasible nor economical. and biological methods also have certain limitations. Therefore, the weed management strategy needs to be shifted towards non-chemical methods. An eco-friendly and economically sustainable management of P. hysterophorus is thus necessary to protect and conserve our environment. Parthenium is reported to have some insecticidal, nematicidal and herbicidal potential. In the Caribbean and Central America, Parthenium is applied externally on skin disorders and a decoction of the plant is often taken internally as a remedy for a wide variety of ailments. Among all of its uses composting is easiest and most effective reported method. Since P. hysterophorus grows luxuriantly in many parts of the world, it is important to explore its beneficial uses if any. Composting might be a useful alternative to convert biomass from this species to a useful material that could be used as soil conditioner. The compost from Parthenium weed can be prepared to recycle the nutrients that are sucked by undesired weed from the soil. But there was a research gap i.e. presently; the available methods take a long time in preparing *Parthenium* compost, while the shorter methods are mostly less eco-friendly. This drawback was fulfilled by continuous efforts of an eminent chemist and an environmentalist; Prof. Suresh C. Ameta and Dr. Satish K. Ameta. They developed a fastest method and named it as Vishishta Composting for composting the weed in an ecofriendly way; it is a method, which can prepare compost of the weed in shortest duration till date (In 60 days only) (Ameta et al., 2016).

VISHISHTA COMPOSTING METHOD

In this method, *Parthenium* weed was composted along with rock phosphate, *Trichoderma* viride fungi culture powder and different organic wastes such as cow-dung, sawdust, cow dung

ash, dried fallen leaves and wheat straw. The term 'Vishishta' is a Hindi word, which means 'something special'.

• Design of Bin for Vishishta composting

A wooden box of size 90 x 90 x 90 cm was prepared (Figure. 2) and used as a bin for composting. Many holes were made on all the four sides of the box providing a proper passage of air in the box. The base and upper parts of the box were kept hollow so that it can be easily detached from the material while turning is provided to the material. Thus, one can perform the work of two bins from one box only; thus, reducing the cost.



Figure 2: Bin designed for Vishishta composting

METHODOLOGY

All the collected materials were mixed in the desired proportions and placed in the bin. A solution of cow dung was prepared using water. It was sprinkled timely on the material during filling material in the bin so as to provide appropriate moisture content. This material was kept undisturbed for 3 days. Only water was sprinkled on it to make optimum moisture content during this phase. Temperature was monitored regularly in the pile and it was found to be around 65°C on 3rd day, which is optimum for composting process. Therefore, after 3 days, the first turning was provided to the material to prevent it from overheating. While turning the material in the pile, some positive signs of composting were observed such as the material was dark in colour, it was too hot, and some fumes were visible even with naked eyes.

Material was provided turning regularly alternate days for one month. After one month, the frequency of turning was reduced because at that time, optimum temperature was not achieved during turning on an interval of a day. So, only 4-5 turnings were provided in next month

with an interval of 7-8 days. A total of 16-17 turnings were provided in the whole process in two months for composting *Parthenium* weed. Water was sprinkled regularly for maintaining moisture content in the pile. A few days after initial turnings, a white fungal appearance was also seen on turning the compost, which may be a possible cause of degradation of feedstock in shorter duration. Thus, 60% of the feedstock is obtained as compost in 60 days through *Vishishta* composting. Quantity of the compost prepared by this method is also better than other methods. The *Parthenium* weed compost contains more nitrogen, phosphorus and potassium and other nutrients than ordinary farm yard manure (FYM). Overall status of the nutrients in as-prepared compost was also appreciable (NPK is discussed in Table 1). Impact of the compost on germination, growth and productivity was also seen on radish, maize and wheat crops; the results were encouraging about composting the weed.

Parameter	Average Test Value
Total nitrogen, percent by weight	1.35
Phosphorus, percent by weight	0.76
Total potash, percent by weight	0.61

Table 1:Status of Nutrients in Compost

Therefore, the proposed method may carry hope in dealing with the most troublesome weed of our country. However, this field requires an extensive study for the development of a strategy for composting of *Parthenium* weed; which is not only eco-friendly but also cost effective, less laborious and can prepare compost in a shorter duration. Further work on the *Vishista* composting method may definitely bring it from the laboratories to the fields, so that farmers can also practice it without any doubt, fear and hesitation. Emphasis should also be given on integrated management of this weed through developing its utilization as well as by mechanical and biological methods available.

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AN ANALYTICAL STUDY OF ONLINE JOB SEEKING BEHAVIOR FOR EMPLOYMENT OPPORTUNITIES

Dolly Bhutani*

ABSTRACT

This paper discusses how different variables can impact on online job seeking behavior of people. Gender, marital status, age have also been considered as determinant of behavioural pattern. There is also an alignment between the wages that was expected by the job seeker and the wage that was mentioned in the online offer. The job seekers, in this case, calculates the terms and conditions provided by the company. Duration of unemployment and how long he is willing to do this job should also be mentioned by the online job seeker, and accordingly, he can find what exactly he wants. The results of the empirical data are then related to the models and discussion has been made on how thesearching methods for the future online job can be impoverished.

Keywords: Online jobs, query logs, searching methods, Unemployment.

INTRODUCTION

Online job seeking method is completely different from that of other job search methods. The importance of online job seeking method is increasing; the efficiency of it is also gradually rising. There are several important factors that determine the job seeking process, but most of them remained unnoticed by the researchers. Sometimes people only observe the applications that are effective and the other sets remained unnoticed.Moreover, the process of job seeking is the act of only looking for employment because of the desire for acquiring a better position. Hence the immediate aim of job seeking is basically to obtain a job interview with the employer that might lead to getting hired in the employment.

It has been noticed that the behavior of the job seekers is to firstly search and find out the vacancies in the job or posts or the employment opportunities which they possess as a personal interest to apply for the employment. However one of the most prominent qualities of the online job seeking is that it provides a huge number of observations which the voluntary web dependent surveys or the online job portals are able to collect. In addition, the online job

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seeking method also provides certain advantages like the cost-effectiveness, saving time as well as easy variability of the survey questions. Apart from this the online job portals are also used to gather resumes and vacancies and therefore serve as the vital platforms in developing a match for the labor market. The vital research question in this paper is how will the job seekers choose the appropriate ones and let go of the others.[1] Thus, a form of network is used for every application. If for example job seekers are considered as nodes, then by linking the nodes is the only method, when more than one job seeker applies for the same job. Thus, by considering this method online job ads are created for every job seeker. Data from online job opportunities are considered here and how job seekers use their applications is studied here. It has also been found that if the applicant spends more time on job seeking, then their choices getworse.

Collection of data

The data covers a sample of data from all the online job websites of India. The date of birth, gender, marital status, years of education and experience, college, subjects studied of the job seekers are observed. [6]

Demography	Employed	Unemployed				
Age	35	35				
Fraction of Males	0.6	0.5				
Wages	1000	600				
Unemployment duration	-	350				
Education						
Primary	0.1	0.2				
High school	15	32				
College	58	35				
Post graduate	1.5	0.7				
Occupation						
Management	27	23				
Technology	31	23				

Table 1: Job Seekers's Characteristics

This search was conducted for around 60 days and the values presented calculated on a total number of applicants considered here, which is 2000.

Life Cycle of Job Search

In Figure 1, the number of applications submitted by an individual is shown, where the average value is calculated. From the figure, it can also be clearly portrayed that the number of unemployment is decreasing as the week is increasing and thus the employment rate is increasing gradually. Thus, it can be said that maybe the job seekers who were unemployed got a job from some other sources and the online jobs didn't match with their criteria. Whereas on the other hand, the employment rate is inclining very gradually and for some job seekers, the criteria provided by the online jobs are matching. [2]



Figure 1: Rate of Employment and Unemployment Considered in Weeks

As for the rate of employment which is too slow, the job seekers may develop a level of frustration and they may also experience a level of stress. Thus, search activities have to be modified and expanded. The responses can often lead to helplessness, withdrawal or even avoidance. Thus, based on the emotion, the anxiety level also increases. Thus, it can be said that the job seekers will stop using their informal sources of job and thus the intensity of job searches will also be lessened. [8]

FUTURE CHALLENGES

Around 80% of Indians searc for jobs from the online resources and jobs got from the personal connection is 66% and from professional contact 68% [4]. 35% of the job seekers said that information given in the online for job resources is precise and perfect to that of the advertisements given in the paper. 90% of the Indian job seekers use their smartphones to browse the list of jobs that are available [3]. It has also been found out that people having a low level of educational qualification mostly rely on their smartphones to search for the jobs online. The main challenges that are faced by the job seekers is updation of their skills and knowledge daily, such that they can match up with the jobs that are available[7]. There are also

few crap jobs present for the experienced people, but for the new candidates, it is a good job opportunity. Sometimes the documents uploaded by the job seeker are not looked into properly and candidates may thus use the same resume for different job applications. For the job seekers searching for an appropriate job might be the full-time commitment. Mostly it has been found that the job seekers need to find the place which suits their capabilities, pays commensurate as per their experiences and skills. Furthermore, the main challenges which the job seekers used to face are that there are too many places to look for. There are various online resources such as employer websites, LinkedIn, and many more. Therefore the issue is that with too many options the job seekers get puzzled where to focus in order to get the desired outcomes. Due to this, it has been noticed that most of the job seekers spend months looking for the positions. On the other hand, it has been found that there used to be uninformative job descriptions in the online job portals. Hence the candidates used to depend on the job descriptions in order to know that whether they are suited for the job or they must apply for the position. Thus glutting for the description of the job with each imaginable details does not provide the candidate a better notions of what is actally crucial. Furthermore, the online job opportunities also does not provide enough informations. Due to this, it has been observed that most of the job seekers used to spend lots of hours researching for the organisations before they wants to apply. Apart from this, the biggest challenge that is faced by the online job seekers is to get noticed among the thousand of job seekers. Therefore one needs to be that much productive or be the saleable one so that they can sale themselves as well as brand themselves and become an outstanding one different from the other competitiors in the same field in order to get recognised by the employer in the competitive labour market. Hence the job seekers requires to make a strong job resume which highlights the skills and also matches with what the organisation is looking for.

DISCUSSION

There are different queries submitted by every individual. Every job seekerhas more than one query and thus the distinct number of queries are issued. Sometimes the tendency of a job seeker is to repeat the query again and again. More than 50% of the job seekers submit 10 queries each. The HR department thus hires employees based on the number of queries that are submitted. The hirers sometimes check the web search of the employees and they expect a variety of queries from it[5]. The same job seeker may have different pieces of information, transactional needs and on the same day. Thus, if these challenges can be addressed then the task of searching for jobs becomes easier.

CONCLUSION

It can be concluded that the job search has become extremely effective in the online world. But, in order to progress by the hirers, the behavior of the job seekers has to be understood too. Query logs of the seekers should be read and understood clearly. The factor of ranking and models doesn't hold true for online job searches. Sometimes a job seeker may not be genuine and is only there to monitor what is going on in the market and what range of salary is prevailing for each job. In the employment sector, the decision-making process is very important and it may sometimes include a high cost. Thus, users invest more in the process of searching.

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REVIEW OF RECENT ADVANCEMENTS IN THE FIELD OF RECONFIGURABLE ANTENNAS

Jitendra Vaswani*

ABSTRACT

With fast changes in technology used for wireless communication, antennas also need to be made compatible and / or need to be replaced. To avoid these replacements of antennas, one possible solution is to design reconfigurable antennas so as to use the same antenna for different wireless technologies. This paper discusses the advancements in the field of reconfigurable antennas in last decade.

Keywords: antenna, communication, meta-material, microstrip, polarization, wireless

INTRODUCTION

In wireless communication using electromagnetic waves around the universe, antenna is in the inseparable part of communication systems. Antennas are used in transmission and reception of electromagnetic waves. We are having distinct antennas based on the frequencies they receive or transmit. The frequencies of operation of antenna depend on the size and geometry of antenna. If one can change the effective length of antenna, the corresponding frequency of operation will change accordingly. An antenna whose properties could be altered to get the desired response like resonant frequency, polarization or radiation pattern is put under the category of Reconfigurable Antenna [1]. Reconfigurable Antennas are further categorized in three subcategories.

(i) Frequency Reconfigurable Antenna: Frequency of operation could be altered by varying the structure of antenna [1].

(ii) Polarization Reconfigurable Antenna: Polarization of antenna could be altered by varying the structure of antenna [1].

(iii) Pattern Reconfigurable Antenna: Radiation pattern of antenna could be altered by varying the structure of antenna [1].

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REVIEW OF PREVIOUS WORK

In the year 2007, a reconfigurable patch antenna was proposed for satellite and terrestrial links, which could switch between two frequencies (0.615 GHz and 1.75 GHz). It used PIN diode as switching element. [2]7.5-dBi right-hand circularly polarized gain, and 15.8% bandwidth. At a lower frequency fl, the antenna operates as a planar inverted-F antenna (7.3% bandwidth and 3.9-dBi peak gain



Figure 1:Schematic diagram of the proposed reconfigurable antenna[2]



Figure 2:Schematic of the CPW-fed single folded slot antenna. The shadowed areas represent metal areas.[3]



Figure 3: Simulated return loss of the folded slot antenna. [3]

In 2009, reconfigurable antenna without bias network was proposed for Wireless LAN. It was basically a slot antenna with PIN diodes to change the effective perimeter of the antenna elements, and it didn't require any DC biasing network as the DC line doesn't affect the antenna's resonant frequencies 5.775GHz and 5.25 GHz.[3]

In 2013, authors designed the frequency reconfigurable antenna using PIN diodes as switches for the frequency ranges 2.1–2.6 GHz, 3.6–4.6 GHz, 2.8–3.4 GHz and 4.9–5.8 GHz. The author has also reconfigured radiation pattern and polarization of antenna [4].

In the same year, another researcher first proposed a Circularly Polarized (CP) omnidirectional antenna[5]. Based on the same antenna, a pattern reconfigurability method was explained as, by carefully changing the phase relations between several sections of above mentioned antenna, radiation pattern can be reconfigured in the 2.4GHz ISM frequency band.

In [6], design techniques for adaptive arrays and its cost effective implementation has been suggested. One of those techniques is reconfigurable antenna design, and the researcher designed a single-feed polarization reconfigurable antenna, that could switch between linear polarization and circular polarization (LHCP and RHCP) keeping high radiation efficiency in both polarization modes (86.9 % - RHCP and 91.5 % - LHCP) along with good axial ratio (< 3 dB at 2.4 GHz).



Figure 4:(a) Top view ofprototyped slot antenna, (b) bottom view ofprototyped slot antenna, and (c) prototyped metasurface[7]

In 2014, H. L. Zhu, S. W. Cheung, X.H. Liu, and T. I. Yuk designed a polarization reconfigurable metasurfaced antenna, that could be rotated around the center of the designed slot antenna to get linear polarization, right-hand and left-hand circular polarizations. Results showed an operating bandwidth of 11.4% (3.3–3.7 GHz) and 5 dBiboresight gain with high polarization isolation [7].

In 2015, Wei Lin and Hang Wong developed a polarization reconfigurable wideband with circularly-polarized antenna. It had radiating arms (four) excited by a reconfigurable feeding network to generate wideband CP waves. PIN diodes are used for achieving polarization reconfigurability. Its operation bandwidth is from 1 to 2.5 GHz [8]

In [9], the researcher presented slot-fed reconfigurable patch antenna and tunable left- handed loop over ground plane antenna, both frequency reconfigurable antennas. The reconfiguration of frequency in the patch is realized by introducing switches in the coupling slot on the other hand the frequency of operation of the left handed loop is reconfigured by deploying varactor diodes. The electrical size of the slot is modified by changing the states of the switches.



Figure 5: Structure modelled in CST. (a) Perspective of the simulation model excluding resistors. (b) Top view of the simulation model excluding resistors.[10]

In the year 2015, a wideband polarization reconfigurable antenna was presented with identical patch arrays rotated by 90 degrees and deployed on both sides of substrate faces. Surface varactors and resistors are also included while designing the EBG surface. LP to CP is accomplished by putting a monopole antenna over the EBG surface [10]. By tuning varactor capacitance C1 and C2 individually or together, high quality AR could be attained at craved frequency. Polarization can be reconfigured by exchanging the two varactor capacitances. Resistors of 10K ohms are deployed to connect adjacent patches with simplified circuits and minimized voltage drops. The variation in peak operating frequency between simulations and measurements is of 5% which may be due to general fabrication or measurement errors Its operating band 1.03–1.54 GHz, i.e 40% BW.

In 2015, PavelNikitin portrayed a reconfigurable antenna with wireless powered switches mounted on the antenna elements. Control signals are sent as the fragment, preceding the data of antenna transmission eliminating the need bias circuits for achieving reconfigurability [11].

In the same year, Joseph Costantine and team used Field Programmable Gate Arrays (FPGAs) and Microcontrollers to reconfigure the antenna. They also used neural networks integrated with graph models on programmable platforms for reconfiguring the antenna. It is also suggested to develop the self-adapting, learning, reacting and a very efficient and dynamic communication link at frequency of 3.24 GHz [12]

In the year 2016, J. Varsha, M. Sumi suggests various switches used to alter the properties of antenna of which generally used switches are PIN diodes, MEMS switches, varactor diodes, FETs etc. The researchers also explained the continuous and switched frequency reconfigurability. MEMS and varactor diodes are deployed for achieving continuous frequency reconfigurability while PIN diodes and FETs are for changing two different frequencies 3.9 GHz and 5.9 GHz discretely [13]. To reconfigure radiation pattern, current distribution on the conductive section of antenna is varied. Polarization of antenna relies on the feeding method and can be altered by changing antenna. PIN diode with the advantage of low cost and low insertion loss is preferred over others. In the heptagon pattern of antenna, its impedance is varied to reconfigure radiation pattern.

In the same year, M.K.A. Rahim, M.R. Hamid, N.A. Samsuri, N.A. Murad& M.F.M. Yusoff, H.A. Majid, reviewed three disparate configuration of reconfigurable antennas. [14]

(i) Narrowband Frequency Reconfigurable Microstrip Slot Antennas in which effective length was varied by using PIN diodes. Another similar antenna is Narrowband Frequency Reconfigurable Patch-Slot Antenna that is rare combination of Microstrip and patch antenna and one could control its frequency of operation and radiation pattern.

(ii) Wideband to Narrowband Frequency Reconfigurable Antennas that incorporates microstrip slot antenna and monopole antenna and PIN diodes are present in the slot for narrowband frequency reconfiguration.

(iii) Band Notched Frequency Reconfigurable Antennas which uses tunable metamaterials suchlike EBG structure to obtain band notch for Ultra WB antenna. Three EBGs with

individual switch are positioned underneath the feed-line of Ultra WB antenna to control band stop property of EBG.

In 2016, a metamaterials based EBG microstrip patch antenna capable of operating at two distinct frequencies, 2.4 GHz and 5.0 GHz is discussed. The MTM-EBG is interspersed into antenna's metallization layer to show its passband or bandgap properties, that alters the electrical length of antenna patch as the function of frequency, here two resonant frequencies. [15] The first frequency i.e. lower frequency is decided by dispersive nature of MTM-EBG and the dimensions of cavity while the upper frequency is decided by cavity size without the EBG. The variation in higher operating frequency between simulations and measurements is of 3% which may be due to over-etching by approx. 18-22%.

In the same year Huan Yang, and RongLin Li proposed a pattern reconfigurable antenna that was comprised of a pair of dipole elements and each dipole element had a short dipole, a folded dipole, and a parasitic element. Two pin-diode switches are connected at the feed of the antenna. States of the PIN diode as switches is used to reconfigure the radiation patterns in two opposite directions. The proposed antenna has a BW of 30.6% (2.02- 2.75 GHz) [16].

In the year 2017, [17] authors presented a compact dual band (2.7-3.4 GHz and 3.8- 4.3 GHz) circularly polarized microstrip antenna. Air gap was introduced between two substrates for circular polarization. Antenna characteristics were improved by using the combination of defected ground structure and fractal theory.

In 2017, G Jyothsna Devi, B T P Madhavpresenteds the reconfigurable MIMO antenna feed by coplanar WG to counteract polarization diversity issues. For reconfiguration, 4 diodes are used and was simulated using HFSS. Switching of diodes didn't affect the coverage of antenna in any direction. Its resonant frequency is 28GHz and bandwidth of 10 GHz [18]

In 2018, Emad Al Abbas, Ahmed ToahaMobashsher, Amin Abbosh proposed the antenna that can switch polarization between RHCP and LHCP by switching the states of PIN diodes in the frequency range of 27.65-28.35 GHz. The designed exploited the patch antenna therewith suitable transmission line feed. [19]



Figure 6: Schematic Diagram of Polarization Reconfigurable Patch Antenna

In the same year, M. Jenath and V.Nagarajan schemed "Z" shaped reduced size antenna on rectangular patch therewith implanting PIN diode in ground plane. "L" shape stub was connected to the rectangular notch carved in the feed line via PIN diode. This achieved frequency reconfigurability (5.6GHz and 6.2 GHz) by changing effective electrical length of antenna via switching PIN diode states. [20]

In [21], researchers realised polarisation reconfigurable, electronically tuned dielectric resonator antenna. Circular polarization was achieved by deploying cross-slot aperture in the ground plane. Similar to most researchers, PIN diodes have been deployed to manage effective dimensions, hence polarisation state of antenna. Switching of PIN diodes is done using microcontroller (ARDUINO-UNO). Bandwidth of roughly 20% with resonant of 2.45 GHz along with gain of 4 dB is observed in all polarization states.

In [22], researchers present a reconfigurable (frequency and polarisation) printed monopole antenna utilizing PIN diodes as switches in two switching circuits. Reconfigurability is achieved by switching circuits on the finite ground plane. The four switching states of antenna are:

S1, 2.02–2.56 GHz (23.6%), linear polarization;

S2, 2.32–2.95 GHz (23.9%) linear Polarization;

S3, 1.92–2.70 GHz (33.8%), left-hand circular polarization;

S4, 1.88–2.67 GHz (34.7%) right-hand circular polarization.

In [23], researchers presented polarization (circular) reconfigurable antenna for 5-Gen wireless applications. The antenna has a semi-circular slot, two PIN diode switches to change states between the right-hand and left-hand circular polarization. The important thing about the design is that the reflection coefficient |S11| was preserved and reconfigurable orthogonal polarizations were realised by altering the states of the two PIN diode switches. Resonance frequency was 3.4 GHz in both states of reconfiguration and gain of 4.8 dBi and 9.11% fractional bandwidth.

CONCLUSION

With the fast changing wireless communication technologies, reconfigurable antennas have become inseparable part of the system. Most of the work is on frequency reconfigurable antennas and as a new researcher one needs to focus on polarisation reconfigurable, pattern reconfigurable and multi-reconfigurable antennas.

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STUDY ON E-COMMERCE AND ITS IMPACT ON DOMESTIC MARKET AND RETAILERS IN INDIA

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ABSTRACT

Internet plays avital role in our daily life. Prior to e-commerce, buying and selling were done physically in the market place. After theinflux of e-commerce in India, our life has become more convenient due toseveral advantages. Online shopping is a part of ecommerce which is done mostly by the users on e-commerce websites in India which provides us platform to buy and sell the products according to our choice at reasonable price. E-commerce website has a significant impact on different markets and retailers. In this paper we will discuss about different markets and retailers and impacts of e-commerce on retailers. In this paper an attempt has been made to highlight the growing impact of the increasing trend of online shopping over the various fixed shop retailers. Retailers comprise a large section of the population and a larger population is dependent upon these retailers. But the emergence of e-stores with their attractive incentives, big discounts and wide varieties has created an adverse impact onto them. This study tries to identify how retail businesses are being affected by the growing numbers of e-stores. This paper also examines the reasons for declining number of footfalls to fixed shop retailers due to increasing trend for online shopping.

Keywords: E-commerce, profit margin, retailer, turnover.

INTRODUCTION

E-commerce is buying and selling of goods and services over the internet. Before e-commerce, buying and selling were done without internet physically in the markets. But after the arrival of e-commerce in India, our life has become more convenient due to several advantages. The advantages offered by e-commerce are online shopping of anything at any time and at any place. Customers can find the products on e-commerce websites which may not be available in physical markets, it reduces cost and time. Without stepping out from home we can get our product at home. Along with e-commerce there is also a prevalent term called e-business due to which the business of enterprises has increased electronically with the help of internet by which they can reach to many customers which increases their sales. There is no specific definition of the terms E-commerce and E-business. These are used interchangeably. In

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fact, E-commerce is a part of E-business which focuses on external activities while E-business focuses on both internal and external activities of a business. E-commerce has a lot of good and bad impacts on different areas. The key determinant of having a successful e-commerce is to reduce the negative impacts and increase the benefits at the same time.

DIFFERENT MARKETS AND RETAILERS IN INDIA

Markets

Physical Markets: Physical Market is a market where customers come physically in the market and face-to-face interact with the seller and buys the product and service in the exchange of money. Examples of physical markets are shopping malls, department stores etc.

Non Physical Markets/Virtual Markets: Non-Physical Market is the market in which customers do not go physically to the seller and do not interact face-to-face. Customer buys the product on internet and exchange the money electronically. Examples of these markets are Flipkart, Amazon, eBay etc.

Auction Market: Auction market is the market in which the goods are sold to the highest bidder and lower bidders are ignored.

Market for Intermediate Goods: In these market raw materials are sold and by using them final product is made.

Black Market: In these markets, illegal goods like drugs, weapons, and alcohol is sold which is supervised by illegal sellers.

Knowledge Market: In this market Information and knowledge-based products are sold.

Financial Market: In this market, liquid assets or money is exchanged. There are three types of financial markets: Stock market, in which stocks are exchanged; Bond market, in which Debt securities is exchanged in the form of the bond; Foreign Exchange market, in which currency exchanges and it is also called Currency market.

Retailers

Department Store: Departmental store is a store which is a combination of multiple small stores under one company which offers a wide variety of products. It adds value for the customers due to offer a wide variety of products at a place.

Supermarkets: Supermarkets generally sell food and beverages but now due to customer's need ,it also sell fashion, electronic- related items. It has a good buying power that is why it sells at low prices.

Warehouse Retailers: Warehouse retailers are situated at the place where the premises rent is very low so that they can store, display and sell large amount of products.

Study on E-Commerce and Its Impacts on Market and Retailers in India

Specialty Retailers: Specialty Retailers sell a special service or product and provide expert knowledge and good service to customers. They add values by adding accessories and related products in the same outlet.

E-Tailer: E-Tailersare those sellers who provide the facility to customers to buy the product through internet and offers home delivery using which they can reach to customers within a big geographical area and can supply goods to them. They have low rent and overhead that is why they offer modest prices.

Convenience Retailer: These retailers are available in residential areas and sell limited products at a first-rate price because they add value of convenience.

Discount Retailer: Discount retailers are those retailers which offer discounts on less fashionable brands by taking it from the suppliers and resell the product till end of line and return the remaining products at the discounted price to the supplier.

IMPACT OF E-COMMERCE ON MARKETS AND RETAILERS

Impact on Markets

Promotion of Products: Through E-commerce product can be promoted in an interesting way and with lots of information directly to the customers which reduces the cost of offline promotion because internet can interact a lot of customers and save amount of cost of advertisements can be used in different areas of business.

Customer Service: Customer service can be enhanced because customers can search detailed information about product or marketplace which offers the product and can compare the prices of different market places.

Brand Image: New businessmen can establish their brands on internet by using attractive images at an affordable price.

Advertisement: Traditionally the advertisements were one-way activity to attract customers and let them know about the new product in market place but now through e-commerce advertisements are two-way process in which customer can browse the market place and product, can compare the prices and also can ask questions to the online retailers.

Customization: Customized products can be made available according to the needs of customers. It will make a good place of business in market and new customers will be attracted.

Order Making Process: Traditionally, to take orders from customers, intermediaries are used which takes a lot of time and expenses; but with e-commerce the order taking is easier which reduces lot of time and expenses and they can make more sales.

Customer Value: Traditionally attaining a big value from the customers was the main interest. Only customers were attracted and it was the biggest target but now sellers make long term relationships with customers to attain long term value by offering them special discounts.

Impact on Retailers

Turnover: Due to e-commerce the turnover of offline retailers has reduced which is a warning signal for the enterprise.

Profit Margin: Upon adventof online shops in the market, offline retailers are suffering from pricing. To survive in market, they have to sell product at low prices which cover only their operational costs and they do not get any profit margin.

Discount: Offline retailers sell their products at discounted rates because online stores offer heavy discount to the customers and to stay in the market and to attract the customers they have to sell the products at discounts.

Variety of Stocks: Variety of goods is offered by online stores to which offline retailers cannot compete because at the end of year the leftover stock can give a huge loss to the retailer.

Customer Services: Offline retailers are providing different services at which online stores fails. Repair and goods of services and after-sales services are provided by offline retailers.

Window Shopping: Low prices offered by online stores leads to window shopping by customers at physical stores and they buy product online due to which they have more prospective customers than actual customers.

Advertisement: Offline retailers focus only on the advertisements so that they can attract customers and increase their sales. They do not leave a single chance to advertise.



Figure 1: Impact of e-commerce websites on offline retailers in terms of different aspects.

Study on E-Commerce and Its Impacts on Market and Retailers in India

FINDINGS, SUGGESTIONS AND CONCLUSION

A major trend in e-commerce this year is that international retailers are investing across Asia-Pacific to gain access to markets. Few cases are like Walmart's May 2018 purchase of Flipkart, India's major homegrown digital retailer.

"India, with its population of 1.3 billion people, represents the biggest opportunity in Asia-Pacific for retailers," said Corey McNair, author of e-Marketer's latest report, (Figure 2)





This paper concludes that e-commerce is very good for us who provides us wide variety of products and services with multiple information and attractive pictures at an affordable price at our doorstep. It provides convenience to customers and allows the enterprise to expand their business over internet. E-commerce have good impact on markets like reduction in the cost of advertisements as many customers can be attracted through internet, new brand can be developed, maintaining a good relationship with customers and making customized products according to customer's needs. But e-commerce has bad impact on offline retailers because customers buys on low price from online shops due to which they also have to lower their price and do not get much profit. Retailers cannot maintain a large stock like online shops because it will cost a huge loss to them. They have to spend more money in offline advertisements to attract customers. Along with the impacts, e-commerce also offers some limitation in terms of markets and retailers like cost of hosting and maintenance of website, infrastructure costto fulfill the orders online, maintaining a large stock in a big warehouse which costs a lot; and mechanism to minimize security and fraud. It has increasingly been seen that due to popularity of online shops, criminal elements are also attracted to these platforms where they hack the personal information of customers and can misuse them. This makes customer to lose trust in the system.

Findings

E-commerce is consistently taking up a larger proportion of consumer time and spending. There are several driving factors for consumers to shop online with price, convenience in shopping and wide range of available products being the primary. The major findings of the study are as follows:

- a. Turnover and profit margin of the retailers have considerably decreased in the past few years.
- b. Retail stores are now-a-days more engaged in services related to customer satisfaction.
- c. Although the retailers are not able to keep a wide variety in their stock, they attempt to keep the best of them so as to affect more sales.
- d. Customers are seen to make window shopping at an alarming higher rate to have a physical look at the product and buy that product online at a reduced rate.
- e. Retail stores are now starting up with home delivery services of their various products at the door step of their customers.
- f. The consumers become more comfortable with the experience of purchasing online with the convenience and product range become relatively more important as a deciding factor for shopping online.

Suggestions

Retailers have to change their attitude towards the market. Today's is a consumer market and as a result the priority is the consumer satisfaction. The firm has to be in the good books of the consumer. Better quality products, fair price and friendly after-sale services and return policy are the basic areas in which the business has to concentrate to a remarkable extent. Additional services should be provided to the consumers to woe them and build upon a loyalty which in turn would ensure a stable sales in the years to come.And More Customers can come again in physical shopping retailers they should provide effective service to the customers. Actually this time, customers have money but they don't have Time.

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RABINDRANATH TAGORE'S THOUGHTS ON EDUCATION WITH SPECIAL REFERENCE TO SHANTINIKETAN

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ABSTRACT

Rabindranath Tagore was one the famous poets, educationist and spiritual thinker of twentieth century. His diversified views and thoughts on various human and social issues have almost brought a revolution and contributed a lot to the welfare of mankind. The objectives of our present study were to find out the effect of Rabindranath Tagore's thoughts on education in present India. This study show that Shantinikatan is an ideal platforms of Indian and western educational system. Rabindranath Tagore wanted to improve educational system of our country. For this he established Shantinikatan based on his thoughts of education, culture and human relation. At present, the education system and thoughts of Rabindranath Tagore provides great inspiration. Shantinikatan is the true reflection of Indian philosophy and ideal Indian education system.

Keywords: Idealism, education, Humanism, nature, Vishwabharati.

INTRODUCTION

India is fortunate to be the birthplace of eminent sons like Dayanand Saraswati, Mahatma Gandhi, Rabindranath Tagore, Aurobindo Ghose, Swami Vivekananda and a galaxy of others, each of whom in his own way, tried to raise the name of the motherland to such spiritual heights not known before in the history of the country since the advent of the British. No doubt, geniuses are born. But the flowering of the multifaceted personality of Rabindranath Tagore was the result of interaction of a variety of favorable environmental factors in producing this genius.

The contribution of Rabindranath Tagore in this respect as well as in other fields, especially in education, has been paramount. In the galaxy of modern educational thinkers, name of

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Rabindranath Tagore, popularly known as "Gurudeva" is famous not only in our country for his contribution in the field of education, but all over the world. One of the most striking features of his educational thinking is that he considered education as the most effective tool for modernizing Indian culture.

Education is described as a process of development. Through education, man develops his intelligence and reasoning, receives knowledge and cultivates good habits. In sum, education make a man able to realize higher values of life essential for him to become a great human being. We can call it a process of behavior modification. According to many philosophers, education is an active side of philosophy. American philosopher on pedagogy, John Dewey mentions, "The relation between philosophy and education is not general but very close because it is education that gives necessary understanding to philosophy. Education should give a practical shape to the aim of philosophy and helps in molding the attitudes of man towards life according aims of life."

Education should ultimately aim at training pupils to love man, nature and all existence. "The fundamental purpose of education is", wrote Tagore, "not merely to enrich ourselves through the fullness of knowledge, but also to establish the bond of love and friendship between man and man". Education should instill the spirit of comradeship, and develop mutual love and sympathy and international understanding. The whole paraphernalia of education with its curricular, co-curricular and extra-curricular activities must prepare pupils to take an active part in the creation of a world society.

Objectives of the Study

- 1. To make an assessment of Tagore's contribution to the theory of Indian education.
- 2. To make an appraisal of Tagore's in education with reference to Shantiniketan.
- 3. To make suggestion for the improvement of the contemporary Indian education.
- 4. To study the Tagore's thoughts on education.
- 5. To study different aspect of education according to Rabindranath Tagore.
- 6. To study the contribution of Rabindranath Tagore in Indian education system.

Limitation of the Study

The study is limited purely to theoretical discussion of Rabindranath Tagore's educational thoughts, ideals and applications to Shantiniketan.

TAGORE'S LIFE TRAJECTORY

Rabindranath Tagore was born on 7 May 1861 in Kolkata into a wealthy Brahmin family. His father was Debendranath Tagore who was a famous leader of *Brahmo Samaj*. Rabindranath Tagore was the fourteenth son of Devendranath. He received early education at home by a tutor. He attended University College in London, but returned before completing his studies. He developed taste for English literature and he was only twenty when his first collection of poems was published.

His writings include more than one thousand poems and two thousand songs in addition to a large number of novels, short stories, dramas and philosophical tests.

In 1909, his world famous work *Gitanjali* was published and he went to England in1912 with it. Next year he was awarded the Nobel Prize for Literature(1913). He became the first Indian and first non-Europeans to win it.

SHANTINIKETAN AND VISHWABHARATI

As an alternative to the existing forms of education, in 1901, he started a small school for education. Later this school was developed into a university and rural reconstruction centre, known as Viswa Bharati, where he tried to develop an alternative model of education that stemmed from his own learning experience. Students at Shantiniketan were encouraged to create their own publications and put out several illustrated magazines. Children were encouraged to follow their ideas in painting and drawing and to draw inspirations from the several visiting artists and writers.

In this school he gave name and local habitation to his dynamic idealism. The school known as Shantiniketan Ashram, became in 1921 the world famous Vishwabharati, a seat of International University seeking to develop a basis on which the culture of the East and West may meet in common fellowship. His legacy endures in the institution he founded.

Calcutta and the Oxford University conferred him the honorary degree of doctorate. He made notable contributions to religious and educational thought, politics and social reform, moral regeneration and economic reconstruction. The poet Laureate of India, a great thinker, philosopher and a teacher, staunch patriot, and above all a noble heart who lived the whole humanity- a perfect man, the bard of Bengal died on 7th August, 1941.

Rabindranath Tagore was one of the earliest educators to think about the Indian education system and gave great examples and views about education. He thought in terms of the concept of global village of education. His educational model has a unique sensitivity and humanity. We find his educational thought to be full of naturalism, idealism, international brotherhood. He extended support to arts and exhorted educators to inculcate this stream for generating empathy and sensitivity.

He shows a natural relationship between cultural and natural environment. When Shantiniketan was laid out in natural environment of simple elegance, for a life of learning and art lived close to nature and to the common people. Shantiniketan still has a high concentration for the educated middle class people. We can find there open space, fresh air, clean water, relatively quite surrounding and full of cultural activities.

Shantiniketan, a center of culture where research into the study of the religion, literature, history, science and art of Hindu, Buddhists, Jains, Zoroastrians, Muslims, Sikhs, Christians and all other civilizations may be pursued along with the culture of West with that simplicity of externals which is necessary for true spiritual realization. Tagore emphasized the importance of an empathetic sense of interconnectedness with the surrounding world.

Main Features of the Shantiniketan School

- It is a community school where there is no distinction of caste and creed.
- Co-educational and residential institution.
- It is a self governing institution has a dairy farm, post office, hospital and workshop.

- It is based on the concept of freedom of the mind.
- Mothertongue is the medium of instruction.
- It is studied in natural surroundings and it provides for manual labor.
- There is well- equipped library.

TAGORE'S VIEWS ON EDUCATION

The aim of education according to Tagore is creative Self-expression through physical, mental, aesthetic and moral development. He stressed the need for developing empathy and sensitivity and the necessity for an intimate relationship with one's cultural and natural environment. He saw education as a vehicle for appreciating the richest aspects of other cultures, while maintaining one's own cultural specificity.

1. Meaning of education: Education is short of the highest purpose of man, the fullest growth and freedom of soul. To the child, the environment will provide an ever-ready back ground for its spontaneous activity. Our true education is possible only in the forest through intimate correct with nature. The objective of education is the freedom of mind, which can only be achieved through the path of education.

2. Aims of Education

The aims of education as reflected in educational institution founded by Rabindranath Tagore in Shantiniketan are as follows:

(a) Self -Realization:

Spiritualism is the essence of humanism; this concept has been reflected in Tagore's educational philosophy. Self-realization is an important aim of education. Manifestation of personality depends upon the self-realization and spiritual knowledge of individual.

(b) Intellectual Development:

Tagore also greatly emphasized the intellectual development of the child. By intellectual development, he means development of imagination, creative free thinking, constant curiosity and alertness of the mind. Child should be free to adopt his own way of learning which will lead to all-round development.

(c) Physical Development:

Tagore's educational philosophy also aims at the physical development of the child. He gave much importance to sound and healthy physique. There are different kinds of exercises, Yoga, games & sports prescribed in Shantiniketan as an integral part of the education system.

(d) Love for Humanity:

Tagore held that the entire universe is one family. Education can teach people to realize oneness of the globe. Education for international understanding and universal brotherhood is another important aim of his educational philosophy. The feeling of oneness can be developed through the concepts like fatherhood of God and brotherhood of man and that all creatures are equal on this earth.

(e) Establishment of Relationship between Man & God:

Man bears the diverse qualities and potentialities offered by God. These qualities are inborn and innate. The relationship between Man and God is strong and permanent. However the dedication to spiritualism and sacredness will lead to the harmonious relationship among man, nature and God.

(f) Freedom:

Freedom is considered as an integral aspect of human development. Education is a man-making process; it explores how the innate power exists within the man. It is not an imposition rather a liberal process that provides utmost freedom to the individual for his all-round development. He said that education is learning only when it is imparted through the path of freedom.

(g) Correlation of Objects:

Correlation exists among God, man and nature. A peaceful world is only possible when correlation between man and nature will be established.

(h) Mother tongue as the medium of Instruction:

Language is the true vehicle of self-expression. Man can freely express his thought in his mother tongue. Tagore emphasized mother tongue as the medium of instruction for the child's education.

(i) Moral and Spiritual Development:

Tagore emphasized moral and spiritual training in his educational thought. Moral and spiritual education is more important than bookish knowledge for an integral development of human personality. There must be an adequate provision for the development of selfless activities, co-operation and love, fellow feeling and sharing among the students in educational institutions.

(j) Social Development:

According to Tagore, "Brahma" the supreme soul manifests himself through men and other creatures. Since He is the source of all human-beings and creatures, so all are equal. Rabindranath Tagore, therefore said, "Service to man is service to god". All should develop social relationship and fellow-feeling from the beginnings of one's life. Education aims at developing the individual personality as well as social characters which enables him to live as a worthy being.

METHOD OF EDUCATION

(a) Teaching through Tours and Trips:

Tagore believed that the subjects like history, geography, economics and other social sciences can be effectively taught through excursions and tours to important spots. By this, students will get an opportunity to observe numerous facts and gain first-hand knowledge through direct experience.

(b) Learning by activities:

Rabindranath Tagore said that for the development of child's body and mind, learning

through activity is essential. Therefore he included activities like climbing tree, drama, jumping, plucking fruits, dancing etc. in his educational programs.

(c) Narration-cum-discussion and Debate Method:

Narration-cum-discussion and debating activities were organized in Tagore's education center to develop oratory abilities of the students. Students were encouraged to solve problems of various areas through rational debate and thorough discussion.

(d) Heuristic Method

Rabindranath Tagore introduced heuristic method as an important method of teaching in his educational institution. In this method; first, the students, are asked questions to clarify their doubts on topics and teachers try to satisfy them by their correct answers. Then the teacher asks the questions to students to evaluate how far the students are able to comprehend the topic discussed in the class.

4. Children as children:

It is a mistake to judge by the standards of grownups. Adults ignore the gifts of children and insist that children must learn through the same process as they do. This is man's most cruel and most wasteful mistake. Children's subconscious mind is more active than their conscious intelligence.

5. Discipline:

Living ideals cannot be set into clockwork arrangement. Tagore wrote, "I never said to them; don't do this, or don't do that...... I never punish them". An ideal school is an Ashram where men have gathered for the highest end of life. Tagore desired to inculcate spiritual culture among students.

6. Relationship between the Teacher and the Student:

In teaching, the guidance should be based upon personal love and human relations. In education, the teacher is more important than the method. The teacher is Guru. He is to guide and stimulate the students. He remarked, a teacher can never truly teach unless he is still learning himself. A lamb can never light another lamb unless it continues to burn in its own flame. So a teacher must always be teacher. A teacher according to Tagore's concept is continuously a learner who is dynamic in his efforts to know the unknown and to let it be known to others. Thus, Rabindranath Tagore offered a highly dignified and responsible role to teachers.

TAGORE'S CONTRIBUTION TO EDUCATION SYSTEM

Rabindranath Tagore, a true philosopher developed an ideal experimental education institution in Shantiniketan. Tagore was a great advocate of spiritual education and also stressed on harmonious development of the child with equal emphasis on mental, social and emotional growth. Tagore was the greatest prophet of modern Indian renaissance who sought to bring change through education.

Tagore was fully dissatisfied with the prevalent system of education at that time and called the schools as factories of rote learning. Then he advocated the principle of freedom for

an effective education. He said that the children should be given freedom so that they are able to grow and develop as per their own wishes. A man through the process of education should be able to come out as a harmonious individual in time with his social set-up of life.

He suggested creative self- expression through craft, music, drawing and drama. Tagore's major contribution to modern education is the establishment of Shantiniketan at Bolepur, in 1901. The school modeled on the ancient ashrams grew into a world university called Viswa Bharati. It is an abode of peace where teachers and students live together in a spirit of perfect comradeship. The motto of the institution is "*where the whole world forms its one single nest*." It has open spaces and atmosphere of freedom surrounded by natural environment. It is open to all irrespective of country, race, religion, or politics.

Tagore advocated teaching while talking as the best method and stressed on tours and excursions. He supported teaching and learning through debates and discussions which develop the power of clear-cut thinking. He adopted activity method which makes the learner physically sound. He also held heuristic method where the student is in the position of a discoverer. He stressed on free environment which makes learner self-disciplined

In Tagore' philosophy of education, the aesthetic development of the sense was us important as the intellectual; and music, literature, art, and dance were given great prominence in the daily life of the school.

CONCLUSION

Tagore is critical of the prevalent system of education which lays emphasis upon bookish learning. The intellectual aim of education, according to him, is the development of the intellectual faculties which should be developed through education. These are the power of thinking and of imagination.

Tagore's educational ideas have been shared by other educationists and many of his innovations have now become part of general educational practices, but his special contribution lay in the emphasis on harmony balance and total development of personality. The visionary and the great educationist in Tagore solved the problem of today as far back as fifty years. Economic forces compel the teachers of today to look for pupils, but in the natural order of ting it is the pupil who should look for the teacher.

The teacher-student relationship designed by Tagore is a model in this context. It became one of earliest co-educational programs in South Asia. Its establishment led to pioneering efforts in many directions, including model for Indian Higher education and Mass education as well as pan-Asian and global cultural exchange. As one of the earliest educators to think in terms of the global village, Tagore's educational model has a unique sensitivity and aptness for education within multi-racial, multi-lingual and multi-cultural situations amidst conditions of acknowledged economic discrepancy, political imbalance and social evils.

He was one of the first Indian to argue for a humane educational system that was in touch with the environment and aimed at over-all development of educational system on essential human virtues like freedom, purity, sympathy, perfection and world brotherhood. Rabindnathra Tagore, by his efforts and achievements, is part of a global network of pioneering educators such as Rousseau, Pestalozzi, Frobel, Montessori, Dewey and in the contemporary context, Malcolm Knowles. Although, Tagore is a superb representative of his country –the man who wrote its national anthem, he is truly a man of the whole earth, a product of the best of both traditions, Indian and modern western culture.

The core of Tagore's educational philosophy was learning from nature, music and life. He created Shantiniketan to realize his educational ideals. This is the reason why his education is easily acceptable by human mind. Tagore extended the meaning and functional importance of certain aspects of personality as nobody else had done before him.

The ideal educator must combine in himself the gifts of a philosopher, a poet, a mystic, a social reformer, a scientist and a veritable man of action as he has to take into account all types of men and their aspirations, all facets of the human personality, all levels of man's experience, all fields of endeavor and achievement. Tagore on all such parameter was an ideal educator of our times.

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DIGITAL JUSTICE: REFLECTION IN THE "BLACK MIRROR"

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ABSTRACT

This remark for the "Black Dark Mirror Philosophy" is a discussion about the transformations of the penalization system, based on the prospects for technological development presented in the "Black Mirror" series. The State, introducing certain laws, seeks to limit the actions of man, creating for him a certain frame of behavior; concurrent, it tries not only to define the limits of what is permitted but also to ensure that the person does not violate them. Modern digital technologies can make it possible not only to monitor compliance with all existing rules but also to decide on penalization and even its implementation. Currently, in contrast to the past, a person can not only not be subject to any physical penalization, but also be excluded from the usual physical space. As before, he can live in his house, walk along the streets, but concurrently be excluded from society; being close, losing the ability to contact other people. The question is raised of what implications for the individual and society can have such a transformation of penalization.

Keywords: Punishment system, "Pitch dark mirror", philosophy of technology, technologyethics, law-breaking, penalization, justiceship.

INTRODUCTION

Technology allowsincreasingly sophisticated penalization of a person. Moreover, it is difficult to call new methods unethical from the point of view of our present morality: firstly, because such penalization is still impossible, and secondly because they are highly humanized. A human being not isolated in a single cell, where elementary household items are missing: he is isolated from other people, keeping the physical space in common with them, or lives insufficiently in free conditions, where consciousness is placed in virtual reality. He can do nothing bad to others or to himself. It is not limited and concurrent; it experiences the influence of isolation from society.

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Currently, it is worth noting that digital technologies are increasingly penetrating the State structure: an example can be taken by technology initiatives aimed at increasing justice and efficiency without compromising the values of freedom and security (The Berkman Klein Center,2018 web) [1]. There are databases of citizens, their property, savings, etc. A system of electronic voting and legislative initiatives arises; the State itself is increasingly becoming electronic when one part of the functions is transferred to the technology, and the other - with the help of technology becomes feasible to the masses. At present, technology not only allows storing data and allows the public to participate in politics, but also allows observing citizens, collecting data, preventing or uncovering law-breaking. [2]

The logical step in this direction could be the use of digital technology in the act of punishment. Already, part of the court decisions in various US states is being passed on by Artificial Intelligence (Tashea, 2017). What if the legislator decides to use technology to solve the problem of penalization? The problem of overcrowded prisons and the maintenance of prisoners can be solved by introducing digital forms of penalization - digitizing consciousness and transferring it into a small capsule or "disconnecting" a person from society.[3][4][5][6]

However, this may not be the last step - in these cases at least some decision on penalization was made. The creation of a system can be a new twist when any offense or even the intention to do so will receive an instant assessment and a corresponding positive or negative stimulus.

In fact, the Buddhist concept of karma or the Christian "will" to be given to every one according to his deeds" will soon become a reality. In this vein, N. Berdyaev's concept of the "New Middle Ages" is remarkable, when the permanent Digital Control will replace the "Gaze of God" that the medieval man was afraid of; concurrent, the car learns more and more about the person (Kasavin Antonovsky,2018)[7]. Not only committed actions, but even the "thoughts" of a person can be analyzed and evaluated: for example, at several enterprises in China, a system of emotional control was implemented that makes it possible to assess the employee's current emotional state, and based on its indicators, decisions are made about whether or not he has an extra day off, as far as he is in line with his position or field of work (Khusyainov,2018)[8][9]. And it is not known whether it will be possible to get an "indulgence" or, like Calvinists, a person of the Digital Agecompel to constantly work, doing exceptionally good deeds. In this aspect, the "Nosedive" episode is interesting, demonstrating a society where people want to like each other, increasing their rating, and this is what forms their social status, and digital technologies allow us to assess the level of approval and track when too low[10][11]. In this case, if, for example, in Germany, escaping from prison is not a law-breaking at the moment – this is a natural human desire for freedom (Zakirov,2014, web;2018). Digital tutorial Consciousness or sensesoriented communication leaves no room for escape. A person can remain at liberty and concurrently be limited in the realization of this freedom. Moreover, this episode shows that it is the "traditional" punishment for a modern person in the form of imprisonment when digital technologies no longer control his life, becomes a true liberation from the fetters of technology and makes it possible to live more fully, testing expressing the whole

cloud of feelings and emotions[12] [13] [14].

Penalization for misdemeanors can be traced in a whole series of episodes of the Pitch Dark Mirror. One can only assume how real they can be embodied; however, there is already experience in making court decisions by a machine, and in the very near future a system will be created for recording and evaluating person's actions, on which his social status, conditions, and level of life will depend. [15]

Digital technologies have opened up tremendous opportunities for freedom of expression and self-realization, but this freedom will be limited to a certain average behavior. Going beyond the "boundaries of what is permitted" can be fixed, evaluated and punished by the system, as in though not have clearly expressed socially dangerous properties. [16]

An interesting moment in this series is the line of "law-breaking and penalization"; in a number of episodes, this subject is encountered when, in connection with the use of some technologies, a person is penalized by means of others. Such a motive is seen in the White Birth episode, where human consciousness can be placed in capsule conditions (so-called Cookies), where time flows completely differently and the whole situation, everything that happens is regulated by the operator.

DISCUSSION

Communication is much more nuanced than speech. Our adaptationto online communication is incomplete replicas of what we want to impersonate ourselves as. Even taking into account texts and conversations, it's still all regulated and altered. Howbeit one could completely ditto someone's style of speech one has still only get words, words used when one is not in person. When one interacts face to face it's all raw, nuanced, and unique to each person. Watch any good impression and you'll see they do more than aloof sound the same, the mover, make facial expressions and interact dissimilar to the person they're impersonating. The machine can't receive all that from just a digital profile, so it dearth highest of a person's personality. On the phone, words are fine, but in person, it just falls flat.

When Victoria, and the audience, is shown the news report of her crime, it is said that it wasn't Victoria who actually committed the crime; but it was Victoria who FILMED it, which means she was an accomplice. In other wording, Victoria was a spectator of the crime. What does this remind you of? Throughout essentially the entire episode Victoria saw spectators filming crimes which were inflicted upon her (by the staff of the white bear park). I think this is an intentional and key part of the plot. The people who were constantly filming her didn't help her, much like Victoria didn't help the girl who was being killed. Perhaps the staff of the park did this on purpose.

We don't think that the machine was penalizing him for checking the time. I think the resulting arguments and emotions from Amy resulted in the time reduction. It would have lasted 5 years because of the trust gained from not checking the time, but because that trust was broken, much like how cheating would affect the durability of a relationship.

I also think it's interesting to consider that by announcing that the video would be made

illegal the next day, the government essentially ensured that every single person would watch as it happened. There were several of the "citizen" characters throughout who made comments about how they couldn't even think about watching it, it made them sick to think about it, etc. However, as soon as word gets around that the video will soon be outlawed; it becomes a different historical event. It's something you can't miss because you'll never get the chance to see it again. You'll miss out on this awful, unbelievable moment, and you can't do that. We think if the government hadn't announced that and, instead, had simply announced after the fact that owning, viewing, distributing, etc. the video was now illegal (not "will be tomorrow"), that perhaps fewer people would have watched and seen. Sure, it never would have been completely eradicated. But it's possible that the near-perfect turnout for the viewing may have been slightly less. The government essentially ensured that every citizen would see what the government was hoping they wouldn't.

CONCLUSION

Thus, in an era where creativity is of paramount importance (much more than physical characteristics), this creativity will always be limited to the average. Probably, these restrictions will cover science to a lesser extent, although there may be incidents, for example, associated with "garage science" and bio-hacking. However, the sphere of creative self-expression can seriously suffer if the State opposes creating graffiti on the walls of the city or restricts artists solely to ideological themes like this. It takes place in Pakistan, and technology can control the enforcement of these restrictions. Already existing, most likely, will not disappear, but new ones will not appear. It was the spontaneity that was able to transform the "Berlin Wall", and it was the violation of the rules that led to the creation of works(Joshi,2015,web). The "Black Mirror" series, showing us a total penalization for a misdemeanor, suggests that one would not follow the "New Middle Ages", where there is a clear system of "law-breaking; penalization", the era of "New Antiquity", when a human being is not so eager to not do bad or do something good, but, first of all, to propitiate the gods, whose function will be taken by a machine that punishes and gives, similar to that shown in the episode "Amazon in the Mood" (" Amazon Women in the Mood ") series" Futurama ", where the machine under the name of "Computer" decided who should live, who and how should be punished.

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BOOK REVIEW

Review by Annavajhula J.C. Bose*

DIABETES TIME TRAVEL: PAST TO THE FUTURE AUTHOR: AJAY VARAMASI, MD Publisher: Independently Published, July 1, 2018, ISBN-13: 978-1983240485, Pp.113 Price: Paperback \$9.99

Health emergencies abound in India. For instance, diabetes and cancer have become the number 1 and number 2 diseases respectively— "Diabetes increased in every Indian state between 1990 and 2016, even among the poor, rising from 26 million in 1990 to 65 million in 2016. This number is projected to double by 2030. A key contributor: Displacement of whole foods in our diets by energy dense and nutrient-poor, ultra-processed food products. At the same time, excessive fertilisers and pesticides are being transported into our body via food and water. Recent research shows that they cause cancers such as leukemia and lymphoma, brain tumours, Wilm's tumours, Ewing's sarcoma and germ cell tumours. Cancer is the second most common disease in India, responsible for about 3 million deaths every year" (Shah, 2019).

According to Dr. Khader Vali, the millets expert and anti-diabetes crusader in India, such diseases were not there 125 years ago but have become rampant over the last three decades, and by 2025 or so, 50 out of every 100 Indians would be diabetic. By the by, India has already become the diabetes capital of the world! (Malik, 2016).

According to Swami Sivananda, diabetes is the king of all diseases, and it usually strikes down the intelligent and well-placed strata of society. This statement applies to me and, as a diabetic, I have been searching for what this disease is all about in purely non-medical terms, but in vain. The book under review too fails to put it in layman's language. The simplest making sense of it perhaps goes like this.

Diabetes is a metabolic disease. Metabolism means conversion of food into energy. When we eat food, it is digested. Starch is converted to glucose which is absorbed into blood for circulation. This circulating glucose is the lifeline for us—it is the vital source of energy for all the cells of our body. Now, insulin is a hormone produced by beta cells of pancreas, a gland located behind the stomach. This insulin helps in utilization of glucose by the cells

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and its storage, in liver or muscles, if there is any excess. When there is deficiency of insulin, excess glucose in blood is neither utilized by the cells nor stored. As a result, blood glucose level goes up beyond the normal kidney threshold, and appears in the urine. That there is diabetes problem is indicated by classical symptoms like frequent urination, increased thirst, loss of weight and weakness; and uncommonly by complications like appearance of carbuncle, itching in private parts, severe chest or urine infection, vision problems or at the extreme by even heart attack or stroke (see Srivastava and Kirti, Undated; Sivananda, 2003).

In this backdrop, the book under review is a fresh addition to already existing plenty of books and research articles on the common health problems in general (e.g. Reader's Digest, 2010) and diabetes in particular. There are popular, experiential write-ups as well (e.g. Malik, 2013). The author of the book under review thanks the reader for picking it up to read in the midst of all the available literature.

The book's highlights are as follows. There is a fascinating dip back in time to when diabetes was first documented. Then there are explanations of the types of diabetes (Type 1 and Type 2) and treatment methods relevant to each. The future predictions about treatment are also mentioned. It may be noted that Type 1 occurs in younger age group, severely deficient in insulin. They cannot survive without insulin. Type 2 applies to older age group. This can be controlled with diet adjustment, regular exercise and/or some oral tablets but later on insulin may be needed. There are tips on how to live as a diabetic and there is a frank discussion of what can happen if the disease goes untreated. Diet and exercise recommendations and eating well by 'plate method' are inspiring indeed. Surprisingly, the author does not mention Dr. Khader Vali's millets diet that has become a rave solution in the Indian context. The reader may also consult Raghram *et al.* (2012) on diet as the most important component of diabetes control.

There is detailed information about insulin pump use and continuous glucose monitoring, useful to medical students. Alternative treatment methods like sleep management, laughter therapy, behavioural modification and meditation and tips for weight loss are discussed to be useful to the patients. The author writes thus: "In my experience, patients with diabetes tend to live better quality lives and more effectively control their diabetes when they can cope with stressful life events and have a good grasp on their condition. Commitment and discipline are required for both meditation and self-care when living with diabetes. When practiced together, payoffs compound and increase exponentially...A routine with meditation reduces anxiety and depression, increases focus, improves relationships, fosters better self-awareness, encourages greater control over blood glucose levels and diabetes, and lowers stress." Weight loss improves insulin production. But there is no magic potion for weight loss: "To reduce your weight, you need to lower your caloric intake and raise your physical activity everyday. You simply need to drink and eat fewer calories than you burn." Remission of Type 2 diabetes may be possible through intensive weight management programmes and routine primary care. Significant weight loss reduces the amount of fat in the liver and pancreas and allows these organs to once again function normally. I think, the most important contribution of the author is the 60-day challenge designed to help the patient make significant lifestyle changes and the 10 simple tips to lead a healthy life. The resources, medication-history and the references given are useful to the medical students.

To sum up, the book is rather difficult to understand for a non-technical reader even as it has very inspiring non-technical contributions. It is worth concluding by quoting the author—a reputed endocrinology practitioner in Florida, USA—thus: "Current treatment options for diabetes vary widely, and in this book, I have presented several options to give you a better understanding of what is available to help you on this path. Some of the options I present are current and commonly prescribed routes. Others are considered more alternative, but I encourage you not to dismiss any until you have read more about them. Diabetes is an incredibly personal disease, and you never know if a strange-sounding or seemingly unrealistic option may be the right one for you."Kudos to the author for his deep honesty and pluralistic approach to diabetes treatment.

There are allopathic, homeopathic, ayurvedic, naturopathic, chromopathic and other treatments of diabetes. Diabetes reversal is what the patient wants from any treatment and the author thinks it is very much possible and depends on how the patient proactively responds to fight the problem. On a personal note, I may mention that I had left ayurvedic consultation and went for allopathic treatment at Dr. Mohan's Diabetes Specialties Centre in Delhi and thereby found a lot of improvement, but I am still open to alternative treatments in order to attain diabetes reversal. Dr. Mohan's treatment is more than tablets; it also includes. inter alia, diet and exercise regimen (see Anjana et al. Undated). The problem for the patient is to find a non-commercialised genuine treatment touch from the therapist concerned. While the author refers to the arrival of miracle drugs round the corner, the drug-free Yogic panacea for diabetes that Sivananda (2003) talks about, must not be ignored-"Practise Paschimottasana, UddiyanaBandha and Agnisarakriya for five minutes daily in the early morning. Stretch the legs. Bend the head. Let it touch the knee gradually. Catch hold of of the toes with thumb and the index finger. This is Paschmottasana. Draw the abdomen back. This is Uddiyana Bandha. Pump the abdomen. This is Agnisara. The rationale of this Yogic panacea is that the pancreas, which is diseased on account of overwork, is toned by these Yogic exercises. It secretes more insulin for digesting the starchy food. This is natural insulin. Hence it is more potent and effective than the artificial insulin produced from the glands of the animals. Your general health will also improve. You will have a healthy and long life. Fear not! Despair not! I assure you. Be sincere and earnest. This is a well-tried panacea. Believe me, friends! Practise these exercises from today, enjoy radiant health and make the pomp of Emperors ridiculous. Regulate your diet also. Fast on every Ekadasi. Have full or partial fast. The former is better. Do not take even a drop of water when you fast in winter. Observe Brahmacharya. Do Japa, Kirtan, meditation regularly. Study Gita also." Also, the reader must seriously consider gardening as a possible cure for diabetes! (Feldmar, 2018). Most interestingly, I have just discovered cure for diabetes without medicines check out https://www.satvicmovement.org/workshops. This is the best path to follow for diabetes reversal in a month and within three months!

I can safely say that this book, along with other references given here, surely gives more than good enough hope to take on the insidious diabetes monster. We the diabetics must choose hope first and then act suitably and immediately instead of waiting for some miracle drug round the corner.

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