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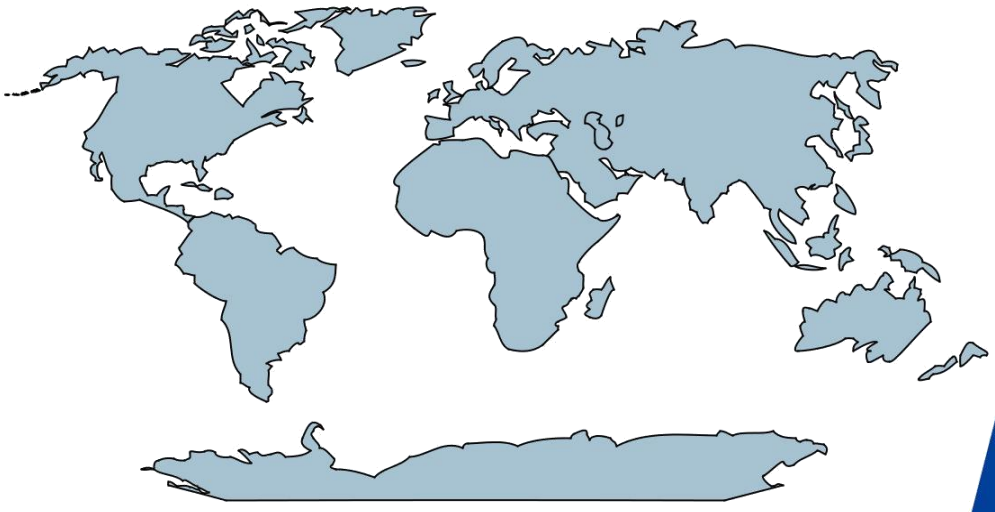

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ETHICAL PERSPECTIVE IN LABORATORY MEDICINE

Dr. Ashish P. Anjankar[1]* and Roshan Kumar Jha[2]
[1]Professor, Department of Biochemistry, Jawaharlal Nehru Medical College, WardhaDattaMeghe Institute of Medical Sciences (Deemed to be University), Wardha, India
[2]Tutor, Department of Biochemistry, Jawaharlal Nehru Medical College, WardhaDattaMeghe Institute of Medical Sciences (Deemed to be University), Wardha, India

ABSTRACT
Background: *The professional personnel of a medical laboratory are bound by the ethical codes of their respective profession. The general principle of healthcare ethics is that the patient's welfare is paramount. The laboratory should treat all patients fairly and without discrimination.*

Description: *Ethics in laboratory medicine starts from collection of information for proper identification of patient and specimen. The patient should be aware of the purpose for which the information is collected.*

Ethical principles continue during specimen collection, performance of tests and reporting of the results. For most laboratory procedures, consent can be inferred when the patient presents him or herself at a laboratory with a request form and willingly submits to the usual collecting procedures, for example, venipuncture. Special procedures, including the more invasive procedures (bone marrow aspirations) will require a more detailed explanation and, in some cases, written consent. HIV testing and certain genetic testing will require counseling.

The laboratory shall use tests procedures, including those for collection of specimens, which meet the appropriate standards. The results of laboratory examinations are confidential unless disclosure is authorized. The results will normally be reported to the requesting physician and may be reported to other parties with the patient's consent or as required by law. In addition to the accurate reporting of laboratory results, the laboratory has an additional responsibility to ensure that the results are correctly interpreted and applied in the patient's best interest.

Ethical guidelines should also be followed during storage and retention of medical records. Test results must never be altered or corrected, except by properly authorized persons in accordance with established procedures. Facilities shall provide a suitable environment to prevent damage, deterioration, loss or unauthorized access. Access to the medical records should be available to Clinician, patient, hospital staff, and other authorized individuals. When a request to access the result is made by authorized person, laboratory must confirm the identity of the person. Different methods may exist in the same laboratory for different tests. (Example: HIV test & Hb test)

Conclusion: *Patients, Colleagues and the profession, Society are the three main groups towards which medical laboratories owe their responsibility. Resident doctors of Preclinical and Paraclinical subjects should be fully aware of Ethical Principles in Laboratory Medicine and they must follow them in their Clinical Practice.*

Keywords: Bioethics, Laboratory medicine, Laboratory professionals

BACKGROUND:

Bioethics in Laboratory Medicine:

It is the duty of the medical doctors to their patients to exercise their professional skills in an ethical manner and to observe the laws of the community. The essential purpose is to ensure that patient's trust in the medical profession is deserved. Laboratory medicine, just as other areas of medicine, is obliged to adhere to high ethical standards. The general principle of healthcare ethics is that the patient's welfare is paramount. This applies to laboratory services as well.

The professional personnel of a medical laboratory are bound by the ethical codes of their respective profession. Patients, colleagues and the society are the three main groups towards which medical laboratories owe their responsibility. "Ethical medical practice is the expected conduct of laboratory physicians" and that striving to achieve high ethical standards is an essential aspect of medical excellence.[2] The overarching goal for laboratory physicians is to maintain professional integrity.

Why Ethics in Laboratory Medicine is Important?

Around 70% of medical diagnoses now rely on pathology laboratory analyses[1] emphasizes the crucial role that laboratory physicians play in patient care. The intermediary clinician, acting as the agent for the patient, needs to subscribe to the same ethical framework as the laboratory physician to ensure that investigation results are

applied in the patient's best interest.[3,4] Decisions about diagnosis, prognosis and treatment are frequently based on results and interpretations of laboratory tests. Irreversible harm may be caused by erroneous tests.

Many countries and professional societies have developed policies and guidance materials on ethical issues related to laboratory medicine. For instance, the International Organization for Standardization (ISO) has created ISO 15189:2012 "Medical laboratories − Requirements for quality and competence".[5] Numerous professional organizations have outlined codes of ethics for clinical laboratory professionals. [6-11] Despite the importance of ethics in laboratory Medicine, there is variability in education that is focused on ethics in the laboratory Medicine.

Ethical dilemmas are faced daily by laboratory physicians, but still ethics does not receive the attention it deserves.A recent report by the IFCC Task Force on Ethics indicates that formal teaching of ethics is absent from many clinical chemistry and laboratory medicine training programs and that there is a perceived need for training programs for ethical considerations in laboratory Medicine. [12]

Description:
Ethical issues in Clinical Laboratory ranges from collection of information from patient, collection of specimen, performance of the tests, sample stocking, storage protocol and retention of records. There are several other areas of ethical concern related with Clinical Laboratory such as biomedical waste management and financial arrangements, which are not directly related with patients. Ethical principles continue during specimen collection, performance of tests and reporting of the results.

Collection of Information:
Ethics in laboratory medicine starts from collection of information for proper identification of patient and specimen. The laboratory should collect adequate information for the proper identification of the patient and specimen. It is also for legitimate purposes (billing purpose and safety of other patients), but unnecessary personal information should not be collected. The patient should be aware of the purpose for which the information is collected.

Collection of Specimen:
For most laboratory procedures, consent can be inferred when the patient presents him or herself at a laboratory with a request form and willingly submits to the usual collecting procedures, for example, venipuncture.Special procedures, including the more invasive procedures (bone marrow aspirations) will require a more detailed explanation and, in some cases, written consent. HIV testing and certain genetic testing will require counseling.In emergency situations, consent might not be possible and under these circumstances it is acceptable to carry out necessary procedures provided they are in patient's best interest.

Patient Autonomy
The patient's right to refuse to be tested should be respected. However, there are certain situations in which patient autonomy is not absolute.For instance, a patient may be deemed incompetent to make a decision about their health, as when the patient is unconscious, mentally ill, or under the influence of drugs.Children are generally deemed not competent to make decisions for them.When patient is incompetent by a reason (age or mental state), consent may be given by parent or other authorized person.

Performance of Tests
The laboratory shall use tests procedures, including those for collection of specimens, which meet the appropriate standards.The results of laboratory examinations are confidential unless disclosure is authorized. The results will normally be reported to the requesting physician and may be reported to other parties with the patient's consent or as required by law. In addition to the accurate reporting of laboratory results, the laboratory has an additional responsibility to ensure that the results are correctly interpreted and applied in the patient's best interest.In some situations, laboratory should refuse to attempt a test rather than produce an unreliable result which could result in harm being done to the patient.

Reporting of Results
The results of laboratory examinations are confidential unless disclosure is authorized. The results will normally be reported to the requesting physician and may be reported to other parties with the patient's consent or as required by law. The laboratory should have written procedures detailing how various requests are to be handled, and this information should be made available to patients on request.

The laboratory is also responsible for taking all reasonable precautions to ensure that method of transmitting results to requesting clinicians and other authorized persons is secure and reliable. This applies whether transmission is by courier, public post or electronic means. Decisions concerning implied consent for the

reporting of results to other practitioners involved (such as consultant practitioners to whom the patient has been referred) should be made carefully taking into account local customs.

Storage and Retention of Medical records:
All records should be legible and stored such that they are readily retrievable. Test results must never be altered or corrected, except by properly authorized persons in accordance with established procedures.Facilities shall provide a suitable environment to prevent damage, deterioration, loss or unauthorized access. Records may be stored for appropriate retention time as per the national, regional or local legal regulations.

Access to Medical records
Should be available to- Clinician, patient, hospital staff, other authorized individuals.The laboratory should develop protocols to handle different requests taking into account local lawsand customs.When a request to access the result is made by authorized person, laboratory must confirm the identity of the person.In exceptional circumstances the withholding of health information from individuals normally authorized to receive it may be justified. An example of such a circumstance is when disclosure may be contrary to a patient's best interests.

Financial Arrangements
Medical laboratories should not enter into financial arrangements with referring practitioners where those arrangements act as an inducement for the referral of patients.It is desirable that private laboratory collecting rooms be completely separate and independent from the referring practitioner's rooms but where this is not practicable, any financial arrangements must not include any element of inducement. Laboratories should try to avoid situations that give rise to a conflict of interest and must be able to function with professional independence.

Research Ethics:
No sample should be used by the researcher without taking informed consent from the patient. The researcher should honestly report the data, materials, and methods used in the laboratory without fabricating any reports It is the responsibility of the researcher to maintain the confidentiality of the patient's information obtained for the purpose of research.

CONCLUSION:
Medical errors usually occur when there is a failure to complete a planned action as it was intended or when an incorrect plan is being implemented. Ethics in laboratory medicine have to be practically followed as a moral responsibility of all the laboratory staff, rather than being recorded in an operating manual. This requires the medical laboratory professionals to realize their duties and have a conscientious attitude toward their work. The principal virtues of compassion, discernment, trustworthiness, integrity, and conscientiousness must always be kept in mind by the laboratory physician for ethical practice.

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THE OUT-MIGRATION AND ITS IMPACT ON UTTARAKHAND: A STEP TO SOLVE THE CHALLENGES AND ISSUES

Gagan Deep Singh
School of Computer Science University of Petroleum and Energy Studies, Dehradun - 248007, Uttarakhand, India

ABSTRACT
Uttarakhand is one of the new state in the Republic of India. The state was formed on 9th November 2000, but since then the out-migration from the villages has increased in an alarming way. Many of the villages are now called Ghost Villages because they have left abandoned. The people migrates out in search of job, better education, better living, and some migrates because of wildlife conflicts in villages. There also issues like health services and basic amenities. Though government has initiated many schemes but they are not sufficient. There is around 70% of land comes in forest and as per the norms it cannot be touched for development of the State. The paper presents the basic study of the Uttarakhand out-migration problem and issues. The paper also presents some of the statistics that shows the rate of migration since formation of the state. Through this paper author also presents the methodology that can be adopted and deployed under Public Private Partnership (PPP) mode for the development of the citizens. This ultimately leads to provide a better livings to the villagers and in near future the out-migration problem may get resolved.

Keywords Uttarakhand, India, out-migration, Ghost Villages, PPP

1. INTRODUCTION
Uttarakhand, a new formed on November 9, 2000 is well known for its natural beauty and pleasant environment. Though, the state have not lead to economic growth as expected and effected the rate of outmigration. As per census reports the migration rate from Uttarakhand hilly areas has random growth since it was formed in 2000. As per the experts, migration leads to abandonment of villages which causes degradation of land, makes villages unlivable. As per the census, Uttarakhand has recorded the highest increase in the share of urban population in any of the Himalayan states of the country while its rural growth rate is lowest. The district Pauri has been noticed the downfall of population from 500 to 175 in Bitgaon and same with the village Bandul where only two women Pushpa devi and Bimla devi and living with their own struggles.

Though the rural Uttarakhand has rich and strong cultural heritage but it faces lot of infrastructural problems such as lack of connecting roads, electricity supply, educational and medical facilities. There are many theories that has been presented earlier for out migrations. The first theory suggests that labour migration is a process of economic development [1]. The second theory corresponds to the macroeconomic model of individual choice. People migrate to places where they can be more productive [2]. The third theory is based on the collective decision of the family/household to increase the net income, and to reduce the risks [3]. The present study draws mainly on the second and third theories. In the Uttarakhand Himalaya, out-migration is a practice of both individuals and families and driven mainly by employment and enhancement of livelihood. Migration in the Uttarakhand Himalaya is not a new phenomenon. It received tremendous in- migration during the 11th and 12th centuries [4,5]. People migrated here from Rajasthan, Gujarat, and the Ganges valley [6]. The pilgrims, who came to Uttarakhand for pilgrimage, settled here permanently. This continued till the advent of Indian British era. Out-migration began mainly during this era when young generation of Uttarakhand region recruited by the British Army. The male population mainly youth, have out-migrated while the elders are practicing farming in the villages [7]. There are many drivers/push factors driving migration from Uttarakhand. Among them, mountain population, unemployment, the low output from agricultural fields, education, climate change, and harsh conditions in rural areas are prominent [8].

Both permanent and semi-permanent migration is seen in Uttarakhand [9]. About 50% of migration was for employment reasons [10] although there were several other reasons such as education, health, the low output from the farmlands, and wildlife. Out-migration has led to depopulation and land abandonment. Further, the male population has out-migrated largely, which has led to a high sex ratio in rural areas i.e. 1037 women per thousand men. The growth in the agricultural sector in rural areas has slowed down and decreased its contribution to gross State Domestic Product (GSDP) (only 10.50%). Meanwhile, about 48.33% of the population are engaged in the agricultural sector. Pilgrimage tourism in Uttarakhand is also popular [11,12,13]. Pilgrims/tourists visit the Char Dham pilgrimages during the six months of Yatra season. To provide services to pilgrims/tourists, a large number of rural youth migrate to the service centres along the roads that lead to pilgrimages. This is the season of crop harvesting and sowing in rural areas. Because of the workforce deficit,

the yield of crops remains low. Unlike the other parts of India, out-migration has adverse implications on the rural areas of Uttarakhand hilly regions. This paper presents the major types of out-migration, reasons for migration, and depopulation in villages. The methodology suggests measures to strengthen rural livelihoods so that the out-migration can be minimized from the Uttarakhand Himalaya.

Hence, to overcome this untouched problem of outmigration we propose an approach through Information and Communication Technology (ICT) that can act as a boon to minimize the rate of migration from Uttarakhand hills and its rural area. Government of India through Digital India is integrating ICT into its national development plans and adopting strategies for its widespread promotion in all the aspects of economic growth. There is an urgent need to ensure that the benefits of Digital India percolate to the grass roots of the rural Uttarakhand. In a framework for the improvement of rural population through ICT, the concept of Rural Knowledge Hubs (RKH) and Rural Knowledge Resource Centre (RKRC) can prove as an important tool to stabilize the problem of outmigration from Uttarakhand villages.

The concept of RKH and RKRC is to provide mainly the need based locale-specific, demand driven information which will be based on the collection of several secondary data and a well planned need assessment, by organizing awareness programs, trainings, local gatherings in RKH and RKRCs and also by making linkages with several leading organizations/institutions (government/non-government/academics/NGOs) for translating the content into field based applications. The Rural Knowledge Hubs and Rural Knowledge Resource Centre will be a place which provides distant services from a single window point to rural masses; especially in remote areas of the Uttarakhand through ICT.

Rural Knowledge Hubs will be emerged as an initiative to impact rural livelihoods to build resourceful and progressive villages. The RKH and RKRC will be interlinked to a control centre with audience at remote villages or content already prepared will be disseminated on the need and desire of rural communities.

Even government of Uttarakhand and government of India along with PPP, can develop KPO, BPO, Call Centers and IT Parks at hilly region of Uttarakhand to promote the employment for the people of rural Uttarakhand. According to the State's Directorate of Economics and Statistics, only one of the hill districts has an average per capita income higher than the State.

2. LITERATURE REVIEW

The review done of the literature presents that only a few studies have been conducted on migration- related issues in rural and hill regions of Uttarakhand. Further, no systematic or concrete study has been done on the major causes and consequences of out-migration in the entire state of Uttarakhand.

The State government's annual plan 2019 – 2020 shows that the per capita income in the village is much lower than in the plains. According to the State's Directorate of Economics and Statistics, only one of the hill districts has an average per capita income higher than the state average while the three districts in the plains occupy the first three positions. And since economic prosperity has largely been limited to the three districts in the plains, the hills are contributing the most to the migrant labour force1.

Earlier studies on causes of out-migration in the Uttarakhand Himalaya are rare. Maithani [14] illustrates that an exodus number of male youth has out migrated for the search of jobs/livelihoods because of limited subsistence economy and low output from agricultural fields. The declining population of two districts of the mountainous mainland – Almora and Pauri of the Uttarakhand Himalaya and observed that it was due to out-migration. and the plain districts within the state have better facilities for industrial and educational development, which are the major pull factors [15]. The geophysical constraints such as difficult terrain, harsh climate, and remoteness are generally the major push factors for out-migration in mountainous areas, particularly in the Uttarakhand Himalaya [16]. Among the pull factors, improved communication, transport networks, new economic opportunities, and better education facilities in the receiving areas are prominent that have increased mobility [17]. There were about 686% of increases in male out-migration between 2001 and 2013 in a part of Uttarakhand, which shows constantly increasing trends [18]. Due to out-migration, Tehri, Pauri, and Almora districts have been facing problems since 1970.

The present study is unique because it is the first of its kind that is carried out on the latest data, i.e. of 2019, as data is available to 2019. Further, it focuses on the main issues of migration, i.e. its reasons and consequences in a different way.

The main objectives of the study are:

(i) To analyze the semi-permanent and permanent, migration, various reasons of migration and

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(ii) To propose a methodology for strengthening rural livelihoods so that the out-migration can be reduced.

3. METHODOLOGY ADOPTED

The Migration data between 2011 and 2019 were analyzed using a percentile, indices, and levels, and through the graphic presentation. Types of migration - semi-permanent and permanent – were analyzed at district and state levels. Further, the major reasons for migration–employment, education, low yield of crops, fear from wildlife, and better infrastructure facilities – have been described. The destinations of migrants, which vary from within the district to district centres, within and outside of the state, and abroad have been illustrated. District and state-wise age of migrants has been elaborated. The state has also observed in- migration (reverse migration) between 2011 and 2018. A case study of a village was conducted in Jan 2020 and 45 households were surveyed using a purposive random sampling method. Data on gender, age, income, education, occupation, and migration were gathered. The nature of migration – permanent, semi-permanent, and seasonal and place of migration – within and outside the state was analyzed. A correlation between migration and other variables such as gender, age, income, education, and occupation was carried out. The observation method through rapid field visits of several areas in different districts was employed to verify the reliability of secondary sources data [19] .

3.1 Semi-permanent and Permanent Migration

At the district level, semi-permanent and permanent migration was analyzed. Semi-permanent migration includes monthly, seasonal, and annual migration. The migrants have their dwellings in the villages where their family members practice subsistence farming. The migrants send remittances, which enhance the income and livelihood of the families. In permanent migration, the migrants leave their villages and migrate permanently to other parts of the state or country. They leave their settlements and farmlands abandoned.

Table 1 shows semi-permanent and permanent migration. The total numbers of villages, where semi-permanent migration occurred after 2011, were 6,338 (40.25% of the total villages), of which the highest number of villages were from Pauri, Almora, and Tehri, which is more than 10%. Five districts – Pithoragarh, Chamoli, Rudraprayag, Nainital, and Champawat – have 5%-10% of villages where semi-permanent migration occurred. The districts where semi-permanent migration occurred in <5% of villages are Bageshwar, Haridwar, Uttarkashi, USN, and Dehradun. After 2011, about 383,726 migrants (3.8% of the total population) out-migrated semi-permanently. The highest number of semi-permanent migrants (>10%) were noticed from Pauri, Tehri, Almora, and Chamoli districts. Three districts – Pithoragarh, Rudraprayag, and Champawat registered 5% -10% semi-permanent migrants. The low number of migrants (<5%) was noticed in the districts – Bageshwar, Nainital, Dehradun, Uttarkashi, Haridwar, and USN in descending order.

Permanent migration occurred mainly in the rural areas of Uttarakhand. The total numbers of villages, where permanent migration took place were 3,946 (25.1% of the total villages). Out of which, the highest number of villages, with more than 10% of people migrated, were noticed in Pauri, Almora, and Tehri districts. Pithoragarh, Chamoli, Rudraprayag, Nainital, and Champawat districts have a medium number of villages (5-10%) where rural-urban migration occurred. Other districts – Bageshwar, Haridwar, Uttarkashi, USN, and Dehradun have fewer villages (<5%) where permanent migration was observed. The number of permanent migrants after 2011 was 118,981 (1.18% of the total population). More than 10% permanent migration occurred in the villages of Pauri (21.5%), Tehri (15.82%), Almora (13.62%), and Chamoli (12%) districts. It was followed by Pithoragarh (8.3%), Rudraprayag (6.59%), and Champawat (6%) districts with a medium level of permanent migration (5-10%). The districts of Bageshwar, Nainital, Dehradun, Uttarkashi, Haridwar, and USN had low permanent migration with <5%.

Table 1. Migration types : Semi-permanent and permanent

Semi-permanent migration (number of villages in %) Total 6,338		
Indices (%)	Levels	Districts
>10	High	Pauri (20%), Almora (16.37%), and Tehri (14.82%)
5-10	Medium	Pithoragarh (9.73%), Chamoli (9.45%), Rudraprayag (5.83%), Nainital (5.4%), Champawat (5.27%)
<5	Low	Bageshwar (4.94%), Haridwar (1.85%), Uttarkashi (1.81%), USN (1.40%), and Dehradun (1.34%)
Semi-permanent migration (number of migrants in %) Total 383,726		
>10	High	Pauri (21.5%), Tehri (15.82%), Almora (13.62%), and Chamoli (12%)
5-10	Medium	Pithoragarh (8.3%), Rudraprayag (6.59%), and Champawat (6%)

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<5	Low	Bageshwar (4.97%), Nainital (4.05%), Dehradun (2.35%), Uttarkashi (2.29%), Haridwar (1.05%), and USN (0.8%)
Permanent migration (number of villages in %) Total 3,946		
>10	High	Pauri (20.81%), Almora (16.37%), and Tehri (14.82%)
5-10	Medium	Pithoragarh (9.73%), Chamoli (9.45%), Rudraprayag (5.83%), Nainital (5.4%), and Champawat (5.27%)
<5	Low	Bageshwar (4.94%), Haridwar (1.85%), Uttarkashi (1.81%), USN (1.40%), and Dehradun (1.34%)
Permanent migration (number of migrants in %) Total 118,981		
>10	High	Pauri (21.5%), Tehri (15.82%), Almora (13.62%), and Chamoli (12%)
5-10	Medium	Pithoragarh (8.3%), Rudraprayag (6.59%), and Champawat (6%)
<5	Low	Bageshwar (4.97%), Nainital (4.05%), Dehradun (2.35%), Uttarkashi (2.29%), Haridwar (1.05), and USN (0.8%)

Source: Rural Development and Migration Commission, Uttarakhand, 2019

3.2 The cause found for out-migration in Uttarakhand

Out-migration has become a common phenomenon in Uttarakhand mainly after 2000 when it became a separate state by getting carved out of Uttar Pradesh. The author collected data on reasons for migration and analyzed them. At the state level, it was observed that about 50.16% of populations out-migrated for employment, followed by education (15.21%). Migration for health stood at 8.83%. There are many other factors such as better facilities (3.74%), the low yield from the traditional crops (5.44%), to follow others (2.52%), and problems from wildlife (5.61%), which have affected out-migration in the Uttarakhand Himalaya. Some other factors, which are not listed, represent 8.48%, which have also affected out-migration. At the district level, employment is the major factor of out-migration, which represents the highest proportion in the USN district (65.63%) and the lowest proportion in the Bageshwar district (41.39%). Education is the second major factor for out-migration at the district level, mainly in the Chamoli district (19.73%), Pithoragarh district (19.52%), Tehri district (18.24%), Uttarkashi district (17.44%), Pauri district (15.78%), and Rudraprayag district (15.67%). Three districts have more than 10% population out-migrated for health improvement. Wildlife (>6%) has become a cause of out-migration mainly in Almora, Nainital, and Pauri districts. However, other districts are also affected by it. In the meantime, Haridwar, Dehradun, and USN districts have been less affected due to wildlife. Few people have out-migrated to follow their neighbours or relatives.

3.3 The outcome of the study and its analysis

The study and analysis revealed that both semi-permanent and permanent migration occurred in each district of the Uttarakhand Himalaya. However, the proportion of the population out- migrated varies from one district to another. The study also noticed that the proportion is almost the same in terms of semi-permanent and permanent migration in all the districts. The three districts – Pauri, Almora, and Tehri have more than 50% migrants out of the total population out-migrated in Uttarakhand. The author noticed that education is one of the drivers of out-migration from the hill districts. Pauri and Almora districts are an example of it. The reason for high migration from Tehri district was the construction of Tehri High Dam where about 114 villages were fully or partially submerged and a large population got rehabilitation in the Dun valleys.

In the meantime, out-migration from the districts, which lie in plain areas, is less. The reason is that the plain districts such as USN, Haridwar, and Dehradun have enormous fertile arable land for a sustainable livelihood. It was also noticed that from the remotely located districts such as Bageshwar and Uttarkashi, out-migration is less because they are practising suitable agriculture, and output from it is substantial in comparison to other mountainous districts. A large portion of migrants was noticed from the age group of 26-35 years. As already discussed, the youth of the region, which belongs to the age group of 26-35 years, have out-migrated in the search for jobs, although migration is substantial in all age groups.

Most of the permanent migrants have migrated out of the state. They migrated along with their family, leaving their settlements and farmlands abandoned. A few people also out- migrated abroad. Migration abroad is the highest, mainly from Tehri, Rudraprayag, and USN districts. A large number of youth are working in hotel industries abroad from these districts. The Sikh community of USN has migrated to European countries and American states for employment.

Out-migration has severe consequences in the sending areas, mainly due to permanent migration. Several villages are fully depopulated due to exodus out-migration. These villages are called the ‘Ghost Villages’.

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Recently, reverse migration (in-migration) was also noticed in a few villages. Most of them are located in plains where infrastructural facilities are better. It is observed that the in-migrants are those who have retired from their jobs and have returned at their villages and native places. However, their number is very less.

4. METHODOLOGY WITH AN ACTION PLAN TO HELP VILLAGERS THAT CAN AVOID OUT-MIGRATION

A preliminary analysis will be done in selected villages, in order to explore the possibility of setting up RKH/RKRC. A target village is proposed to be identified amongst villages at rural areas of Uttarakhand such as, remote areas of Pauri Garhwal, Almora, Pithoragarh, Bageshwar, Chamoli, Champawat, Nainital, Rudraprayag and Uttarkashi. Support can also be sought from NGOs in terms of use of their basic infrastructure and social network.

NGO unit will be identifies that has been working towards sustainable development and rural industrialization for benefit of farmers, landless labor and other deprived sections especially women through science and technology based innovation and participatory action research. Demographic data of these districts will be reviewed for further analysis and deliberations in context of the proposed road map.

4.1 Stepwise Action Plan as per proposed Methodology

- Need – Assessment Survey : To identify the statement of information needs of the target village.
- Establishment and operation of RKH/RKRC :
- To meet desired objectives identified through need assessment survey at end of first phase.
- Conduct various knowledge dissemination programs, need based training programs etc.
- To co-ordinate, monitor and improve functioning of the Centre.
- To raise income generation and employment opportunities.
- Periodically study improvement in quality of life, standard of living, per capita income of villagers.

4.2 Need Assessment Survey: Its objective is to collect a wide range of information regarding the village, ranging from demographic details like population, number of house-holds, percentage age-groups, literacy-rate, main occupation (farming/ non-farming activities/business/service etc), sources of income, to details like the availability of various basic services such as medical (Primary Health Centers, hospitals, clinics), trained staff, education facilities etc. For this purpose, a questionnaire will be designed and administered. It is proposed to make a prior meeting with the village Pradhan/head, to give him/her a brief idea of the overall aim of the project and request for his/her support for an accurate need assessment and further execution. This is important to finally determine the direction and focus of the RKH/RKRC In addition to general details the questionnaire will also ascertain the needs of the villagers which can be met through RKH and for this reason it is proposed to conduct it, like a group meeting, between the project team and the villagers. An appropriate sample size based on the population of the village would be chosen. The villagers would be informed in advance to attend the group meetings where a general discussion of few hours (2-3) mainly focused to the above objective will be held. It is proposed to repeat the meetings as per the requirement, to clearly demarcate the exact needs of the villagers from such a knowledge centre. After detailed analysis of the obtained data, the information is proposed to be used to decide the main information focus for the knowledge centre.

4.3 Establishment and operation of the RKH/RKRC: The RKH/RKRC would be established at a place that will be easily approachable to all the villagers, in nearby areas especially to the people from the target village. The centre shall work along the lines of e-choupal and make available, in real time, the information to the farmers regarding the mandi rates of the commodities that they are producing. Tie-up with governmental, non-governmental institutions, self-help groups can be made to ensure farmers get a better deal for their produce and they are able to make their selling decisions in the light of proper information. The RKH/RKRC would cater to providing training to the villagers, on latest food processing and preservation techniques, energy efficient cooking methods, energy conservation best practices for effective household management, etc. This training can be conducted at the Knowledge Centre, central studio utilizing the computer(s) along with audio-visual and other IT enabled tools or in a video conferencing mode, connecting the central studio to remote site from where the trainer can deliver a session in interactive mode. RKH can also be used for dissemination of information regarding health and nutrition, general hygiene, sanitation, first-aid, vaccination etc. Training can be provided through RKRC on any other topic as may be identified through the need-assessment survey. One of the objectives of

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RKH/RKRC would be to focus on the income generation and increase employment opportunities. The objective of the project is also to study over a period of time, the improvement in people's life in terms of their education, awareness, medical services, income, standard of living, quality of life etc.

4.4 Proposed Framework

Each RKH has one or more desktop computers, at least one printer, radio communications equipment, a wireless tower antenna mounted on top of the building, and in some cases, a video kiosk. These are maintained by the villagers. The videos enable visitors to play and watch video-tutorials on farming, health and other topics. Each RKH selects and helps promising youth to undergo various types of computer skills training. The training sessions are held at the appropriate RKH or RKRC. Additional on-line, video and cloud-based training materials and exam practice materials are available for use by the trainees at the local villages through the VKCs. The framework of RKH and RKRC is shown in figure 1.

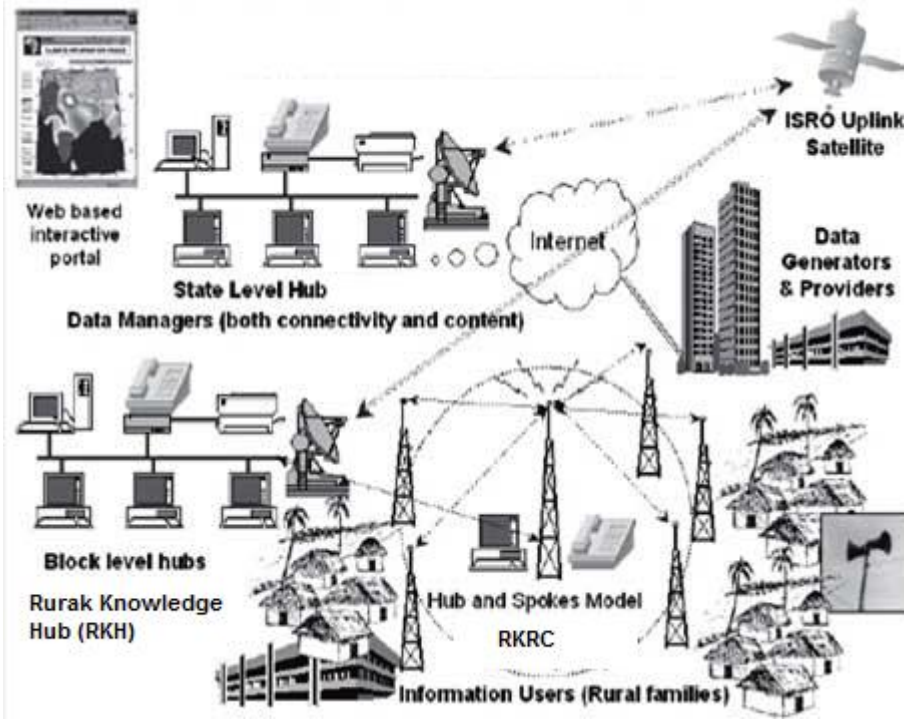

Figure 1 : Framework for RKH & RKRC [20]

4.5 Operations at the RKH/RKRC

As noted above, the RKRC forms the hub of activities for a cluster of RKH. Local project staff maintains the systems at the hub. The wireless system and web server administration are taken care of by the core team of RKH. The RKH/RKRC creates and maintains numerous databases pertaining to agriculture, commodity prices, livestock health and welfare, medical data, governmental data, grants and aid availability from various agencies of the government, women's welfare-related data, etc. Each RKH will also have a fully equipped library containing magazines and other publications of local region.

5. CONCLUSION

Out-migration is the most realistic problem of Uttarakhand and its villages. The huge population, mostly young people, has out-migrated semi-permanently and permanently. In several areas, only the old-aged people and women were left living with minimum basic amenities. Migration has led to 'Ghost Villages' and has severe repercussions on the farming systems. The rate of out-migration has increased mainly after 2000 and has aggravated during recent times. Unemployment is one of the major impediments of out-migration. Since the rural areas are devoid of infrastructural and institutional facilities, augmentation of employment is not possible. Further, the output from traditionally practiced subsistence cereal cultivation is not enough to carry livelihood sustainably. These factors have manifested a large out-migration of youth from the region, and if it continues, the out-migration will have severe adverse implications on the rural areas and their economy. Several steps should be raised to minimize out-migration and attract the migrants to come back to their respective villages. Institutions related to development should be set up so that employment can be augmented and granted to the local people. The development of educational institutions may be a strong tool that can restrict the youth to out-migrate for education. Modern technological innovations related to agriculture can enhance the yield of crops

and employment opportunities. Therefore, at the community level, the development of agriculture should be ensured. The government should come forward for the development of infrastructural facilities and through it, employment can be augmented.

The proposed solution has a multitude of benefits with suggestive road map for Uttarakhand government to contemplate, implement and lead. Government of Uttarakhand under PPP mode can develop a vast infrastructure for KPOs, BPOs, Call Centers and IT Park for employment enhancement at hilly region of Uttarakhand. They can even provide Data Centers at these locations and can also opt for sustainable solar energy for electric power at these units. Even the climatic conditions also fit for ICT equipments

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OPTIMIZING REAL-TIME INTERNET OF THINGS DATA USING BIG DATA COMPUTING PLATFORM

[1]A. Dharmita and [2]M. S. Minu
[1]Second Year CSE BDA, SRMIST
[2]Assistant Professor, CSE, SRMIST

ABSTRACT
IOT offers the capability to connect and integrate both digital and physical entities of an appliance. A fundamental challenge centre's around managing big IOT data that these appliances produce, which is not only extremely large in scale and volume but also noisy and continuous. In our research we have explored Big Data based IOT driven technologies and the importance of pre-processing, meta data, data storage formats, data management and how big data is closely associated with IOT technologies. To achieve the objective of managing big data we are going to use the two most widely used framework namely Apache Hadoop and Apache Spark explained in detail in the research. Now some of the challenges faced by the IOT based appliances and the users are privacy, data storage and analysis, scalability, pre-processing. However, using the concepts of bigdata we can overcome these challenges. This paper finally helps in the implementation of combined efforts of IOT and bigdata altogether in the field of education, healthcare, urban planning, agriculture sector, and industries and also illustrates how these two technologies working simultaneously can not only improve the quality of the appliances but also enhances the experience of the users. This proposed methodology as per research will be easy and accurate compared to the existing methodology.

Keywords: Big Data, IOT, Apache Hadoop, Apache Spark, Volume.

INTRODUCTION
IOT AND BIG DATA
Internet of things is a group of machines that are interrelated and works without the intervention of humans. They are connected through sensors and checked upon using internet. It's a machine-to-machine communication process. While big data is collection of structured, semi-structured and unstructured data that are collected from various organizations. The amount of data being collected is being increased and has crossed over Terabyte and now is the range of Petabyte. Because of this big data we are able to store unlimited amount of data in a secured and structured manner.

Big Data has been characterized by three different parameters which are:

1. ***Volume*** - It is one of the important characteristics that describes the big data. Since the amount of data is increasing the traditional techniques and the methods used cannot be used and there is a serious requirement of enhanced techniques to process and analyze the data.

2. ***Velocity*** - It's the speed in which data is being processed. The rate of incoming data from various devices. Large amount of data is being generated through social media like WhatsApp, Instagram post, Twitter.

3. ***Variety*** – The amount of heterogenous data processed through various organizations and accounts. In other words, it's the number of forms of data. [6]

INTERNET OF THINGS DATA
The data generated using IOT is large in volume and random in nature. To access these data, we need to use the big data tools for analyzing and processing them. The data is generated in multiple ways and variety of devices and is processed in different ways and is transmitted to different locations.

EXISTING METHODS AND TOOLS USED
THE BIG DATA TOOLS USED TO ANALYSE IOT DATA
To overcome the ever-increasing data volume in the range of many areas we use a process called cluster computing. It is the process of sharing the computation task among multiple computers and these computers form a cluster. It works on distributed system with the networks.

The two most widely used Big Data framework is Apache Hadoop and Apache Spark.

Apache Hadoop – This framework is an open-source platform that is well established platforms that supports the distribution and parallel processing of massive data. Used for storing large volume of raw data and also provides a general partitioning mechanism across different machines. It's also called a multi-purpose engine but not a real time engine and a high-performance engine. Hadoop contains libraries that use a simple programming

language. Hadoop is based upon two nodes: Master node and Slave node. Master node is the one that helps in dividing the problem into sub-problems. Each sub-problem is distributed into different slave node. All the output from the slave node is collected at the end and given to the master node. The Hadoop platform contains the Hadoop kernel, Hadoop MapReduce framework provides highly efficient and reliable programming environment for large volume of data. [9]

Apache Spark – It's also an open-source platform but it is mostly used to get over the restrictions of MapReduce like fault tolerance, linear scalability and for processing large scale data processing framework. Few of its advantages are that it is easy to use, provides high speed, and has sophisticated analysis. Apache spark is not a modified version of Hadoop and it is also not dependent on Hadoop. Hadoop is just one way of implementing spark. Spark uses Hadoop in two ways. They are: Storage and Processing. [10]

Apache Storm – It is used for extensive data processing. It works on real-time data, which should be distributed and fault-tolerant. It forms a cluster of data that is similar to Hadoop clusters. It also works as a Master node and worker node. [3]

Apache Splunk – It's a web interface that allows the user to analyse, search and monitor the data. It helps to register the structure and unstructured data that are produced by machines. This is a smart real-time support system for exploring data. [9]

APPLICATIONS OF BIG DATA ANALYTICS USING IOT DATA

EDUCATION

The use of data in education began around eight years ago, due to the emergence of the field of learning analytics, which are today commonly named as Learning Management Systems (LMS). IT focuses on the measurement and analysis of student data to improve learning and learning environments. Big Data is making education more and more interesting, affordable and available. [7]

HEALTHCARE

The AI powered machine learning is continuing to gain foothold in healthcare sector. From various data collected from medical records of patients we can diagnose the person with the medical condition. With this data an early warning can be given in case if a person is suffering from a certain medical condition. [5]

URBAN PLANNING

The complexity of modern and smart cities has risen in the recent years. The traditional urban planning, design and management methods have reached their limits. [5]

AGRICULTURAL SECTOR

In this sector the farmers are undergoing a digital revolution. Big data is being used to deliver predictive awareness in farming operations and drive real-time operational decisions. In many developing countries the changes in the weather pattern, plantation, topography is less informed so, data is needed to note all these changes and inform them that might have a change. [7]

INDUSTRY

In manufacturing industries, the ability to successfully analyse big data can process flaws, update customer service, enhance production quality, increase efficiency that saves time and money. [5]

PUBLIC SERVICES DELIVERY

To improve productivity, performance, innovation and policy making processes, the government has an opportunity to tackle big data solutions. [5]

CHALLENGES FACED

PRIVACY

The data being captured can be vital and privacy of it has to be considered. This happens when we try restoring particular or private data using the big data tools. Currently the privacy issues are in the data mining domain of big data. Presently there is no way these challenges and the way they manage the privacy and security. [8]

DATA STORAGE AND ANALYSIS

The volume of data over the years have increased drastically through mobile devices, remote sensing, radio sensing, etc. The diversity of the datasets have also increased over the years significantly. [2]

DATA MINING

The process of extracting data from IoT data. It provides an excellent solution to obtain graphical or analytical solution for the new data. [3]

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SCALABILITY
It is the biggest challenge for big data analytics. The amount of data generated by IoT devices results in the natural shift of processor technology with increased number of cores. The hierarchical storage is critical here. Scalability consists of 2 dimensions: Horizontal and Vertical. [1]

Horizontal scalability: When more servers with less RAM and processors are added.

Vertical scalability: When new resources are added to the existing system to meet the requirements.

VISUALISATION
Due to the large amount of data the visualisation of this data is very difficult. So, for this big data and visualisation should work effortlessly. Graphical representation of the data provides the link between the data and gives proper interpretation. Challenges also arise due to the heterogenous and diverse nature of data. Different types of methods are needed for different kinds of data and a single method is unsuitable for this. Real-time analytics is another challenge. [4]

PREPROCESSING
The IoT data that is produced has a lot of unnecessary data that needs to be removed so a few steps have to be done before they are processed and analysed.

Data cleaning**:** Filling the misplaced values and correcting the inconsistencies in the facts.

Data integration**:** Data with different representation are put together.

Data transformation**:** The received data is generalized and normalized.

Data Reduction**:** Represents a reduced data in data warehouse. [3]

INTEGRATION
The data that is generated from IOT devices are in different format. This is the process of giving data in a single format that has data from diverse springs and then collects the assessment of data. [8]

INFORMATION SECURITY
The data security can be ensured by using techniques like authentication, authorization and encryption. Other security measures that big data face is variety of devices, lack of intrusion system, real-time security monitoring. There is a need to improve the security systems. Here the major difficulty would be creating a multi-level security, privacy preserved data model. [2]

CONCLUSION
IoT has become significant source of Big Data which is useless if it is not analyzed properly. This paper focuses on Big Data context concerning the Internet of Things. It describes the basic concepts of IoT and its architecture. It gives an elaborated structure of Gartner's 3 V's model. This paper enhances the understandability of the reader for the relation between IoT, Big data, and analytics. It familiarizes reader to different Big Data Analytics platforms which can handle various IoT datasets. After reading this paper, a reader will be aware of different platforms and will be able to select one for their particular problems.

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STUDY ON USE OF ONLINE FOOD ORDERING APP BY STUDENTS IN MUMBAI DISTRICT

[1]Mr. Vikas Mishra and [2]Dr. Susmita Daxini
[1]Assistant Professor, K.E.S. Shroff College
[2]Associate Professor, D.T.S.S. College

ABSTRACT:
Food is a basic necessity of life. Change in life style has a great impact on food pattern of society. Trend of ordering food using online apps is result of that. Significant association is found between use of online food delivery app and gender. Discount offered on food is a major determinant for ordering food online.

Keywords: Online food app

INTRODUCTION:

In current materialistic world, where more importance is given to luxuries, comforts, brands and showoff. Thirst of power, money and comforts makes our life more uncomfortable. A person works hard for a good career and job so that he can enjoy a better standard of living and better-quality food and can have other basic requirement of life. However, he fails in spite of all his attempts. Life of people specially in metro cities is very fast. In a middle-class family both husband and wife are working to cope up themselves with increasing cost of living. Many families due to their busy schedules are not carrying their lunch box with them. Not even they have breakfast at home. They depend on vendors or restaurants and hotels for their lunch and breakfast. Few people are of opinion that carrying tiffin is old and outdated it does not match with their position and status so they prefer to have food outside. Having lunch in a hotel or restaurant create another problem for such people and that is of time. Lunch time is of limited period and sometimes they have to wait for their food in hotel. To overcome these problems, they started ordering food from hotel to their work place but here availability of delivery boy becomes a threat for them. Many times, hotels refused their orders due to non-availabilities of delivery boys. Now this problem is solved by food ordering apps. Food ordering apps are the media by which local hotels and restaurants, chefs, canteens are delivering take away and food parcel directly to consumers footsteps. Now days consumers are getting more attracted towards online ordering apps rather than home delivery of a specific restaurants. In a process of online food ordering apps there is no human intervention involved which gives it more privacy. Apps are having number of restaurants, chefs' kitchens listed with their menu specifically. So, the consumers need not to carry pamphlets and menu list for further orders. It gives convenience to order food on click of a button. These apps can be directly downloaded to smart phone which give them more accessibility. By giving your address and profile, payment information account can be created. However, the app needs to be downloaded by the customers on their cell phones and register them on the app. Creating profile on apps includes their address and payment information. Apps are having different kind of mode of payments like credit cards, debit cards, cash less accounts and free home delivery. Different apps offer different services, offers, features or restaurants too. Downloaded app used to give some coupons discounts, previous order history, some palette suggestions, recent customers review on restaurants as well as dishes.

Students studying in colleges are very much used to for such online foods. They use to order food using these online app at several occasions. Availability of discount and quick delivery of foods are the factors which motivates students to order food using these online apps.

Objectives:

1- To study the association between the satisfaction of consumer and gender.

2- To know about the major determinant which people to order online for food.

3- To study relation between frequency of ordering food through online app and gender.

REVIEW OF LITERATURE

Sheryl E. Kimes (2011): In his research paper the matters that convenience perceived control is the two most important factor necessary to understand consumers perception and attitude towards online food service. Many customers still prefer to have one on one conversation with the hotel as in offline food delivery that because relationship when interaction and conversation exist.

Serhat Murat Alagoz & Haluk Hekimoglu (2012), opined that e-commerce is dynamically growing worldwide, the food industry is also indicating an increased growth. They have suggested the Technology Acceptance Model (TAM) as a base to study the acceptance of online food ordering apps. Their analysis of data stated that the attitude towards online food ordering is due to the ease and usefulness of online food ordering

process and also vary according to their innovativeness against information technology, their trust in e commerce websites and few external influences.

Leong Wai Hong (2016): Technology is one of the key factors as to why e- commerce industry is growing as a result of which online food delivery service business is also growing. For any hotel industry to grow, efficiency is mainly needed which can boost profitability and productivity of the business. The use of online food delivery services will lead any restaurant business whether well- great success or fortunately on a timely basis because getting online platform will allow the industry to improve their credibility, more fame plus more trust factor will increases the details of a particular restaurant will be put up on the online platform.

H.S. Sethu & Bhavya Saini (2016), their idea was to analyze the student's perception, behavior and satisfaction of online food ordering and delivery applications. Their study shows that online food ordering apps secure their time due to easily availability. It is also found that visibility of their favourite food at any point of time and always access to internet, free data are the main reasons for using the apps.

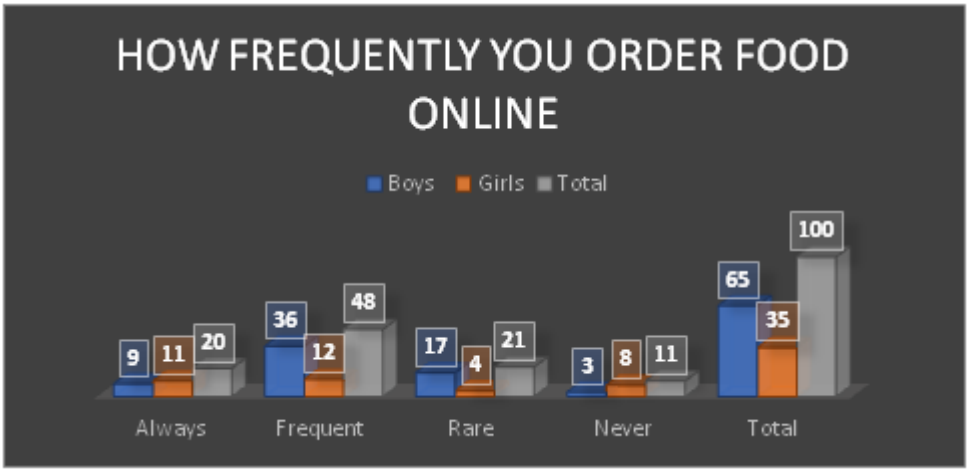
Varsha Chavan, et al, (2015), the use of smart phone mobile interface for consumers to view order and follow has helped the restaurants in delivering orders from consumers immediately. The increase in uses of smart phones and computers are giving platform for service industry. Their Analysis concluded that this process is convenient, effective and easy to use, which is expected to better day by day in coming times.

RESEARCH METHODOLOGY:

Researcher has collected data through primary source to record response of respondents. Respondents have selected through convenience method of sampling. Students studying in colleges of Mumbai district are selected for study. Chi-square test is used for data analysis.

FINDINGS:

	Boys	Girls	Total
Always	9	11	20
Frequent	36	12	48
Rare	17	4	21
Never	3	8	11
Total	65	35	100



Reason for using food delivery App

	Boys	**Girls**	**Total**
Convenience	11	7	18
Time saving	12	4	16
Variety	10	9	19
Ease in Payment	8	4	12
Discount	24	11	35
Total	65	35	100

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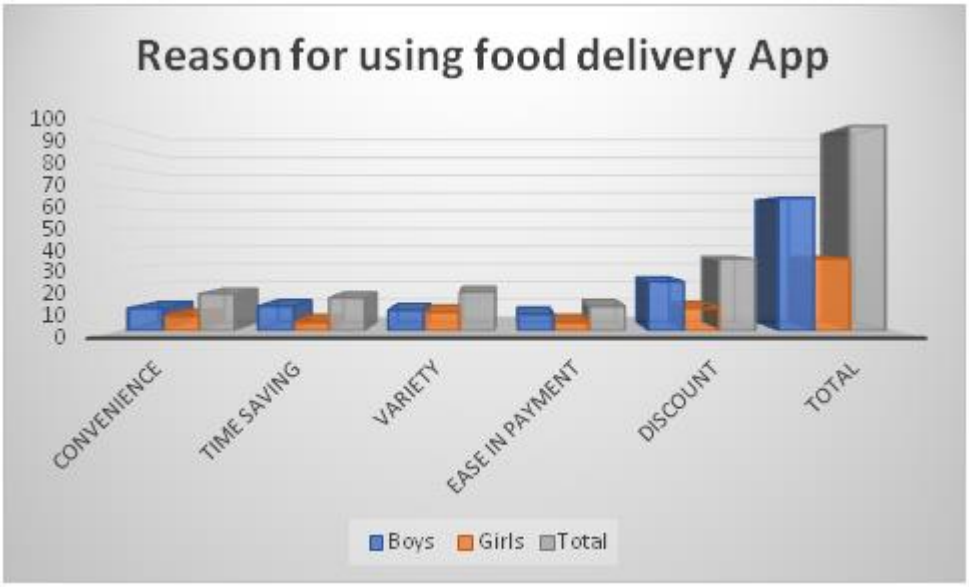
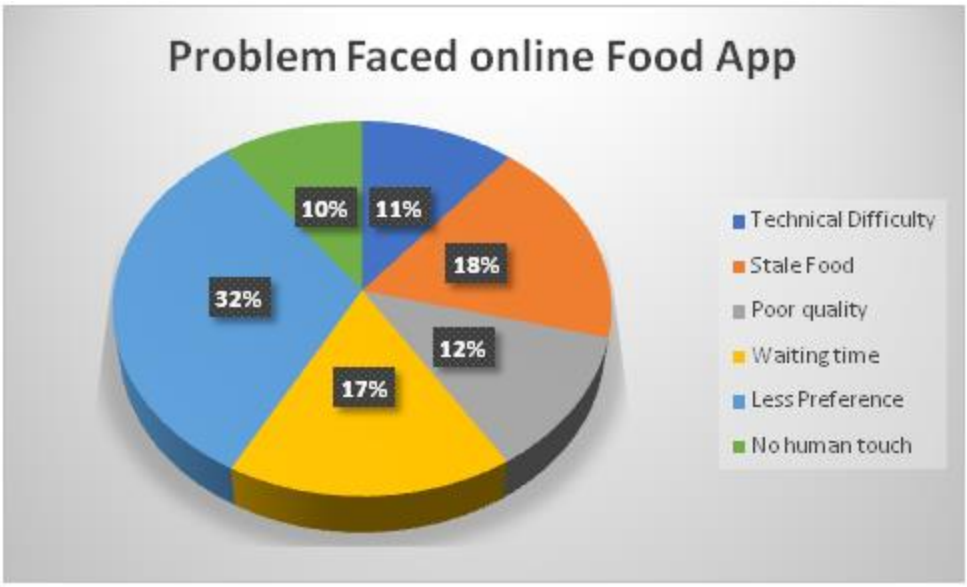


Problems faced on food delivery App

Technical Difficulty	11
Stale Food	18
Poor quality	12
Waiting time	17
Less Preference	32
No human touch	10
Total	100



DATA ANALYSIS AND HYPOTHESIS TESTING:

H_0: There is no significant relation between use of online food delivery app & gender.

H_1: There is significant relation between use of online food delivery app & gender.

Observed value

	Boys	**Girls**	**Total**
Always	9	11	20
Frequent	36	12	48
Rare	17	4	21
Never	3	8	11
Total	65	35	100

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Expected value

	Boys	Girls	Total
Always	13	7	20
Frequent	31.2	16.8	48
Rare	13.65	7.35	21
Never	7.15	3.85	11
Total	65	35	100

Calculated value

O	E	O-E	(O-E)^2	(O-E)^2/E
9	13	-4	16	1.777778
11	7	4	16	1.454545
36	31.2	4.8	23.04	0.64
12	16.8	-4.8	23.04	1.92
17	13.65	3.35	11.2225	0.660147
4	7.35	-3.35	11.2225	2.805625
3	7.15	-4.15	17.2225	5.740833
8	3.85	4.15	17.2225	2.152813
				17.15174

In above table O is observed value and E is expected value.

Degree of freedom 3 and 5% of significance level table value of chi-square is 7.185.

Calculated value is more than table value so we have enough evidence to reject null hypothesis and accept the alternate hypothesis.

H_0: There is no significant relation between reason for ordering food online & gender.

H_1: There is no significant relation between reason for ordering food online & gender.

Observed value

	Boys	Girls	Total
Convenience	11	7	18
Time saving	12	4	16
Variety	10	9	19
Ease in Payment	8	4	12
Discount	24	11	35
Total	65	35	100

Expected value:

	Boys	Girls	Total
Convenience	11.7	6.3	18
Time saving	10.4	5.6	16
Variety	12.35	6.65	19
Ease in Payment	7.8	4.2	12
Discount	22.75	12.25	35
Total	65	35	100

Calculated value:

O	E	O-E	O-E^2	O-E^2/E
11	11.7	-0.7	0.49	0.04188
7	6.3	0.7	0.49	0.077778
12	10.4	1.6	2.56	0.246154
4	5.6	-1.6	2.56	0.457143
10	12.35	-2.35	5.5225	0.447166
9	6.65	2.35	5.5225	0.830451

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8	7.8	0.2	0.04	0.005128
4	4.2	-0.2	0.04	0.009524
24	22.75	1.25	1.5625	0.068681
11	12.25	-1.25	1.5625	0.127551
Total				2.311456

For degree of freedom 4 and 5% of significance level table value of chi-square is 9.488.

Calculated value is less than table value hence we do not have sufficient evidence to reject null hypothesis.

CONCLUSION:

On the basis of above findings, it can be concluded that gender has no impact on reason for using food delivery app but gender wise difference is on frequency of use of online food delivery app. Majority of the respondents accepted that food delivery apps offer less preferences. Providing stale food is another problem which is reported by the respondents.

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RESEARCH OUTPUT ON "COVID-19" 2019-2021: A BIBLIOMETRIC ANALYSIS OF TOP FIVE JOURNALS

Shohar Bano
Research Scholar, Department of Library and Information Science, University of Kashmir, India, 190006

ABSTRACT:
Introduction: The world is fighting the ongoing battle with the lethal novel coronavirus. The importance of scientific publications for timely and authentic information to contain and prevent coronavirus is very important. Therefore, this study evaluates the research output on Covid-19 during a period of 2019-2021.

Methods: The search related to Covid-19 was carried out in Web of Science to find and identify documents published during the period of three years in the top 5 journals. The different bibliographical parameters were studied and evaluated in MS- Excel.

Results: A total of 8376 documents were retrieved from Web of Science. Total growth in the literature was observed with each passing year and the growing relevance of the topic appeared prominent. The majority of documents were published in the form of research articles than any other category. Also, a clear distinction in research output was observed between developed and developing countries. The majority of research was published and funded by countries like USA, UK, and Europe with English as the major communicating language.

Keywords: Covid-19, Bibliometric Analysis, Research Output, Research Trends

1. INTRODUCTION

The world has witnessed catastrophic events that have shaken and traumatized the lives of people living here and Covid-19 is one such devastating worldwide phenomenon that not only caused millions of deaths but deranged the entire social fabric of the whole wide world. The ongoing Covid-19 scenario will remain an active part of world history that cannot be left out. In December 2019, the Chinese authorities addressed the worldwide media that a highly infectious virus is spreading through their communities in the form of a severe acute respiratory syndrome (SARS) a type of coronavirus in one of the Chinese cities of Wuhan and reported their first case on 1st of December 2019. However, World Health Organization (WHO) named the disease COVID-19 on 11 of February 2020 following foundational guidelines of the Food and Agriculture Organization (FAO) and World Organization for Animal Health (OIE) **(WHO, n.d)**. Covid-19 is thought to have originated in bats, according to experts. The Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS) are both caused by coronaviruses. At one of Wuhan's open-air "wet markets," novel coronavirus made the leap from animals to humans **(WebMD, 2021)**. However, according to the Coronaviridae Study Group of the International Committee on Taxonomy of Viruses 2020, they named it formally as SARS-CoV-2 based on the phylogeny, taxonomy and established practices. This study considered the transmission of this virus from bats to humans. Due to its contagious nature, it was found that SARS-CoV-2 has active transmission among humans **(Huang et al., 2019)**. Some of the common symptoms found among the infected were fever, cough, and fatigue. However, other less common symptoms included sputum production, diarrhoea, headache and haemoptysis **(Huang et al., 2019)** among patients in Wuhan hospital. Before being established as a pandemic it was reported as an epidemic by The World Health Organization on January 31 2020, also reporting it as a public health emergency of international concern **(Bulut & Kato, 2020)**. Covid-19 evolved for four months since it first appeared in China, and quickly expanded to other nations across the world, posing a global danger **(Liu, Kuo, Shih, 2020)**. Later, on 11th March 2020 WHO declared covid-19 as a global pandemic when the cases increased threefold outside China and 118,000 cases in 114 countries with 4291 deaths **(WHO, 2020)**. The main source of infection are the small liquid droplets while an infected person sneezes, coughs speaks, and breathes which also contaminate other people at close distance **(WHO, 2019)**. The highly infectious and transmissible nature of SARS-CoV-2 resulted in its spread from Wuhan, China to 213 other countries globally **(WHO, 2020)** causing millions of deaths and causalities worldwide. This resulted in global lockdown from March 2020 and a standstill of all the daily activities during the first wave of covid-19. According to the economic group, Worldometer 434,968,392 cases happened worldwide including both active cases and deaths and by February 26, 2022, the total death count had reached 5,963,107 globally. The most common approach to contain the spread of this virus is social distancing and isolation of confirmed cases, and contact tracing and quarantine **(Lin, et al, 2020)**. The result of coronavirus pandemic has serious outcomes not only on health and wellbeing but also global economy and policies **(Maital and Barzani, 2020)**, for example, "On April 20th, 2020, the price of West Texas Intermediate crude oil slumped into negative for the first time in

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history, falling to negative 37.63 U.S. dollars per barrel"**(Statista, 2020)**. The slump due to coronavirus even exceeded all aspects of human life from education, closure of offline classes to transfer of education to online platforms. According to a study conducted by leading consulting and management firm McKinsey and Company among students from 1st to 6th grades across 40 states of America, it was found that by the end of the year 2020-2021 the online learning of students resulted from them being five months behind their regular curriculum in learning maths and four months in reading from their regular yearly curriculum **(Dorn, Hancock, Sarakatsannis & Viruleg, 2021)**. Compromised mental health has also been a matter of concern during this pandemic era. The most common mental health complications during the acute phase of coronavirus were widespread depression, anxiety and tension among individuals **(Sahu, 2020)**. A study by **UNICEF(2020)** reveled that coronavirus disrupted the mental health of people all around the globe particularly young people from age 13-29. Among the individuals, they surveyed 15% felt depression, and 27% reported anxiety during the first wave of Covid-19. The threat that novel coronavirus poses to the people and communities has subsided to a great level and people have accepted it as a "new normal". However, since the end of the first wave of Covid-19, almost three waves have struck the different parts of the world with different variants of this virus. This evolving nature of the virus has resulted in a major threat and challenge not only to people but to the scientists and experts that are constantly trying to control its spread. The world has seen five variants of Covid so far **(WHO,2022)** and big pharmacy giants created few vaccines to contain the virus, but the evolving nature of the Covid virus is still a larger threat and maintains a great level of uncertainty in future. Therefore, it cannot be concluded that there is *one solution that suits all* kinds of the vaccine till now.

Coronavirus has been a main focal point of investigation and study for researchers and experts from different fields' health and medical sciences, prevention through the formulation of vaccines, its effect on economic, financial policies, education, wellbeing and new ways of working and development. The body of literature is growing because this topic is reflected in the trends of all research and developmental fields. Therefore, to analyze the growth of coronavirus in different fields of study, it would be necessary and interesting to conduct a bibliometric analysis on this topic to identify and point of different trends. The main aim behind conducting bibliometric studies is to find out the growth of knowledge, flow of knowledge among individuals, countries, and disciplines by discovering different trends in research **(Kurtz & Bollin, 2011)**.

2. PURPOSE AND SIGNIFICANCE OF THE STUDY

Coronavirus/Covid-19 is a contagious viral disease that is currently the most researched topic worldwide. There is no dearth of literature on different types of viruses that are related to SARS and MERS associated coronaviruses. However, the onset of the new variant of coronavirus commonly known as Covid-19 in the year 2019 made it most studied topic among health practitioners and researchers because such symptoms, viral traits and human and societal impact of coronavirus were not documented in human history. The topic is still of relevance today due to its changing variants from time to time and new coronavirus needs to be studied more deeply to unlock its various factors that are still unknown to humans. Consequently, the literature base is increasing three-folds with each passing day. Therefore, conducting evaluations of the growth and rate of such research has always been important in the scholarly literature to discover different trends.

3. OBJECTIVES

The objectives of the study are:

1) To explore the annual publication trends of the top five journals

2) To determine the type of documents published in these journals

3) To specify the countries of the publications

4) To indicate the type of access of the publications

5) To identify contributing authors, funding agencies and research areas of the publications

4. METHODOLOGY

Claraviate Analytics Web of Science (WoS) database was consulted as the main source of data collection for the study. Web of Science is used for extensive and authentic coverage of scholarly literature and it is also used by many studies as the preferred source of bibliometric studies **(AlRyalat, Malkawi & Momani, 2019)**. "Covid-19" which is the common name of SARS-CoV-2, was used as the search term to run searchers in the WoS database. The search was conducted by limiting the search to title and topic. The search was further confined to three year period of 2019-2021. However, the search was further limited to the top five journals publishing Covid-19 research. These five journals included "*International Journal of Environmental Research and Public Health"*, *"PLOS ONE", "British Medical Journal", "Frontiers in Psychology"* and lastly

"Frontiers in Public Health". All of these filters and limitations yielded 8,376 results from WoS. After selection and identification of necessary bibliographical details, the results were downloaded and recorded in MS-Excel. Moreover, ORCID ID, Researchers id and google scholar author profile was used to differentiate authors with the same names.

5. FINDINGS

5.1 Yearly distribution of publications

A total of 8,376 publications were retrieved from the period of 2019 -2021 against the search term "Covid-19" in five top leading journals indexed by Web of Science. It is quite clear from Table 1, that the growth of literature on Covid-19 shows a steady increase from a total of 6, (0.17%) articles in 2019 to a rapid increase of 2828, (33.76%) in 2020. However, a growth spurt of publications can be seen in 2021 taking the research publication base to 5548(66.23%) across the top 5 journals publishing this research. Therefore, a growth of literature can be observed from the year 2020 to 2021, during which the different vast research was published on Covid-19 across different fields.

Table 1: Yearly distribution of publications

Year	Total number of Publications	Total percentage of publications
2019	6	0.17%
2020	2,828	33.76%
2021	5,548	66.23%
Total number	8,376	

5.2 Document Type

The majority of authors preferred to disseminate the findings of their research in the form of research articles accounting for 5788(61.93%) out of which 4 articles are data papers and 1 retracted publication in the total publication record. 1097(13.09%) are news items followed by 741(8.84%) editorial material, 387(4.62%) review articles, 258(3.08%) letters and 100(1.19%) corrections, as listed in Table 2. However, out of all the above documents types, 2(0.02%) are published as retractions, 1(0.01%) book review, 1(0.01%) expression of concern and 1 bibliographical item.

Table 2: Publication Type

Publication Type	Number of documents	Percentage
Research articles	5788	61.93%
News items	1097	1097%
Editorial material	741	8.84%
Review articles	387	4.62%
Letters	258	3.08%
Corrections	100	1.19%
Retractions	2	0.02%
Book review	1	0.01%
Expression of concern	1	0.01%

5.3 Country of Publications

A total of 151 countries published Covid-19 research in the top 5 journals from 2019 through 2021. The USA topped the list with 1487(17.7%) contributing publications followed by China 973(11.6%), England 941(11.2%), Italy 731(8.72%) and other countries respectively, Table 3. However, 19 countries could contribute only 1 article respectively to Covid-19 research.

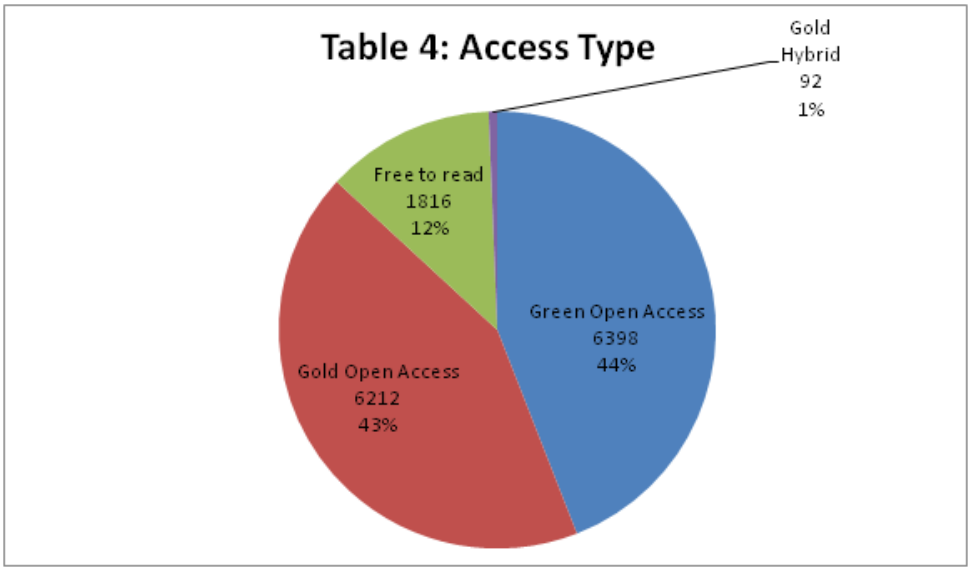
Table 3: Top 10 Publishing Countries

Rank	Country	Total number of Publications	Total %age of Publications
1	USA	1,487	17.7%
2	China	973	11.6%
3	England	941	11.2%
4	Italy	731	8.72%
5	Spain	530	6.32%
6	Germany	393	4.69%
7	Canada	350	4.17%

8	Australia	347	4.14%
9	Saudi Arabia	213	2.54%
10	Brazil	210	2.50%

5.4 Access Type

Out of the total of 8,376 documents, 6,398(44%) publications are available through is green open access followed by 6,212(43%) publications that are accessible through both green routes and gold open access. 1816 (12%) documents are available for free reading without any barrier to access. Moreover, 759 (9%) publications have been submitted by authors exclusively through green open access and 336(4%) publications are accepted in the green open access range of publications. Also, 92(1%) publications are available through the Gold-Hybrid route as shown in Table 4.



5.6 Authors, Funding agencies and Areas of Research

A total of 199 authors contributed to the coronavirus research. However, the top 5 contributors of Covid-19 research during the period of 2019-2021 is Mahase E/ Elisabeth Mahase with 266(2.69%) publications across the top 5 publishing journals followed by Gareth Iacobucci/ Iacobucci G 189(2.25%), Jacqui Wise/ Wise J and Owen Dyer/ Dyer O and Abi Rimmer/ Rimmer A have 99 (1.18%), 92 (1.09%) and 89(1.06%) publications respectively. Moreover, 193 authors contributed 50 or fewer articles respectively among them 29 contributed anonymously. 200 funding agencies funded Covid-19 research and investigation worldwide. Out of which most of the Covid-19 research is funded by the United States department of health human services with 226 funded researchers, followed by European Commission 219 research projects, National Natural Science Foundation of China Nsfc funded 217 authors, National Institute of Health Nih USA fully funded 209 and UK Research Innovation Ukri funded 115. These funding agencies are the top funders of Covid-19 research. The research area of Covid-19 publications published in the top five journals covers different aspects of coronavirus research ranging from “public environmental and occupational health” with 4282 publications in this research area to “environmental science ecology” 3079 publications. "Science technology other topics" 2479, “general internal medicine” 2115 and lastly by “psychology” with 1318 publications are also covered in this research.

6. DISCUSSION

It is evident from the bibliometric analysis of top 5 journals indexed in Web of Science publishing Covid-19 research during 2019-2021, that there is an increasing growth of research and literature with increasing time, this statement can be attributed to the fact that the topic of Covid-19 and coronavirus is still very much trending. These different trends are led by studies that have been done and areas still undergoing study the medical, societal, economic, educational, and psychological and many other aspects of novel coronavirus. Additionally the rise of different variants of coronavirus with the passing time in engaging experts particularly in health and medical sectors to study it more intensely to contain it.

The findings highlight that authors preferred to publish the findings of their research in the form of research articles (61.93%) as compared to news items and other document types as proven by various studies like **(Gul et al, 2015)**. These findings can be attributed to the fact that scholarly research articles have wider dissemination and readability as compared to other forms of scholarly communications. However, the number of corrections also point out the rectification in published works displaying improvement. Also, the majority of

research was carried out by developed nations like the USA, England, and Italy points out the advancements in this field as compared to the majority of developing nations or third world countries that managed to contribute comparatively less number of articles **(Shamsi et al, 2020)**. However, on eastern side China proved to be the second largest contributor of publications on Covid-19. India contributed a total of 170 publications to the Covid-19 crisis in a period of three years. The accessibility of the research publications is a major setback among nations particularly developing countries due to lack of funds and the top authors contributing to this research also belonged to western nations. Out of 8,376 publications about 6398 (44%) authors preferred to publish their works through the green route of open access thus providing an opportunity to all of the nations worldwide to access their important research findings. Also, majority of big publishing houses made their research on Covid-19 freely accessible and free to read during those tumultuous times. A bulk of the Covid-19 research is also funded by developed nations like the USA, Europe and UK surpassing developing countries. Interestingly, the majority of the authors publishing research on Covid have chosen their interests in areas like public health and environmental health, science technology, environmental ecology followed by internal medicine and psychology with English as the major language of communication.

7. CONCLUSION

The observed growth of literature on Covid-19 is witness to the fact that the researchers and experts are already working and going to retain their interest in this field. The changing and evolving nature of coronavirus already makes it an active area of expert and scholarly observation promising the explosion of research endeavors and publications. Moreover, the era of the pandemic is not ending till now. There is a looming threat of future such viruses, their origin, communication and spread making it a field of study and analysis by authors, countries and funding. This will lead to research evaluation and discovery of new trends in the flow of coronavirus research.

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AN ANALYTICAL STUDY ON AVAILABILITY AND USAGE OF INFORMATION RESOURCES BY UNDERGRADUATE STUDENTS AT UNIVERSITY OF NIGERIA NSUKKA, NNAMDI AZIKIWE LIBRARY

[1]Muhammad Tukur Lawal and [2]Dr. Lawal Iro Sani
[1]Department of Library and Information Science SRM University, Sonepat, Haryana, India
[2]Department of Library and Information Science, Umaru Musa 'Yar'adua University, Katsina

ABSTRACT
The main objective of the study is to analyze the Availability and Usage of Information Resources by Undergraduate Students at University of Nigeria Nsukka, Nnamdi Azikiwe Library in Nigeria in order to identify the types of available information resources, and, the level of usage, of information resources, questionnaires were administered to users. The researcher took 0.4 % of the entire respondent population= 36000= 150., so one hundred and fifty (150) copies of the questionnaires were given to the respondents. one hundred and twenty five(125) copies were retrieved and analyzed, representing 83.33 %. The findings show that in the Nnamdi Azikiwe Library, the existing information tools available, accessible and used by undergraduate students. Even though. User-confronted constraints include internet access, power failure, employee attitudes, current information resources, particularly e-journals e-books databases, e-journals e-books, as there was not much available based on their information needs. There was no access to adequate information resources for users because of the insufficient number of library employees. The study recommended the enhancement of existing information tools and user information needs such as, offline database subscriptions, HINARI, AJOL, JSTORE and E-Granary to access information offline, with millions of textbook and journal information resources accessible and added every second. Insufficient numbers of library workers were present, which meant that information resources were not adequately arranged and readily accessible. The jobs of LIS professionals will help users access and use information tools, repackage and disseminate information to them. These findings suggest the need to formalize and improve relations between users and library staff in order to increase access to information

Keywords:, Information resources, Digital information, Knowledge and research, University library, Utilization, users

INTRODUCTION
The aim of the establishment University Library is to provide adequate information resources and retain the highest standard of excellence as research oriented institutions. It is also meant to enhance academic inquiry and educate users on certain strategies of retrieving relevant data for their educational pursuits Lee and Soohyung. [1] The aims and objectives are to make available a global base of electronic/digital information worldwide based on the mission and vision of the institutions for learning, research and teaching, as observed by Ajay and Satyanarayan. [2].

The rationale behind this study is to Analyze on the Availability and Usage of Information Resources by Undergraduate Students at University of Nigeria Nsukka, Nnamdi Azikiwe Library with a view to taking into consideration the benefits to users. and identify the gap that might exist between the user's expectations and the provision of Knowledge tools, and programs that are currently offered by the University Library

LITERATURE REVIEW
We live in a digital world today in multidisciplinary subjects, especially in the field of agriculture, tremendous growth and diversification of knowledge has emerged; information has been identified as one of the essential resources required for success in nearly every major human endeavour. The compilation, arrangement and distribution of eonomic and Productive knowledge dampened the librarian's skills and expertise. In all aspects of society and in all

Types of Information Resources, Services Available In University Library
In education, science, learning and community services, the accessibility of information resources plays a major role. The third law of Library said that "every book its reader". Knowledge resources must be given for successful teaching, study and leaning, undergraduate students must have access to different types of information resources, in their areas of specialization. This will not only expand their knowledge base but also prepare them ahead of the constraints they will face in the process of learning, study

Consequently, the study carried out by Vijayakumar[3] opined that majority of the respondents said that newspapers, project reports, subject books, CD-ROM database and reference books are available and thesis,

general books and web resources are less available. His views were corroborated by Kwaghgba and et-al [4], Onye [5], Yaseen and et-al [6] Ajiji [7] Aladeniyi and Temitope [8] and Das Parnab [9] while Abubakar [10]. It stressed the e-databases subscribed to research by agricultural scientists in federal University libraries in Nigeria such as AGORA and African Journals, others include CD-ROM, MEDLINE, PubMed, Biomed Central, Online and HINARI, CAB Abstracts, BEAST CD, VET CD, and TEEAL. This finding is agreed upon by Bello and Chioma[11] an evaluation of the extent of ICT deployment in academic libraries in Oyo State, Nigeria, on the globalization of library and information services, where they confirmed the availability of E-Granary, EBSCOHOST, JSTOR, Jaypee Digital, HINARI, AGORA and OARE with the Directory of Open Access Journals (DOAJ) and partial Institutional Repository (IR).These views were agreed upon by Rukwaro[12] Ekene and et-al [13] They claimed that libraries receive information materials such as books, theses, papers, magazines, encyclopedias, dictionaries, e-journals e-books, etc. But Akpe and et-al [14] has a different opinion where he stated that information resources are not sufficient. This indicates that the views of respondents on their responses to the types of information requirements in the Library are not too different from each other. The study conducted by Afianmagbon and et-al [15]Availability of information resources as factors that influence research productivity of academic staff at Lead City University, Nigeria, on information literacy skills, indicates high level information resources availability to lecturers and other academic staff in Lead City University who are utilizing them in conducting researches. However, Abubakar [16] a case study of pharmaceutical science students from the University of Jos investigated the availability and accessibility of information resources in university libraries for academic use by students and revealed that books are some of the library's information resources. Journal, web libraries and internet, e-books, computers, e-journals, encyclopedia index, handbooks, newspaper and magazines are other information resources that were strongly suggested by respondents, some of the data resources were shown poor, as revealed by respondents, while more than half of the respondents recognized them. They are: audio-visual conference proceedings and abstracts and indexes for monographs and regular CD-ROM databases. However, Kutu and Olabode [17] has a different view in his study on the availability of information resources in libraries, as he stated that the most available print information resources were newspapers, textbooks and journal collections while the least available included indexes, technical reports and manuscripts. This view was corroborated by Ilogho and et-al [18] Swaminathan and et-al [19] and Babarinde and Festus [20] Interms of accessibility, scholars have divergent views on accessing information resources. However, according to Jabbar et-al[21] Study Accessibility and Use of Research Scholars' Institutional Repository: A Case of the COMSATS Institute of Information Technology, Lahore, they stated that users accessed Information Resources out of campus while other respondents accessed Information Resources within campus and some did so through IP and very few used other mode of access. This study is similar to that of Jan and Reman[22] the University Students of Pakistan: A Quantitative Study of Khushal Khan Khattak University of Karak-Pakistan on Internet Usability and Accessibility, they found out that majority of the students of the Khushal Khan Khattak University Karakwas accessing the Internet at their homes, hostels and the University Library. Interestingly, others were accessing the Internet at classrooms and Computers. However, Olubiyo and Yemi [23] have different view on their study On Knowledge, Accessibility and Use of Serial Publications among Adeyemi College of Education Undergraduate Students, Ondo Library, they stated that students access serial materials by asking staff, following directional signs, browsing racks and shelves and searching periodical catalogue in that order.

1 The Use of Information Resources in University Library

In the same vein Oyewumi and et-al [24] a research on Information Communication Technology (ICT) and its effect on the use of newspapers in University Libraries in Nigeria were conducted. The outcome clearly shows that most respondents used scholarly journals twice a month and on a monthly basis and used them deliberately for self-examination, learning more about a subject, assignment and coursework. The research also indicates that the participants can readily access academic journals. Most of them suggested that academic journals helped educate and guide them on how to conduct research and perform quality research. The finding was agreed upon by Aba and et-al [25] Oriogu and et-al[26] A comparable view was that of the study carried out by students of the Federal University of Technology, Owerri, on the availability, accessibility and usage of library information services (FUTO).The study reveals that World Wide Web (WWW), e-mail services, e-journal, e-books, e-database and DVD/CD ROMS, textbooks and internet are the resources that students mainly utilize. They often use tools for electronic content, such as databases, electronic journals, and electronic books. cybercafés, reports, handbooks seminar/conference maps/atlas, frequently, while CeRA Journals Indiastat, CABI abstract horticulture online database, Agricultural Economics database EBSCO resource J-Gate Plus Fortnightly, FAO and Agricola Agricat were utilized moderately to prepare for examination, browsing the web, up-dating knowledge, in-depth research work, up-dating and correspondence lecture notes. The majority of respondents decided to use the information tools to acquire general information and for analysis, assignment

and study purposes. The discoveries were supported by Owolabi and et-al [27] Kumar [28] Akpe and et-al[29] Aladeniyi and Temitope [30] and also Salubi and et-al[31] while Madondo and et-al[32] and Madu and et-al[33] In their research on the use of electronic information services by undergraduate students at the Faculty of Management and Administration at the University of Africa, Mutare, Zimbabwe and on the availability and use of ICT for information retrieval by undergraduate students at the Ramat Library, University of Maiduguri, respectively, they have contrary views. They asserted that undergraduate students at Africa University typically use electronic information services inadequately the results revealed the low level of computer usage in the library for the retrieval of information. CD ROM use was very poor and there was a low degree of internet use. Most respondents also did not use e-mail in the Library for information retrieval.

In addition, the above studies show beyond reasonable doubt that the respondents used knowledge services with serious disagreement that there is a low level of resource utilization in some African countries including Nigeria. But the degree of consumption is very high in developing countries like India. However, it is of great concern to access and use agricultural information, tools, services and facilities in the Agriculture University Libraries in Nigeria. But since then, what has happened? Any of the barriers may be discovered through current research.

Statement of the Problem

STATEMENT OF THE PROBLEM

Analysis provides University Library with the opportunity to evaluate how well they contribute to the achievement of their parent organizations' objectives, identify issues in the areas of information resources, monitor progress towards specifications, compare past, present and desired levels of the future and identify areas where improvement is, what the libraries have or do not, what they do, how well they do it and what they need to accomplish with evidence that the expectations of the parent body are being met. In this aspect, one of the ways for **Nnamdi Azikiwe Library** to make their contributions to the University and the clienteles is by analyzing the information resources. It has become critical to identify the gap in the provision of information resources, in order to demonstrate that it is worth doing the tasks they are involved in and the resulting cost they incur

Research Objectives

To analyze the types of information resources available in the **Nnamdi Azikiwe Library**, UNN

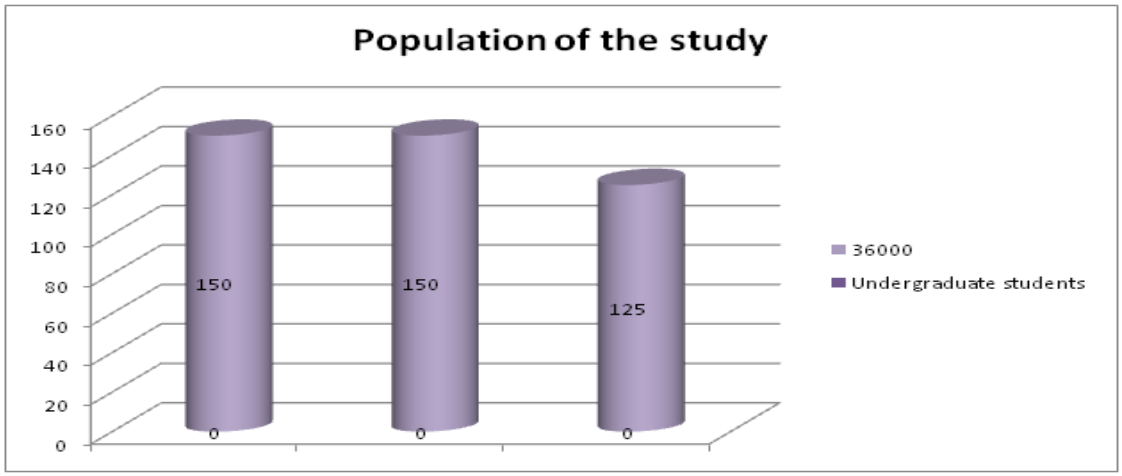
3. To assess the degree to which **Nnamdi Azikiwe Library** use information resources,

Population of the study

The population of the study consist all the undergraduate students in Nnamdi Azikiwe Library University Nigeria Nsukka

University	Undergraduate students	Sample	No. of quest adm	No. of ques retrieved	%
UNN	36000	150	150	125	83.33%

Figure 1



Since the study is a mini project to An Analyze on the Availability and Usage of Information Resources by Undergraduate Students at University of Nigeria Nsukka, Nnamdi Azikiwe Library., the sample of 150 means

around 0.4% is justifiable. However, 150 questionnaire were distributed at last only 1725 (83.33%questionnaires were returned with complete response

Data analysis

Table Availability of information resources

. Information Resources and the Furniture Available in Agriculture University Libraries

In this research, information resources available in the Library are major variables. Their inclusion is quite significant. It allows the researcher to classify the resources of information available in the library supplied by the library of each respondent in the university under review. The respondents were asked to indicate the information resources in the library to assess the available information resources in the library under review. Their answers are presented below in Table 2.

Table 2 . Information resources available in the Library

Information resources										
UNN	Undergraduates									
Library resources and services	Excellent		Good		Average		Poor		Very Poor	
frequency/%	F	%	F	%	F	%	F	%	F	%
Adequate no of text books	11	44.00	3	12.00	6	24.00	3	12.00	2	8.00
Adequate no of reference materials	4	16.00	9	36.00	9	36.00	1	4.00	1	4.00
Adequate no of journals	3	12.00	10	40.00	8	32.00	0	0.00	2	8.00
Adequate no of e-books	4	16.00	6	24.00	8	32.00	4	16.00	2	8.00
Adequate no of online journals/databases	7	28.00	2	8.00	9	36.00	4	16.00	2	8.00

In order to decide the type of information resources available in the studied University Library, respondents were provided with lists of potential library information resources to tick as many as possible. As indicated by the respondents, Table 2 above shows the type of available information tools. The study shows that the available information resources are dominated by journals, textbooks, thesis/dissertations/projects, newspapers, conference proceedings & technical reports, e-books, and e-thesis/dissertations/projects

Table 3 usage of information resources by undergraduates' students

Very high		High		Medium		Low		Very low	
F	%	F	%	F	%	F	%	F	%
17	68.00	6	24.00	0	0.00	0	0.00	1	4.00
16	64.00	4	16.00	4	16.00	0	0.00	1	4.00
13	52.00	5	20.00	3	12.00	0	0.00	3	12.00
15	60.00	3	12.00	5	20.00	0	0.00	1	4.00
14	56.00	3	12.00	3	12.00	0	0.00	4	16.00
15	60.00	6	24.00	0	0.00	1	4.00	3	12.00
14	56.00	8	32.00	1	4.00	1	4.00	1	4.00
12	48.00	8	32.00	2	8.00	1	4.00	1	4.00
12	48.00	5	20.00	4	16.00	0	0.00	4	16.00
15	60.00	2	8.00	4	16.00	1	4.00	2	8.00
18	72.00	2	8.00	3	12.00	1	4.00	1	4.00
15	60.00	4	16.00	5	20.00	0	0.00	1	4.00
10	40.00	7	28.00	5	20.00	1	4.00	1	4.00
13	52.00	4	16.00	4	16.00	2	8.00	2	8.00
10	40.00	8	32.00	2	8.00	1	4.00	3	12.00
10	40.00	8	32.00	1	4.00	2	8.00	3	12.00
10	40.00	10	40.00	3	12.00	0	0.00	2	8.00
10	40.00	10	40.00	1	4.00	3	12.00	1	4.00

In order to determine the extent of the use of the information sources studied in the Nnamdi Azikiwe Library UNNU, a list of information sources was provided to the respondents to rank according to priority status. Table 3 above shows the information Sources rank as per priority. Majority ranked books, journals, e-books and e-journals much higher. Government publications, atlases, maps and posters, for instance, are the type of library information resources ranked very lower

CONCLUSION

The library's success depends on its its ability to reduce the gap between supply and demand for information resources The Library is a growing organism." In terms of information resources, it should therefore expand. In addition, consumers need knowledge in the academic setting to carry out their, , study and academic pursuits. The library attached to university must be satisfied with this knowledge. Any academic library's primary purpose is to bridge the connectivity gap between the population of the user and the vast universe of information resources' and serve as an interface between them to ensure that whatever information they need is made accessible as and when necessary. This study analyzes the degree to which the Nnamdi Azikiwe Library UNN is supplied with unique information resources. The study also found that in the scholarly pursuits of undergraduate students, both printed and electronic information play important roles.

RECOMMENDATIONS FOR THE PROVISIONS OF INFORMATION RESOURCES IN HIGH DEMAND FROM USERS (FUTURE)

1. Provision of facilities which are in high demand amongst users based on their needs of different types, textbooks, journals, offline databases, e.g. e-Granary and other resources are to be procured by the library.

2. With the advent of networking, internet and the information explosion, contemporary students have access to these newfangled technologies. Therefore most of them are likely to access the library's information resources online instead of patronizing the library. If provisions are made in the library to capture the information resource usage of these users, who access the Library through computer networks, greater insights about the level of utilization could be gained. Library staffs also require in-house training programmes on how to use these new technologies and information retrieval techniques so that they can give valuable inputs to library users. Findings reveal that the users hardly approach the library staff for any assistance. One reason is that the library staffs are not well trained to assist them. Secondly, the staffs are not conversant with all the resources available in the library. Thirdly, they are not skilled enough to guide the users to use various information resources, especially e-resources. Fourthly, there is lack of communication skills to share their knowledge with the users. At any rate, the ultimate users are the library staff and students. The library staff would be upset with the security at risk if the existing information resources are not maximally utilized and the users would regret that they could not get in time the information needed for their teaching, learning and research.

3. It is thus essential to train the library staff on all these aspects to improve their relationship and skills. Efforts should also be made to create a comprehensive a Frequently Asked Questions (FAQs) module about the availability, location and ways and means of using these facilities, which would prove absolutely useful to the end user.

4. It is necessary to subscribe to various digital knowledge resources and e-databases, so that users have access to the various types of information resources necessary for their academic and research work. With the advent of the internet and information technology, the various services you need in the library have become almost difficult to procure physically, and if the library could subscribe to various online and offline databases, the user could access whatever information they need in the library.

5. The Nnamdi Azikiwe Library UNN should introduce other means of utilizing information resources online, such as library telegram group, video conferences during the lockdown n case of pandemics like Corona virus to enable library to reach out to users to share knowledge and make use of the online resources effectively.

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AUGMENTATION OF DECISION TREE CHARACTERISTICS FOR AGRI-FOOD SUPPLY CHAIN USING INTERNET OF THINGS

S. Balamurugan[1], Dr. P. Aurchana[2], Dr. E. Gurumoorthi[3] and I. Govindharaj[4]
[1]Assistant Professor, School of Computers, Madanapalle Institute of Technology & Science
[2]Assistant Professor, Department of CSE, Malla Reddy University
[3]Assistant Professor, Department of CSE, St. Peter's Engineering College
[4]Assistant Professor, Department of CSE, CK College of Engineering College and Technology

ABSTRACT
We propose effective Agri Supply Chain Management tracking strategies using the Internet of Things and find a resolution to visualize data to live with current economic conditions and improvements to meet consumer needs reliably in terms of value, quality and prices. The biggest challenge is to focus on the exact current limits to prevent Agri food allergies from reaching unsafe levels and to update customers about safety procedures. The proposed tree classification algorithm is for Agri food tracking, with the aim of making accurate predictions and providing additional time data. The Internet of Things is used to track and monitor Agri food quality and to verify data collected from producers and customers. According to the research results, the proposed algorithm has a high level of accuracy, a short processing time, and a low error rate.

Keywords- Agri-food supply chain, Traceability, Food safety, Internet of Things, Classification Tree characteristics

1. INTRODUCTION
Over the past decade, food has become a major problem worldwide, especially in China, as it is a major source of energy for human civilization [1]. For various reasons, its quality and safety have been a major concern. For example, the 2008 Sanlu melamine milk powder debacle rocked mankind because of the devastating effects it had on thousands of children, many of whom died [2]. Another shocking incident took place in 2011 when it was discovered that the animal protein of the Shuanghui assembly, China's largest meat retailer, included a chemical called Clenbuterol hydrochloride, which is illegal to inject into Chinese foods. [3] [4].

People want a food tracking system that can monitor a complete food cycle, which includes the production, processing, transport, storage, and marketing of food [5], all of which contain many unreliable concerns. Additional research has been conducted worldwide to assist food users in identifying food quality and safety concerns as a result of advances in global technologies such as Internet of Things (IoT) [6]. The Internet of Things (IoT) is a concept that connects everything in real time, and is expected to have a significant impact on the value of our human lives in the future. [7].

IoT technology should be able to raise potential FSC tracking, tracking, and management solutions. By monitoring the product content of each product throughout its life cycle and providing useful information to make it easier and more secure, the Internet of Things will play a role in solving food quality and safety issues [8].

Sensors have the potential to increase IoT anxiety and other factors [9]. The natural conditions of the food

tracking system are tested using less expensive sensors and methods based on less expensive backgrounds and faster system connections. Figure 1 shows the use of IoT in recent years. The Internet of Things is connected every day. Transport Systems, Agriculture, Energy Efficiency, Security and Privacy, Asset Management, Embedded Systems, Industrial Systems [10], Pervasive Computing, Smart Home [11], and Health Care Applications [12] have all seen an increase in communication. Agri-food chain traceability has been used to ensure the quality of food in various locations around the world.

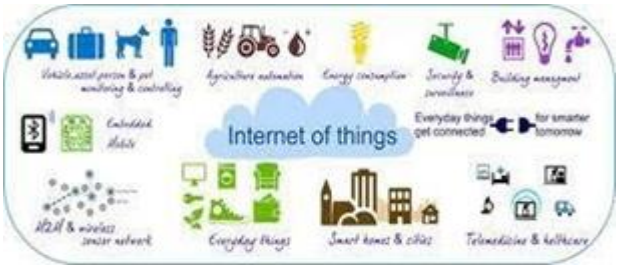

Fig.1 IoT applications

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The Internet of Things will be reviewed and distributed to provide access to reliable, accessible, and trouble-free information for data analysis and troubleshooting. [13]. Social safety and long-term growth, adherence is essential [14]. A basic indicator of food-related management is the functioning of a complete supply chain. Any problems that arise in producing food safety can be quickly identified with effective management [15].

The whole paper is organized as follows: Section 2 shows Related Activities, Section 3 shows the proposed activity, Section 5 presents the performance appraisal, and Section 6 presents the end of the article.

2. LITERATURE RESEARCH

Internet of Things (IoT) is a project that aims to connect everything at all times and in all places, with the aim of greatly enhancing the importance of human existence in the future. According to European society [16], "objects have basic characteristics and behaviors that work in intelligent settings using intelligent barriers to communicate and communicate in social, environmental, and user contexts." IoT technology should be able to detect and resolve tracking, monitoring, and management concerns in the FSC. IoT solutions have been used in the supply chain for some years to improve the quality and protection of medicines [17].

Demonstrating a detailed analysis of the classification tree category in clinical speech data, using a unique approach [18]. The intricate design of smart devices focuses on tree division, which is used to analyze the data provided by smart devices. This proves the importance of big data in the development of smart media applications. The results of the classifier and its ability to apply data mining techniques. Due to an increase in memory capacity and faster performance levels, performance in ID3 and C4.5 archives has been improved. ANN and DLANN show very high accuracy at the end of the process by modeling high-quality data extraction, but it is statistically expensive [19].

Difficulties and methods of comparative study of the three categories were discussed. As a comparison, various data sets from UCL data sets are used in this study. The C4.5 algorithm improved performance in all site-tested situations [20]. The filter adds a new important feature to each event that reflects the selections made by a limited classification algorithm [21]. Whether the classification method is constructed from a set of initial acquisitions or comparisons is a model file that has been progressively classified. Statistically, a filter is a subset of a well-organized set [22]. CART is a type of isolation used to translate test data from collected information. C4.5 is a possible modeling method, and data mining is a deep process of knowledge [23]. The purpose of this method is to determine how many sets of specific data set parameters.

Food tracking has been used in various situations around the world to ensure food quality. The concept of blockchain has been used to ensure the adherence of the Agri-Agri-food chain. Tracking barriers are classified using independent management [24]. Design lines are drawn. Conservation of natural resources and management of the Agri-Agri-food chain have contributed to the conservation of the environment. Food chain networks will keep things safe while also helping to protect the environment. The Internet of Things was used to improve the mathematical model [25]. In order to maintain customer trust, an agri-food chain can be traced.

3. PROPOSED WORK

Depending on the popularity of food retailers and retailers, agricultural food security may be introduced to the market in a variety of ways. The store can make huge profits by buying counterfeit food from unregistered retailers at a lower price. The strait distribution of food, as shown in Figure 2, can provide the basis for counterfeit food, advertising, or commercialization. The counterfeit food industry is growing at the expense of consumer health, and the current situation makes it impossible to monitor this crooked food market. Temperature, humidity, soil pH, soil nutrition, water level, and other variables are all monitored by telephones and computers, allowing farmers to keep an eye on their fields, crops and infrastructure.

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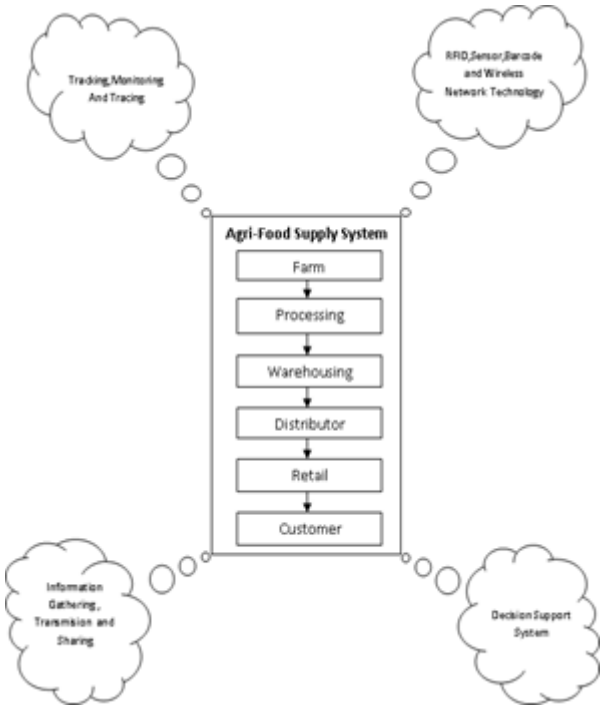

Fig.2: The framework of food traceability system

Figure 3 shows a typical Agri-food chain flow diagram, linked to food management tracking. The complete Agri-food chain is divided into five parts, as shown in Fig.2. Farming, processing, storage, distribution, and marketing are all examples of businesses. Take, for example, the production of agricultural farms. First and foremost, the planting area, including the quality of the soil, water, and air, should be measured at the producer's contact. Then, in order to ensure the security of ascending and related monitoring data, all practical methods must be used.

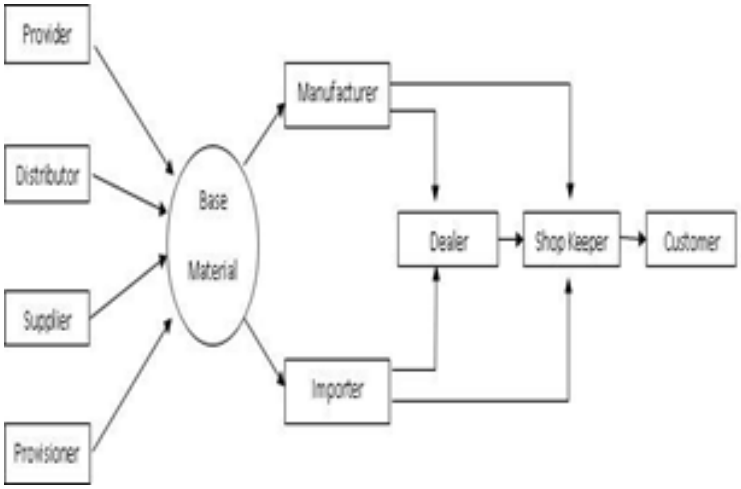

Fig.3: Flow diagram for the Agri-food chain

Our goal with the IoT in the Agri-food series is to establish partnerships between supply chain participants and methods, customize goods and services, view product distribution everywhere, get complete information at the supply chain process, and benefit. accuracy to meet the integrated supply chain challenge. RFID, sensor, barcode, and wireless sensor network can all undermine IoT fears and various other problems. Sensors and food safety systems are used to calculate natural conditions in food tracking, based on an effective approach and rapid contact with the environment.

When data is delivered to a network, only data is displayed in the specified format. An improved way to minimize network error tracking and ensure harvest date and location. The proposed strategy aims to close the gap between food tracking for customers and manufacturers. As shown in Fig. 4, WASPMOTE sensor and ZigBee network module located at the heart of the tracking system. This sensor, mounted on a tracking vehicle, combines temperature, humidity, and temperature sensors.

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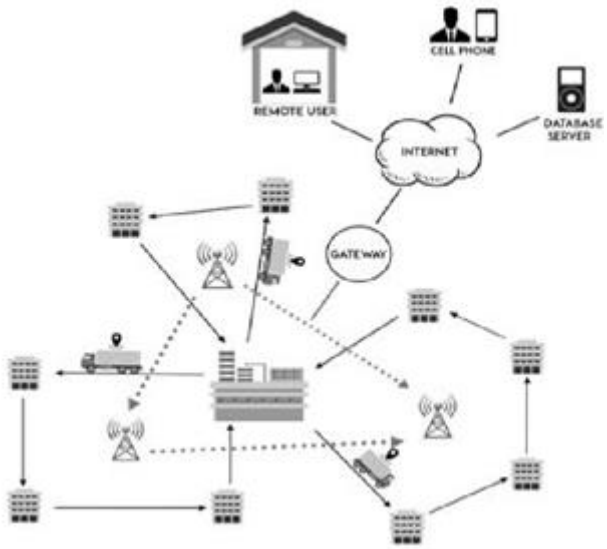

Fig. 4 Architecture for food based IoT

In fact, making timely decisions is important when it comes to food safety issues. If the cause of the illness is not found within an hour, most people will be put at risk. We cannot participate in every piece of food, whether there are problems or not, from physical and chemical testing sensors everywhere in the series, as that could lead to significant financial losses for food companies. As a result, you only taste food with fragmentary slices on the market. Then, using this small sample of products, we manipulate the data to get a comprehensive depiction of the pollution conditions across the network, including the contaminated area and any additional food needed.

In the training data collection, the parameters associated with each record provide information advantage. The Category Separator renders a attribute that provides the maximum value of information and separates a set of features by this attribute field. This function is used to build multiple small groups in a repetitive manner. Finally, a tree-like structure following the structure sequence was built to force the separation of the training set. Separation requirements are required for the proposed node breaches in tree structure.

Entropy is specified as

Entropy (t) = -∑ p (i/t) log2p (i/t) **(1)**

The Gini Index is the variance between the distribution opportunities of the Agri food chain, where food quote prices deviate from those of impurities, and are defined as:

Gini Index = 1-∑ [p (i/t)] 2 **(2)**

As the impurity quantifies, information gain is a variable based on impurity that uses entropy computations. It refers to the distinction between producer and consumer entropy.

Info Gain = Entropy (manufacturer)-entropy (consumer) **(3)**

When the target food attribute domain is relatively broad, the Gini Index will have issues with food safety. Differential requirements known as towing criteria may be used in this case. This need is described as follows:

Towing Criteria (t) = PLPR(Σ (|p (i/tL)-p (i/tR)|)) **(4)**

This study proposes the Classification tree classifier, a hierarchical approach that allows determined sets of an entity to be merged with additional unique ones. Despite the fact that this property was not permitted in the IoT data logic region, we produced it in order to increase the product's quality.

Algorithm to generate Classification Tree algorthim

Input:

a. Data Partition, DP, set of configuration tuples and their connected class labels

b. quality_list, set of applicant attributes

c. quality_choosing_procedure, a method for determining the principle of dividing copies of data into

business classes. This rating contains custom_division and subdivision or subset.

Output: Classification Tree
Method:

1. Produce a node N1
2. if tuples in DP are all of the similar class, Cl, then
3. return N as a leaf node categorized with the class Cl
4. if quality_list is empty, then
5. return N1 as a leaf node labelled with the mainstream class in DP
6. apply quality_choosing_procedure (DP, quality_list) to discover the most excellent dividing_principle
7. label node N with dividing_measure
8. if dividing_principle is discrete-valued and more number of way divides approved then
9. quality_listquality_list-dividing_principle
10. For each result j of dividing_principle Let DPj be the set of data tuples in DP gratifying result j if DPi is empty then connect a leaf considered with mainstream class in DP to node N1 else, connect the node revisited by produce Classification tree (DPj, quality_list) to node N1
11. Return N1

Output: A tree of post-pruned Classifications.

4. AGRI-FOOD QUALITY MONITORING SYSTEM

The ampule is connected to the microchip, and temperature and humidity sensors are taken into account, regardless of whether an automated Agri-food series information system is developed. The most important use of the proposed study is to construct the auxiliary sensors shown in Fig.4 and the problems of the connected devices. The whole system is easy to use thanks to FQMS and Cloud computing applications connected to the LDR, MQ3, and DHT11 sensors.

Figure 5 shows the IoT System based on Arduino UNO and includes sensors such as DHT-11 temperature and humidity monitoring, MQ3 alcohol detection levels, and LDR light exposure measurement. The ESP8266 Wi-Fi Modem is connected to the Internet via a Wi-Fi router via Arduino. Thingspeak is an Internet of Things (IoT) platform for entering and monitoring sensory data. The natural ingredients that affect food can now be tracked anywhere, anytime, and on any device thanks to the Internet of Things.

The security system detects network connections by identifying significant sensor size barriers. To monitor the system, IoT data is used to monitor food supplies. To ensure that the goods are flawless, the image of food tracking control is updated in real time.

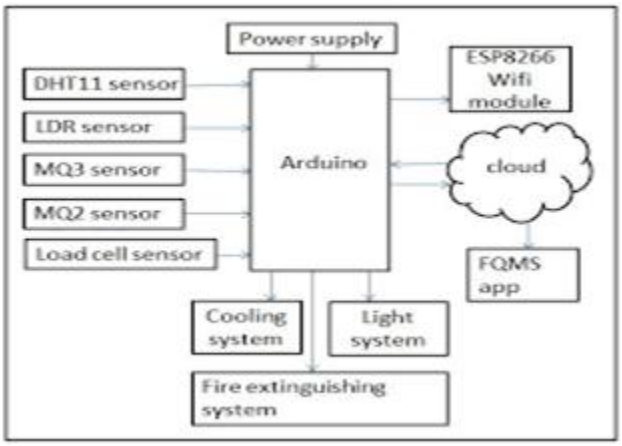

Fig. 5 Agri-Food quality monitoring process using IoT

5. PERFORMANCE EVALUATION

In this section, we discuss research statements and investigations in order to reach a conclusion. The purpose is to use physicochemical research to model the quality of wine. This can be used after a professional.

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Performance rating is based on Wine Quality Database [26]. The training data set includes a flexible selection limit and verification process, and the proposed model is suitable using a separator. It is used to give a high quality result. It has 1599 cases, is divided into two parts: 1071 train and 528 tests, and covers the following 12 features:

Table 1: Simulation parameters

Simulation parameter	Meaning
Software	Google Co laboratory
Output	Classification Tree Classifier
Libraries	Pandas, Numpy, Matplotlab and Sklearn
Data Set Characteristics:	Multivariate
Attribute Characteristics:	Real
Associated Tasks:	Classification
Number of Instances:	1599
Number of Attributes:	12
Missing Values?	N/A
Area:	Business

fixed acidity {Real}, volatile acidity {Real}, citric acid

{Real}, residual sugar {Real}, chlorides {Real}, free sulfur dioxide {Real}, total sulfur dioxide {Real}, density

{Real} }, pH {Real}, sulfur {Original}, alcohol {Real}, Output variation (based on sensory data), quality (score between 0 and 10)

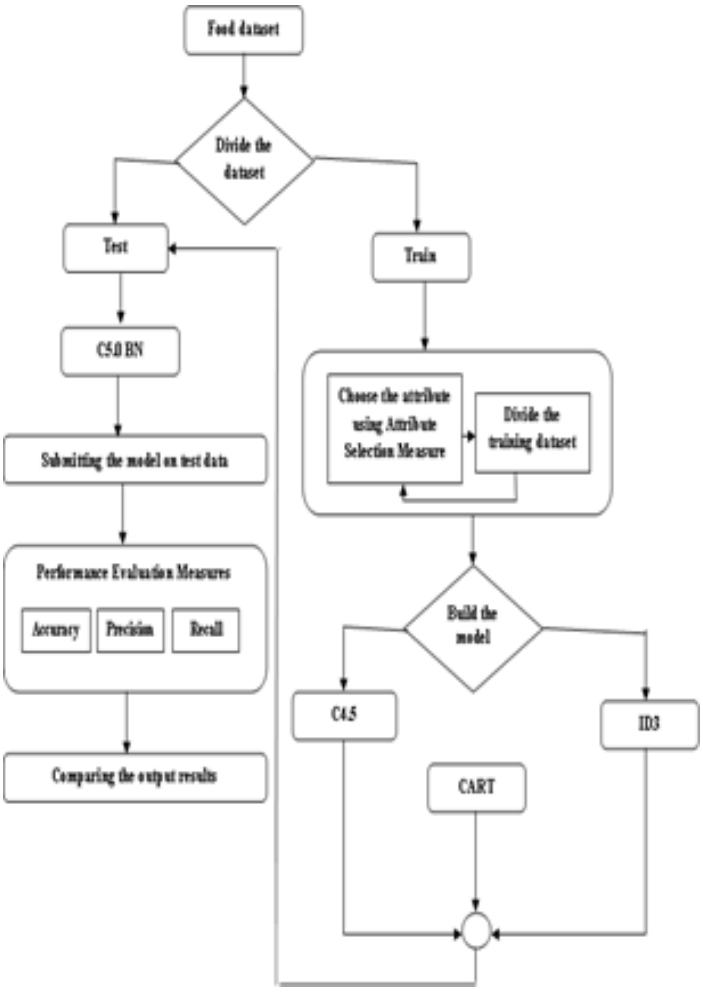

Fig.6. Steps of work

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Analysis of quality parameters

Accuracy

According to the findings, the quality of the separation tree is greatly improved. Table 1 & Figure 7 note the accuracy analysis of ID3, C4.5 and CART algorithm. The accuracy level of the CART algorithm has apparently improved.

Table 2: Comparison of accuracy measure for Classification Tree classifiers algorithms

No. of Experiment	ID3	C4.5	CART
1	71.5%	86%	90.5%
2	78%	81%	85%
3	74%	79.5%	83%
4	77%	80.5%	84%
5	81%	85%	89%
6	82.5%	86.8%	90.5%
7	76.5%	81.5%	87.5%

There is a condition from Table 2, that CART has more advanced class accuracy compared to previous classification algorithms such as ID3 and C4.5 algorithms. The relationship between the categories of tree species is shown in Figure 6.

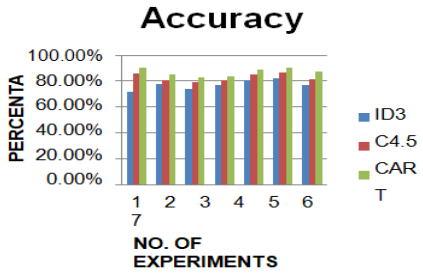

Fig. 7: Comparison of Accuracy Measure for Classification Tree algorithms

5.1.2 Memory utilization

Table 3 shows the complete memory representations used for ID3, C4.5 and CART and their comparisons. Also memory usage related to the proposed CART and ID3 and C4.5 algorithms are provided using Fig. 8. According to the acquired findings; capacity for ID3 memory usage, the C4.5 algorithms are larger than the proposed CART algorithm.

Table 3: Comparison of Memory Consumption for Classification Tree algorithms

No. of Experiment	ID3	C4.5	CART
1	31211	30621	29817
2	34825	34327	33823
3	36013	36171	36263
4	39461	38726	37461
5	39251	38726	38271
6	35628	34734	33928
7	41528	40173	39928

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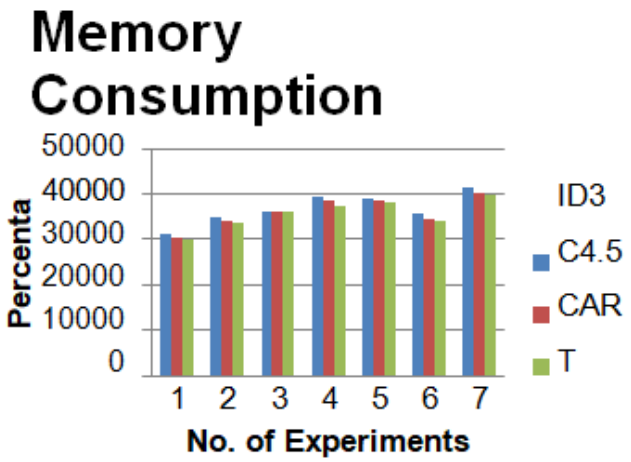

No. of Experiments

Fig. 8: Comparison of Memory Consumption for Classification Tree algorithms

It is only a matter of time from Table 3 that the CART algorithm has limited memory usage as compared to previous classification algorithms such as ID3 and C4.5 algorithms. The relationship of power consumption of the segregation tree sections can be seen in Fig. 8.

4.1.3 Training time

Based on the collected results, the training time required to measure data is greater than the ID3 and C4.5 algorithms. Therefore the release of the ID3 and C4.5 algorithms is expected in the training period.

Table 4: Comparison of Training Time for Classification Tree algorithms

No. of Experiment	ID3	C4.5	CART
1	3.2	4.3	5.9
2	7.1	8.5	7.9
3	5.1	6.2	7.4
4	4.2	6.5	9.3
5	4.2	5.1	6.9
6	3.9	6.87	8.3
7	4.8	6.9	9.52

It is endless from Table 4 and Fig. 9 that CART has a better training time than previous classification algorithms such as ID3 and C4.5 algorithms.

Fig. 9: Comparison of Training Time for Classification Tree algorithms

6. CONCLUSION

The aim of this study was to compare three different classification algorithms using IoT. Improve the performance of the CART algorithm compared to ID3 and C4.5 algorithms. In addition, survey research uses algorithms. Exploring and building a CART separation tree requires a little memory and time. According to the findings of this study, ID3 has 100 abnormalities, and C4.5 has the lowest incidence of adverse events. With effective mobility, the manufacturer maintains the quality of the client's needs. The proposed method was tested in an unusual diet. Unwanted data is removed to improve customer health while promoting economic growth.

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USING FACEBOOK AS AN LMS FOR TEACHING THE ENGLISH LANGUAGE: A CASE STUDY OF AN EXPERIMENT DURING THE COVID SITUATION

Tarun Tapas Mukherjee[1] & Swayam Prabha Satpathy[2]
[1]Assistant Professor, P.G Department of English, Bhatter College, Paschim Medinipur, West Bengal, India
Email: ttm1974@gmail.com
[2]Associate Professor, Department of Humanities and Social Sciences, Siksha 'O' Anusandhan (Deemed to be University), Odisha, India
Email: dr.swayam.prava@gmail.com

ABSTRACT
The article deals with the pros and cons of using Facebook in a practical setup. After long deliberations, Facebook was accepted an as alternative LMS in the UG and PG levels in a higher education institution, situated in a rural location in Paschim Medinipur, West Bengal, India. The platform continued to be used for almost two years. The entire system of education—notice distribution, classroom teaching, gathering responses, attendance, assessments and examination, and evaluation, was conducted on the virtual platform for more than 2000 students. The article attempted a retrospective study of the entire affair in order to mark the advantages and disadvantages in using the social media platform.

Objectives
- *To mark the factors negatively affecting online teaching-learning in a real-life context in a rural area*
- *To find out the efficacy of using Facebook as an LMS in a retrospective manner after using it for two years.*
- *To compare the functionalities of FB Groups with popular video conferencing systems widely used during the pandemic for online teaching*
- *To point out the positive and negative aspects of FB that came out during the use*
- *To present some snapshots of the student's perception and attitude to the learning experience with regard to their language skill developments*
- *Finally, to mark the diabolical features that can jeopardize the entire system of teaching-learning.*

Research Methods:
- *The experiment was necessitated by a real crisis and the study followed much later. So, it makes a retrospective appraisal of the entire affair conducted in a constructivist manner. For this, a mixed method—qualitative and quantitative, has been adopted.*
- *The study contains a focused survey among students who participated in online teaching-learning on Facebook.*

Keywords*: Facebook group, LMS, COVID-19 Pandemic, Digital Divide in India*

INTRODUCTION
Covid 19 forced India and much of the world to go for shutting down everything and fight Corona from the locked-down condition. The immediate impact of covid 19 was, of course, on education. Students and teachers were forced to the corner of their homes and join the e-learning programmes in a rather haphazard and unplanned manner. It was completely an unplanned and unprofessional arrangement as most of the institutions were not familiar with the online systems, nor were the students and teachers prepared to shift to a different mode and platform of learning. The matter got complicated because of several inherent drawbacks in the implementation of the online reaching-learning system in rural areas. These factors negatively affected the implementation of online teaching-learning:

1. Digital divide
The following general drawbacks are noted by many authors. S. S. Rao (2015), S. Singh (2010), Viswanath Venkatesh, Tracy Ann Sykes (2012), Nidhi Tewathia, Anant Kamath, P. Vigneswara Ilavarasan (2020) and many other researchers laid bare many issues in this regard. Anuradha Mathrani et all (2021), Abhradeep Karmakar et al (2020), Tarun Shyam and SC Das (2021), Vaidehi Rajam et all (2021) and others worked specifically on the digital-divide situation in the COVID-19 context. The gravity of the situation, however, was of global nature. As late as April 2021, UN Deputy Secretary-General Amina Mohammed warned the General

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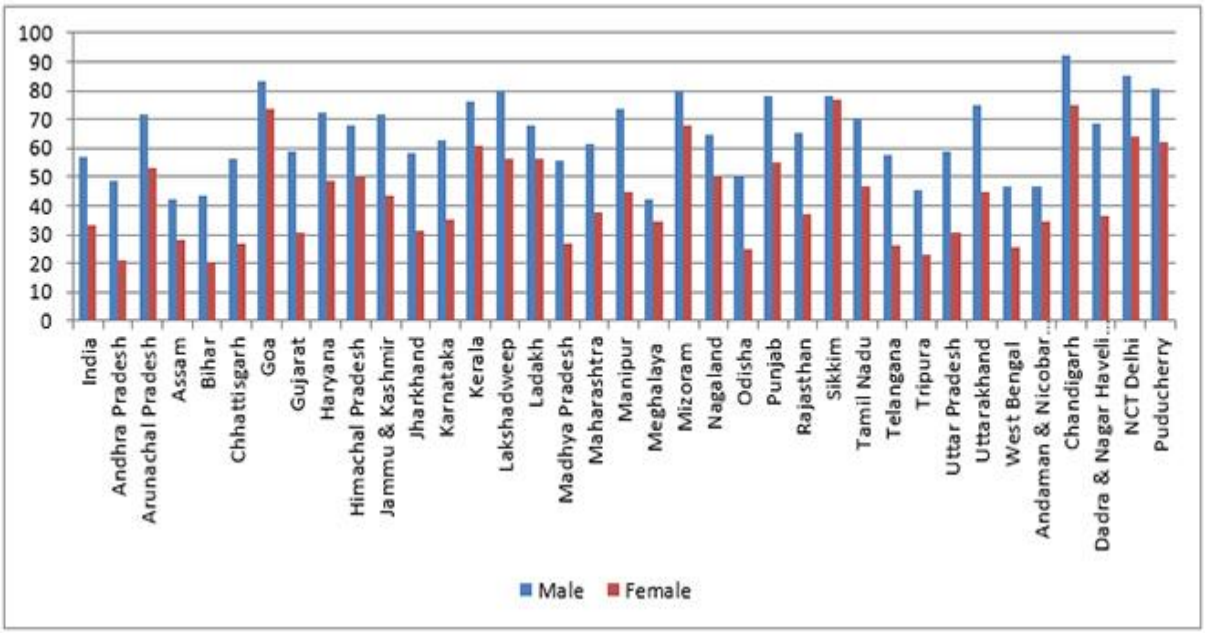
Assembly that without decisive step by the global community, the digital divide can become "the new face of inequality".

> "The COVID-19 crisis has highlighted this disparity. While confronting the pandemic, those without Internet access have been unable to benefit from remote education, remote work, or remote health services. Without decisive action, the digital divide will become the new face of inequality." (United Nations, 2021)

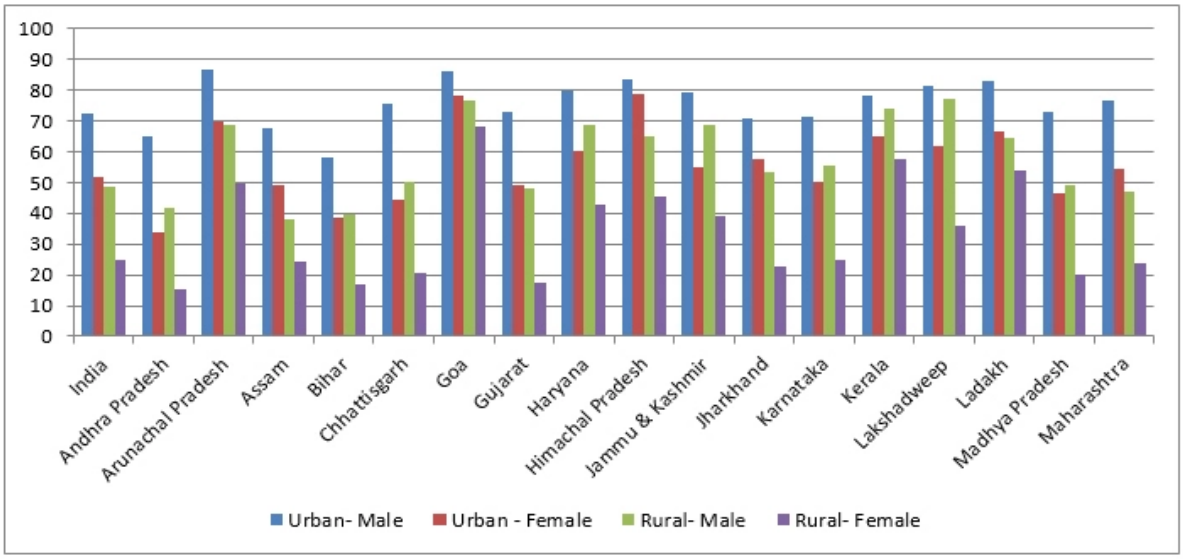
The Organisation for Economic Co-operation and Development defines "digital divide" as "the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to both their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities." (Organisation for Economic Co-operation and Development. 2001) In India, there is a serious digital divide, with differences in internet usage and access to digital infrastructure depending on factors like gender, caste, age, and location—rural vs. urban. Men generally have more access to the internet and own more mobile phones. The following figures from the NFHS Survey raises a very dark situation in this regard:

Percentage of individuals who have ever used the internet- State-wise gender divide



Source: Data from NFHS 2019-21

Percentage of individuals who have ever used the internet- State-wise gender and rural/urban divide



Source: Data from NFHS 2019-21

The experiment

The experiment of using Facebook as an LMS was undertaken in an institution situated in a rural area, where many of the students belong to the socially-disadvantaged sections. It was not possible for the college authority and the administration to address the issue immediately in the COVID situation. Fortunately, many govt and non-govt scholarships helped students to procure smartphones and get access to the mobile internet. But even after having the devices, we found students acutely suffering from loss of connectivity during video conferencing. But we could not ascertain how many students were completely cut off from e-learning.

2. Limitations of the devices:

S. Criollo-C (2018) analyzed and pointed out several limitations of using smartphone for M-learning:

- "Limited storage and processing capacity.
- Usability issues due to device size.
- Low visual quality of information delivered by a mobile.
- Lack of mobile technology compatibility with students and teachers.
- Insufficient coverage or link failure in wireless communication.
- Scarce standards for the design and evaluation of mobile applications for learning.
- Incompatibility with some educational approaches.
- Limited bandwidth and low rates of information transfer."

Even if the latest smartphones are in some cases smarter than computers in the respect of accessibility, they have their inherent limitations in having cross-functionalities and disruptions with calls and messages and loss of connection and concentration

3. Limitations of the platforms:

Ana-Paula Correia, Chenxi Liu &Fan Xu (2020) analyzed the use of Zoom, Skype, Teams and WhatsApp as video conferencing system for the educational purpose. Several expert analyses are available on these issues. Daniel R. Bailey (2022) analyzed the use of Zoom. Before the arrival of the COVID-19 most of the educational institutions in India were not prepared for e-learning. So the immediate consequence was confusion regarding the choice of platforms and inability to choose the paid platforms. Nobody knew long the situation will continue. Since it was not possible for many institutions to go for big-budget paid e-learning platforms, they went for instantly free available options as temporary measures like using the free version video conferencing and streaming platforms like Google Meet, Youtube, Zoom, Cisco Webex, Mcrosoft Teams etc. But these platforms were not created for the purpose of e-learning and naturally did not have the integrated system to address the issues of keeping the saved records of the classes, comments and queries and attendance. Above all, these platforms did not have any kind of online examination systems.

4. Lack of training of the teachers and students:

Even though almost everybody was using the smartphone before the COVID, they rarely used it for teaching-learning purpose. The result was that the students and the teachers were in need of training. Since it was an emergency situation affecting every sphere of our life, they made rapid adjustments with the situation after the authority made a choice and arranged for training.

5. Shortage of funds:

The worst effect of Corona was, of course, on the economy. The educational institutions suffered from shortage of funds and so it was not possible to take up big projects and involve paid personnel for implementing advanced e-learning system. What was to follow for all was a kind of digital constructivism where the stake holders were expected to learn from experience.

6. Lack of vision, techno-expertise, experience and control:

In the COVID situation the central agencies and the regulatory authorities on top were found to be clueless regarding addressing the real situation. Instead, they were found to be issuing circulars and orders for implementing e-learning without specifying or creating any kind of stable platform. Nor was there any sincere attempt to address the digital divide in India.

Facebook as an LMS

Several studies before the COVID-19 identified the potential of Facebook as an educational tool. Selwyn (2009) spoke about utilizing the "conversational, collaborative and communal qualities of social networking services".

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Baran (2010) tried to incorporate a Facebook-based component into a conventional classroom setting. Allen (2012) on the other hand put a caveat:

> "Facebook does not allow us to separate formal and informal uses in education. Its design and social affordances are all about confusion and overlap, while its computer mediated format also trumps the traditional use of time and place as a means of enforcing the separations between people based on role and function." (Allen, 2012, 223)

Real crises lead us to finding alternatives in the real-life contexts. As the Pandemic stretched over a long period of time, many educators started using Facebook as an LMS. Munni & Hasan (2020) examined how "a designated Facebook Group can be used for conducting regular classroom activities as well as improving teaching practice of the instructors at a time of crisis such as Covid-19". (Munni & Hasan, 2020) Avila & Cabrera (2020) conducted research and found that the use of Facebook Group in virtual classrooms "highly improved the academic performance of students compared to those that were taught using a modular approach". (Avila & Cabrera, 2020, 1859).

The choice of Facebook

The present study was conducted much later than its actual implementation. When the Corona started and the shutdowns followed, the first task was to make connection with the stakeholders. Facebook was suggested to the college authority by the present writer and after deliberations it was accepted keeping in mind various plus points it offered over other platforms like YouTube, Zoom, Cisco Webex, Microsoft's Teams, Teamlinks etc.

Advantages because of integrated multifunctional features of Facebook group.

1. Privacy: Closed Facebook groups allowed students and teachers a niche in the social media platform to conduct classes without its being made public. Only verified users were allowed to enter the group and participate in the academic activities. In the emergency situation, the students and the faculty members temporary a temporary virtual home where they can interact with others from their isolated condition.

2. *Advanced audio/video live for holding classes, invited lectures etc*

The feature of Facebook Audio or Video Live provided the facility for hosting classes in real-time following a fixed routine. Using the features, we hosted routine classes and a few invited lectures. Since, in many cases, both the teachers and students suffered from low connectivity, the option of audio live proved to be of great help for all as it required low bandwidth.

3. *Storage system*: The storage system of Facebook proved to be highly beneficial as all the records including the shared files, video/audio files, attendance records and comments could be saved permanently outside the storage of the individual devices.

4. *Record keeping and attendance*: Unlike the other free video conferencing systems, attendance could be taken in the form of comments of a particular live class. Commenting could be turn off after the class was over.

5. *Cross-platform application of third-party programmes like Streamyard*: in the year 2020, Facebook did not roll out the Messenger Room feature and the video streaming was rather one-way activity and users could not be taken directly on the board. A few third-party programmes were available to address the issue. We used Streamyard to increase interactivity but the system suffered from low bandwidth issues.

6. *Radio-like features*: COVID-19 cut off students from the campus and classroom and above all from their teachers. There was huge amount of fear, anxiety and confusion among students, as if suddenly the world was coming to an end. In this kind of situation, Facebook audio live acted like the old radio service broadcasting the teachers' voices from long distance yet bridging the communication gap and providing much-needed psychological counselling for fighting the pandemic and continuing education in a different mode.

7. *Quiz function*: Facebook introduced Quiz feature in Group functionality. Though it had basic and limited functionality unlike Google Form, it could be utilized for exciting interest and adding variety to the teaching-learning process.

8. *Mentoring system*: We tried to experiment with this newly-added feature but the feature did not seem to work well.

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9. *Sharing of Cross-platform multimedia*: Because of the facility of document uploading, sharing links, posting videos, teachers shared huge amount of supplementary teaching materials with students—all in one place, in curated manner.
10. *Conducting organized online exams*: During the year 2020 after March, it was very difficult to conduct examinations in online mode as such system were not made available. Facebook groups was a better option for sharing the question papers with students. They would write answers at home and send their scripts as a single PDF file via email.
11. *Conducting and recording students' presentations*: There was a need to let the students come face to face online and deliver short presentations so that their soft skill development is not hampered. Again, there were few papers where presentations were essential. Facebook was found to be very helpful in this regard.
12. *Using the instant messenger*: By using the Messenger facility students were able be in constant touch with the teachers and with their classmates. Anybody could be contacted as all the teachers and students were members of the groups.
13. *Free of charge*: Because of its nature of open social platform, using Facebook group features are free in the sense that users don't need to pay.

Comparison with other platforms

	Interactive Class	Record Keeping and storage	Stability of the Virtual Location	Privacy	Bandwidth needed
Facebook	Less interactive	Fully supportive	Fully stable	Lesser	Less
Google Meet	Fully interactive	Not supportive	Not stable	Greater	more
Webex	Fully interactive	Not supportive	Not stable	Greater	more
Zoom	Fully interactive	Not supportive	Not stable	Greater	more
Mocrosoft Teams	Fully interactive	Not supportive	Not stable	Greater	more

The experiment and the experience:
As stated earlier, moving to FB was necessitated by an emergency situation marked by fear and confusion and lack of concrete initiatives from the central agencies. It was a time when some institutions were conducting e-learning by using WhatsApp messaging service. All the departments of college agreed to use FB group as an LMS. So more than 2500 students joined the FB groups. The Department of English had about 250 students and all were given training for using the FB groups. Since FB is a social media and could have privacy concerns, at the outset all were given oral and written instructions regarding privacy and online harassment. As the students and teachers rapidly adjusted to the system, the focus was now on developing their language skills-listening, speaking, reading and writing. A survey was made later on among students who used FB as an LMS. The results show that a significant percentage of students responded positively to the features enabled by FB. The following question was asked:

How did the Facebook Group classes help you in overall language learning during Corona?

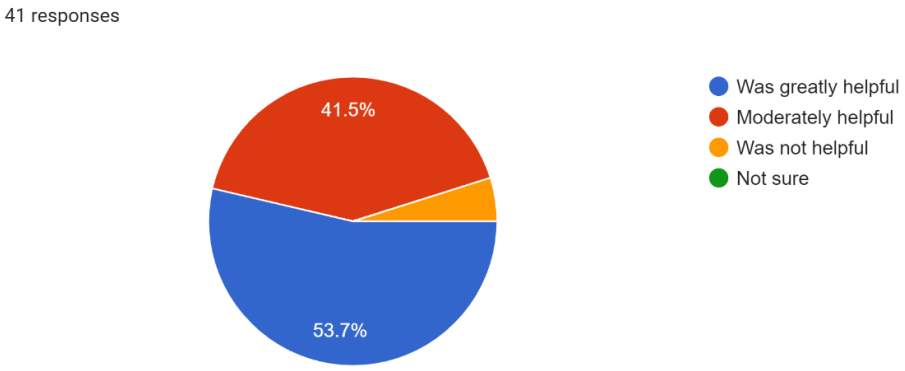

Figure 1

Listening: The students depended on the live audio/video lectures delivered by the teachers. This was the only way of communication in the absence of a physical classroom. So, it was a necessity—more than ever, to listen to the teachers properly in an attentive manner. This category showed highest positive response.

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Which of the following skills did you learn most using the Facebook group?

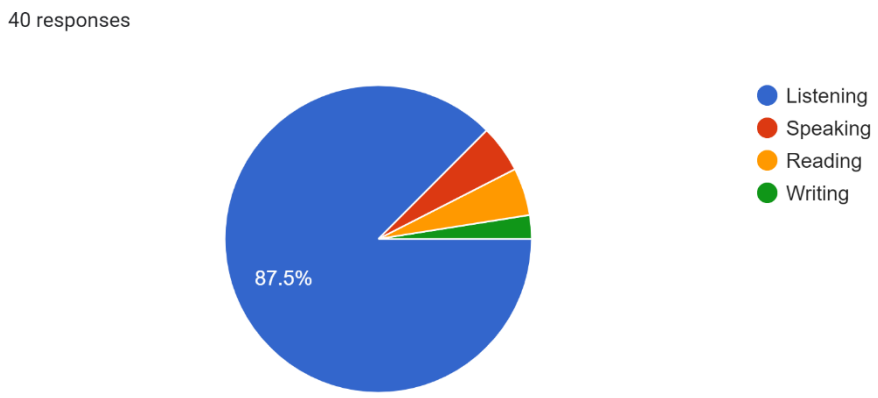


Figure 2

Then another question on listening was put:

Do you think your listening skill improved after listening to the Facebook group lectures?

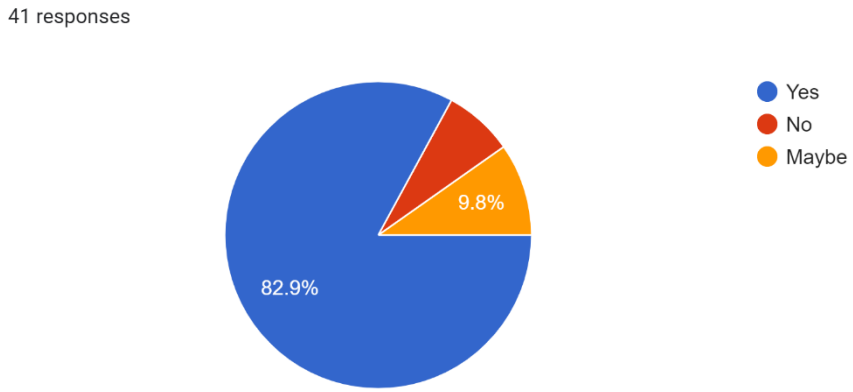
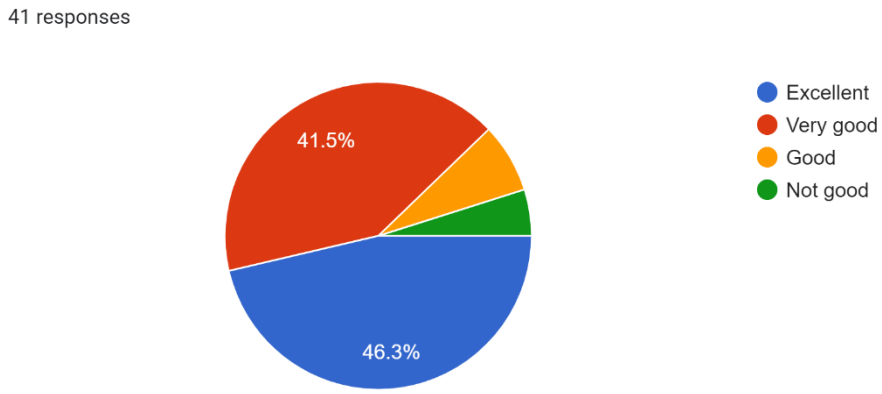


Figure 3

Another question was put before them on a feature which was not available with the free video conferencing systems.

Facebook group provided the facility of listening to the lectures even after the class. How would you rate the facility?



Developing Soft Skills: We took special care so that students would not suffer from psychological pressure of the pandemic and would continue to develop their soft skills. The responses to this category are also positive:

We arranged presentation sessions for students. Was it helpful for developing your presentation skills?

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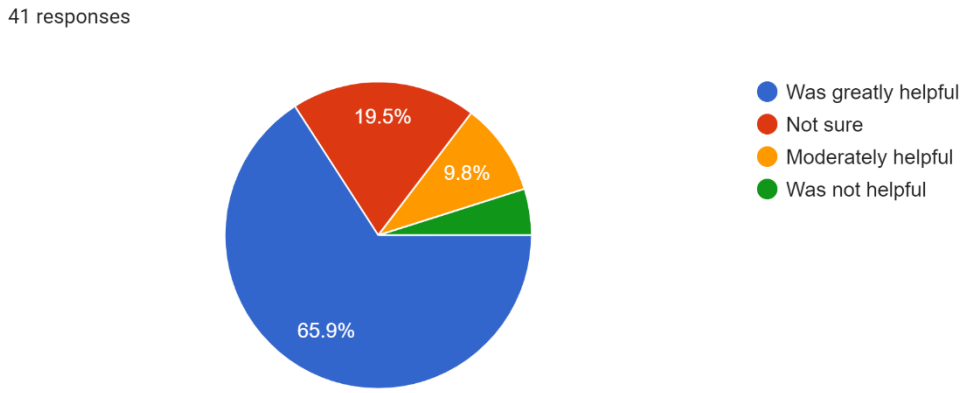
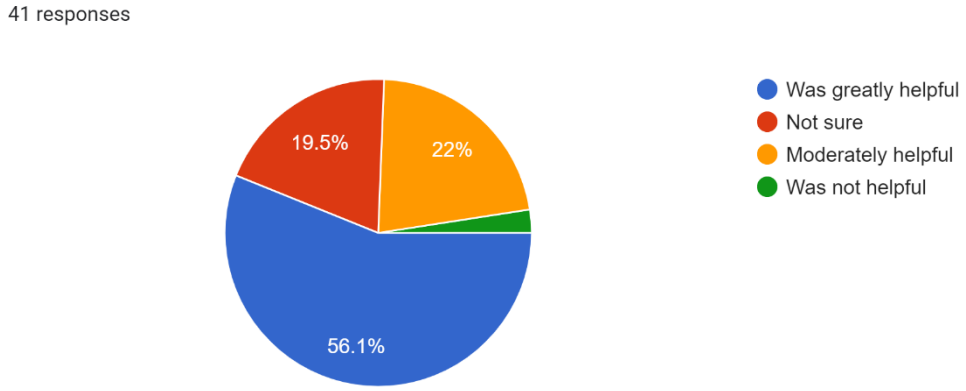


Figure 4

Question: We arranged special classes for developing soft skills for delivering presentations? How were the sessions?



Speaking: The inherent features of FB don't allow much interactivity and so it is difficult to develop their speaking skills by using the native features. For this we integrated Streamyard in the livestreaming and it allowed direct participation of the students, The feedbacks point to a positive outcome of such integration.

We arranged interactive classes by integrating Streamyeard. Did it help you in developing your speaking skills?

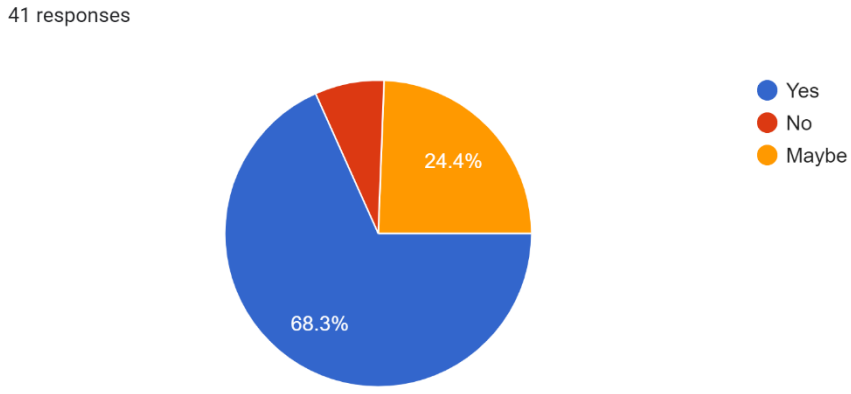


Figure 5

ELT Skills: As part of their syllabus, we had to teach an ELT paper and we invited external faculty for this. The responses to this are rather mixed perhaps because of the fact that ELT teaching goes better with the traditional method of direct face-to-face teaching.

We arranged ELT classes for learning the necessary skills. How were the sessions?

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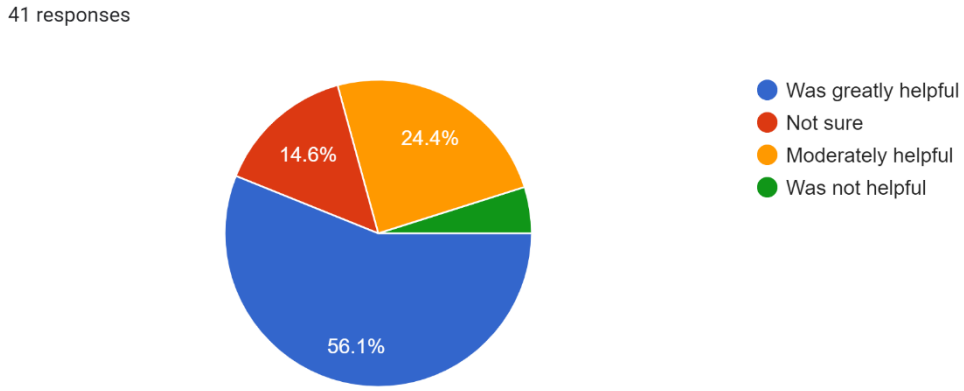
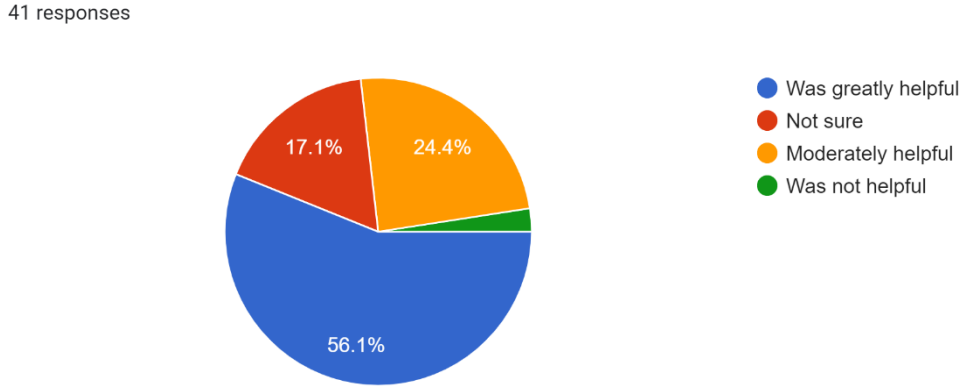


Figure 6

Question: We arranged special classes by external teachers for developing your language skills. How were the sessions?



Writing: As part of their syllabus, there were one project paper and a seminar paper which demanded field research, academic research and writing. No fieldwork was possible during the pandemic and we had to refer them to the existing fieldworks and documentations available openly on the web. But they were given extensive guidance and guidelines on writing. We find them responding positively to the arrangements,

We organized special classes for developing your writing skills regarding project works. How were the sessions?

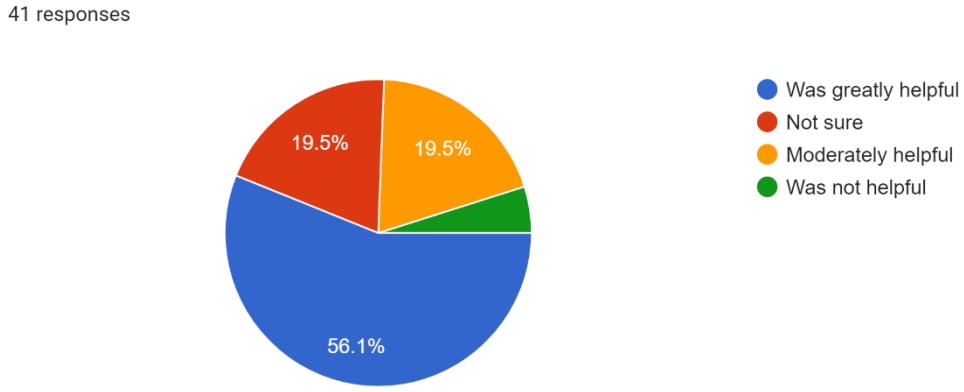


Figure 7

Another question was asked rather specifically.

We organized special classes for developing your writing skills for the seminar paper for the PG IV. How were the sessions?

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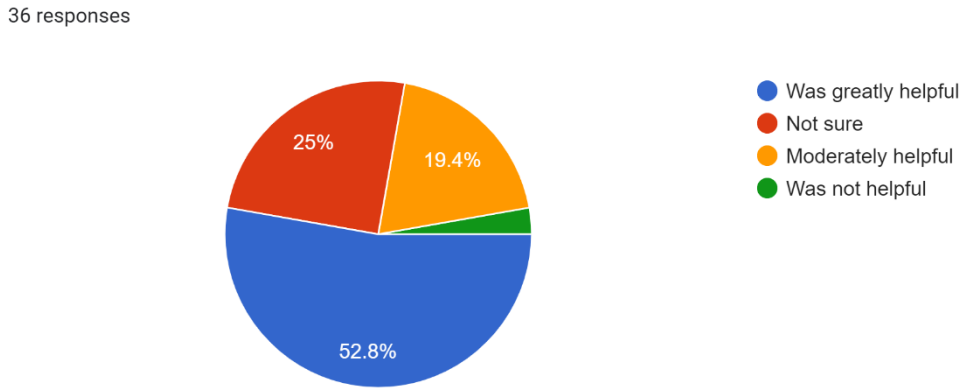
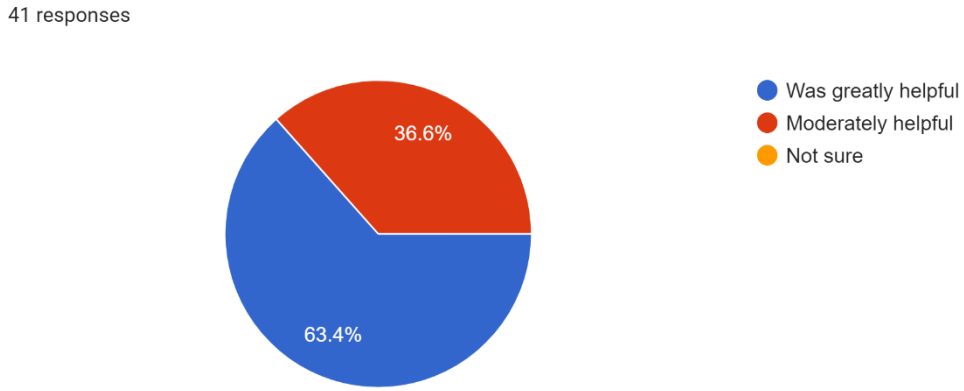


Figure 8

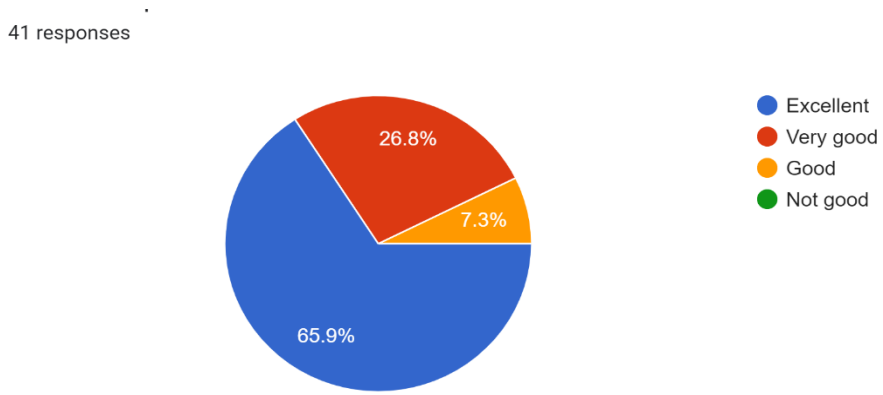
Communication and sharing resources: We used FB as a constant and instant platform of communication with the students. Based on this, the following question was asked:

We used Facebook group as a communication channel for circulating a wide-range of information. How was the system of including everything in one platform?



Assessments and Examinations: FB provided us with the facility of sharing question papers and assessment links at one stable location together. We conducted assessments by uploading the question papers and posting the links of internal assessments via Google Form. The following questions were asked and very positive response was received:

We arranged internal assessments by integrating Google Form feature in the Facebook groups. How the experience?



We arranged semi-online university exams by including circulating the Question Papers in the Facebook groups. How was the experience?

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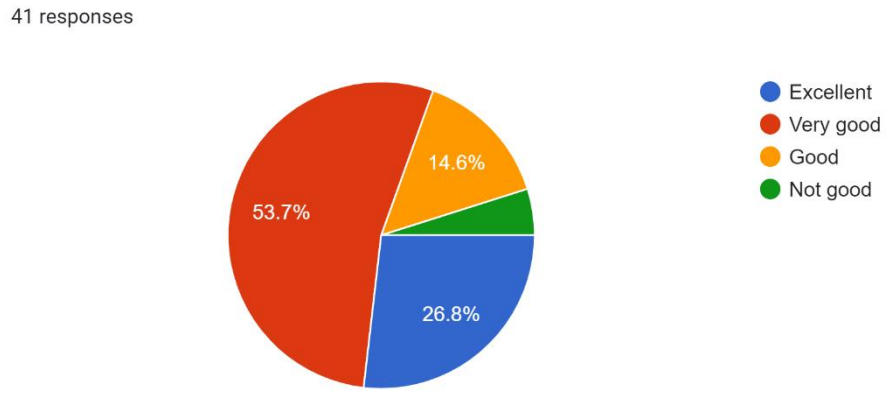

LIMITATIONS OF THE SURVEY

The survey was conducted among students residing purely in rural areas which are marked by digital divide. Even if the students possess smartphones, they suffer greatly from bandwidth issues because of fluctuating connectivity. This also contributed to the much of less positive and negative response.

LIMITATIONS OF USING FACEBOOK

The responses and the experience of the teachers prove that if Facebook group is used as an LMS, it still contains three serious limitations: lack of direct interactivity, attraction for switching on to other places on FB and privacy concerns. Live video/audio lectures sometimes may turn into one-way activity from the teachers and students may remain passive or moving to the other places of FB as there is live feed catered to the users constantly. These live feeds sometimes can cause information overload for a user and it can lead to loss of concentration and distraction, which the deadliest element in the learning process. During our long-term use of FB, we received quite a few complaints regarding privacy issues and in some cases they were serious.

CONCLUSION

We must remember that FB is a commercial social media platform that follows a business model which compels it to evolve as per the demands of the market economy. It is built on an interconnected collection of numerous robotic programmes and the network together works towards generating revenue from advertisements In the absence of any human intervention, it can into a hell of deviant ideas and materials with the feeding of lewd pornographic advertisements. This can have serious consequences of hacking and blackmailing. Again, there may not be immediate commercial benefit for the company if they add classroom features to their services. However, FB is conscious of the potentialities and they have a section on exploring the features. And in the absence of premium LMS, we can go ahead with what is instantly and freely there.

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ENVIRONMENTAL DEGRADATION: A PRESSING SOCIAL ISSUE AFFECTING THE NATURAL WORLD AND HUMAN SOCIETY

Dr. Gulab Pathan
Head, Department of Sociology, Poona College of Arts, Science and Commerce, Camp, Pune
gulap.pathan@poonacollege.edu.in

ABSTRACT
This research paper examines the critical issue of environmental degradation and its profound impact on both the natural world and human society. The degradation of our environment has become a pressing social concern, demanding immediate attention. This paper explores the various dimensions of environmental degradation, its causes, consequences, and potential solutions. By highlighting the interconnectedness between nature and human society, this research aims to raise awareness and promote action towards mitigating the adverse effects of environmental degradation.

INTRODUCTION:
Environmental degradation is a growing concern that poses significant challenges to both the natural world and human society. The acceleration of industrialization, population growth, and unsustainable practices have led to widespread ecological imbalances. As a result, the degradation of ecosystems, depletion of resources, and pollution have become increasingly prominent issues. Recognizing the gravity of this situation, it is imperative to delve into the complexities of environmental degradation and its social implications.

PROBLEM STATEMENT
The problem at hand is the detrimental impact of environmental degradation on the natural world and human society. It encompasses various issues such as deforestation, pollution, climate change, resource depletion, and urbanization. These factors not only disrupt ecosystems but also give rise to social challenges such as health risks, displacement, and socioeconomic inequalities. Addressing this problem requires a comprehensive understanding of its causes, consequences, and potential solutions.

OBJECTIVES
The primary objectives of this research paper are as follows:

1. To examine the causes of environmental degradation, including deforestation, pollution, climate change, resource depletion, and urbanization.
2. To analyze the consequences of environmental degradation on both the natural world and human society, encompassing ecological imbalances, species extinction, habitat destruction, health risks, displacement, and socioeconomic inequalities.
3. To explore potential solutions and mitigation strategies, including sustainable resource management, conservation efforts, renewable energy adoption, policy interventions, and community participation.
4. To raise awareness about the interconnectedness between nature and human society, emphasizing the urgency and collective responsibility to address environmental degradation.

This research aims to contribute to the understanding of environmental degradation as a pressing social issue and provide insights that can guide policymakers, stakeholders, and individuals towards effective action and sustainable solutions.

Environmental degradation poses a significant threat to the well-being of both the natural world and human society. The rapid acceleration of human activities, driven by industrialization, population growth, and unsustainable resource consumption, has led to widespread ecological imbalances. This paper aims to shed light on the multifaceted aspects of environmental degradation, emphasizing its social implications and the urgent need for collective action.

CAUSES OF ENVIRONMENTAL DEGRADATION
This section examines the primary causes of environmental degradation, including deforestation, pollution, climate change, overexploitation of natural resources, and urbanization. It delves into the underlying factors driving these causes, such as population growth, industrial expansion, and inadequate environmental policies. Through an analysis of case studies and empirical evidence, the section establishes a comprehensive understanding of the factors contributing to environmental degradation.

CONSEQUENCES OF ENVIRONMENTAL DEGRADATION

The consequences of environmental degradation are far-reaching and affect both the natural world and human society. This section explores the ecological consequences, such as habitat destruction, species extinction, soil erosion, and water pollution. It also delves into the social implications, including health risks, displacement of communities, food insecurity, and socioeconomic inequality. By examining the linkages between environmental degradation and social issues, this section highlights the urgency to address this problem holistically.

SOLUTIONS AND MITIGATION STRATEGIES

To combat environmental degradation, effective solutions and mitigation strategies are crucial. This section explores a range of approaches, including sustainable resource management, conservation efforts, renewable energy adoption, policy interventions, and community participation. It also examines successful case studies and initiatives implemented at the local, national, and global levels. By presenting a comprehensive overview of potential solutions, this section aims to inspire policymakers, stakeholders, and individuals to take proactive steps towards environmental sustainability.

CONCLUSION

Environmental degradation is a pressing social issue that demands immediate attention. This research paper has highlighted the interconnectedness between the natural world and human society, emphasizing the adverse effects of environmental degradation. By understanding the causes, consequences, and potential solutions, it is possible to address this critical issue and strive towards a more sustainable future. It is essential for individuals, communities, governments, and organizations to collaborate and take collective action to preserve our environment for future generations. Only through concerted efforts can we mitigate the social and ecological challenges posed by environmental degradation and pave the way for a harmonious coexistence between nature and human society.

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IMPACT OF GREEN MARKETING ON CONSUMER BEHAVIOR AND DECISION MAKING

Dr. Rakesh Garg
Associate Professor, Department of Commerce, S.D. (PG) College, Panipat
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ABSTRACT
Green marketing is going to be proactive topic with it steps into the world of the consumers where consumers are not only aware for the multiple brands and their perceived quality but also they have started to pay more attention to the environment and thereby becoming more eco friendly. Therefore the companies are also exploring the various ways for communicating with the customers so that customers can be retained as loyal for long by adopting green management.

The purpose of this research is to investigate the impact of green marketing on consumer purchasing patterns and decision making in India. This paper attempts to analyze the correlations between environmental belief factors (eco-labeling, green branding and packaging, environmental advertisements, green pricing, embedding an eco-image, environmental concerns and beliefs) and the environmental behaviour of consumers. The significant findings show that intensity of green packaging and green branding, importance of green products and premium green pricing have a significantly positive impact on consumer behaviour leading to green purchases. Correlations were found between eco-labeling, green branding and green pricing and the environmental behaviour of consumers.

Keywords: *Green Marketing, Consumer Awareness, Consumer Buying Decisions, etc.*

INTRODUCTION
The concept of green marketing is the business practice that considers consumers concerns with regards to preservation and conservation of the natural environment (Codington, 1993). It refers to the process of selling products and/or services based on their environmental benefits. Such a product or service may be environmentally friendly in it or produced and/or packaged in an environmentally friendly way. The term Green Marketing got attention and importance in late 1980's and early 1990's when specific products were identified as being harmful to earth's atmosphere. Defining green marketing is not a simple task where several meanings intersect and contradict each other. "Green Marketing" involves developing and promoting products and services that satisfy customer's needs and wants for quality, performance, affordable pricing and convenience with minimum environmental harm not necessarily eliminating it. Companies that excel in green marketing will benefit from better relations with customers, regulators, suppliers and other firms in their industry. According to Pattie (2001), the green marketing has evolved over a period of time. **First phase** was termed as "Ecological" green marketing, **Second phase** was "Environmental" green marketing and **Third phase** was "Sustainable" green marketing.

GREEN PRODUCTS AND ITS CHARACTERISTICS
The products those are manufactured through green technology and that caused no environmental hazards are called green products. Promotion of green technology and green products is necessary for conservation of natural resources and sustainable development. We can define green products by following measures:

- Products those are originally grown,
- Products those are recyclable, reusable and biodegradable,
- Products with natural ingredients,
- Products containing recycled contents, non-toxic chemical,
- Products contents under approved chemical,
- Products that do not harm or pollute the environment,
- Products that will not be tested on animals,
- Products that have eco-friendly packaging i.e. reusable, refillable containers etc.

GREEN BUYING BEHAVIOUR
It is essential to analyse green buying behaviour of green consumers in order to identify the factors that are driving the consumer purchase patterns, including the intention of purchase and actual purchase behaviour of green products. Grob (1995) defines behaviour in environmental context as actions that have a direct effect on

the ecosystem. There are multiple green practices that are gaining momentum. Some of them include recycling, saving paper and electricity, avoiding the use of aerosols, encouraging the use of biodegradable products, use of organic food and so on (Gilg et al., 2005). Consumer demand in terms of green movement is gradually sloping upwards (Han et al., 2010). The reason for this shift towards green purchases could be a result of consumers' realization of the impact their behaviour has on the environment.

OBJECTIVES OF THE STUDY

1. To analyze the correlations between environmental belief factors (eco-labelling, green branding and packaging, environmental advertisements, green pricing, embedding an eco-image, environmental concerns and beliefs) and the environmental behaviour of consumers.
2. To understand the marketing mix of green marketing.
3. To know the golden rules and marketing strategies of green marketing.
4. To suggest some measures for consumers to increase the green practices.

REVIEW OF LITERATURE

Pride and Ferrell (1993) Green marketing, also alternatively known as environmental marketing and sustainable marketing, refers to an organization's efforts at designing, promoting, pricing and distributing products that will not harm the environment. A research agenda is finally suggested to determine consumers' awareness of environmental justice, and their willingness to bear the costs associated with it.

Oyewole, P. (2001). In his paper presents a conceptual link among green marketing, environmental justice, and industrial ecology. It argues for greater awareness of environmental justice in the practice for green marketing. A research agenda is finally suggested to determine consumer's awareness of environmental justice, and their willingness.

Brahma, M. & Dande, R. (2008). The Economic Times, Mumbai, had an article which stated that, Green Ventures India is a subsidiary of New York based asset management firm Green Ventures International. The latter recently announced a $300 million India focused fund aimed at renewable energy products and supporting trading in carbon credits.

Sanjay K. Jain & Gurmeet Kaur (2004). In their study environmentalism have fast emerged as a worldwide phenomenon. Business firms too have risen to the occasion and have started responding to environmental challenges by practicing green marketing strategies.

Kilbourne, W.E. (2011) discussed the failure of green marketing to move beyond the limitations of the prevailing paradigm. The author identified areas that must be examined for their effect in the marketing/environment relationship, namely economic, political and technological dimensions of the cultural frame of reference.

Prothero, A. (2012) introduced several papers discussed in the July 1998 issue of 'Journal of Marketing Management' focusing on green marketing. This included a citation of the need to review existing literature on green marketing, an empirical study of United States and Australian marketing managers, a description of what a green alliance look like in practice in Great Britain, ecotourism and definitions of green marketing.

Prothero, A. & Fitchett, J.A. (2013) argued that greater ecological enlightenment can be secured through capitalism by using the characteristics of commodity culture to further progress environmental goals. Marketing not only has the potential to contribute to the establishment of more sustainable forms of society but, as a principle agent in the operation and proliferation of commodity discourse, also has a considerable responsibility to do so.

Oyewole, P. (2014) in his paper presented a conceptual link among green marketing, environmental justice, and industrial ecology. It argues for greater awareness of environmental justice in the practice for green marketing. A research agenda is finally suggested to determine consumer's awareness of environmental justice, and their willingness to bear the costs associated with it.

Karna, J., Hansen, E. & Juslin, H. (2015) interpreted that proactive marketers are the most genuine group in implementing environmental marketing voluntarily and seeking competitive advantage through environmental friendliness. The results also give evidence that green values, environmental marketing strategies, structures and functions are logically connected to each other as hypothesized according to the model of environmental marketing used to guide this study.

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Rayapura (2016) in support cites a Nielsen global study which showed that 55% of global online consumers across sixty countries surveyed expressed willingness to pay more for products and services from companies that area dedicated to positive social and environmental impact.

GREEN BRANDING

One of the most significant elements of green branding strategies is green positioning which can further be classified into functional or emotional. Elements that are classified as emotional are considered more important compared to functional elements of branding and green positioning of products (Meffert and Kirchgeorg, 1993). According to Sarkar (2012), when green positioning is used in terms of a corporate strategy, it can be based on different emotional brand benefits such as selflessness associated with emotion of well-being, benefits including auto-expression that are a result of using socially recognizable green brands and nature related benefits (Sarkar, 2012, p. 47).

GREEN ADVERTISEMENTS

Green advertisements first incepted in late 1960s as a result of concerns brought up by consumer activism, public and scientific communities and others about firms using anti-environmental practices (Easterling et al., 1996). Over the years, green advertising decreased because of false claims via advertisements, exaggeration in the advertisement content and it was found that consumers' were perplexed about the terminologies used (Polonsky et al., 1997). Yin and Ma (2009) state that green advertising caught momentum again in 2000s, with developments in international legislations, global support, renewed interest among consumers and so on, therefore starting the sustainable age (Belz and Peattie, 2009). Green advertisements refer to adverts including sustainability of the environment, eco-friendly content, substance targeting needs and desires of green consumers and other stakeholders (Zinkhan and Carlson, 1995).

RESEARCH INSTRUMENT

Questionnaires provide the researcher an opportunity to collect data from a large sample size with a low possibility of the responses' distortion (Saunders et al., 2009). With an intention to collect large amount of data with negligible distortion of responses, this research has adopted the Questionnaire instrument for this quantitative study. Since the research was associated with buying behaviour of consumers with regard to green marketing, the participants included regular supermarket visitors from different gender, age groups, education qualification and place of residence. The gender was coded as Female=1 and Male=2. The age group was further divided into tertiles (18-23=1, 23-38=2, and 39-62=3). The highest education level was divided into three and coded as Intermediate=1, Graduate=2 and Masters=3. The place of residence was coded as Urban=1 and Rural=2. To facilitate the research, 100 surveys were sent out to participants from Haryana, India, of which 80 complete responses were received. Correlation and Regression analysis are both used to analyse the relationships between variables, however, correlation analysis shows the degree of association while regression analysis shows the relationship between dependent and independent variables.

Hypothesis 1: There is a positive relationship between green branding and packaging and the environmental behaviour of consumers.

Hypothesis 2: There is a positive relationship between green advertising and the environmental behaviour of consumers.

Hypothesis 3: There is a positive relationship between green pricing and the environmental behaviour of consumers.

Hypothesis 4: There is a positive relationship between environmental concerns and beliefs and the environmental behaviour of consumers.

DATA ANALYSIS

The internal consistency is used to measure the correlation of responses between the different questions of the questionnaire. Cronbach's alpha (>0.7) is considered as a reliable technique to measure the internal consistency of questionnaires with multiple items (Gliem and Gliem, 2003).

To analyse the descriptive statistics, test of normality is done using the Shapiro-Wilk test and distributions of histograms. Depending on the normality or the deviation from it, statistical tests on different groups are carried out. The P value shows the significance level and for $P<0.05$, the null hypothesis is rejected and for $P>0.05$, the null hypothesis is accepted.

Table : 1

Variable	Frequency	Valid %
Categorical Variables Gender		
Female	45	56.3
Male	35	43.8
Age		
18-23	26	32.5
23-38	27	33.8
39-62	27	33.8
Highest Education Level Attained		
Intermediate	20	25
Graduates	38	47.5
Masters	22	27.5
Place of Residence		
Urban	69	86.3
Rural	11	13.8

Table: 2: Correlation between Factors of Environmental Beliefs and Environmental Behaviour

Variables	R	Sig.
Effectiveness of eco-labeling and green products identification	.250*	.027
Intensity of green packaging and branding for ecological customers	.318**	.004
Environmental advertisement and green consumption patterns	.120	.291
Importance of green products and premium green pricing	.365**	.001
Embedding an eco-image in marketing of green products	.065	.572
Consumers' perceptions on environmental concerns and beliefs	.026	.819

In the case of the correlation between effectiveness of eco-labelling and green product identification and environmental behaviour, it can be observed that there is a very weak positive correlation between the variables **(R=.250)**, however, it is statistically significant **(P=.027)**. Similarly, correlation between importance of green products and premium green pricing and the environmental behaviour is positive but weak and statistically significant **(R=.365, P=.001).** In the case of green branding, correlation is significant at 0.01. So, considering the correlation between intensity of green packaging and branding and the environmental behaviour, a statistically significant and positive weak correlation can be found **(R=.318, P=.004)**. There is no correlation or statistical significance between embedding an eco-image in marketing of green products **(R=.065, P=.572),** green advertisements **(R=.120, P=.291)** or consumers' perceptions on environmental concerns and beliefs **(R=0.26, P=.819)** and environmental behaviour.

RESEARCHERS HAVE IDENTIFIED MANY REASONS FOR WHICH A MARKETER SHOULD GO FOR ADOPTION OF GREEN MARKETING

1. Marketers must see green marketing as an opportunity to achieve its objectives because all types of consumers both individual and industrial are becoming more concerned and aware about the natural environment and have modified their purchasing behavior accordingly. It is believed that the marketing of green goods will have a competitive advantage over the other goods simultaneously meeting their business objectives.
2. Many organizations have started to realize that they have a moral obligation to be more socially responsible. This is in keeping with the philosophy of CSR which has been successfully adopted by many business houses to improve their corporate image. Firms in this situation can take two approaches:

- Use the fact that they are environmentally responsible as a marketing tool.
- Become responsible without prompting this fact.

3. Governmental bodies are forcing firms to become more responsible. In most cases the government forces the firm to adopt policy which protects the interests of the consumers. It does so in following ways:

- By banning production of harmful goods or by products
- By banning consumption of harmful goods; or

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- Evaluating the system by which a consumer can evaluate sub standard products easily.

4. Competitors' environmental activities may be a pressure for the other firms to change their environmental marketing activities. In order to get pace with competitors claim to being environmentally friendly, firms must change over to green marketing. It is believed that green marketing will infiltrate the entire industry. As society has become more concerned with the natural environment, some firms have begun to modify their behavior in an attempt to address society new concerns.

GOLDEN RULES OF GREEN MARKETING

1. **Know you're Customer:** Make sure that the consumer is aware of and concerned about the issues that your product attempts to address, (Whirlpool learned the hard way that consumers wouldn't pay a premium for a CFC-free refrigerator because consumers dint know what CFCs were.).
2. **Educating your customers:** Isn't just a matter of letting people know you're doing whatever you're doing to protect the environment, but also a matter of letting them know why it matters. Otherwise, for a significant portion of your target market, it's a case of "So what?" and your green marketing campaign goes nowhere.
3. **Being Genuine & Transparent:** Means that a) you are actually doing what you claim to be doing in your green marketing campaign and b) the rest of your business policies are consistent with whatever you are doing that's environmentally friendly. Both these conditions have to be met for your business to establish the kind of environmental credentials that will allow a green marketing campaign to succeed.
4. **Reassure the Buyer:** Consumers must be made to believe that the product performs the job it's supposed to do-they won't forego product quality in the name of the environment.
5. **Consider Your Pricing:** If you're charging a premium for your product-and many environmentally preferable products cost more due to economies of scale and use of higher-quality ingredients-make sure those consumers can afford the premium and feel it's worth it.
6. **Giving your customers an opportunity to participate:** Means personalizing the benefits of your environmentally friendly actions, normally through letting the customer take part in positive environmental action.
7. **Thus leading brands should recognize that consumer expectations have changed:** It is not enough for a company to green its products; consumers expect the products that they purchase pocket friendly and also to help reduce the environmental impact in their own lives too.

GREEN MARKETING MIX

Understanding the target consumer will help marketers to know whether "greenness" is an appropriate selling attribute and how it should be incorporated into the marketing mix. Every company has its own favorite set of marketing mix. Some have 4 P's and some have 7 P's of marketing mix. The 4 P's of green marketing are that of a conventional marketing but the challenge before marketers is to use 4 P's in an innovative manner if they wanted to adopt the policy of green marketing.

A. Green Product: The products have to be developed depending on the needs of the customers who prefer environment friendly products. Products can be made from recycled materials or from used goods. Efficient products not only save water, energy and money, but also reduce harmful effects on the environment. Green chemistry forms the growing focus of product development. The marketer's role in product management includes providing product designers with market-driven trends and customer requests for green product attributes such as energy saving, organic, green chemicals, local sourcing, etc., For example, Nike is the first among the shoe companies to market itself as green.

B. Green Price: Green pricing takes into consideration the people, planet and profit in a way that takes care of the health of employees and communities and ensures efficient productivity. Value can be added to it by changing its appearance, functionality and through customization etc. Wall Mart unveiled its first recyclable cloth shopping bag.

C. Green Place: Green place is about managing logistics to cut down on transportation emissions, thereby in effect aiming at reducing the carbon footprint. For example, instead of marketing an imported mango juice in India it can be licensed for local production. This avoids shipping of the product from far away, thus reducing shipping cost and more importantly, the consequent carbon emission by the ships and other modes of transport.

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D. Green Promotion: Green promotion involves configuring the tools of promotion, such as advertising, marketing materials, signage, white papers, web sites, videos and presentations by keeping people, planet and profits.

GREEN MARKETING PRACTICES IN INDIA

1. **Tata Steel:** Tata Steel commits to install technology to minimize the adverse impact of its processes on the environment by conserving the natural resources & energy by reducing the consumption and wastage & recycling of materials. Developed and rehabilitate waste dumps through a forestation and landscaping. Maintaining and operating the facilities with applicable Environmental laws, statutes and other regulations.
2. **Indian Railways:** Recently IRCTC has allowed its customers to carry PNR no. of their E-Tickets on their laptop and mobiles. Customers do not need to carry the printed version of their tickets.
3. **Wipro's Green Machines:** Wipro InfoTech was India's first company to launch environment friendly computer peripherals. For the Indian market, Wipro has launched a new range of desktops and laptops called Wipro Green ware. These products are ROHS (Restriction of Hazardous Substances) compliant thus reducing e-waste in the environment.
4. **State Bank of India:** SBI is providing many services like; paper less banking, no deposit slip, no withdrawal form, no checks, no money transactions form all these transaction are done through SBI shopping & ATM cards. State Bank of India turns to wind energy to reduce emissions. The wind project is the first step in the State Bank of India's green banking program dedicated to the reduction of its carbon footprint and promotion of energy efficient processes, especially among the bank's clients.
5. **Forest and Environment Ministry of India:** Has ordered to some retail outlets like Big Bazaar, More, Central, D-Mart that they should provide polythene carry bags to those customers only that are ready to pay a price for it.

GREEN MARKETING IN INDIA: INITIATIVES TAKEN BY THE GOVERNMENT AS WELL AS BY VARIOUS ORGANIZATIONS

Considering the importance of the environment for human beings, the Indian Government as well as various organizations is taking 'green initiatives' for the sake of environmental protection and sustainability.

INITIATIVES TAKEN BY ORGANIZATIONS

Various initiatives have been taken by various organizations for adopting environment friendly practices/ green practices, some of them are as follows:-

- HCL launched HCL ME 40, its range of eco-friendly notebooks. HCL claims that it is an eco-friendly notebook free from polyvinyl chloride (PVC). Further, this product was given a five-star rating by the Bureau of Energy Efficiency. They also meet REACH (REACH is the European Community Regulation on chemicals and their safe use) standards and are 100% recyclable and toxin free (Rediff.com: Here are some of India's leading 'Green' Companies, 2011).
- In 2007, Voltas (Tata Group) launched the 'Green' range of air-conditioners, following which it was made mandatory by the government to have energy star ratings for electronic home appliances. Energy Star is a well known international standard for energy efficient consumer products that originated in the United States (Rediff.com: Here are some of India's leading 'Green' Companies, 2011).
- Wipro also launched eco-friendly desktops which were introduced under the Wipro Green Ware initiative, with an aim to cut down e-waste. The systems launched are toxin free and operate under a total recycling policy. Wipro has 17 e-waste collection centers in India where products are collected and recycled, and 12 Wipro campuses in the country have been certified as green buildings (Rediff.com: Here are some of India's Leading 'Green' Companies, 2011).
- ACC recently launched its eco-friendly brand, 'Concrete+'. This brand uses fly ash (a hazardous industrial waste) to help conserve natural resources as dumping of fly ash is a major environmental problem, thus making it an eco- friendly product. The new product has been designed exclusively to ensure high durability (Rediff.com: Here are some of India's Leading 'Green' Companies, 2011).
- MRF launched eco-friendly tubeless tyres MRF ZSLK, which are made from unique silica-based rubber compounds and promises to offer fuel efficiency for vehicle owners (Rediff.com: Here are some of India's Leading 'Green' Companies, 2011).

- Pidilite has launched environment friendly synthetic resin adhesive named Fevicol AC Duct King Eco Fresh. It is claimed to be the first eco-friendly adhesive of India and boasts of being an all-in-one adhesive. The company officials say that this water-based adhesive spreads easily and smoothly at room temperature, without emitting any harmful fumes and is suitable for residential as well as industrial projects (Rediff.com: Here are some of India's Leading 'Green' Companies, 2011).
- Haier India took the green initiative by launching its 'Eco-Life' series electronic products aimed at designing smart and environment friendly products that should fulfill environmental norms along with meeting customers' needs. The range of electronic products the company is offering through this series includes refrigerators, all ranges of automatic washing machines, split and window air conditioners, a wide range of water heaters and LED & LCD TVs (Rediff.com: Here are some of India's Leading 'Green' Companies, 2011).
- P&G India introduced compact detergents in India for Ariel and Tide using fewer raw materials and packaging material, while ensuring superior consumer value. P& G India also redesigned the pump package of their beauty product Olay, which reduces plastic consumption and is 25% lighter than the earlier packaging. Re-designing the pump package has saved over 400 tonnes of packaging a year (the weight of a Boeing 747) (P&G, 2013).
- SBI is using eco and power friendly equipment which consumes less electricity in its new ATMs, which has helped SBI to save power costs and earned it carbon credits. SBI opened its first green banking branch at Jotsoma Science College in Kohima under the green banking initiative of State Bank of India (The Times of India, 2012).

INITIATIVES TAKEN BY THE GOVERNMENT

The following are the initiatives taken by the Government of India:-

- The Reserve Bank of India has requested the Non Banking Financial Corporations (NBFCs) to take proactive steps and initiatives to increase the use of electronic payment systems, and to gradually phase-out cheques and eliminate post-dated cheques in their routine business transactions as a part of "Green Initiative" (Department of Financial Services, Government of India : Green Initiative Master Circular, 2012).
- The Finance Minister announced ` 600 crore for green initiatives in the Union Budget, 2011 mainly for the protection and regeneration of forests and for environmental management.
- The Government has set up various standards for environment protection such as energy efficiency standards for appliances (refrigerators, air conditioners, tube lights, transformers, and other electrical appliances), energy conservation building code (ECBC), and fuel efficiency/emission norms for vehicles (Ministry of Environment and Forest, Government of India, 2010).
- The Ministry of Corporate Affairs (MCA), Government of India has taken a 'Green Initiative in the Corporate Governance' vide its Circular Nos. 17/2011 dated 21.04.2011 and 18/2011 dated 29.04.2011 which enables the entity to deliver all important documents to shareholders in the electronic form (i.e. to their e-mail address) that have been registered with the depository participants, including the notice of extra ordinary general meeting, annual general meeting, director's reports, audited financial statements, and so forth (Octane Research, 2013).
- In the Government's report of annual Indian economic survey 2011-2012, sustainable development and climate change was introduced for the first time, where lower-carbon sustainable growth was proposed as a central element of India's 12th five-year-plan (Patankar, 2012).
- According to an estimate, India spent approximately US$45 billion on green IT and sustainability initiatives in the year 2012, and the figure may reach US$70 billion by 2015, fueled by the Government's push for greater adoption (Yap, 2012).

CONCLUSION

Today companies from all fields have come up with different forms of green marketing, though the government and many private companies have been making an effort to bring about a green mindset among the people and promote green products, a lot still need to be done to make green products truly viable and workable especially in India. Based on the results, it was gathered that effectiveness of eco-labelling had a positive effect on the consumers' environmental behaviour. It was also observed that environmental advertising had a negative effect on environmental behaviour; similar result was found in terms of environmental concerns and beliefs of consumers and its relationship to the environmental behaviour. This shows that consumers are concerned about

the environment, but they are reluctant to purchase green products. In terms of correlations also, no significant correlation was found between the environmental concerns of consumers, environmental advertising and eco-image and the environmental behaviour of consumers. Further research, with a bigger sample size might be able to shed more significant insights with regard to these findings. The green marketers in India should carry out heavy promotional campaigns, because a majority of the Indian consumers are not sure about the quality of the green products.

With the threat of global warming looming large, it is extremely important that green marketing becomes the norm rather than an exception or just a fad. Recycling of paper, metals, plastics, etc., in a safe and environmentally harmless manner should become much more systematized and universal. It has to become the general norm to use energy-efficient lamps and other electrical goods. Marketers also have the responsibility to make the consumers understand the need for and benefits of green products as compared to non-green ones. In green marketing, consumers are willing to pay more to maintain a cleaner and greener environment. Finally, consumers, industrial buyers and suppliers need to pressurize effects on minimize the negative effects on the environment-friendly. Green marketing assumes even more importance and relevance in developing countries like India. Live a green life and let the greenery of nature live forever.

SUGGESTIONS

- Environment friendly behaviour is far and difficult to attain. Hence environmental awareness and attitudes should be created in the minds of consumers during their childhood days itself.
- It requires rigorous efforts at school level to create an attitude of environment sustainability.
- Eco clubs play an important role in creating environmental awareness amongst the future generation. So eco clubs should be there in all schools and colleges.
- Expand the consumer awareness of green products by creating effective green marketing campaigns or environmental related activities. The companies should try to more focus on the green features of the product in their marketing activities.
- Price is the attribute that consumers reflect on when making a green purchasing decision. Consumers are less likely to purchase green products if they are more expensive. So price should be reduced for the eco-friendly products.
- Companies should create ads that are more focused on green, eco-friendly image that will influence their customers purchasing decision.

FUTURE RESEARCH

The future research could take a new approach to this study by using mixed approach using survey to collect the quantitative data complemented with qualitative data by means of in-depth interviews, to study the drivers of green consumer behaviour like green branding and premium green pricing, over a period of time. Studies could be undertaken to identify why green advertising has a negative impact on environmental behaviour of consumers even though green branding has found to have a positive impact on the same.

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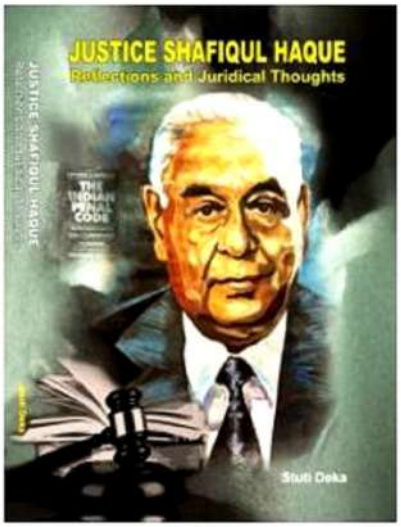

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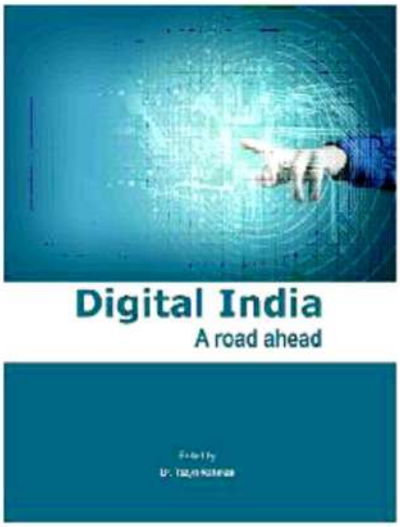

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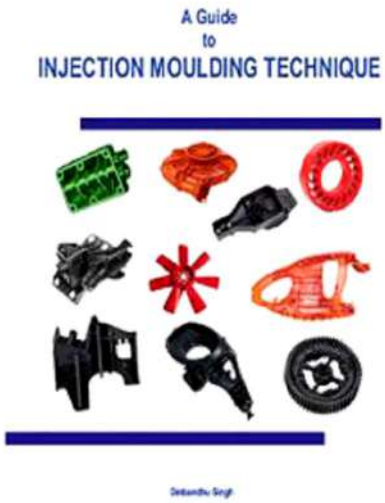

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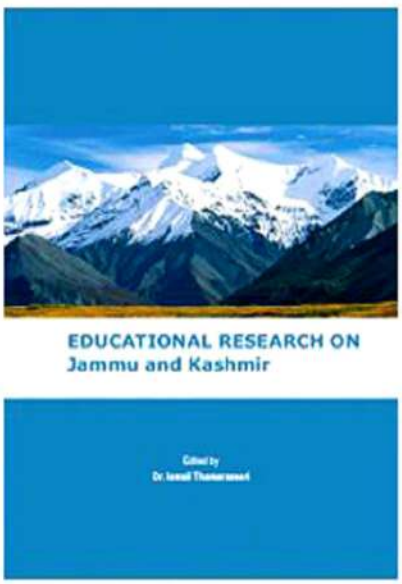

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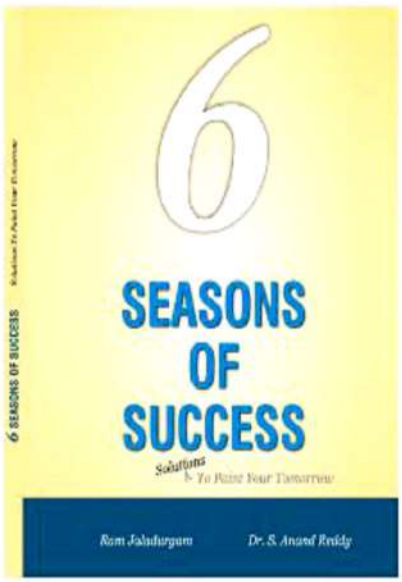

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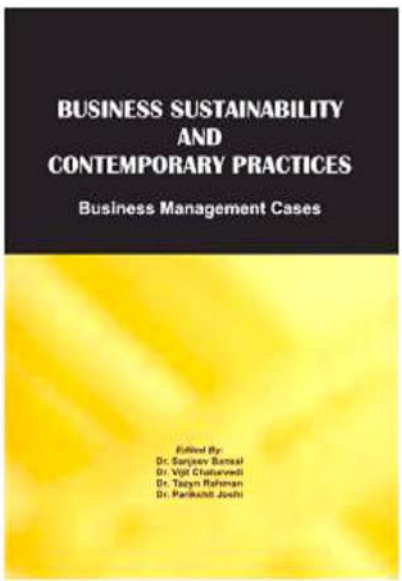

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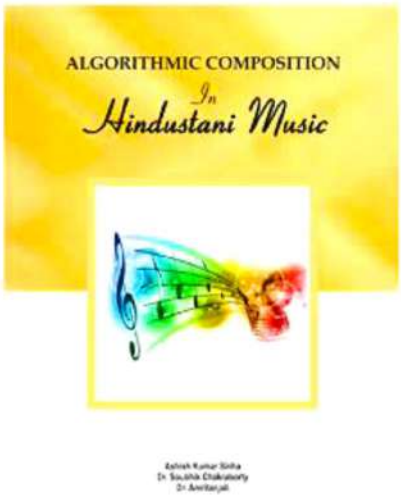

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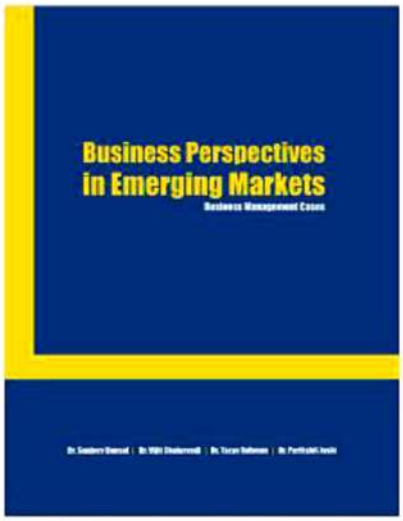

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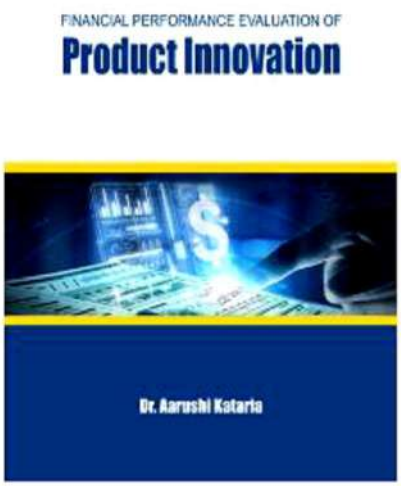

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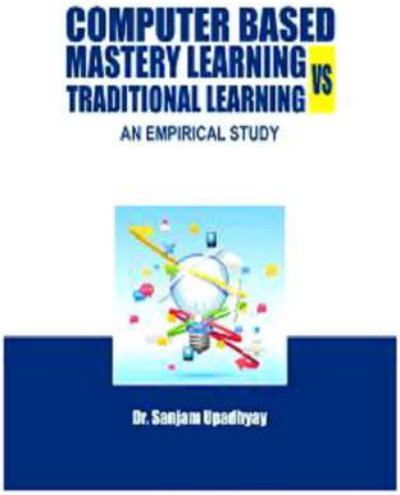

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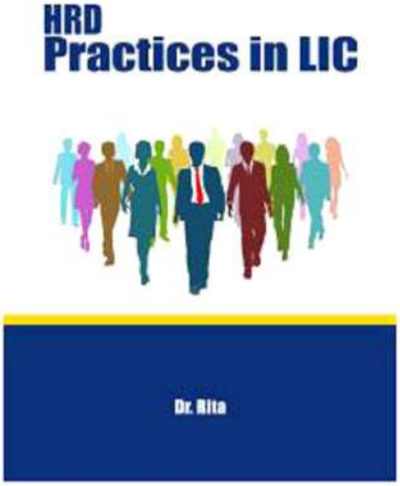

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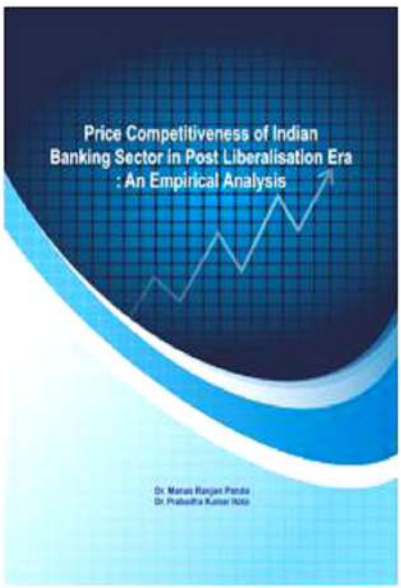

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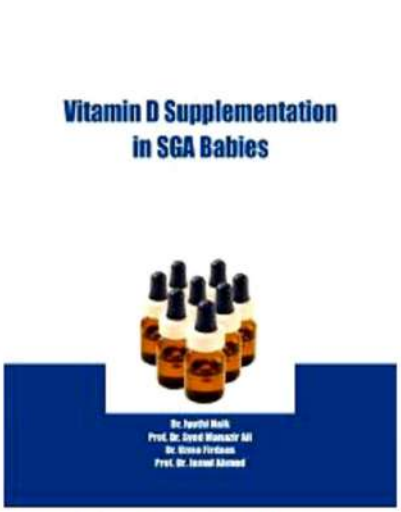

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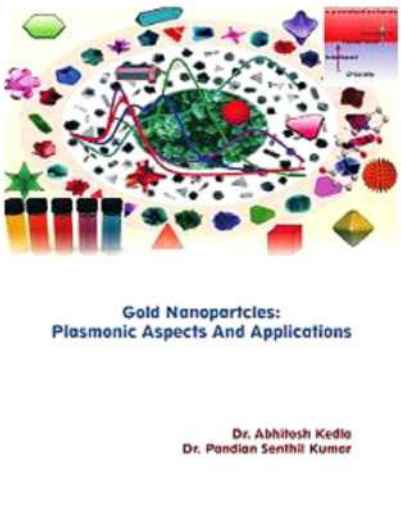

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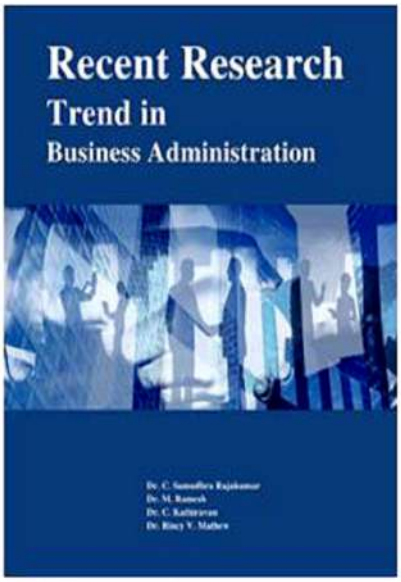

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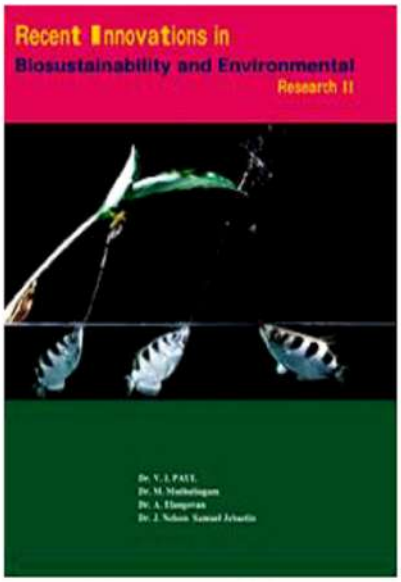

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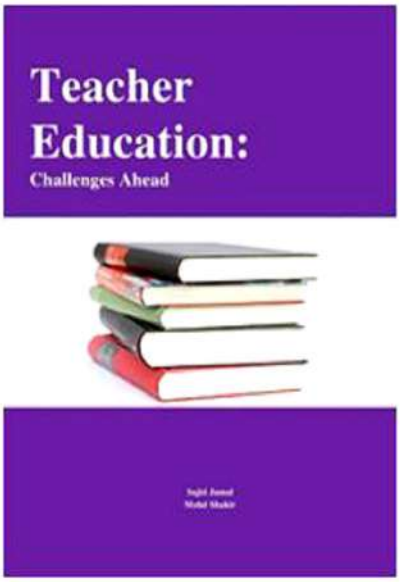

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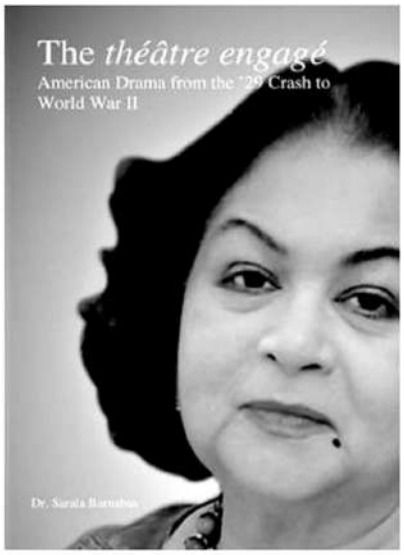

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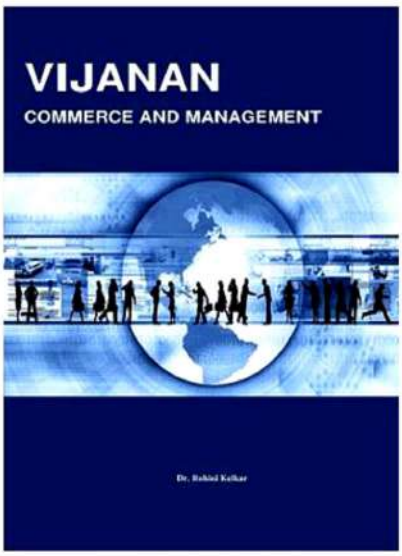

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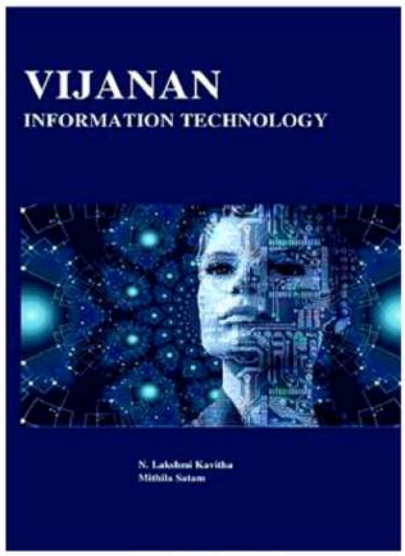

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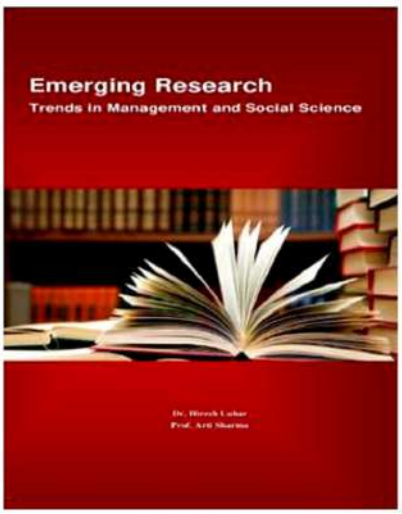

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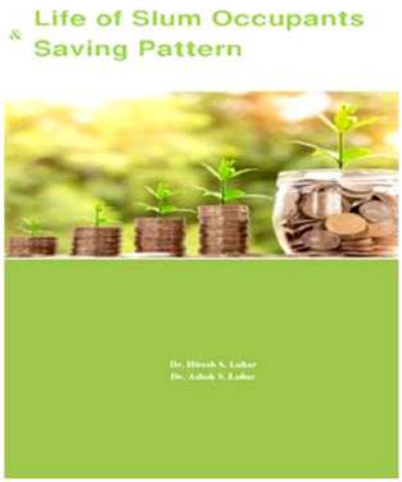

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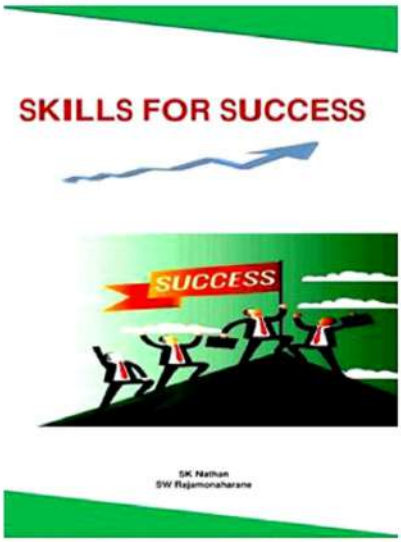

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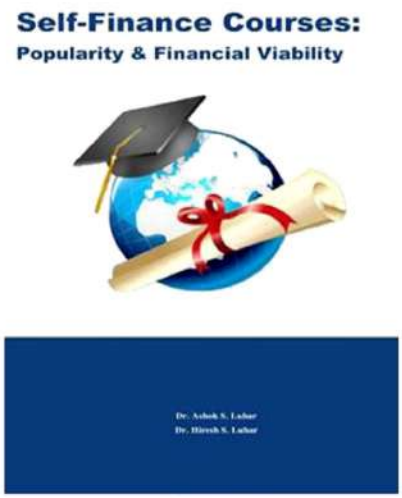

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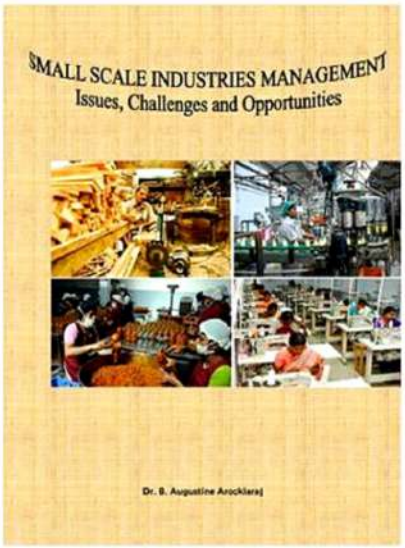

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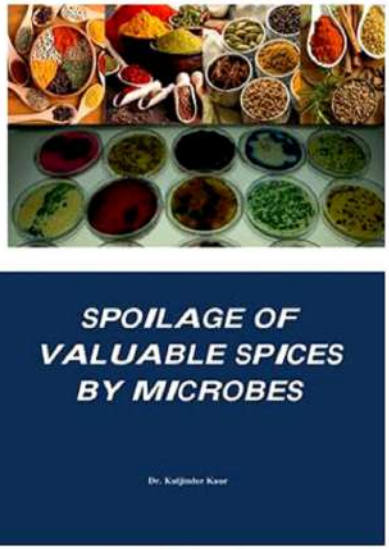

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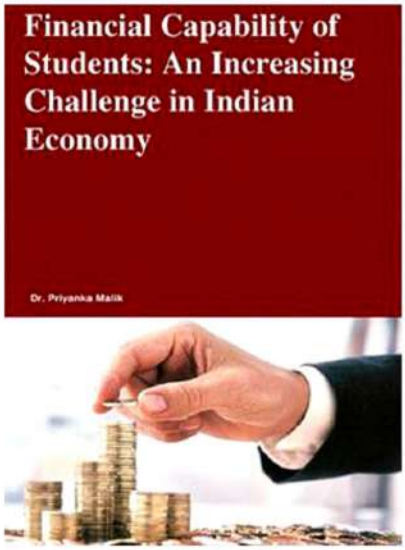

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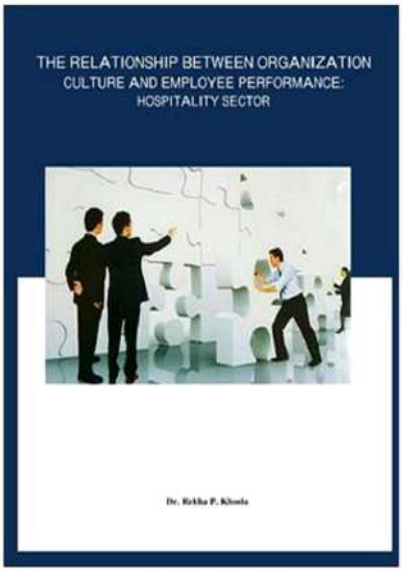

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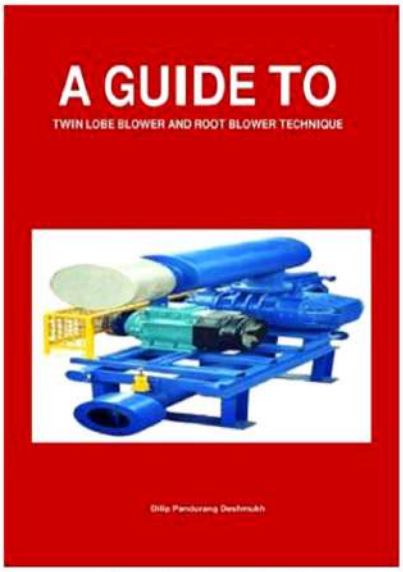

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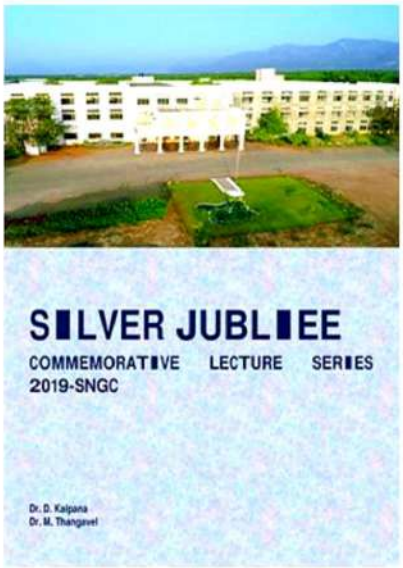

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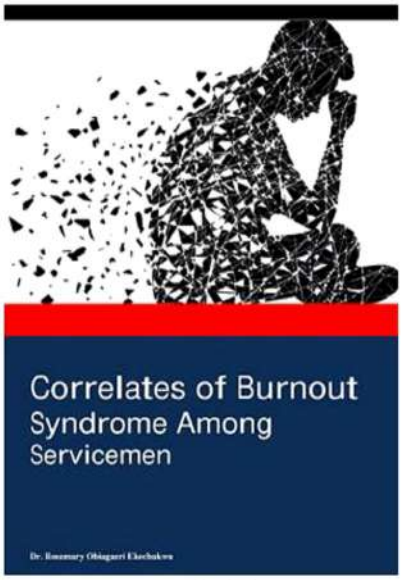

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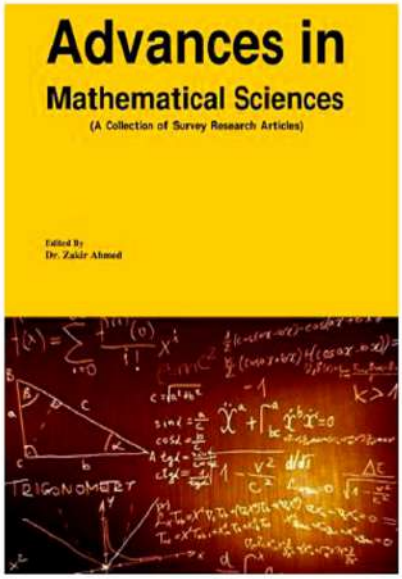

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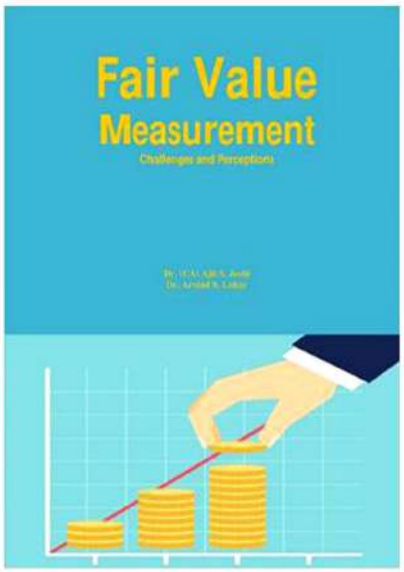

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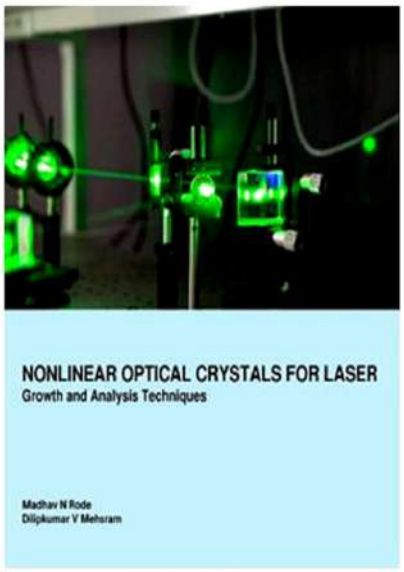

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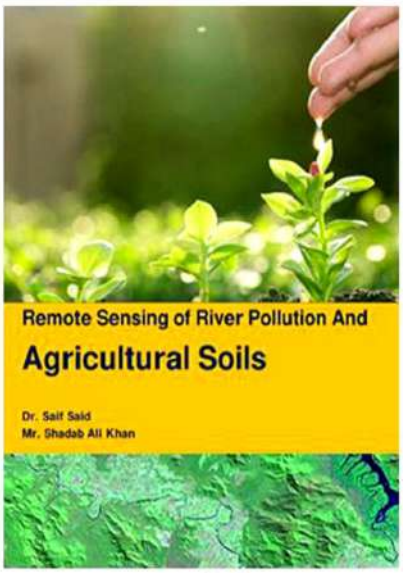

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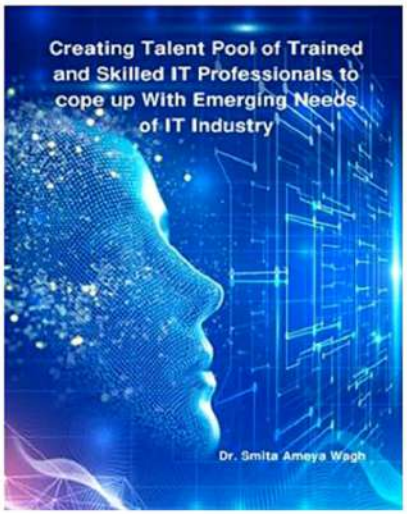

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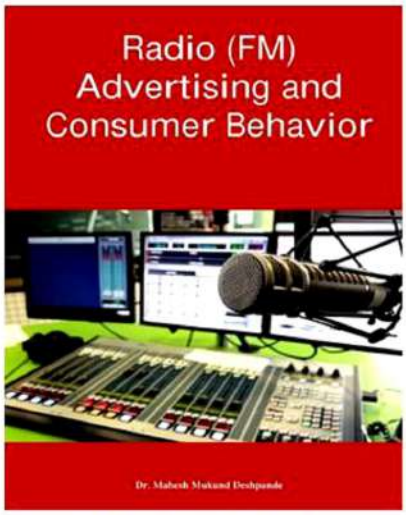

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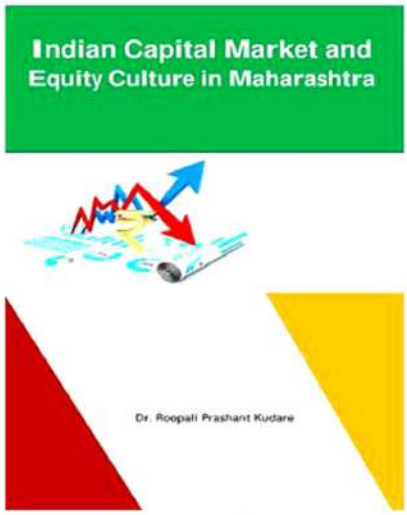

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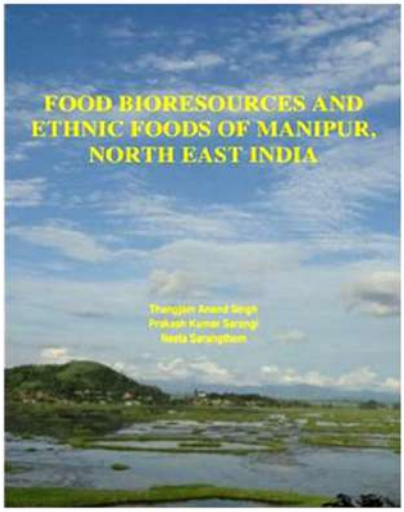

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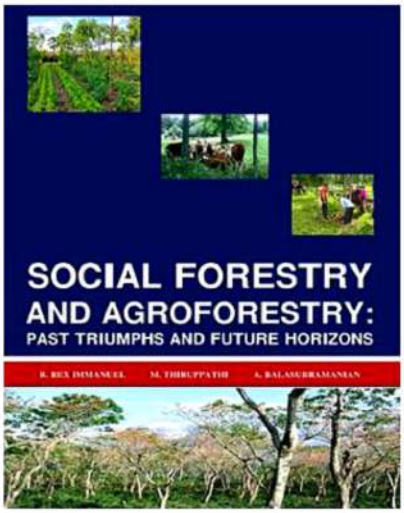

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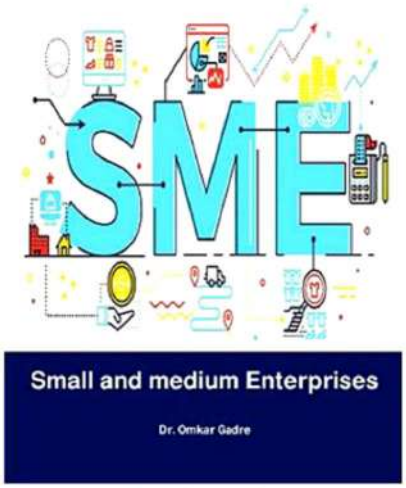

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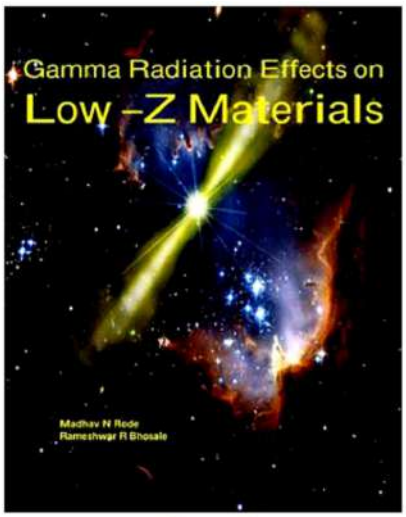

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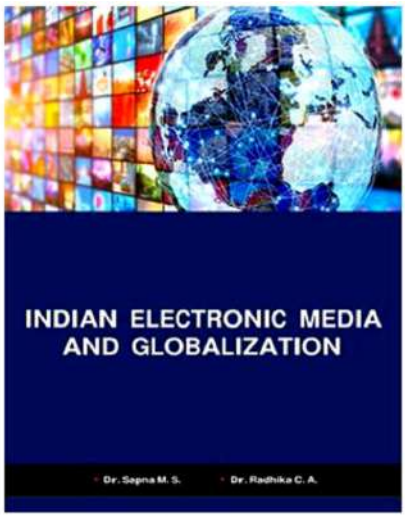

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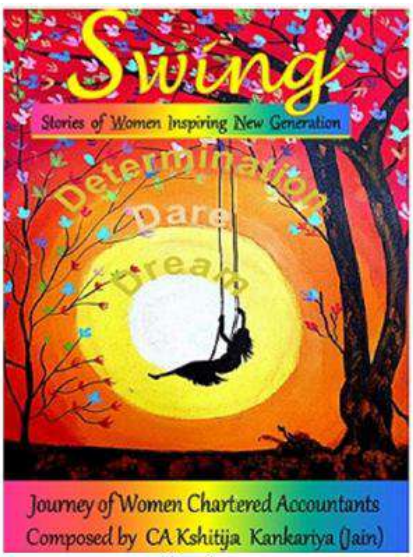

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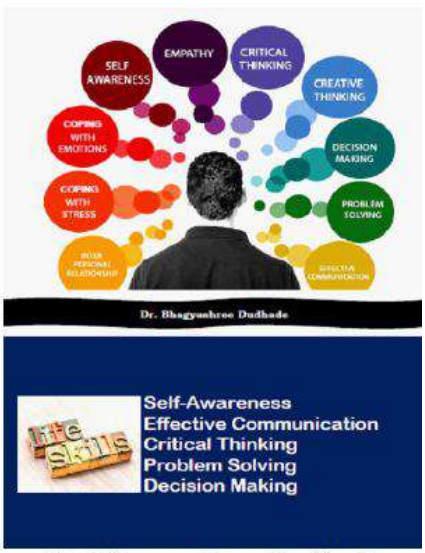

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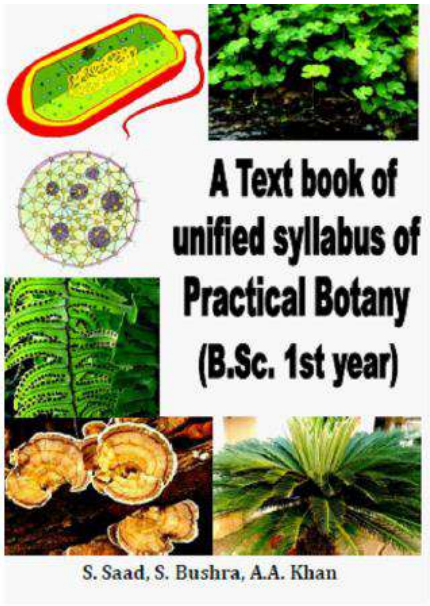

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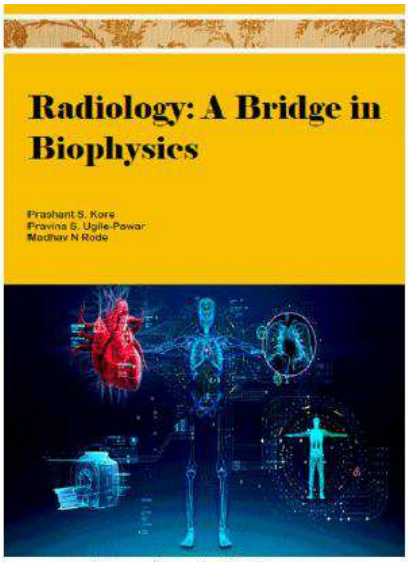

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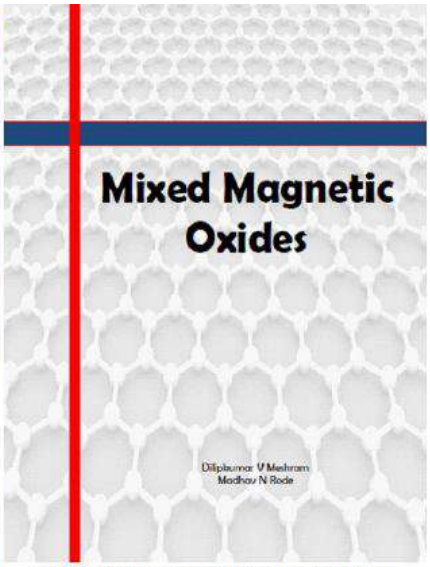

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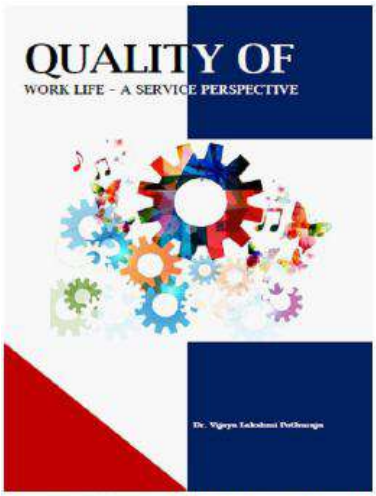

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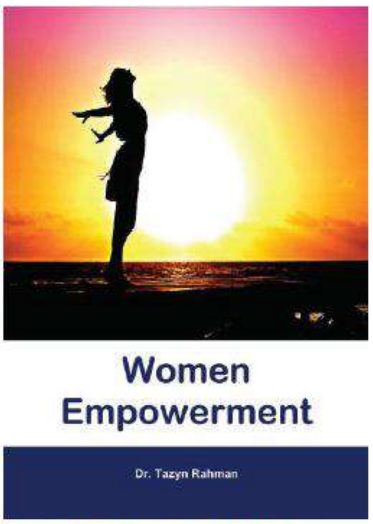

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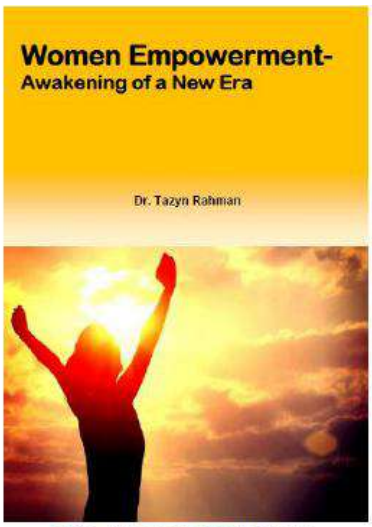

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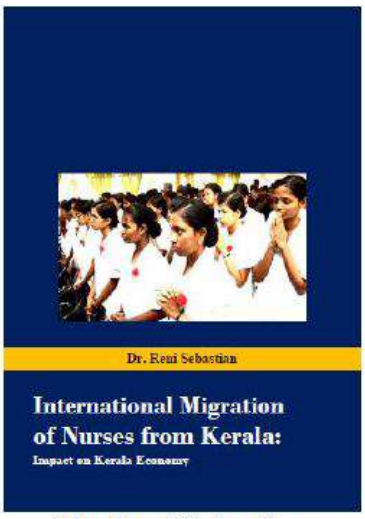

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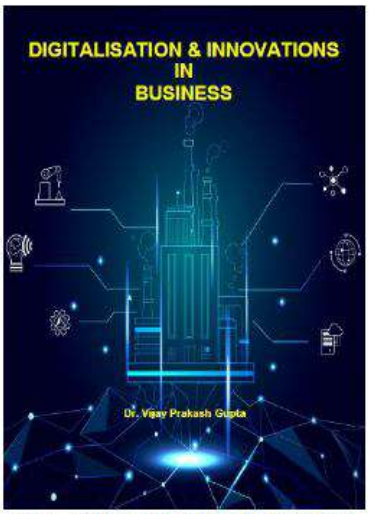

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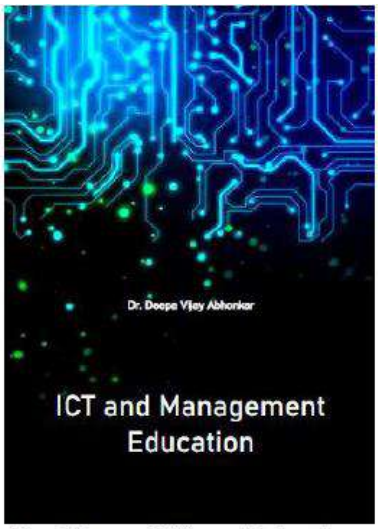

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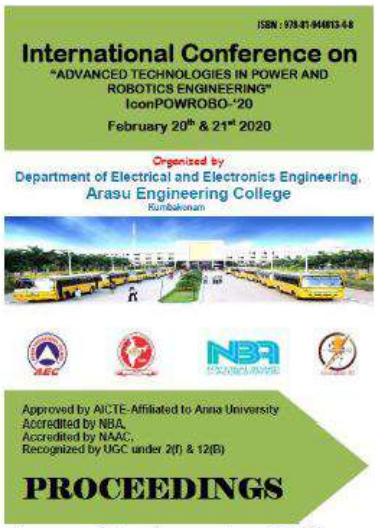

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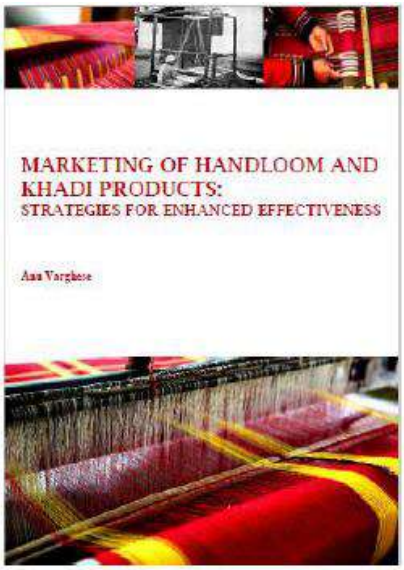

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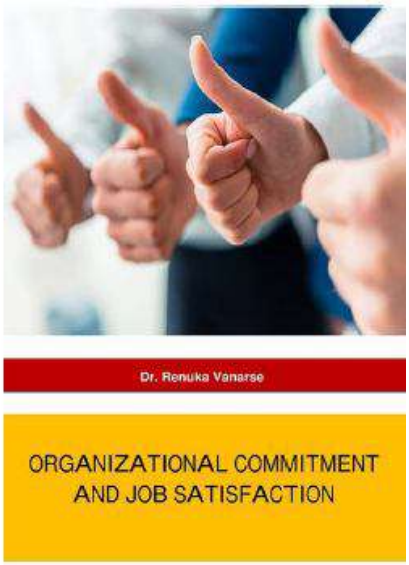

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