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PATTERN MINING AND SOCIETY INPUT PRIVACY ISSUES

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ABSTRACT

When most people think of ethics or morality, it refers to well-defined standards of right and wrong, usually in terms of rights, obligations, and benefits to society, fairness, or specific virtues. As technology advances, computers continue to have a greater impact on society. The world-wide-web in its current form, linking heterogeneous data from distributed sources, has led to a number of concerns about issues related to privacy, copyright, and intellectual property. The benefits of such a Web are plenty but threats to personal information in such as social networking sites also abound. Privacy is essential for the proper functioning of a liberal, democratic society.

KEYWORDS

Knowledge Discovery, Pattern Recognition, Data Mining, Smart Services, Society, IT, Privacy, Security, Heterogeneous Data, India Tomorrow, India Talent etc.

INTRODUCTION

We are in an age often referred to as the information age. In this information age, because we believe that information leads to power and success. Unfortunately, these massive collections of data stored on disparate structures very rapidly became overwhelming. This initial chaos has led to the creation of structured databases and database management systems (DBMS). Confronted with huge collections of data, we have now created new needs to help us make better managerial choices. These needs are automatic summarization of data, extraction of the "essence" of information stored, and the discovery of patterns in raw data. Extraction of interesting patterns or knowledge from massive data is Data Mining. A set of items, subsequences or substructures that occur frequently together (or strongly correlated) in a data set are called Patterns. Patterns represent intrinsic and important properties of datasets. Uncovering patterns from massive data sets are called Pattern Discovery. In terms of Data View, there are 3 types: Structured, Semi-Structured and Unstructured Data. In this paper, we are going to cover unstructured data. As our Honorable Indian Prime Minister Shri Narendra Damodardas Modi who is dynamic, dedicated and determined focusing on Digital India & Skill India concept and once said this equation "**IT** (Information Technology) **+ IT** (India Talent) **= IT (India Tomorrow)**"[1]. Building a digital India where there is a major source of abundant data through science & engineering and web & computerized society. **Unstructured Data** consists of:

- Text Data and Web Data,
- Spatial and Spatiotemporal Data,
- Multimedia Data,
- Data Streams & Sensor Data,
- Time-Series Data, temporal Data, Sequence Data,
- Graphs, Social networks & Information networks.

India has always been a forerunner in adopting Information Technology. IT is all set to play an even bigger role in addressing the challenges for all round development of the economy through forward looking technologies like e-governance, e-health, e-security, e-education, etc. It will serve as the key change agent to empower and bring harmony and would continue to be the growth engine of "new" India – "***Information Technology for India Tomorrow"***.

PRIVACY BREACH

Let us take one real time example that happened – Jewellers misuse PAN Card details from Railway reservation charts. As per Commercial Circular No. 5 of 2011 issued wide Letter No.2010/TG.1/20/P/Tatkal dt.28.01.2011, Tatkal tickets shall be issued only on production of one of the 8 prescribed proofs of Identity. One among them is PAN CARD. The details of the Identity proof shall be captured by the system and indicated on reserved tickets as well as on the reservation charts.

[1]*National Convention on IT for IT 2015* organized by Computer Society of India in collaboration with Vizag Steel.
*IR as per the above direction display PAN CARD DETAILS along with other details of reserved passenger's, in the reservation chart pasted outside the Coach.

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This practice has become a boon for benami transactions .In an attempt to combat black money; Government of India by Finance Act 2012 has made it mandatory traders like Jewellery dealers to collect tax (TCS) from customers on purchase of jewellery exceeding Rs.5 lakhs.

While complying with TCS rules for collection, payment and uploading of TCS information (E-filing of TDS returns), Jewellery dealers have to furnish PAN of customers. For certain customers, it is not convenient to provide PAN as they may have constraints in explaining the source. In such cases to accommodate high net worth customers, unscrupulous traders have an easy source of benami PAN particulars from reserved railway passengers chart.

After such illegal use of PAN CARD details of unconnected taxpayer, there is almost 6-12 months' time for the PAN holder to know that a transaction of above nature has taken place in his name and only if he goes through Form 26.

The Income Tax Department will first initiate action from the taxpayer side asking him to prove that he /she has not carried on the above transaction. The onus lies on the genuine taxpayer for fault committed by the traders.

Hence, Akhil Bharatheeya Grahak Panchayat (ABGP) requested by its memorandum that the Indian railway's either withdraw pan card as one of the prescribed proofs of identity for tatkal reservation or publish either the English alphabet part or numeric part and not the full details of pan card in the reservation charts displayed on the railway compartments to safeguard the interest of railway reserved passengers.

The problem of privacy-preserving data mining has become more important in recent years because of the increasing ability to store personal data about users, and the increasing sophistication of data mining algorithms to leverage this information.

DATA MINING AND KNOWLEDGE DISCOVERY

Data Mining, also popularly known as Knowledge Discovery in Databases (KDD), refers to the nontrivial extraction of implicit, previously unknown and potentially useful information from data in databases. While data mining and knowledge discovery in database (or KDD) are frequently treated as synonyms, data mining is actually part of the knowledge discovery process. The following figure (Figure 1.1) shows data mining as a step in an iterative knowledge discovery process.

Figure-1

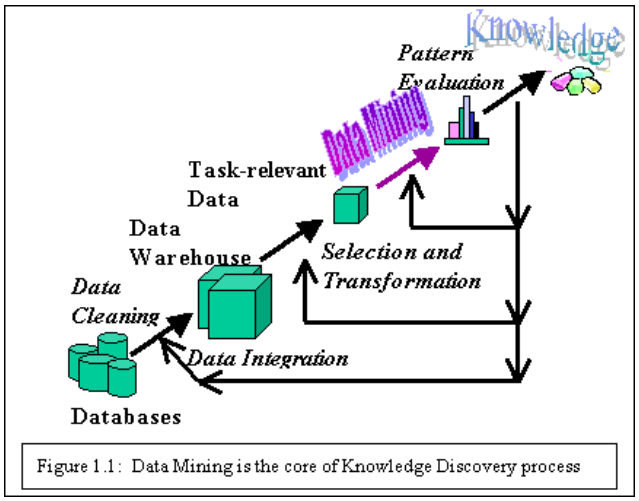

Figure 1.1: Data Mining is the core of Knowledge Discovery process

Sources: Authors Compilation

As shown in above figure, The Knowledge Discovery in Databases process comprises of a few steps leading from raw data collections to some form of new knowledge. In this paper, we are going to see Pattern discovery under the Pattern Evaluation process.

The handful of data mining techniques that have been developed for relational data include probabilistic relational models (PRMs) (Friedman, Getoor, Koller, and Pfeffer 1999), Bayesian logic programs (BLPs) (Kersting and de Raedt 2000), first-order Bayesian classifiers (Flach and Lachiche 1999), and relational probability trees (RPTs) (Jensen and Neville 2002). In each of these cases, both the structure and the parameters of a statistical model can be learned directly from data, easing the job of data analysts, and

greatly improving the fidelity of the resulting model. Older techniques include inductive logic programming (ILP) (Muggleton 1992; Dzeroski and Lavrac 2001) and social network analysis (Wasserman and Faust 1994).

For example, relational probability trees (RPTs) were applied to learn models that predict the box office success of a movie based on attributes of the movie and related records, including the movie's actors, directors, producers, and the studios that made the movie.

SECURITY AND SOCIAL ISSUES

Security is an important issue with any data collection that is shared and/or is intended to be used for strategic decision-making. In addition, when data is collected for customer profiling, user behavior understanding, correlating personal data with other information, etc., large amounts of sensitive and private information about individuals or companies is gathered and stored. This becomes controversial given the confidential nature of some of this data and the potential illegal access to the information. Moreover, data mining could disclose new implicit knowledge about individuals or groups that could be against privacy policies, especially if there is potential dissemination of discovered information. Another issue that arises from this concern is the appropriate use of data mining. Due to the value of data, databases of all sorts of content are regularly sold, and because of the competitive advantage that can be attained from implicit knowledge discovered, some important information could be withheld, while other information could be widely distributed and used without control.

DATA SOURCE ISSUES

There are many issues related to the data sources, some are practical such as the diversity of data types, while others are philosophical like the data glut problem. We certainly have an excess of data since we already have more data than we can handle and we are still collecting data at an even higher rate. If the spread of database management systems has helped increase the gathering of information, the advent of data mining is certainly encouraging more data harvesting. The current practice is to collect as much data as possible now and process it, or try to process it, later. The concern is whether we are collecting the right data at the appropriate amount, whether we know what we want to do with it, and whether we distinguish between what data is important and what data is insignificant. Regarding the practical issues related to data sources, there is the subject of heterogeneous databases and the focus on diverse complex data types. We are storing different types of data in a variety of repositories. It is difficult to expect a data mining system to effectively and efficiently achieve good mining results on all kinds of data and sources. Different kinds of data and sources may require distinct algorithms and methodologies. Currently, there is a focus on relational databases and data warehouses, but other approaches need to be pioneered for other specific complex data types. A versatile data-mining tool, for all sorts of data, may not be realistic. Moreover, the proliferation of heterogeneous data sources, at structural and semantic levels, poses important challenges not only to the database community but also to the data mining community.

PRIVACY ISSUES

Data mining (or simple analysis) on people may come with a profile that would raise controversial issues of:

- Discrimination,
- Privacy,
- Security.

Examples:

- Should males between 18 and 35 from countries that produced terrorists be singled out for search before flight?
- Can people be denied mortgage based on age, sex, and race?
- Women live longer. Should they pay less for life insurance?

There are three (3) Categories on privacy issues arising out of data mining:

- **I/P Privacy (or data hiding)**: Distort or hide data to prevent the miners from reliably extracting confidential or private information.
- **O/P Privacy (or Knowledge hiding):** No disclosure of sensitive patterns or knowledge from datasets.
- **Owner Privacy:** Does not allow any party to reliably learn the data or sensitive information that the other owners hold (i.e., the source of the data)

In this paper, we are going to look about Privacy-Preserving Pattern Mining.

ENSURING INPUT PRIVACY

Approach-1: Service provider anonymizes user's private information – B2B (business-to-business) environment however do you really trust them?

Approach-2: Data anonymized/perturbed at the data source itself by applying methods like Data perturbation, transformation, or hiding (hide sensitive attributes) – B2C (business-to-customer) environment: Anonymized likely by a 3rd – party vendor as shown in below Table-1.

Table-1: Ensuring Input Privacy by Data Anonymization

ID	ZIP	Age	Disease
1	61801	45	Heart
2	61848	49	Cancer
3	61815	41	Flu
4	61804	32	Diabetes
5	61802	38	Diabetes
6	61808	39	Flu

ACTUAL DATA

ID	ZIP	Age	Disease
1	618**	4*	Heart
2	618**	4*	Cancer
3	618**	4*	Flu
4	618**	3*	Diabetes
5	618**	3*	Diabetes
6	618**	3*	Flu

DATA PERTURBATION

Sources: Authors Compilation

DATA PERTURBATION

Statistical Distortion: *Using randomization algorithms*

- Independent attribute perturbation: Values in each attribute perturbed independently.
- Dependent attribute perturbation: Take care of correlations across attributes.

Randomization protects information at the individual level. Randomization usage will protect Privacy by returning $\mathbf{x_i + r}$ instead of $\mathbf{x_i}$, where **r** is a random value drawn from a distribution such as Uniform or Gaussian.

Statistical Databases: provide statistical information without compromising sensitive information about individuals:

Query Restriction:

- Restrict the size of query result,
- Control overlap among successive queries,
- Keep audit trail of all answered queries,
- Suppress small data cells,
- Cluster entities into mutually exclusive atomic populations.

Data Perturbation:

- Replace the original database by a sample from the same distribution,
- Sample the result of a query,
- Swap values between records,
- Add noise to the query result,
- Add noise to the values.

Negative results: cannot give high quality statistics and simultaneously prevent partial disclosure of individual information.

FUTURE SCOPE OF RESEARCH

The key future directions in the field of privacy-preserving data mining are as follows:

- Privacy-Preserving Data Publishing,
- Changing the results of Data Mining Applications to preserve privacy,

- Query Auditing,
- Cryptographic Methods for Distributed Privacy,
- Theoretical Challenges in High Dimensionality.

CONCLUSION

Any new adoption of technology comes with its own set of challenges, most explicitly in areas of trust and security, standardization and governance. A potential adverse side effect of data mining – privacy could be compromised: Privacy and accuracy are typically contradictory in nature. Improving one often incurs a cost on the other. Many research issues on pattern discovery are still waiting to be solved. It is a process of human evolution, which is natural, even faster pace of technology changes impact the human existence far more drastically and significantly.

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IMPACT OF INFORMATION TECHNOLOGY ON EDUCATIONAL SECTORS: A STUDY WITH REFERENCE TO ENGINEERING COLLEGES IN INDIA

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ABSTRACT

The purpose of this study is designed to provide as comprehensive report on impact of Information Technology in engineering colleges. This technology gives advantage to Educational sectors. Information technology (IT) has influenced every aspect of our lives and cultures. Without IT-based applications, it would be difficult to keep information stored securely, process information efficiently and communicate conveniently. IT will not only continue playing a key role in the convergence of computing, communications and all other aspects of computational science and applications but will also influence the future's roadmap in many significant areas. In this context, the study aims to give particular attention about how information technology plays a vital role in the education sectors and to suggest some helpful measures to promote the involvement of information technology in education sector. The Government also took many steps for development of Information Technology in Educational sectors. Mainly it plays a vital role in Engineering Students.

KEYWORDS

Information Technology, Educational Sectors etc.

INTRODUCTION

Information Technology covers a broad spectrum of hardware and software solutions that enable organizations to gather, organize, and analyze data that helps them achieve their goals. It also details technology-based workflow processes that expand the capacity of an organization to deliver services that generate revenue. The four focuses of IT personnel are business computer network and database management, information security, business software development, and computer tech support because the necessity for information technology is king. With the emerging popularity of the Cloud technology, many organizations are taking this up as an alternative to actual hardware using up space. Cloud computing service providers manage IT infrastructure and platforms, and provide businesses with access to remote data storage and software packages.

The significance of integrating technology use in higher education instruction is undeniable. The benefits include those related to access to instruction by underserved populations, adequately preparing students for future careers, capitalizing on best instructional practices, developing higher order thinking activities, and engaging students whose relationships with technology are increasingly native, among others. The significance of the current study is because few prior studies focused on the factors that support, or inhibit, the use of educational technology by faculty in schools of education.

The availability of computers in classrooms has increased four-fold within the past decade. Classroom technologies have been focused on easing teacher workload such as through use of online assessments and record keeping. To capitalize on the positive impact such technologies can have on student achievement; they must be authentically integrated into daily instruction (Kopcha, 2010). In 2005, nearly all large higher education institutions offered some online course delivery.

Enrollment in online courses has been on a sharp incline since. It is suspected that institution size is an important factor in the effective use of education technology (Chen, 2005). While Saeed, Yang, and Sinnappan (2009) examined the role of learning styles in achievement, they found technology preferences as having a much greater impact. They suggest that current students are far more flexible with learning styles than those of the past. Since the focus of their study was students in IT fields, they suggest examining similar variables in non-science-based disciplines. Young minds enable themselves to absolve surroundings information for informed decision making at any later stage in life and their they are enlightened to accept new ideas expose creativity, and develop critical thinking. Computer is not very valid for us because we cannot afford it due to our underdevelopment stage.

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REVIEW OF LITERATURE

Davies, et al, (2000) reported that a guiding principle in the integration of Information Technology in the Education System should be evidence-based policy formulation. It has been acknowledged that "whichever part of the public sector one is concerned with, one observation is clear: the current state of research-based knowledge is insufficient to inform many areas of policy and practice. Saeed (2000) rightly noted that in Pakistan, IT is becoming a necessity. Students of Universities frequently use libraries equipped with technology and push to IT in education setups. The Government in IT, and majority being spent on human resource development and enabling infrastructure provision is investing millions of dollars. The Government of Pakistan is leading the technology revolution in the country in various projects aimed at improving infrastructure, human resource development and integrating IT in the public and private sector. Bates, (2001) addresses the issue of IT usage in his study and claims that campus-based activities and private sector training markets have been the largest users of IT tools and applications, and that the education sector has incorporated Internet use for many years. Additionally, he says that since a knowledge-based economy demands technology-ready workers, governments and business communities put enormous pressure on educational institutions to use IT in their daily routine tasks.

Daniel (1996) stated that as modern systems in IT laptop and other devices bringing a rapid change in the education sector, information technology is very important for the education sector today. Information technology is not only a subject, but it can be applied to any topic; there is big opportunity for all the students to get information from the internet. The 21st century demands ICT skills in all fields, most importantly for education, employment and for everyday life. Today employers demand confidence and efficiency in ICT use either they are at academic level or at industry level; because ICT skills are crucial in the context of job skill demand. Thus, this presents an enormous challenge to the educators; they are expected to equip students with relevant, up-to-date, and high-quality ICT experience before students emerge into the employment world. Volman (2001) describe that Informational technology has enabled institutions to cut expenses, by eliminating the require for physical transportation and reducing the want for facility. The National Center for Academic Transformation, colleges offering many facilities and data for the students on the web for the educational purposes. Seventy percent of these students passed the course with a rating of "C" or higher, compared to 62 percent of students in traditional classes. The university also saved 30 percent over the cost of traditional classes. Foulger and Williams (2007) have been critical of teacher preparation programs for addressing technology standards in a single, stand-alone course. Rather, they advocate a more integrated design where technology has an integral role in delivering core content. They also identified the importance of collaboration in maintaining effective use of new technology practices. Similarly, Nicholas and Ng (2009) examined engagement, collaboration and learning within online environments. They used a mixed methods design and found that the relationship with the instructor was pivotal in successful online learning experiences. As facilitators, instructors can create a spotlight venue for students, which increase motivation and engagement. This involves the expectation that student artifacts will be made, at least partially, public.

METHODOLOGY USED

The methodological techniques and ways of analyzing the observations play an important role in social research. According to Nachmias (1981) "The scientific methodology is a system of explicit rules and procedures upon which research is based and against which the claims for knowledge are evaluated" According to Young (1959), social research is the systematic method of discovering new facts, or verifying old facts, their sequences, interrelationship, causal explanation and the natural laws which govern them.

Questionnaire: A two page, Questionnaire was designed keeping in mind the objectives of the study, which were to analyze the impact of Information Technology on Educational Sectors. The literature survey and pre study consultation with Educational and IT experts were taken into account. The questionnaire consisted of few open-ended questions, some questions were either using ranking scale or Likert scale, and dicotomes type of questions.

Tools Used: Questionnaire and personal Interview method used for primary data collection.

Sample Size: 100, the data is collected using a random sample of consumers. Consumers who have significant knowledge of the topic were identified and selected at random for questioning.

Sampling Frame: The sampling frame of the present research is citizens of four locations having knowledge of IT and uses IT for education purpose.

Tools for Data Collection: All the respondents are interviewed on demographic segmentation and technical usage of IT.

Secondary Data: Secondary data was collected through research papers, Newspapers, journals, websites, books, project reports and so on.

OBJECTIVES OF STUDY

- To know the impact of information technology in the Education sectors.
- To study about socio-Economic-cultural factors which influence on Educational sectors.
- To know the relation between Information Technology and Educational sectors.
- To know level of acceptance of Information technology by the educational sectors.
- To suggest helpful measures to promote the involvement of information technology in education sector.

DEFINITION

Stands for "Information Technology" and is pronounced "I.T." It refers to anything related to computing technology, such as networking, hardware, software, the Internet, or the people that work with these technologies. Many companies now have IT departments for managing the computers, networks, and other technical areas of their businesses. IT jobs include computer programming, network administration, computer engineering, Web development, technical support, and many other related occupations.

DATA ANALYSIS AND INTERPRETATION

Table-1: Age

	Frequency	Percentage
21-30	90	90
31-40	4	4
41-50	6	6
Total	100	100

Sources: Authors Compilation

From the above table, it indicates 90% of respondents are 21-30 age 4 % are 31-40 and 6% are 41-50 age.

Table-2: Gender

	Frequency	Percentage
Male	65	65
Female	35	35
Total	100	100

Sources: Authors Compilation

From the above table, it indicates 65% of Respondents are Male and 35 % are female.

Table-3: Household Income

	Frequency	Percentage
5000-15000	15	15
15000-25000	21	21
25000-35000	46	46
More than 35000	18	18
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that 15% of respondents are having income level of 5000-15000, 21% are 15000-25000, 46 % are 25000-35000 and remaining 18% are more than 35000.

Table-4: Education

	Frequency	Percentage
BSC	5	5
B.Tech	74	74
MCA/ MBA	6	6
M.Tech	15	15
Others	0	0
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that Most of the (74%) of the respondents are from B. Tech, 15 % are M. Tech, 6% are MCA / MBA and 5% are BSC.

Table-5: Education Sector of India as Developed One

	Frequency	Percentage
Yes	55	55
No	45	45
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that 55% of respondents accepted Educational sector of INDIA as developed one and 45 % are not accepted.

Table-6: Is there importance to IT in Educational Development

	Frequency	Percentage
Yes	95	95
No	5	5
Total	100	100

Sources: Authors Compilation

From the above table, it indicates most of the Respondents are (95%) are agreed there is an importance to IT in educational sectors and 5 % are not.

Table-7: Rate the present Technology Development in Educational Institutions

	Frequency	Percentage
Excellent	32	32
Good	26	26
Average	28	28
Not good	14	14
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that only 32% of Respondents said Educational Institutions have developmental technology 28% said Average 26% said good and 14% of respondents said not good.

Table-8: Is present education system copes with IT

	Frequency	Percentage
Yes	73	73
No	27	27
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that 73 % of respondents accepted present educational system copes with IT and 27% are not.

Table-9: Opinion regarding the level of adoption about the use of Information Technology

	Frequency	Percentage
Equal	42	42
Sufficient	34	34
To some Extent	11	11
Not cope with them	13	13
Total	100	100

Sources: Authors Compilation

From the above table, it indicates 42% of respondents said equal level of adoption about the use of Information Technology 34 % are sufficient 13 % are said not cope and 11% of respondents said some extent.

Table-10: Relation between Educational sector development and IT

	Frequency	Percentage
Yes	54	54
No	46	46
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that 54 % of are accepted that there is a relation between Educational sector development and IT and 46 % of respondents are not accepted.

Table-11: Is IT an Easy Way to Online Education

	Frequency	Percentage
Yes	69	69
No	31	31
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that 69% of respondents said IT is an easy way to online education and 31% are said it is not an easy way.

Table-12: Level of IT in Engineering Colleges

	Frequency	Percentage
Advanced	32	32
Traditional	56	56
Simple	12	12
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that 56 % of respondents said level of IT in Engineering colleges is traditional 32 % are said advanced and 12% are said simple level of IT.

Table-13: How Much IT Shows Impact on Student Learning

	Frequency	Percentage
Great Extent	41	41
Some Extent	39	39
Not at all	20	20
Total	100	100

Sources: Authors Compilation

From the above table, it indicates most of the respondents said IT shows impact on Student learning 39% said some extent and 20% of respondents said not at all.

Table-14: Is there any improvement in teaching methods of Faculties along with cope up of IT

	Frequency	Percentage
Yes	67	67
No	33	33
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that 67% of respondents said there is an Improvement in teaching methods of Faculties along with cope up of IT and 33% are said no.

Table-15: Is Present Educational Curriculum supports IT

	Frequency	Percentage
Yes	87	87
No	13	13
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that most of the respondents (87%) said Present educational curriculum supports IT and 13 % are said not support.

Table-16: How can IT helps Achieving Educational Goals

	Frequency	Percentage
Great Extent	63	63
Some Extent	28	28
Not at all	9	9
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that 63% of Respondents said in great extent IT helps in achieving Educational goals 28 % said some extent and 9% said not at all.

Table-17: Is Indian Government Takes any Initiation Steps To Conduct Awareness Programmes on IT Importance.

	Frequency	Percentage
Yes	44	44
No	56	56
Total	100	100

Sources: Authors Compilation

From the above table, it indicates that 56 % of respondents said government is not conduct any awareness programmes on IT and 44% said yes.

FINDINGS

- A huge majority of respondents are from 21-30 age groups from Andhra Pradesh region of India.
- In this research, most of the respondents are male.
- 46% of respondents are having monthly income of 25000-35000.
- Huge respondents are engineering students.
- In this research 55 % of respondents agreed with Education sector in INDIA is developed one.
- Majority of the respondents said there is an importance to IT in educational sector.
- Majority of the respondents said Present technology in education is good.
- 73% of respondents said present educational system copes with IT.
- 42% of respondents said equal level of adoption about the use of Information Technology 34% are sufficient 13% are said not cope and 11% of respondents said some extent.
- 54% of are accepted that there is a relation between Educational sector development and IT and 46% of respondents are not accepted.
- 69% of respondents said IT is an easy way to online education and 31% are said it is not an easy way.
- 56% of respondents said level of IT in Engineering colleges is traditional 32% are said advanced and 12% are said simple level of IT.
- Most of the respondents said IT shows impact on Student learning.
- 67% of respondents said there is an Improvement in teaching methods of Faculties along with cope up of IT and 33% are said not cope up of IT.
- Majority of the respondents agreed that Present educational curriculum supports IT.
- 63% of Respondents said in great extent IT helps in achieving Educational goals.
- 56% of respondents said government is not conduct any awareness programmes on IT.

RECOMMENDATIONS

There is a need to government has to take initiation for development of IT in educational institutions. Along with development of IT there is a need to faculty also learn and implement in teaching methods. A student has to shows active participation in learning of IT along with their studies. Educational institutions also plan their curriculum along with IT development.

RESULTS

There is a strong relation between IT and Educational sectors. It is very important to countries like INDIA adopt new IT technologies in educational curriculum for cope up of students with modern trends. The evolution of information technology reached a turning point with the development of the Internet. Once a government project, the Internet was created for military purposes. As many people believe that level of information technology in INDIA should be traditional neither simple nor advanced so that its economic institutions may develop and INDIA will be an educated flourishing and developing country. Information and communications technologies (ICTs) are powerful tools for empowerment and income generation in developing countries like INDIA. Therefore, there is a need more concentrate on IT in educational institutions.

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MULTI-FOCUS IMAGE SYNTHESIS BASED ON DWT AND TEXTURE WITH SHARPENING

C. Rama Mohan[6] Dr. S. Kiran[7] R. Pradeep Kumar Reddy[8]

ABSTRACT

Image synthesis is a technique that combines the several details of multiple input images together, in such way gets the new image in that all objects are in focused and visual for human observation. In this paper, the proposed method based on DWT and Texture with sharpening gives better results than compared to previous methods like DWT and DWT plus Texture.

KEYWORDS

Image Fusion, Discrete Wavelet Transform (DWT), Texture, Sharpening etc.

INTRODUCTION

Image Synthesis is a process of combining the significant particulars from multi-focus images into a single image, where the synthesized image will be more detailed than compared to any one of the input images, without giving particulars that are not present in the input images. Image fusion techniques can improve the quality and increase the application of these data. There are several types input images such as, Multi focus or Multi temporal, Multi sensor, Multimodal. The image synthesis process has several significant necessities such as:

- The synthesized image should conserve all features from the input images.
- The image synthesis process should not produce wrong results due to artifacts [2].

In image synthesis process, image registration is the first step, that transforms the several sets of data into a harmonize system. The applications of Image fusion find in several areas of satellite imaging for remote sensing, object detection and recognition, navigation guidance, medical diagnosis, military and civilian surveillance, etc. By using simple primitive techniques will not get better results in terms qualitative metric such as entropy. Recently, Discrete Wavelet Transform (DWT) and Combination of DWT with Texture have been popular image synthesis techniques. These methods produce better results than compared to simple primitive techniques.

Image synthesis algorithms can be classified into three types: pixel, feature and decision levels. Pixel level image synthesis algorithm depends on the pixels of source images while feature level image synthesis algorithm depends on features extracted from the source images. Pixel level is a low level of image synthesis that is used to examine and combine data from different sources before original information is estimated and recognized. Feature level is a middle level of fusion, which extracts important features from an image such as shape, edges, length, direction and segments. Decision level is a high level of fusion, which points to actual target [1].

The process of image synthesis is the better content from each of the input images are combined together to form a resultant fused image whose quality is greater than compared to any one of the input images**.** Image synthesis methods can be divided into two groups such as spatial domain fusion method and transform domain synthesis [2].

Spatial domain synthesis method directly works on pixels of input images. The synthesis methods such as averaging, simple minimum, simple maximum, component analysis (PCA) and IHS based methods comes under spatial domain techniques. In transform domain method image is first transferred in to frequency domain. The synthesis methods such as DWT fall under transform domain method.

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DISCRETE WAVELET TRANSFORM METHOD

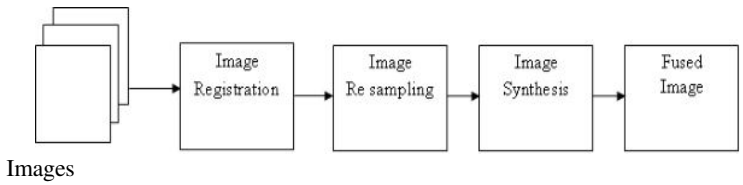
Introduction

Wavelets are oscillatory functions with finite duration, finite energy and zero average value. They are appropriate for study of transient signal. The irregularity and good localization properties make them better basis for study of signals with discontinuities. Wavelets can be illustrated by using two functions viz. the scaling function f (t), also called as 'father wavelet' and the wavelet function or 'mother wavelet'. Mother wavelet (t) goes through translation and scaling operations to give self-analogous wavelet families as given by Equation.

$$\psi_{c,d}(t) = \frac{1}{\sqrt{c}}\psi\left(\frac{t-d}{c}\right), \quad (c, d \in R), c>0$$

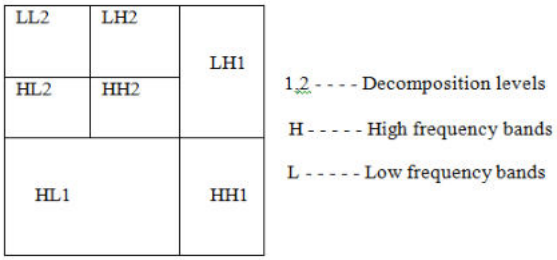
Wavelet transform is a technique that decompose image into four sub images, each image represents the same image, but difference in its frequency. It is an eminent technique for analyzing signals. When DWT is performed, the image is decomposed into four parts such as, one is approximation component (LL) and remaining three are detail components (HL, LH and HH). 2-D Discrete Wavelet Transformation (DWT) converts the image to frequency domain from the spatial domain. The LL band contains the average image information while the other bands contain directional information due to spatial orientation [3]. The basic steps carry out in image synthesis is shown in figure below:

Figure-1: Preprocessing of Image Fusion



Sources: Authors Compilation

Figure-2: Wavelet Decomposition



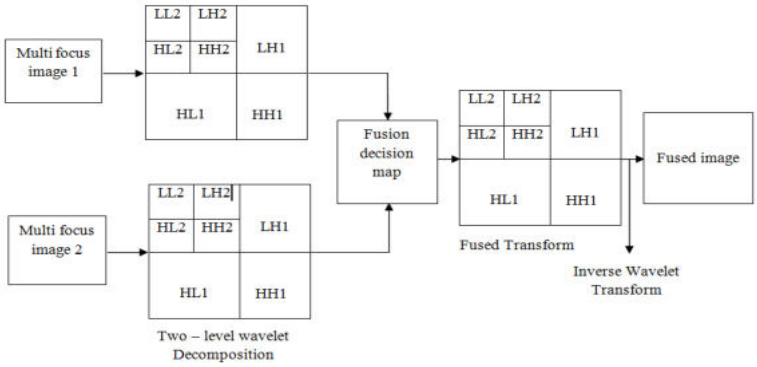
Sources: Authors Compilation

DWT is applied on the previously registered images, and then wavelet coefficients are generated for input images by this operation. A synthesis rule has to be applied on these coefficients then synthesized image is obtained using inverse wavelet transform. At each level are acquired two sets of coefficients, approximation (LL) and detail (HL, LH and HH). First, carry out the DWT in the vertical track, followed by the DWT in the horizontal direction. After the first stage of disintegration, obtain four sub-bands: LL1, LH1, HL1, and HH1. For each consecutive level of wavelet disintegration, the LL sub band of the prior level is used as the input. To perform DWT on second level applied DWT on LL1 and for third Level disintegration applied DWT on LL2 and finally get four sub-band of third level that are LL3, LH3, HH3, HL3 shown in Fig.2 [3]. At many different resolutions, a single image is represented simultaneously (1x1, 2x2, 4x4, …, 2Nx2N). At every level create four new images of size (2N-1) x (2N-1).

General Process of Image Synthesis Using DWT

Step1**:** Discrete Wavelet Transform implemented on both the input images to create decomposed Image.
Step2**:** Synthesize the each disintegration level by using several synthesis rules.
Step3**:** Carry out the Inverse Discrete Wavelet Transform on synthesized decomposed image,
Then obtain reconstructed image [2].

Figure-3: Wavelet Based Image Fusion



Sources: Authors Compilation

DWT WITH TEXTURE FEATURES BASED IMAGE SYNTHESIS

The high-frequency sub-band and low-frequency sub-band of the source image decomposed by wavelet have significant texture salience. For multi-focus image, the higher texture salience denotes the important visual meaningful information such as image texture and edge. The multi-focus images describing the same scene have the different texture salience in corresponding goals. The goals possessing the higher clarity in a source image have the larger texture salience than other source images in the same region. The texture feature can characterize this kind of texture salience. Texture feature-based image fusion method is to select the coefficients from the source images with higher texture saliency as the coefficients of the fused image.

A. Texture Features Measurement

Image texture is defined as the spatial deviation in pixel intensities i.e., gray values. Texture calculated in two ways such as co-occurrence matrix method and run-length matrix method. In this paper, use co-occurrence matrix method [4].
An algorithm for texture feature extraction as follows [4]:

- Read the input image and store it in a buffer.
- Requantize the input image to the required gray level, in order to reduce computation time.
- Set window size for feature calculation.
- For each window around a pixel, perform the following:
  i) Calculate the co-occurrence matrix (GLCM),
  ii) Calculate the feature value,
  iii) Store it in the corresponding position,
- Find the minimum and maximum value.
- Normalize the feature value by intensity mapping from 0 to 255.
- Display the resultant feature image.

B. Procedure for GLCM

- Create framework matrix,
- Decide on the spatial relation between the reference and neighboring pixel,
- Count the occurrences and fill in the framework matrix,
- Add the matrix to its transpose to make symmetrical,
- Normalize the matrix to turn it into probabilities,
- The calculation for symmetrical normalized GLCM is follows:

$$T_{i,j} = \frac{Pi,j}{\sum_{i,j=0}^{N-1} Pi,j}$$

Where $T_{i,j}$ is defined as the texture measurement at location (i,j), is$P_{i,j}$ defined as the each pixel in the GLCM. From that texture measurement, we can calculate the texture features like:

$$Contrast = \sum_{i,j=0}^{N-1} T_{i,j}\,(i-j)\text{^}2$$

$$Dissimilarity = \sum_{i,j=0}^{N-1} T_{i,j}\,|i-j|$$

$$Homogeneity = \sum_{i,j=0}^{N-1} \frac{T_{i,j}}{1+(i-j)\text{^}2}$$

- Angular second moment (ASM) and energy:

$$ASM = \sum_{i,j=0}^{N-} T_{i,j}\text{^}2$$

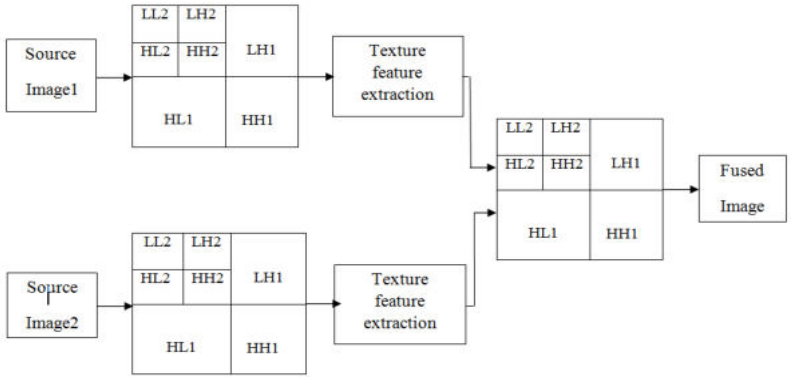
$$Energy = \sqrt{ASM}$$

$$Entropy = \sum_{i,j=0}^{N-1} T_{i,j}\,(-ln\,T_{i,j})$$

$$Correlation = \sum_{i,j=0}^{N-1} T_{i,j} \left[\frac{(i-\mu_i)(j-\mu_j)}{\sqrt{(\sigma_i\text{^}2)(\sigma_j\text{^}2)}} \right]$$

C. Fusion of Wavelet Coefficients with Texture Features

Figure-4: Image Fusion Based on Texture Features



Sources: Authors Compilation

Let $\alpha_A(i,j)$ and $\alpha_B(i,j)$ be the wavelet transform coefficient of the source image A and B at location (i,j) respectively, then $E_A(i,j)$ and $E_B(i,j)$ will be obtained from the above energy equation. To the wavelet coefficients, we adopt texture energy to determine the wavelet coefficients of the fused image. Let $\alpha_F(i,j)$ be the wavelet transform coefficients of the fused image F at location (i,j). Similarly, we can fuse the set of images into single image by using all features [4].

$$\alpha_F(i,j) = \begin{cases} \alpha_A(i,j), \text{ if } E_A(i,j) \geq E_B(i,j) \\ \alpha_B(\text{i,j}), \text{ if } E_A(i,j) < E_B(i,j) \end{cases}$$

The step of image fusion is repeated at each pyramid sample position. Finally, the image is obtained by using the inverse wavelet transform.

SHARPENING OF SYNTHESIZED IMAGE

Image sharpening is a dominant tool for highlighting texture and drawing viewer focus. It is also essential of any digital photo at some point and knows where it is applied. Digital camera sensors and lenses blur an image to certain level for all time, for example, and this requires correction, however, not all sharpening methods produce equal quality in the perception. When carry out the sharpening too forcefully, unsightly sharpening artifacts may occur. Due to this, the sharpened images are not clear in the visibility. On the other hand, when sharpening done correctly, it can improve image quality [6].

Sharpening of digital image files are one of the most important aspects of image quality. Sharpening brings out feature and gives an image presence, but not all images should be sharpened to it level and even some areas within an image frequently require a specific sharpening. When it comes to sharpening, many factors need to be considered [5].

Human perception is very sensitive to boundaries and fine details of an image, and since they are collected primarily by high frequency components, the visual quality of an image can be exceptionally reduced if the high frequencies are attenuated. In contrast, enhancing the high-frequency components of an image leads to progress in the visual quality of image. Image sharpening refers to any enhancement method that highlights boundaries and fine details in an image. Image sharpening is extensively used in printing and photographic industries for mounting the local contrast and sharpening the images.

The main important point in efficient sharpening procedure lies in the selection of the high-pass filtering operation. Conventionally, linear filters have been used to employ the high-pass filter; however, linear methods can lead to undesirable results if the original image is corrupted with noise. A tradeoff between noise attenuation and edge highlighting can be acquired if a Weighted Median (WM) filter with suitable weight is used. To demonstrate this, consider a WM filter applied to a gray-scale image where the following filter mask is used.

$$W = \begin{bmatrix} 0 & 1 & 0 \\ 1 & -4 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

Sharpening create edges appear more defined by darkening the darker pixels and brightening the brighter pixels. This creates a crisp edge between light and dark section of the image, giving it extra contrast [7].

Example:

The below figure shows that, an unsharpened picture of a bowl of fruit. Notice the softness in the matt and on the surface of the fruits. Now here is the same bowl of fruit after applied a little sharpening.

Figure-5: Unsharped Image

Figure-6: Sharped Image

Sources: Authors Compilation

IMAGE QUALITY METRICS

The universal necessity of an image synthesis process is to conserve all valid and useful content from the source images, while at the same time it should not initiate any artifacts in resultant synthesized image. Quality metrics are used to measure the benefits of synthesis and used to compare results of different synthesis algorithms.

A. Entropy (EN):

Entropy is used to compute the amount of content present in the image. The privileged value of entropy indicates that the information increases and the synthesis performances are improved [2].

$$Entropy = \sum_{g=0}^{L-1} p(g) \log p(g)$$

Where p(g) is the probability of gray g, and the range of g is [0, ……., L-1]

EXPERIMENTAL RESULTS

The experiments have been carried out on set of multi focus images. Results of some of the methods are shown below:

Figure-7: Reference Image

Figure-8: Multi-Focus Image1

Figure-9: Multi-Focus Image2

Figure-10: Multi-Focus

Figure-11: Multi-Focus image4

Figure-12: Sharped Contrast Feature Image

Figure-13: Sharped Dissimilarity Feature Image

Figure-14: Sharped Homogeneity Feature Image

Figure-15: Sharped ASM Feature Image

Figure-16: Sharped ASM Feature Image

Sources: Authors Compilation

Description of Results

Simulations are performed using Mat lab software, which possesses excellent graphics and matrix handling capabilities. Mat lab has a separate toolbox for image processing applications, which provided simpler solutions for many of the problems encountered in the research. In paper, image fusion is done by objective measurement in which evaluations are automatic and mathematical

defined algorithms. A new image fusion technique using Texture analysis is a well-known objective evaluation algorithms for measuring image quality such as standard deviation and Entropy have used.

Following operations are performed in simulation.

Table-1

S. No.	Fusion Technique	Entropy Without Sharpening	Entropy With Sharpening
1	DWT & Texture ASM feature	6.6899	7.0021
2	DWT & Texture energy feature	6.6907	7.0015
3	DWT & Texture homogeneity feature	6.6994	7.0044
4	DWT & Texture Contrast feature	6.7095	7.0098
5	DWT & Texture Dissimilarity feature	6.7142	7.0112

Sources: Authors Compilation

- The Multi focus images are registered.
- The Wavelet transforms and texture analysis steps are performed on both images.
- The maximum frequency fusion rule is used for the fusion.
- An inverse Wavelet steps are performed on the fused image.

The multi-focus (image can be captured in different ways by single sensor) source images carried on fusion process. In this paper, there are four degraded images those are blurred with a Gaussian-smoothing kernel. While images are blurred with average filter most of the noise is added in the resultant fused image. So, use Gaussian-smoothing filter. In this paper, consider the image size of 256 by 256. It is not fixed. Whatever the size is not a problem.

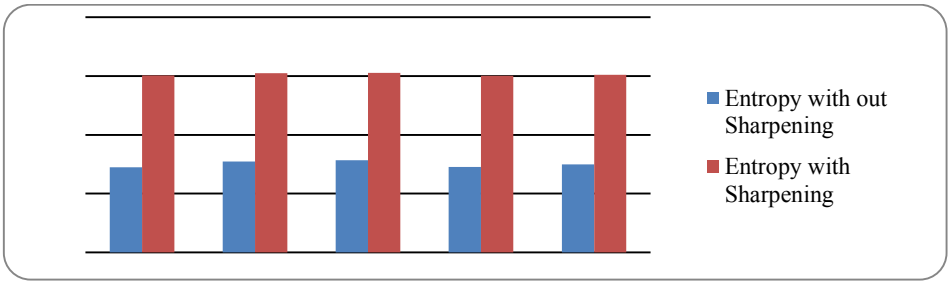
In experimental results figure 1 is a gray scale image that is taken as a reference image. The images from figure 2 to figure 5 are the multi focus images. These images are taken as input images for image fusion. Figure 6 represents the sharpened fused image based on texture contrast feature, figure 7 represents the sharpened fused image based on texture dissimilarity feature, Figure 8 represents the sharpened fused image based on texture homogeneity feature, Figure 9 represents the sharpened fused image based on texture ASM feature and Figure 10 represents the sharpened fused image based on texture energy feature.

Comparison of Different Fusion Methods

The above table shows the comparison of several fusion methods with and without sharpening. From this table conclude that fused image with sharpening gives better results than compared to fused image without sharpening. For deciding this use entropy as a performance metrics.

Graphical Representation of Image Synthesis Algorithms

Figure-17



Sources: Authors Compilation

CONCLUSION

Spatial domain image synthesis techniques afford high spatial resolution. However, the main problem of spatial domain is image blurring. The transform domain provides high quality spectral information than compared to spatial domain. Therefore, image synthesis performs based on Discrete Wavelet Transform, which gives better results. The combination of DWT and Texture with

sharpening, the quality of synthesized image still increased than compared to DWT and Texture without sharpening. The synthesized image quality was evaluated using Quality metrics.

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DATA INTEGRITY PROOF TECHNIQUES IN CLOUD COMPUTING: A SURVEY

K. Shyam Sunder Reddy[9]

ABSTRACT

Cloud computing is an emerging technology that opens a new era in the field of Information Technology as it can provide a wide variety of scalable and elastic IT services in a pay-as-you-use model. Clients/users can reduce the huge capital investments in their own IT infrastructure in terms of buying, installing and maintaining computational resources. Globalization of computational resources may be the biggest contribution the cloud has made to date. For this reason, cloud is the subject of many security issues. Until today, lot of efforts has been made to improve security in cloud computing but still cloud computing is insecure. The Cloud Data Storage paradigm poses numerous research challenges, which influence the overall performance, usability and scalability. As storage-outsourcing services and resource-sharing networks have become popular, the problem of efficiently proving the integrity of data stored at untrusted servers has received increased attention. This paper presents a survey of different data integrity proof techniques for remotely stored data on cloud, providing a comprehensive comparison between the different proposed techniques.

KEYWORDS

Cloud Computing, Data Integrity, Proofs of Retrievability, Provable Data Possession, Third Party Auditor, HAIL etc.

INTRODUCTION

The term cloud has been used as a metaphor for the Internet. Cloud computing is a somewhat distributed and Internet based computing. Cloud computing is a promising technology that uses the Internet and central remote servers to maintain large number of applications and data and also guarantees quality of service. It incorporates on-demand deployment, open source software, Internet delivery of services, and virtualization [1]. The basic components of cloud computing are services, clients, platform, application, storage and infrastructure. The essential characteristics a cloud must possess are on-demand self-service, broad network access, rapid elasticity, resource pooling, and measured service. Cloud computing improves organizations performance by utilizing minimum resources and management support, with a shared network, computing resources, bandwidth, software and hardware in a cost effective manner and limited service provider dealings [2]. In cloud, everything is provided as a service (XaaS). In practice, Cloud Service Providers (CSPs) deliver a wide variety of services like Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), Infrastructure-as-a-Service (IaaS), Communication-as-a-Service (CaaS), Monitoring-as-a-Service (MaaS), Storage-as-a-Service (StaaS), Security-as-a-Service (SecaaS), Data Integrity-as-a-Service (DIaaS), Cache-as-a-Service (CaaaS), Identity and Policy Management-as-a-Service (IPMaaS), Network-as-a-Service (NaaS), Business as a Service (BaaS) and IT-as-a-Service (ITaaS) etc. From clients' perspective, the cloud appears as a single point of access for all their computing needs. These cloud-based services are accessible anywhere in the world, as long as an Internet connection is available.

The main aim of cloud computing is to provide reliable, customized and guaranteed computing environment to the end users. However, due to constantly increase in the popularity of cloud computing there is an ever-growing risk of security becoming a main and top issue. In Cloud Data Storage (CDS) systems, the server that stores the client's data is not necessarily trusted. The cloud servers are distrusted in terms of both security and reliability, which means that data may be lost or modified maliciously or accidentally. Sometimes the CSP may hide the data corruptions to maintain the reputation. As users no longer possess their data locally, it is of critical importance to assure users that their data are being correctly stored and maintained. However, outsourcing the storage of very large files to remote servers presents an additional constraint: the client should not download all stored data in order to validate it because it is computationally expensive as well as bandwidth consuming. However, outsourcing also means that the clients physically lose direct control on their data sets and tasks. The loss of control problem (means that clients are unable to resist certain attacks and accidents) has become one of the root causes of cloud security. As the data is physically not accessible to the user, the cloud should provide a way for the user to check if the integrity of his data is maintained or is compromised. It is essential to provide adequate security measures to protect the stored data from both malicious outsider attacks and the CSP itself.

One of the biggest concerns with CDS is that of data integrity checking and security at remote servers. What is more serious is that for saving money and storage space the CSP might neglect to keep or deliberately delete rarely accessed data files which belong to an ordinary client. Thus, enabling public verifiability for CDS security is of critical importance so that users can ask an external audit party to check the integrity of outsourced data when needed.

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DATA INTEGRITY PROOF TECHNIQUES

Data integrity is one of the main aspect of CDS security [3][4]. Data integrity (state of being whole or complete) means ensuring that data is identically maintained during any operation (such as transfer, storage, or retrieval). Data integrity implies that data should be honestly stored on cloud servers, and any violations (e.g., data is lost, altered, or compromised) are to be detected. In order to solve the problem of data integrity checking at untrusted servers, many techniques/solutions have been proposed in the literature. They are generally fall into two categories: Provable Data Possession (PDP) and Proofs of Retrievability (POR).

Provable Data Possession (PDP)

PDP is a probabilistic proof technique proposed by Ateniese et al. [5], for ensuring data integrity at untrusted servers. PDP model enables untrusted servers and it allows a client to verify that the server possesses the data without retrieving it. This scheme uses public key based (RSA based) Homomorphic Verifiable Tags (HVTs) for auditing outsourced data, to achieve public verifiability. HVTs act as verification metadata for the file blocks. Because of homomorphic property, tags computed for multiple file blocks can be combined into a single value. For instance, given two values T_{mi} and T_{mj}, we can combine them into a single value $T_{mi}+T_{mj}$ corresponding to the sum of messages m_i+m_j.

A PDP scheme is a collection of four polynomial-time algorithms.

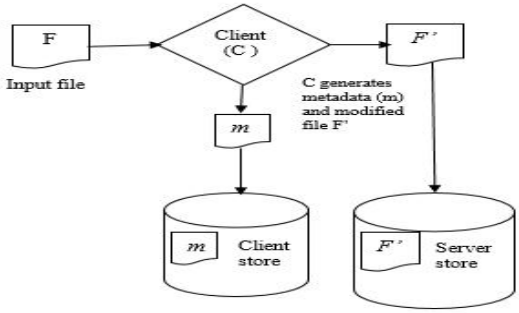
- *KeyGen*(1^k)$\rightarrow$*(pk,sk)* is run by the client to setup the scheme. It takes a security parameter *k* as input, and returns a pair of matching public and secret keys.
- *TagBlock(pk,sk,m)*$\rightarrow T_m$ is run by the client to generate the verification metadata. It takes a public key *pk*, a secret key *sk*, and a file block *m* as inputs and returns T_m (verification metadata).
- *GenProof(pk,F,chal,Σ)*$\rightarrow$ *P* is run by the server in order to generate a proof of possession. It takes a public key *pk*, an ordered collection *F* of blocks, a challenge *chal*, and Σ, which is an ordered collection of the verification metadata corresponding to the blocks in *F* as inputs, and it returns a proof of possession *P*.
- *CheckProof(pk,sk,chal,P)*$\rightarrow${0/1} is run by the client in order to check a proof of possession. It returns whether *P* is a correct proof of possession for the blocks determined by *chal*.

Protocol for PDP: The protocol for PDP is shown in Fig-1 (a & b) and it works in two phases: *Setup phase* and *Challenge-Response phase*.

Setup phase:

- In this phase the client C (data owner) pre-processes the file (which a finite ordered collection of *n* blocks: $F=(m_1,m_2..m_n)$) before sending it to the cloud server.
- The client generates a piece of metadata (for verification purpose) that is stored locally, using probabilistic key generation algorithm.
- Client transmits the file to the untrusted server *S* for storage, and may delete the file from its local storage.

Figure-1: Pre-process and Store

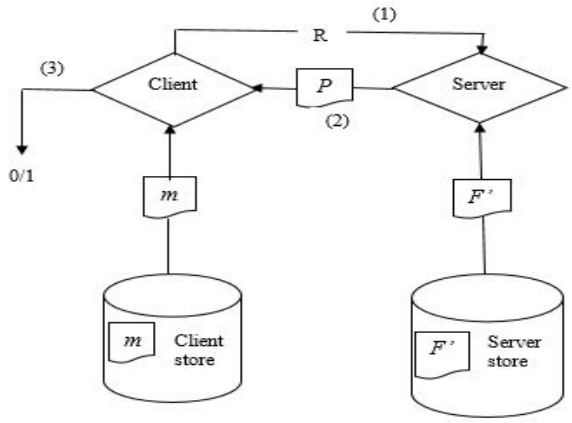


Sources: Authors Compilation

Challenge-Response Phase:

In this phase, the server stores the file and responds to the challenges issued by the client.

Figure-2: Verify data Possession



Sources: Authors Compilation

- When user wants to check for data integrity, it will generate a random chanllenge *R* against a randomly selected set of file blocks, and sends to the server to determine whether the integrity of stored data is maintained or is compromised, without downloading the original data.
- Using the queried blocks and their corresponding verification tags, the server generates a proof of posseion *P*.
- The client will compare the reply data with the local meta-data and is able to prove whether the integrity of the data is violated.

The server S must answer all the challenges from the client C; failure to do so represents a data loss.

The probabilistic guarantee of PDP shows that the PDP can achieve a high probability for detecting server misbehavior with low computational and storage overhead. However, the PDP protocol is only applicable to static files (i.e., append only files) and the authors do not consider the case of dynamic data storage. This limitation reduces its applicability to cloud computing because it is featured with dynamic data management.

Scalable PDP (S-PDP)

Scalable PDP model [6], proposed by Ateniese et al., is an improved version of the original PDP model. The original PDP model uses public key cryptography to reduce computation overhead whereas S-PDP model uses only symmetric key cryptography, which is more efficient than public key encryption. Computation and communication overheads at both server and client sides are less because of symmetric key cryptography. S-PDP support dynamic operations on remote data. It allows for block updates, deletions and appends to the stored data. However this scheme does not support fully dynamic data operations, i.e., it only allows very basic block operations with limited functionality (i.e., for instance block insertion cannot be supported). S-PDP scheme focuses on single server scenario and does not address small data corruptions, leaving both the distributed servers scenario and data error recovery issue unexplored. S-PDP does not require bulk encryption. One limitation of SPDP is that all challenges and answers are pre-computed, and the number of updates is limited and fixed as a priori. S-PDP does not support public verifiability due to symmetric encryption.

Dynamic Provable Data Possession

Erway et al. [7] have formalized a model called dynamic provable data possession (DPDP). They extend the PDP model in **[**5] to support provable updates on remotely stored data files using rank-based authenticated skip lists. This scheme is essentially a complete dynamic version of the PDP solution that supports full dynamic operations like insert, update, modify, delete, etc. The index information in the tag computation in Ateniese et al. PDP model [5] is removed to support update for block insertion. The experiment result shows that, although the support of dynamic updates costs certain computational complexity, DPDP is practically efficient. For instance, to generate a proof of possession for a 1GB file, DPDP only produces 415KB proof of data and 30ms computational overhead. In DPDP, all the challenges and answers are dynamically generated. This scheme is based on RSA. So the communication overhead of server and clients are higher than symmetric key cryptographic technique.

The DPDP protocol introduces three new algorithms, which are known as PrepareUpdate, PerfromUpdate and VerifyUpdate. *PrepareUpdate* algorithm is run by the client in order to prepare an update request that includes the update to be performed (i.e., modify block *i*, delete block *i*, full rewrite, add a block after block *i* etc.). *PerformUpdate* algorithm is run by the server to perform the actual update of the file, and subsequently returns an update proof to the client. *The client to verify the server's behavior during the update runs VerifyUpdate algorithm*.

Multiple-Replica PDP

Reza Curtmola et al. [8] were the first to consider a multiple-replica PDP (MR-PDP) model. They extend the PDP model in [5], to apply to multiple replicas, that creates multiple copies of an owner's file and audit them. MR-PDP model is aimed to ensure data possession of multiple replicas across the distributed storage system. A replica consists of the original data file masked with randomness generated by a pseudo-random function (PRF). Replicas cannot be compared or compressed with respect to each other, because each replica uses a different PRF. In this scheme, a single set of tags can be used to verify any number of replicas. The MR-PDP scheme increases data availability and reliability; a corrupted data copy can be reconstructed by using duplicated replicas on other servers.

A multiple-replica PDP scheme is a collection of five polynomial-time algorithms (*KeyGen, ReplicaGen, TagBlock, GenProof, CheckProof*). *KeyGen* is a key generation algorithm that is run by the client to setup the scheme. *ReplicaGen* is the client to generate the verification metadata for a file block runs a replica generation algorithm that is run by the client to generate a replica of a file F. TagBlock algorithm. *GenProof* is a proof generation algorithm that is run by the server in order to generate a proof of possession. *The client runs CheckProof algorithm* in order to validate a proof of possession.

Protocol for MR-PDP: MR-PDP works in three phases: *Setup phase Challenge phase* and *Replicate phase*.

Setup phase: In this phase the client C initializes the system by executing *KeyGen* algorithm, and then uses *ReplicaGen* to generate *t* replicas of file *F* i.e., $F_1,F_2,...,F_t$ and pre-processes the file by executing *TagGen* to generate the verification tags for these replicas. The client then stores the replicas and the verification tags at the servers $S_1,S_2,...,S_t$ and retains a small, constant amount of information that will be used in the challenge phase. Finally, the client may delete the file, the replicas, and the tags from its local storage.

Challenge phase: The client can execute individual challenges or complete challenges. For individual challenges, the client interacts with a particular server S_i and determines if *Si* possesses the file F_i at the time of the challenge. A complete challenge consists of *t* individual challenges, which can be executed in parallel.

Replicate phase: This phase allows the clinet to perform replica maintenance. The clinet can dynamically create new replicas using *ReplicaGen* algorithm in order to maintain a desired replication factor whenever it detects a replica failure (some server cannot prove possession of a replica)

MR-PDP is computationally much more efficient than using a single replica PDP scheme. Another advantage of MR-PDP is that it can generate further replicas on demand, at little expense, when some of the existing replicas fail.

Proofs of Retrievability (POR)

Ari Juels et al. [9] proposed a Proof of Retrievability (POR) model, where error correcting codes and spot-checking are used to ensure both *possession* and *retrievability* of data files on archive service systems.

A first Approach (A Naive method)

In the POR scheme, the scheme involving a keyed hash function $h_k(F)$ is the simplest scheme for proofs of retrievability. In this scheme, the client/verifier computes the cryptographic hash value $r= h_k(F)$ for the file *F* with a key *k,* before sending the data file *F* to the cloud data storage, and stores this hash value along with secret, random key *k*. To check that the untrusted server/prover possesses the data file *F*, the client releases *k* and sends *k* to the server, which is subsequently asked to re-compute the hash value, based on the *F* and *k*. After this, the server generates the proof of possession and sends the hash result to the client for comparison. By storing multiple hash values over different keys, the verifier can initiate multiple, independent checks.

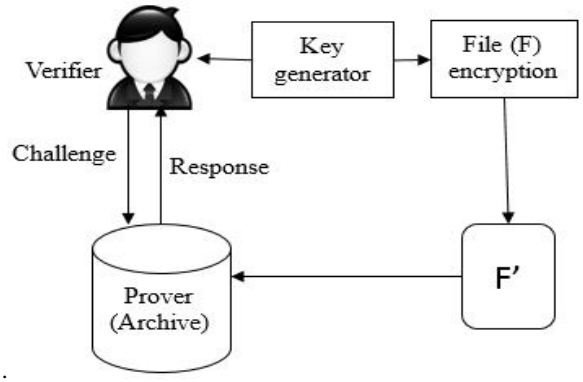
This approach provides strong proof that the server retains the data file F. However, the disadvantage is the high overhead (High resource costs) that is produced. This overhead exists because each time of verification requires the server to run a hashing process over the entire file.

Original POR

A POR is a protocol in which a server proves to a client that a target file is intact, in the sense that the client can retrieve the entire file from the server with high probability. Hence, POR guarantees not only correct data possession but it also assures retrievability upon some data corruptions.

A POR system includes six algorithms: *keygen, encode, extract, challenge, respond, and verify*. The algorithm *respond* is the only one executed by the server. The client executes all other algorithms. The schematic of a POR system is shown in Figure-3.

Figure-3: Schematic of a POR System



Sources: Authors Compilation

The POR protocol works in two phases: *setup phase* and *verification phase*.

Setup phase: In this phase, the verifier *V* encrypts a raw file *F* into an encoded file *F'* by using an encoding algorithm, and randomly embeds a set of sentinels (randomly valued check blocks). Server doesn't know that where the sentinels are stored because they are indistinguishable from regular data blocks and are randomly stored in the file F'. A key generation algorithm produces a key *k* stored by the verifier and used in encoding.

Verification phase: In this phase, the verifier performs a challenge-response protocol with the server to check that the verifier can retrieve the file *F*. The verifier throws the challenge to the cloud data storage by specifying the position of the collection of the sentinels in *F'*, and asks the server to return the corresponding sentinel values. If the server has tampered with or deleted F', there is high probability that certain sentinels are also corrupted or lost; this causes the server to be unable to generate a complete proof for the original file. Therefore, a client has an evidence to prove that the server has corrupted the file. Because the number of sentinels is limited, the POR model adopts error-correcting codes to recover the file with only a small fraction being corrupted.

POR is designed to be lightweight. In other words, it attempts to minimize the storage overhead at client and server side, the communication overhead of an audit, and the number of data-blocks accessed during an audit. This scheme does not support public verifiability. Similar to PDP, POR can only be applied to static data files.

HAIL

Kevin D. Bowers et al. [10] introduced HAIL: *A High-Availability and Integrity Layer*, a distributed cryptographic system that allows multiple servers to prove to a client that a stored data file is intact and retrievable. HAIL is a remote-file integrity checking protocol that includes seven functions (*keygen, encode, decode, challenge, respond, verify, and redistribute*) and offers security, efficiency, and modeling improvements over straightforward multi-server application of POR protocols. HAIL allows the client to transmit a file across multiple servers with redundancy and only store a small constant amount of information in local storage for verification purpose. HAIL uses message authentication codes (MACs), pseudorandom functions, and universal hash functions to ensure integrity process. The proof generated by this method is independent of size of data and it is compact in size. The main threats that HAIL combats are mobile adversaries, which may possibly corrupt the data file *F* by undermining multiple servers. HAIL requires more computation power and it is applicable for static data only.

Third Party Auditor (TPA)

Wang et al. [14] proposed a secure cloud storage system supporting privacy-preserving public auditing. Public auditability allows an external audit party (called third party auditor) to verify the integrity of remotely stored data. In this, users can ask a third party

auditor (TPA) to check the integrity of outsourced data. TPA has expertise and capabilities that user and CSP do not have. TPA is trusted to assess the CSP's storage security upon request from user.

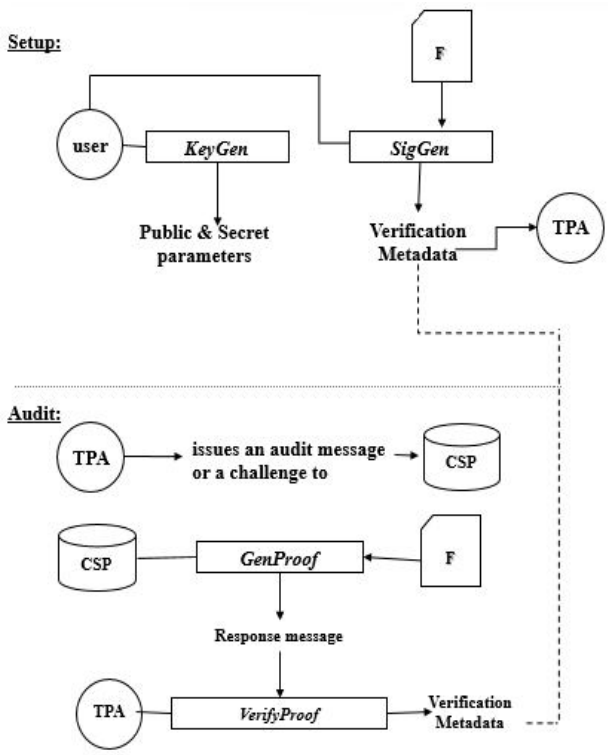
A third party auditing scheme consists of four algorithms (*KeyGen, SigGen, GenProof, VerifyProof*). *KeyGen* is a key generation algorithm that is run by the client to setup the scheme. *SigGen* is a signature generation algorithm that is run by the client to generate verification metadata, which may consist of MAC, signatures or other information used for integrity checking. *GenProof* is a proof generation algorithm that is run by the cloud server to generate a proof of data storage correctness. *VerifyProof* is a proof verification algorithm that is run by the TPA to audit the proof from the cloud server.

The schematic of a third party auditing scheme is shown in Figure, which consists of two phases: *Setup phase* and *Audit phase*.

Setup phase: In this phase, the user executes the *KeyGen* algorithm to generate public and secret keys, and preprocesses the file *F* using *SigGen* to generate the verification metadata. The user then transmits the data file *F* and the verification metadata to the server for storage, and deletes its local copy.

Audit phase: In this phase, the TPA issues a challenge or an audit message to the cloud server to make sure that the cloud server has possesses the data file *F*. The cloud server will generate a proof and derive a response message by executing *GenProof* using *F* and its verification metadata as inputs. The TPA then verifies the response from the server by using *VerifyProof.*

Figure-4: Schematic of a TPA



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To securely introduce an effective TPA, the TPA ensures the following: 1) Cloud data can be efficiently audited without a local data copy, and cloud clients suffer no on-line burden for auditing; 2) no new vulnerabilities will be introduced toward user data privacy. To achieve privacy-preserving public auditing, the authors have used homomorphic linear authenticator which has been utilized in existing literatures [11][12][13], with random masking technique. When combining a homomorphic authenticator with random masking, the TPA becomes unable to access the data content while it is performing auditing. Extensive analysis shows that this scheme is provably secure and highly efficient.

SUMMARY

PDP and POR are the class of problems that provides secure, efficient and practical approaches in order to determine whether the integrity of stored data is maintained or is compromised. We have summarized and compared several data integrity proof techniques for remotely stored data in Table-I.

Table-I: Comparative Survey of Data Integrity Proof Techniques

Technique	Protocol/ Model	Advantages	Disadvantages	Method used for Data Integrity
PDP [5]	*KeyGen*: run by client *TagBlock*: Client *GenProof*: Server *CheckProof*: Client	- Efficient. - Only a small portion of file needs to be accessed to generate proof of possession. - Supports public verifiability. - Support blocks less verification.	- Works only with static data. - Probabilistic guarantee may result in false positive. - Lack of privacy-preservation. - Lack of error correcting codes to address data corruptions.	- Homomorphic. Verifiable Tags (HVTs): to combine multiple tag values into a single value to reduce the size of proof.
S-PDP [6]	*KeyGen*: run by Client *TokenGen*: Client *Update*: Server *Challenge*: Client *Proof*: Server *Verify*: Client	- Lightweight PDP to support homomorphic function and does not require any bulk encryption. - Uses symmetric key cryptography, which is more efficient than public key encryption.	- Does not support public verifiability. - Does not support fully data dynamic operations. - All challenges and answers are pre-computed.	- Symmetric key cryptography. - Message Authentication Code.
D-PDP [7]	*KeyGen*: run by Client *PrepareUpdate*: Client *PerformUpdate*: Server *VerifyUpdate*: Client *Challenge*: Client *Proof*: Server *Verify*: Client	- Support fully data dynamic operations. - All challenges and answers are dynamically generated.	- Fully dynamic support causes relatively higher computational, communication, and storage overhead. - Not suitable for thin client	- Rank based authenticated directory. - RSA-tree. - Authenticated skip list.
MR-PDP [8]	*KeyGen*: run by Client *ReplicaGen*: Client *TagBlock*: Client *GenProof*: Server *CheckProof*: Client	- Computationally much more efficient than using a single replica PDP. - It can generate further replicas on demand, at little expense, when some of the existing replicas fail.	- Works with static data only. - Not applicable for dynamic data storage.	- Message Authentication Code. - Pseudorandom function.
POR [9]	*KeyGen*: run by Client *Encode*: Client *Extract*: Server *Challenge*: Client *Respond*: Server *Verify*: Client	- Ability to recover file with error-correcting code. - Efficient: reduces the computational and storage overhead at both client and server side.	- Works with static data only - Needs additional space to hide sentinels. - Supports only limited number of queries as a challenge.	- Sentinels: to check data integrity. - Error-correcting code: to recover a partially corrupted file.
HAIL [10]	*KeyGen*: run by Client *Encode*: Client *Decode*: Server *Challenge*: Client *Respond*: Server *Verify*: Client *Redistribute*: Client/Server	- Ability to check integrity in distributed storage via data redundancy. - Allows user to store data on multiple cloud - Proof is compact in size and is independent of data size.	- Works with Static data only. - Not suitable for thin client.	- Pseudorandom functions - MACs - Universal hash functions.
TPA [14]	*KeyGen:* run by Client/TPA *SigGen:* Client/TPA *GenProof:* Server *VerifyProof:* Client/TPA	- Supports privacy - preserving public verifiability. - Secure and highly efficient	- More overhead involved; user sends the tree root to TPA.	- Homomorphic linear authenticator with random masking. - Merkle Hash Tree (MHT): to support data dynamics.

Sources: Authors Compilation

CONCLUSION

Cloud computing imposes many issues which are related to security and privacy. Data integrity is an emerging area and it is the most challenging and burning issue in cloud computing era. In order to solve the problem of data integrity checking at untrusted servers, many schemes have been proposed under different systems and security models, namely PDP, SPDP, DPDP, POR, TPA, etc. This paper presents a survey of various data integrity proof techniques with their pros and cons. The existing schemes on ensuring data integrity at remote servers often lack the support of either public verifiability or fully dynamic data operations. Some schemes suffer from high computational, communication and storage overheads. From this survey, we can conclude that designing an efficient, secure and fully dynamic data integrity technique is still open area of research.

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COMBINATORIAL OPTIMIZATION AND COLORING OF GRAPHS

Tushar Bhatt[10]

ABSTRACT

From the references of randomized rounding technique of kargar-Matwani-Sudan's algorithms we observe that 3-colorable graph in n-vertices with maximum degree Δ in polynomial time using $O(\Delta^{0.631})$ colors and relevant to them we observe that the chromatic number of perfect graph follows that $\omega(G) = \Theta(G)$ where Θ Lovasz theta function.

KEYWORDS

Wigderson's Algorithm, SDP Relaxation, Kargar-Matwani-Sudan's Algorithm, Lovasz Theta Function etc.

INTRODUCTION

In this paper, we discussed about coloring of graphs. First, we discuss the randomized rounding technique of Kargar, Matwani and Sudan that can color a 3-colorable graph in *n* vertices with maximum degree Δ .in polynomial time using $O(\Delta^{0.631})$ colors. Next we discuss more generalized algorithm of Kargar, Matwani and Sudan that combines this randomized technique with Wigderson's algorithm to yield an $O(n^{0.386})$-coloring of graph. Finally, we discuss Lovasz Theta function, a SDP relaxation that led to finding clique and chromatic number of perfect graphs.

Definition 1.1 A k-coloring of a graph G is a mapping of V (G) onto the integer 1…… k such that adjacent vertices map into different integers.
Definition 1.2 A k-coloring partitions V (G) into k-disjoint subsets such that vertices from different subsets have different colors.
Definition 1.3 A graph G is k-colorable if it has a k-coloring.
Definition 1.4 The smallest integer k for which G is k-colorable is called the chromatic number of G.
Definition 1.5 A graph whose chromatic number k is called a k-chromatic graph.
Definition 1.6 A coloring of a graph G assigns colors to the vertices of G so that adjacent vertices are given different colors.

WIGDERSON'S ALGORITHM

It is a combinatorial algorithm and allows us to color any 3-colorable graph in $O(\sqrt{n})$. It is follows the following steps:

PROCEDURE Color (G)

{G graph}

1: While $\Delta_G > \sqrt{n}$ do
2: Pick$v \in V$ with $d(v) > \sqrt{n}$
3: 2-color its neighbourhood $N(v) = \{u/(u,v) \in E\}$
4: Never use those colors again
5: Delete $N(v) \cup \{v\}$from G.
6: Color G
7: color G with $\sqrt{n}$ colors.

RELAVANT SDP RELAXATION

If $\chi(G) \leq 3$ then the following SDP feasible:

$$\forall i \quad \| v_i \| = 1$$

$$\forall ij \quad \in E < v_i, v_j > \leq -\frac{1}{2}$$

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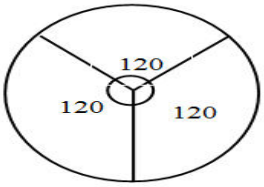
This implies that if we have three coloring then the vertices of a graph can be partitioned into three disjoined sets such that vertices in the same set have no edges between them. Therefore, if we map these sets to three different points on a 2D sphere as shown in Figure 1, we get a maximum separation of 120^0 between these points so the inner product of vectors is exactly $-\frac{1}{2}$.

Figure-1: SDP relaxation for $\chi(G) \leq 3$



Sources: Authors Compilation

KARGER-MATWANI-SUDAN'S ALGORITHM (KMS)

We use Wigderson's algorithm and SDP relaxation mentioned above to define KMS. As with the Geomans-Williamson's case, we have some spread of points on unit sphere as our starting points. Points associated with the neighboring vertices have a large separation, 120^0at least.

We can think Geomans-Williamson as a variant of coloring problem so that we try to color in two colors but not to satisfy all edges but to satisfy as many edges as possible. We use something similar here with the exception that now we use many more colors instead of just using two colors. Getting more and more colors will help us getting less and less monochromatic edges.

We take a random hyperplane and the color given to the vertices on one side of hyperplane is different from the color on other side. Next, we take another random hyperplane and do the same, so in general, we can do this for *t* times and at the end, we partition the sphere into at most 2^t sections. In general, we have *t* such random unit vectors and a point on the sphere is mapped to, $a \pm 1$ vector of dimension t depending on its *sign* vector as shown in Figure 2.

Algorithm KMS Part- I

Solve the VP and let $v_i, v_j, \ldots \ldots v_n$ be the solution.

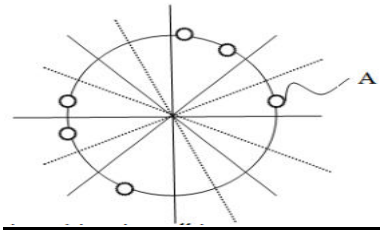
Choose $t = [\log_3 \Delta + 1]$ random hyperplanes $r_i, r_j, \ldots r_n$where Δis the maximum degree of graph G.

Assign v_i with a color that corresponds to is sign vector as follows:

$$v_i \rightarrow (sign\ (\prec v_i, r_i \succ), sign(\prec v_i, r_j \succ), \ldots sign(\prec v_i, r_t \succ)$$

Sign there are 2^t distinct vectors so 2^t colors are used in this step. Now we analyze the number of monochromatic edges when we use the mapping as our colors.

Figure-2: Point A is Positive since All Its Sign Vectors Are Positives



Sources: Authors Compilation

The mapping can be thought of as a coloring where the name of color is $\pm$ vector in t- dimension. We focus on one edge, let $v_i$and v_j be the vertices so the probability that they get the same color is exactly the probability that each and and every hyperplane will keep them on the same side, if any of *t* hyperplanes separate these vertices, they will get the different color. Suppose the angle between vertices is βthen the probability that they are not separated is $\frac{\pi-\beta}{\pi}$. We know if there is an edge between vertices then they have a good separation and β is at least 120^0. So far an angle i, j and for any coordinate s we have:

$$\Pr[sign\ (\prec v_i, r_s \succ) = sign\ (\prec v_j, r_s \succ)] \leq \frac{1}{3}$$

So from independence,

$$\Pr[col\ (v_i) = col\ (v_j)] \leq \left(\frac{1}{3}\right)^t \leq \frac{1}{3\Delta}$$

Therefore, the expected number of monochromatic edges is:

$$E[number\ of\ monochromatic\ edges] \leq m\frac{1}{3\Delta}$$

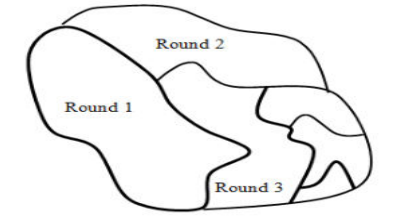
Where m is number of edges bounding m as a function of Δ we get:

$$E[number\ of\ monochromatic\ edges] \leq \frac{n\Delta}{2} \cdot \frac{1}{3\Delta} \leq \frac{n}{6}$$

After step 3 we have at most $\frac{n}{3}$ bad vertices that are involved in $\frac{n}{6}$ monochromatic edges. We remove the colors from the vertices with monochromatic edges and continue the process for uncolored vertices with fresh colors. To color all the vertices we require $\log(n)$ iterations and each round require 2^tcolors so in total we need $2^t \cdot \log(n)$ colors see figure 3.

$$\text{Total colors used} = 2^t \cdot \log(n) \approx \Delta^{log_3{}^{(2)}} \approx \Delta^{0.631}$$

Figure-3: Graph Coloring with KMS Part 1



Sources: Authors Compilation

As we can see that, there is no improvement in the number of colors used when compared to Wigderson's algorithm. To improve the number of colors Karger, Matwani and Sudan suggested another algorithm that combines Algorithm 2.1 with Wigderson's algorithm.

Algorithm KMS Part-II

1. As long as there exists vertex v with degree$\geq \delta$, color the neighbors of v with two colors. Afterwards we discard the neighbors of v and the two colors used.

2. For the remaining graph apply Algorithm 2.1.

Since we cannot have more than $\frac{n}{6}$ iterations so total number of colors used$\leq \frac{n}{6} + \delta^{0.631}$. The number of colors used is minimized when $\frac{n}{6} = \delta^{0.631}$which implies$\delta = n^{\frac{1}{1.631}}$. Thus, total colors used$= O(n^{\frac{1}{1.631}})$.

LOVASZ THETA FUNCTION

Definition 3.1 Vector chromatic number is the smallest *k* for which the $\bar{G}$ is *k*-vector colorable. *G* is *k*-vector colorable if the following SDP is feasible.

$$\prec v_i, v_j \succ \leq -\frac{1}{k-1} \forall_{ij} \in E$$

$$v_i \in \mathbb{R}^n$$

$$\prec v_i, v_i \succ = 1$$

Lovasz defined the vector chromatic number of a graph G and it is named Lovasz Theta function theta $\theta(G)$, Where

$\omega(G) \leq \theta(\bar{G}) \leq \chi(G)$

Where $\omega(G)$ size of maximal is clique of a graph G and $\theta(G)$ is vector coloring of G.

Lemma 3.2 If G is k-colorable then it is also k-vector colorable.

Proof: Kargar showed that for all positive integers' k and n with $k \leq n+1$, there exist K unit vectors in $\mathbb{R}^n$such that the dot product of any distinct pair is $-\frac{1}{k-1}$. Bijectively mapping the k colors to these k vectors we can prove the lemma.

Definition 3.3 Perfect graph is a graph G for which

$$\omega(H) = \chi(H)$$
$$\forall\ subgraph\ H\ of\ G$$

For Perfect graphs $\theta(\bar{G})$ allows us to compute $\omega(G) = \chi(G)$.

Lemma 3.4 $\omega(G) = \chi(G)$

Proof: Let $v_i, v_j, \ldots \ldots v_n$ be an optimal vector chromatic solution of G.

$$\|v_i\| = 1$$
$$\langle v_i, v_j \rangle \leq -\frac{1}{k-1},\ \ k = \Theta(\bar{G})$$

Suppose ∃ a clique of size ω in G $(\omega = \ \omega(G))$. Let I be that clique.

$$0 \leq \langle \sum_{i\in I} v_i\ , \sum_{i\in I} v_i\ \rangle = \sum_{i} \langle v_i, v_i \rangle + \sum_{i\neq j} \langle v_i, v_j \rangle$$
$$\Rightarrow \sum_{i\in I} \langle v_i, v_j \rangle \geq -\ \omega$$
$$\Rightarrow \max_{i\neq j} \langle v_i, v_j \rangle \geq -\frac{\omega}{\omega(\omega-1)} = -\frac{1}{\omega-1}$$
$$\Rightarrow \Theta(\bar{G}) = k \geq \omega.$$

CONCLUSIONS

Whenever we worried about coloring of perfect graph in Combinatorial Optimization then by using chromatic number concept very easily given a color in vertices as well as in edges without repeating any color.

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A SURVEY ON CONSUMER AWARENESS TOWARDS E-WASTE MANAGEMENT IN THE CITY OF MANGALORE

Nikshitha Shetty[11]

ABSTRACT

The electronic industry is the world's largest and fastest growing manufacturing industry. During the last decade, it has assumed that role of providing a forceful advantage of the socio-economic and technological growth of a developing society. The consequence of its consumer-oriented growth combined with rapid product obsolescence and technological advances are a new environmental challenge - the growing menace of "Electronics Waste" or "E-Waste" that consists of obsolete electronic devices. Over the past two decades, the global market of electrical and electronic equipment (EEE) continues to grow exponentially, while the lifespan of those products becomes shorter and shorter. Therefore, business and waste management officials are facing a new challenge and e-Waste or waste electrical and electronic equipment (WEEE) is receiving considerable amount of attention from policy makers. The basic variables like consumer attitude, motivation, knowledge and behaviour are very important considerations while empowering consumers to participate in the e-waste management system. Mangalore is an important city in Karnataka and is situated on the west coast. After integration, the city is developing fast in all directions in the field of education, industry, technology and commerce. This will leads to the abundant volume of e-waste. At present in Mangalore have 12 e-waste collection points (wheelie Bin) for the safe disposal of calculators, batteries, computers and mobile phones etc.

This paper titled "A Study on Consumer Awareness towards E-waste Management in the City of Mangalore is an attempt to study consumer awareness and willingness to participate in e-Waste disposal, e-Waste recycling and e-Waste management.

KEYWORDS

Electronic Waste (E-Waste), Waste Electronic and Electrical Equipment (WEEE), Wheelie Bin, Safe Disposal, Obsolete, Environmental Challenge etc.

INTRODUCTION

Electronic equipment significantly influence the way societies relate and it is impossible to ignore the vast positive impacts of electronic use by society. Nevertheless, important concerns also exist related to the flow of electronics deemed obsolete by consumers (e.g. Households, corporations, public agencies, schools etc.) all over the world. These concerns intensify as the manufacturing and adoption rate, triggered by technological development of these devices increases, around the world. Compared to expenditures on product development, marketing and sales, a smaller amount of resources has been devoted to the end-of-use management of electronic equipment such as reuse, recycling and land filling.

Definition of E-Waste

Electronic waste (e-waste) comprises waste electronics/electrical goods that are not fit for their originally intended use or have reached their end of life. This may include items such as computers, servers, mainframes, monitors, CDs, printers, scanners, copiers, calculators, fax machines, battery cells, cellular phones, transceivers, TVs, medical apparatus and electronic components besides white goods such as refrigerators and air-conditioners. E-waste contains valuable materials such as copper, silver, gold and platinum, which could be processed for their recovery.

E-WASTE IN INDIA

Despite a wide range of environmental legislation in India, there are no specific laws or guidelines for electronic waste or computer waste. As per the Hazardous Waste Rules, e-waste is not treated as hazardous unless proved to have higher concentration of certain substances. Several Workshops on Electronic Waste Management was organized by the Central Pollution Control Board (CPCB) in collaboration with Toxics Link, CII etc. Action has been initiated by CPCB for rapid assessment of the E-Waste generated in major cities of the country. A National Working Group has been constituted for formulating a strategy for E-Waste management. A comprehensive technical guide on "Environmental Management for Information Technology Industry in India" has been published and circulated widely by the Department of Information Technology (DIT), Ministry of Communication and Information Technology. Demonstration projects have also been set up by the DIT at the Indian Telephone Industries for

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recovery of copper from Printed Circuit Boards. Although awareness and readiness for implementing improvements is increasing rapidly, the major obstacles to manage the e-wastes safely and effectively remain. These include the lack of reliable data that poses a challenge to policy makers wishing to design an e-waste management strategy and to an industry wishing to make rational investment decisions.

RESEARCH METHODOLOGY

The present research is a theoretical research based on primary data collected from a sample of 100 residents randomly selected by the author within the city limits of the Mangalore. The sample group consisted of persons in the age group of 20yrs to 50 years. The scope of the present research is to know and understand the consumer awareness regarding E-Waste Management in Mangalore City.

FINDINGS OF STUDY

The present study aimed to gauge the awareness level and practice of people regarding E-Waste Management:

- In the disposal of WEE gadgets, of the total 100 respondents, it was found that 83 percent of the respondents are unaware regarding E-Waste collection centre in their city.
- The study also reveals that majority of the respondents are unaware about the E-Waste guidelines in India.
- The survey also reveals that 68 percent of the respondents are unaware regarding E-Waste recycling initiatives introduced by the company and 32 percent are aware about these initiatives.
- It is found that 56 percent of the respondents are unaware of the crossed out wheelie /wheeled bin symbol present in EEE gadgets while 34 percent aware regarding this symbol.
- It is noted that among the sample respondents 90 percent are aware of the hazardous materials present in EEE gadgets while 10 percent are unaware of the chemicals present in EEE gadgets.
- It is noted that among the sample respondents 86 percent are willing to pay for E-Waste recycling schemes while 14 percent are not willing to participate E-Waste recycling scheme.
- The study reveals that the amount of money willing to be paid for a green EEE product ranges from less than 5 percent to above 10 percent of the price of the product.
- In the disposal of WEE gadgets, of the total 100 respondents, it was found that 75 percent of the respondents are aware of the effects of discarding gadgets while 25 percent of the respondents are unaware of the effects of discarding gadgets.
- It is noted that the major source of knowledge in discarding gadgets are newspapers, user manuals, television, radio and internet. 58 percent of the respondents gather information on electronic gadgets from the user manuals, 20 percent gather information internet. 12 percent from television and 10 percent gather information from the newspaper.
- The study reveals that 88 percent of the respondents are aware about the environmental and health issues related to WEEE while 12 percent of the respondents are unaware about the environmental and health issues related to WEEE.

SUGGESTIONS

- There is a need to design E-Waste awareness programmes to educate the community on the impacts and management of e-waste.
- Awareness needs to be created through the use of mass media. Environmental consciousness among people should be developed through organizing rallies, awareness campaigns and workshops to highlight the need to manage e-waste.
- Collection drives need to be organized to encourage people to dispose their WEEE provision of adequate drop-off points.
- Special bins with crossed out wheelie/wheeled symbol need to be placed at prominent public locations which area accessed by the public in the city such as shopping malls, Educational Institutions , Hospitals, Railway Stations, Bus stand, Airports etc., to encourage voluntary disposal of WEEE gadgets.
- The responsible authority should work together with the local authority to increase public awareness and to promote the recycling of wastes, including e waste, among the public.
- The Government needs to improve collaboration among stakeholders in order to enhance public awareness on E-Waste.
- Green initiatives by manufacturers need to be encouraged by suitable policies framed by the Government.
- There is a need to gradually eliminate or phase out harmful substances used in the manufacture of EEE gadgets.

CONCLUSIONS

E-waste must be generated because of the need to key into the technological age. However, it is both valuable as source for secondary raw material, and toxic if treated and discarded improperly. Hence, recycling of such wastes, thus assumes significant importance from the commercial standpoint while proper disposal is crucial from the health and environment point of view. From

the foregoing, the facts on ground is a clear indication that while most of e-waste are being brought down to developing countries in addition to the ones on ground, people are yet to appreciate the difference between the regular municipal solid waste and e-waste, the potential benefits of recycling e-waste and the health implication of not handling them well. This therefore calls for a serious environmental sensitization campaign whereby if the recommended awareness model is adopted; it will go a long way into awakening both the people and the government on this environmental challenge.

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IDENTIFICATION OF FLOOD VULNERABLE ZONES IN FATEHABAD DISTRICT

Sandeep Verma[12] Mona Yadav[13] Vikas Sihag[14] Savit Pal[15] Bhanu Pratap Singh[16]

ABSTRACT

Delineation of flood vulnerable zones mapping were conducted to identify the priority areas and high-risk zones in the flood plains of Ghaggar River in Fatehabad district. Remote Sensing and GIS provides more flexible and accurate decisions to the decision makers in order to evaluate the effective factors. Fatehabad District situated in western part of Haryana has an area of 2538 sq. km. geographically it falls between 29 °15' to 29 °49' North latitude and 75 °13' to 75 °58' East longitude. The total area of Fatehabad District is 2538 km^2.IRS-P6LISS-III (October 2009) data has been used in the study. A digital Elevation Model (DEM) method has been used to analyze the flood vulnerable zones. Out of the total area of Fatehabad District, 44.28 sq. km area is under highly vulnerable zone, 475.62 sq. km area is under moderate vulnerable zone and 1935.36 sq. km area is under the safe zone. Flood disaster has a very special place in natural hazards. Its effect area is not bounded; it is an unusual event of a river basin. Some of the causative factors for flooding in watershed are taken into account as annual rainfall, size of watershed, slope, drainage density and land use. Digital elevation model (DEM) is useful in delineating the vulnerable zones. Flood vulnerable zones of Fatehabad District maps have been generated with a view to assisting decision makers on the menace posed by the disaster.

KEYWORDS

Flood Vulnearable Zones, Disaster Management, Rainfall etc.

INTRODUCTION

Disaster is a sudden, calamitous event bringing great damage, loss, and destruction and devastation to life and property. The damage caused by disasters is immeasurable and varies with the geographical location, climate and the type of the earth surface / degree of vulnerability.

Definitions

Flood: A temporary covering by water of land normally not covered by water. This shall include floods from rivers, mountain torrents, Mediterranean ephemeral watercourses, and floods from the sea in coastal areas, and may exclude floods from sewerage systems.

Flood Risk: The combination of the probability of a flood event and of the potential adverse consequences to human health, the environment and economic activity associated with a flood event.

Flood Plain Maps indicate the geographical areas, which could be covered by a flood according to one or several probabilities: floods with a very low probability or extreme events scenarios; floods with a medium probability (likely return period >= 100y); floods with a high probability.

Flood Hazard Maps are detailed flood plain maps complemented with: type of flood, the flood extent; water depths or water level, flow velocity or the relevant water flow direction.

Flood Risk Maps indicate potential adverse consequences associated with floods under several probabilities, expressed in terms of: the indicative number of inhabitants potentially affected; type of economic activity of the area potentially affected; installation which might cause accidental pollution in case of flooding; other information which the Member State considers useful.

Damage: The amount of destruction or damage, in health, financial, environmental functional and / or other terms because of an occurred hazard.

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Vulnerability: The degree of fragility of a (natural or socio-economic) community or a (natural socioeconomic) system towards natural hazards. It is a set of conditions and processes resulting from physical, social, economical and environmental factors, which increase the susceptibility of the impact and the consequences of natural hazards. Vulnerability is determined by the potential of a natural hazard, the resulting risk and **the potential to react to and/or to withstand it, i.e. its adaptability, adaptive capacity and/or coping capacity.**

Role of Geo-Informatics in Flood Zones Mapping

Information derived from GIS and Remote Sensed satellite imagery plays an important role in disaster management and crisis prevention. Their effective application depends not solely on technical specifications, but is influenced by factors such as data collection, processing and distribution, capacity building, institutional development and information sharing. In this context contemporary technology such as GIS, GPS, database, Internet etc., will play an important role.

Satellite images provide vital information required by the decision makers at different phases in flood disaster cycle i.e. pre flood (preparedness), during flood (relief and rescue operations) and post flood (mitigation measures).

Presently, optical satellite data from IRS-P6 satellite and microwave data from RADARSAT / ERS SAR satellites is being used for flood mapping and monitoring, whereas for detailed damage assessment Cartosat-1 and 2 images are used.

OBJECTIVES OF STUDY

- To delineate flood vulnerable zones

STUDY AREA

General Description of the District
Fatehabad district came into existence on July 15, 1997. It was carved out of Sirsa and Hissar districts. The district has three sub divisions namely Fatehabad, Tohana, Ratia and six development blocks namely Fatehabad, Tohana, Ratia, Bhuna. Bhattu-kalan and Jakhal. Fatehabad is located at 29.30o N 75.27o E. It has an average elevation of 224 meters (734feet). This city is situated on National Highway No. 10 connecting the Sirsa to Delhi. In addition, it is connected through road network to Bhatinda, Patiala and Sangrur in Punjab.

Temperature
In the district, there is a rapid increase in temperature after February. The mean daily maximum temperature is 41.6□C in June, which is the hottest month. Sometimes, the maximum temperature of the district may rise up to 470 C to 48□C during summer season.

Climate
The climate of the district is characterized by its dryness and extreme temperature variations and scanty rainfall. The year may be divided into four seasons. The cold season from November to March is followed by summer season, which ends by June. The period from July to September is called the monsoon season. The major part of the rainfall occurs during these months. The latter half of September and October constitutes the post monsoon period.

Physiography
The district is part of the Ghaggar alluvial plain and its southern and western portion mark a gradual transition to the Thar Desert. Topographic pattern of the district owes its existence to geographic processes having closer affinity with climatic aridity, both of recent and past geological periods. The district can be divided into following land units:

- Sub-recent alluvial plain.
- Late Quaternary to sub-recent sand dune areas.
- Plain with sand dunes.

Drainage
Ghaggar, the largest seasonal stream in Haryana, which enters the district as deeply incised fluvial channel near Jakhal and makes an exit west of Bira Badi. The Ghaggar is a dying stream since the scant volume of discharge stands in marked contrast to its large channel width. The river drains large volume of flood flow during the rainy season and is generally dry in summer. However, this is the lifeline of the drainage system in the area.

MATERIALS

- SOI Toposheeet (1:50,000)
- Secondary Data - old map, literatures
- GPS (Global Positioning System)
- ARC GIS 9.2 ERDAS 9.1

Table-1: Details of Satellite Data Used

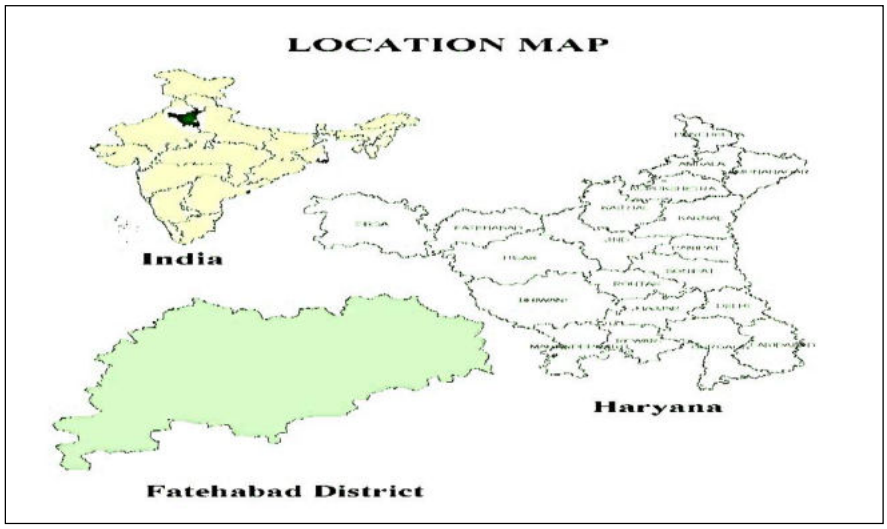
S. No.	Satellite	Sensor	Spectral Bands (microns)	Spatial Resolution (m)	Swath	Repeat Cycle (Days)
01	IRS P6	LISS-III	B2, B3, B4, B5	23.5m	141 Km.	24

Sources: Authors Compilation

METHODOLOGY USED

- SOI Toposheet and IRS LISS-III are used for spatial data,
- After that, georefernsing LISS-III data through Toposheet,
- Than geometric and radiometric correction,
- Base map and thematic map are prepared,
- Ground truth,
- Digital Elevation Model (DEM) created,
- Final map preparation,
- Demarcation of flood vulnerable zone.

Figure-1: Location Map of the Study Area



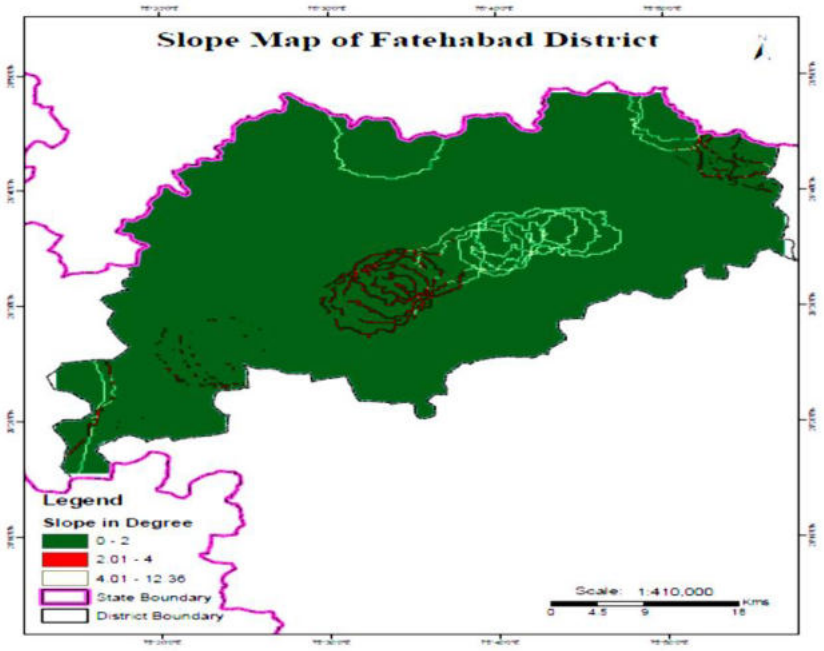
Sources: Authors Compilation

Results

In the present investigation, the flood vulnerable zones have been delineated based upon the slope of the district. A composite map showing the flood vulnerable areas were created using Digital Elevation Model (DEM).

In this application, the range numbers are designated as Highly, Medium, and Safe Zones on the output map depicting the level of flood vulnerability of the study area, Height of each zone to flood vulnerability was also calculated as 172-203m is highly vulnerable zones, 203 – 214m is moderate vulnerable zones, and 214-225m is under the safe zone. We categories in three parts Slope of the district as: 0 - 2.140 highly, 2.140 - 4.690 moderate and 4.690 - 12.30 slope going into the safe zones.

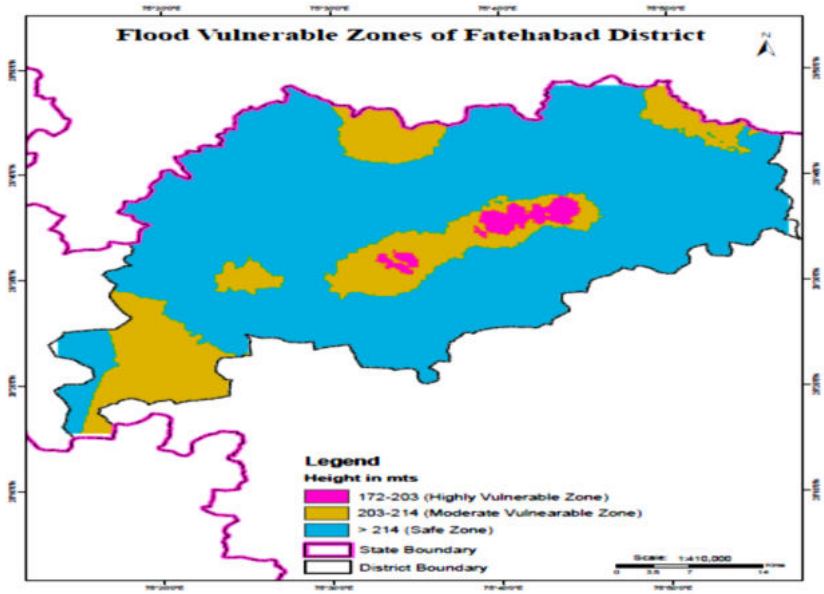
Figure-2: Slope Map of Fatehabad District



Sources: Authors Compilation

Total basin area of Ghaggar is 32132 sq. km.

Figure-3: Flood Vulnerable Zones of Fatehabad District



Sources: Authors Compilation

In highly vulnerable zones those areas are included their height of the area is 172-190 meters and slope is 0-20. Which areas are in the touch of Ghaggar River are also highly affected by flood every year likewise-villages Lamba, Kamana, Aharwan, Mirana, and Baliyala. This highly caused all fields of life of man. The road, which connects the Ratia to Kamana, is the best and lively example of that lost during flood. This cannot be regained again until now. Total highly vulnerable area is 44.28 sq. km. In

moderate zone, those areas are included where height is 191-208 meters, and slope is 20 - 4.60.in these zones specially transport network like - railways and roadways transport is affected.

The roads, which attach the Fatehabad to Ratia, are collapse during to flood 2010. Jakhal railway line was also affected by the flood in 2010. Total moderate vulnerable area is 475.62 sq. km. In safe zones where height is 209-225 meters and slope is 4.6 o–12.30. In this zone, likewise villages are Mochiwala, Bigghar, and Gaurakhpur. The total safe area in Fatehabad District is 1935.36 sq. km.

CONCLUSION

In Fatehabad District high wise and slope wise highly vulnerable zones is very less. Out of this, flood also affects the safe zones. Man himself is the main cause of their disaster; likewise, man constructed the Rangoi, which comes from Ghaggar by the way of Lamba, Ayalka, Fatehabad and in the end it again meet in Ghaggar at Sirsa. It is not very deep and it is not in firm condition. Therefore, at the time of flood it cannot control water and caused flood in the touching areas. It is also the main reason affect Fatehabad during flood.

Everything has its two parts- if one thing does badly to us it also does good for us in the other way. During the period of flood in 2010, farmers of Fatehabad have sowed the crop of rice and up to the season of rice, their crops were ready to cutoff. So many farmers who have lost their crops during flood they gained so many prices as compensation from government more than they did loss.

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GEO-INFORMATICS BASED URBAN LAND USE / LAND COVER ANALYSIS OF JIND CITY

Satpal[17] Mona Yadav[18] Vikas Sihag[19] Mohit Kumar[20] Bhanu Pratap Singh[21]

ABSTRACT

Urban Land use study is important for urban planning and management. Urban areas are facing serious problem of land use management because the knowledge of land use pattern helps to develop strategies to balance the conservation & developmental pressure on urban land resources. This study demonstrates the potential of geospatial technologies as a Decision Support System (DSS) in analyzing the cohesiveness of Jind city. The study was carried out by using Google earth imagery of 2010 using on screen visual analysis of land use pattern. The land use features were prepared in Arc GIS vector form, which is used for identifying the various classes of urban land use.

The result shows that Jind has 44.68 percent under residential purpose and in The both commercial & industrial land use categories equally covers less than twenty percent each and area under vacant land and about 7.90 percent It is evident from study that even being a planned city it is facing number of problems like roads & parking, slums, pollution and lack of infrastructure and requirement of spatial expansion for different land uses to meet the continuous increasing demand of increasing population.

KEYWORDS

Remote Sensing, GIS, Land Use / Land Cover etc.

INTRODUCTION

The modern technology of remote sensing includes both aerial as well as satellite based systems, allow us to collect a lot of physical data easily with speed and on repetitive basis and together with GIS helps us to analyses the data spatially, offering possibilities of generating multiple options, thereby optimizing the whole planning process. These information system also offers interpretation of physical (spatial) data with socio-economic data, and thereby providing an important linkage in the total planning process and making it more effective and meaningful.(Ravindra Kumar Verma1,et.al.)[1]

The purpose of the study is to shows the role of geospatial technology in planning of Jind city. With the help of this technology the land use and land cover patterns have been categorized namely; built up areas, agriculture land, wasteland, forest, open spaces, water bodies and transportation etc. This technology cost effective, less time consuming and gives the accurate result by updating temporal database. There is increasing trend in using space technology data in urban areas land use planning and management in recent decade (Tuyahov et al., 1973 [2]; Jensen, 1983[3]; Haack et al., 1997[4]).

In an early attempt to relate remotely sensed reflectance to socio- economic parameters, Forster (1983) [5] devised a classification scheme for Landsat imagery that could be applied to urban areas to produce a residential quality index. Remote sensing data have also been used in attempts to estimate population (Lo, 1986 [6] and 2001) [7] and quantify urban growth and land use (Mesev et al., 1995[8]; Stehanov et al., 2001) [9]. Welch (1982) [10] conducted a resolution analysis of satellite sensors and demonstrated that 0.5 to 10 m spatial resolution is necessary to adequately characterize urban infrastructure in most of the cities/towns.

Jensen and Cowen (1999) [11] have identified a hierarchy of urban/suburban attributes that can be measured using remote sensing data. The current/near future high resolution satellite data from Cartosat-1/2, Cartosat-3, RISAT, ASTER, LANDSAT ETM in optical, microwave, infrared, thermal will begin to meet urban planning needs.

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OBJECTIVES OF STUDY

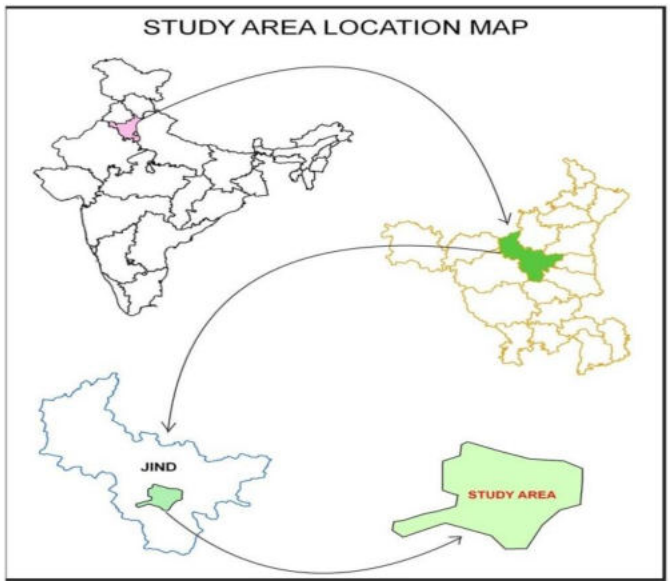
- To access the present status of urbanization with the help of remote sensing Geo-spatial data and GIS based Information system.
- To prepare urban land use map.

STUDY AREA

Jind district lies in the North of Haryana between 29°15'30'' and 29°21'51" North latitude & 76°13'40" and 76°23'10" East longitude. On its East and North-East lie the districts of Panipat, Karnal and Kaithal respectively. Its boundary line on the North forms the inter-state Haryana- Punjab border with Patiala and Sangurar districts of Punjab. In the West and South-West it has a common boundary with district Hissar & Fatehabad and in its South and South-East lays the district of Rohtak and Sonipat respectively.

The area of the district is 2736 square kilometres, e.g. 6.20% of the state. According to the Indian Census 2001, the total population of the district was 11,89,827 e.g. 5.63% of the state population. The population growth in the decade of 1991-2001 was recorded as 21.36%, e.g. lower than the state average of 28.43%. The literacy rate of the district was 52.33%, e.g. lower than the state average 57.20%. The population density of the Jind district was recorded 440 persons per sq.km that is lower than the average of the state density 478 persons per sq.km. Sex ratio of the district was 852, e.g. lower than the state average 861 females per thousand males**.**

Figure-1: Showing Location Maps of Study Area



Sources: Authors Compilation

The level of urbanization in the district was 20.30% of the district population, e.g. lower than the state average of 28.92%; while in 1991 it was 17.20% and 24.63% respectively. According to the Indian Census 2001, Jind city comes under the category of A-class city (e.g. population more than 100000). Jind city & its agglomeration cover an area of 15.30 sq. km. Its population was recorded 135,855(e.g.0.64% of the state population). The density of the city was 8879 persons per sq.km while in 1991 it was 5516 persons per sq.km. Sex ratio of the city was 851, e.g. slightly lower than the averages of both state & district.

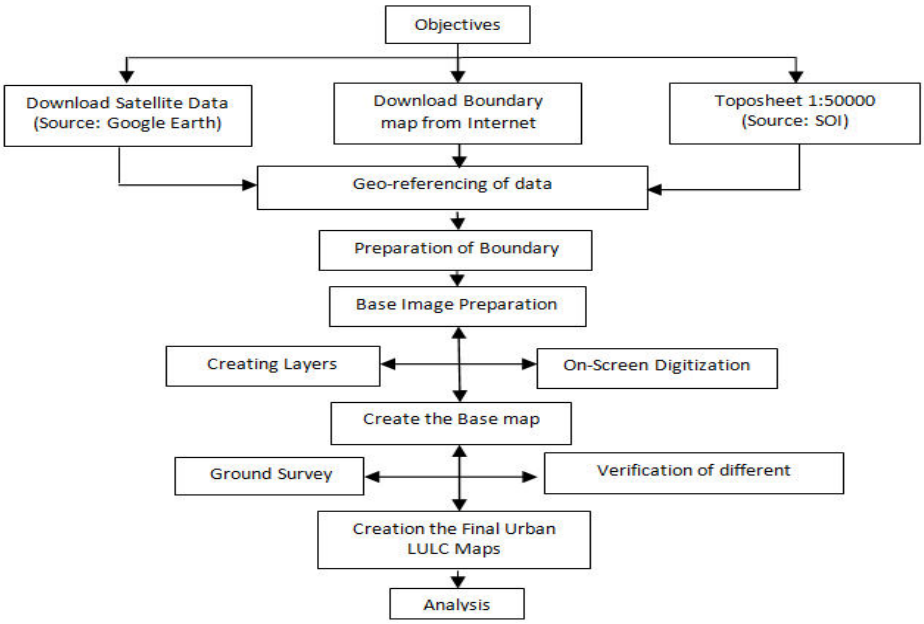
MATERIAL AND METHODOLOGY

Primary Data: Google Earth satellite data of year 2010 have been used for the study purpose. Google Earth displays satellite images of varying resolution of the Earth's surface, allowing users to see things like cities and houses looking perpendicularly down or at an oblique angle. In this study satellite imagery is used for preparation of base map by downloading and mosaicking the images from Google earth.

Secondary Data: Survey of India (SOI) Toposheets nos 53C/2, 53C/3, 53C/4, 53C/6, 53C/7, 53C/8, and 53C/11on 1:50,000 scales were used in study. As name suggests top sheet gives the information about the topographical condition of the surface and also contains information about roads, railways, settlements, canals, rivers, electric poles, post offices etc. These were used for demarcating the study area outer boundary.

Methodology: The study area images were geo-referenced which means assigning coordinates to map & transforming raster image to input coordinates system which enables viewing, querying & analysing the satellite data. On the basis of brief reconnaissance survey and additional information from previous research in the study area the land use classification was developed in broad purview of Anderson classification (Anderson et al 1976) [13]. After that on screen interpretation process was performed on imagery. It was based on the standard visual interpretation elements such as shape, size, colour, tone, texture, pattern and association. The interpreted thematic layers accuracy was verified during field visit. It is important in order to relate image data to real features and materials on the ground and doubtful areas were checked and modifications were carried as per ground verification. Finally land use/land cover (LULC) map was prepared. As shown in the methodology flow chart has been give below for easy and better understanding of the procedure adopted (Figure-2)

Figure-2: Showing Methodology Chart of Present Study



Sources: Authors Compilation

RESULT & DISCUSSION

Urban Land use is the human utilization of land. It involves the management and modification of natural environment or wilderness into built environment such as fields, pastures, and settlements. It has also been defined as "the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it .The study area is having different urban land uses are categorized into such as Residential area, Public semi-public area, Layouts/Plotted Area, Industrial area, Vacant Land, Commercial area, Recreational Land, Public Utilities & Facilities etc. as showing in Fig-3 and table-1. Detailed about each classes of Urban LULC given below:

Table-1: Showing existing Urban Land Use of the Study Area

S. No.	Built up Urban Area	Area in Hectares	Area in Percentage
1	Residential area	707.25	44.68
2	Public semi-public area	237.34	14.99
3	Layouts/Plotted Area	206.03	13.02
4	Industrial area	185.03	11.69
5	Vacant Land	125.06	7.90
6	Commercial area	88.50	5.59
7	Recreational Land	28.66	1.81
8	Public Utilities & Facilities	5.08	0.32
	Total	1582.95	100.00

Sources: Authors Compilation

The Residential area is spread over 707.25 **Hectares** that is (44.68%) out of total study area as shown table 2 and fig-3. The area under Commercial land is 88.50 **Hectares** (5.59%). The Industrial area occupies **185.03 Hectares** (11.69%) The demand of land for industry is increasing. The public/semi-public land use class covers 237.34 **Hectares** (14.99%). This category included with all government offices, institutional and hospitals etc. These constitute water supply, sewerage, waste disposal/landfill, electric power, inland gas supply and so on. It includes water pumping and treatment plants; gas and oil storage tanks and pipelines, and power plant, transmission lines and so on. This area is 0.32% of the total study area it is called Public Utilities & Facilities Recreational land covers 1.81% of the study area. Vacant land only 7.90% of area is vacant land in Jind study area. It includes the areas under use for the movement of people, goods and material. It is a measure of accessibility, speed, usage / carriageway (IRC-2007) and connectivity (IRC-2007). It includes railway, roads, airports, seaports, railway stations and bus terminus. Major transportation routes influence other land uses in their location and distribution. The roadways include major and minor roads /

streets, bridges / flyovers, expressway, ring road and traffic islands. Rail facilities include broad and meter gauge service and terminal facilities like stations, sidings, and repair and maintenance yards. There are airport facilities in the city. There is a bus stand, railway station having broad gauge rail facility, some flyovers / bridges, & tuck terminus in Jind. All detail of these categories show in fig.4 and table 2.

Figure-3: Distribution of Urban Land use Study area

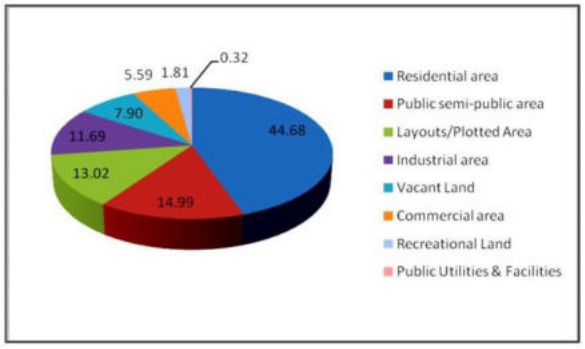


Figure-4: Existing Urban Land use Study area

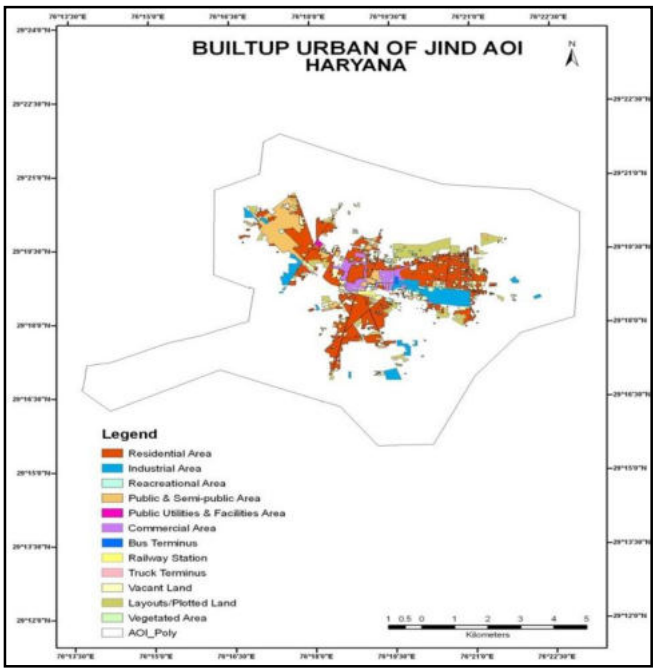
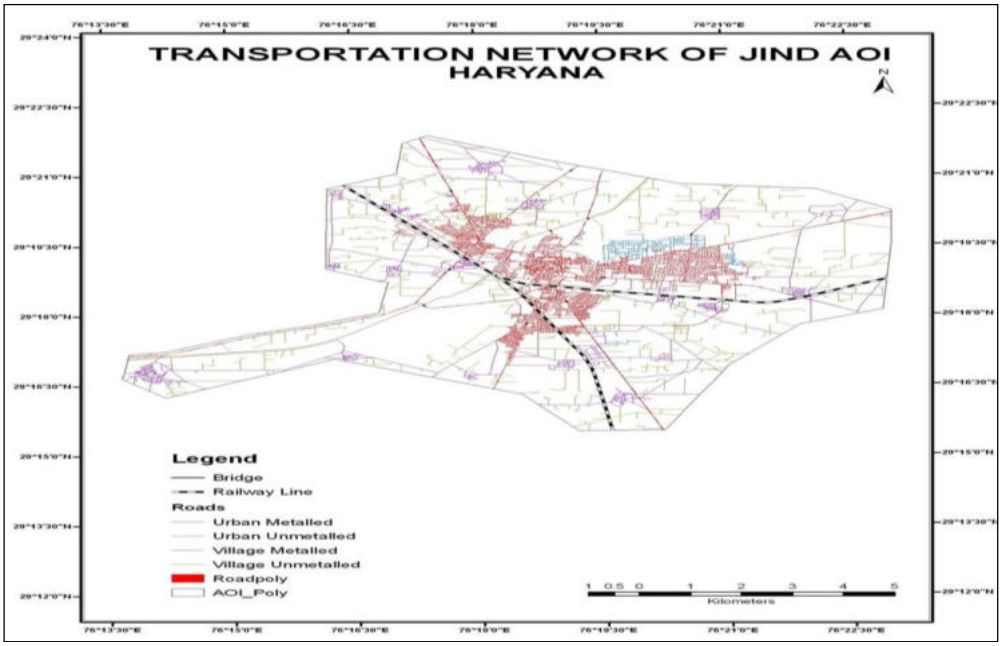


Table-2: Transportation Network Area Coverage of Jind AOI Area

S. No.	Transportation (Polygon Feature)	Area in Hectares	Area in Percentage
1	Road Major	29.38	0.31
2	Railway station	7.67	0.08
3	Railway Line	7.00	0.07
4	Bus Terminus	3.67	0.04
5	Truck Terminus	1.02	0.01
	Total	48.74	0.52

Sources: Authors Compilation

Figure-5: Transportation Map of Jind Study Area



Sources: Authors Compilation

CONCLUSIONS

The study demonstrates the importance and potentiality Satellite Remote Sensing technique for preparation of more consistent, accurate and up-to-date baseline information on urban land use for future planning, management and development of any area, the present study is derived based on interpretation of Jind city with the help of satellite data (Google Earth). It comprises of residential area, industries, public-semi-public utilities, communication, etc. The built up area alone covers 16.90% area. In overall, the built up area is well planned. The area is well connected with metaled roads. However, the area is facing some congestion and greenery problem.

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SPATIAL ANALYSIS OF CROPPING PATTERN IN MEHEM BLOCK OF ROHTAK

Savit Pal[22] Bhanu Pratap Singh[23] Mohit Kumar[24] Vikas Sihag[25]

ABSTRACT

In this study, the cropping pattern of Mehem block is done which falls in Rohtak district, Haryana. Multi-date data is taken for the study. The image is from IRS p6 LISS sensor. The cropping pattern of two seasons is analyzed. The unsupervised classification of LISS data is done and then major classes were identified. It is found that in Kharif season cotton has the highest area cover, which is 11.5 thousand hectare and other crops like paddy, sugarcane, bajra/jwar, other and fellow. Have similar area, which is nearly 4 thousand hectare each. In Rabi season wheat has major cropping area nearly 32 thousand hectares followed by mustard and other crops having cropping area 4.40 and 2.76 thousand hectares respectively. Fallow land is 2.89 thousand hectare in Rabi season.

KEYWORDS

Cropping Pattern, Mehem, Kharif, Rabi, LISS etc.

INTRODUCTION

Agriculture resources are among the most important renewable, dynamic natural resources. Comprehensive, reliable and timely information on agricultural resources is very much necessary for a country like India whose mainstay of the economy is agriculture (Balaselva Kumar S., 1997). Agriculture is the backbone of Indian economy, providing the livelihood to about 67.0% of the population and contributing approximately 35.0 per cent to the gross national product (Roy P. S. 2004). The crop type classification through satellite data the interpretation is the based on the premise that specific crop types can be identified by their spectral response pattern and texture. Successful identification of crops requires knowledge of the developmental stages of each crop in the area to be inventoried. Because of changes in crop characteristics during the growing season photography from several dates during the growing cycle, can by very useful in the interpretation process (Lille sand T.M., 2003). Agricultural geography is a part of economic geography (Coppock, J.T., 1968), which deals with the production processes and is concerned with the study of the distributional patterns and spatial relationship of the agricultural phenomena. Integration of soil suitability for the cultivation of cotton crop along with the spatial distribution of cotton crop as derived from remote sensing data through a conformity analysis enabled to delineate cotton crop grown under different suitability regimes. This information is useful towards planning for efficient production of cotton crop by apportioning those land parcels that are highly suitable for cultivation of cotton (Chatterji, B.N., 1979).

Cropping pattern is defined as the yearly sequence and spatial arrangement of crops or crops and fallow, in a given area. For convenience, it is categorized based on crop season as – *Kharif, Rabi* cropping pattern. Growing two, three or four crops in a year is defined as double, triple and multiple cropping patterns. Choudhury, Swagata, et.al. (2003) have conducted the study on Agriculture resources considered one of the most important renewable and dynamic natural resources.

Kharif Cropping Pattern: It has the southwesterly monsoon crops from July to October, which includes rice, sugarcane, bajra, maize, groundnut and cotton etc. Crops mixtures are widely grown, especially during this season.

Rabi Cropping Pattern: The post-monsoon crops are the Rabi season crops which grown from October to March. Wheat, mustard, sorghum, sugarcane and gram can be considered the base crops for describing the Rabi cropping patterns.

Study Area: The present study proposes the cropping pattern analysis and crop rotation mapping of the Mehem Block of Rohtak, which is one of the district of Haryana states. Rohtak district have five blocks names Kalanaur, Lakhan Majra, Meham, Rohtak and Sampla.

Location and Extent: The Rohtak district is located between 28º23' to 29º06' N latitudes and 76º13' to 76º58' E longitudes. It covers a total area of 1745 sq. Kms. It is bounded on the north by the Sonipat and Jind districts, on the west by the Bhiwani district, on the north-west by the Hissar district, on the south by Jhajjar district and on the east by the Sonipat district.

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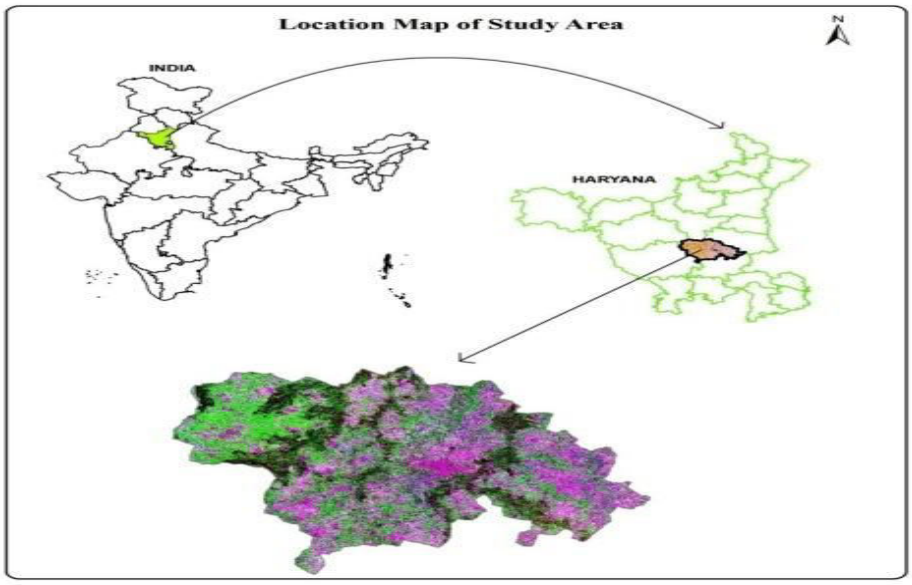
Figure-1: Study Area Location Map



Sources: Authors Compilation

Land use Analysis: As per the historical data obtained from statistical abstract of Haryana (2007-2008) 94.24 percent of total geographical area (TGA) of the district is under cultivation while remaining 11.51 % of total geographical area was under permanent fallow, settlement, wasteland etc. the district had 83.24 % net sown area and 41.88% area cultivated more than once. Rohtak District stretches from 26°19'N and 28°59'N latitudes and from 76°13'E and 76°29'E longitudes. Rohtak District has 147 villages and all the villages were taken for the present investigation.

MATERIAL AND METHODOLOGY

Database Requirement

For doing any research work various kinds of data are required for fulfill of our research purposes. Therefore, various kinds of data were used in study, which is briefly described below:

Digital Satellite Data

Remote sensing data are the basic data source for mapping the cropping system of the state region. Indian Remote Sensing Satellite Resource-sat (IRS-P6) LISS III data is the ideal one with optimum spatial and temporal resolution. The sensor provides 23.5 m spatial resolution data in Green, Red, NIR and SWIR bands with 24 days revisit capability. Its repeat cycle can be used for deriving kharif, Rabi & Summer cropping pattern and change analysis between these seasons.

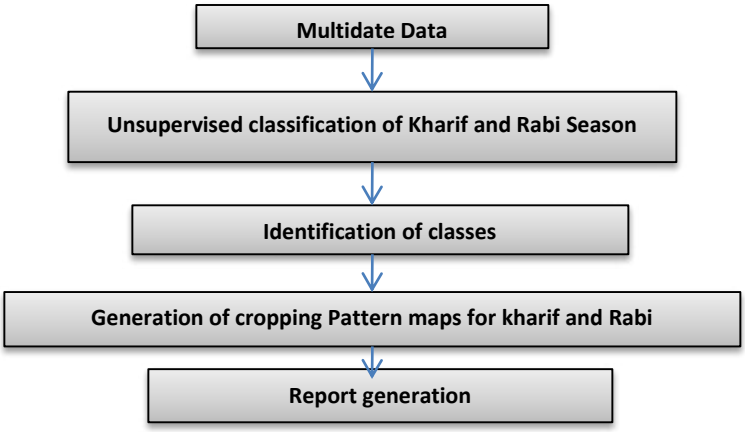
Remote sensing data from sensor LISS III on-board Indian Remote Sensing Satellite Resource-sat (IRS-P6) of 2007-08 were used to analyze the changes in cropping pattern and crop rotation for three seasons Kharif and Rabi. Multi-date Satellite data of Kharif and Rabi season were used for identify most of the crops as possible.

Collateral Data

Ground Truth Points, Administrative Boundaries (District & Block) and BES (Crop Statistics data) are available from the Haryana Space Application Center, Hissar; Haryana (HARSAC).Ancillary data of crop statistics are available from the BES (Crop Statistics data) and Statistical Abstract of Haryana.

***Methodology*:** Digital image analysis was carried out through study on windows platform using Geomatica software. In order to analysis cropping pattern and crop rotation of Sonipat district and its blocks for the year 2007-2008 complete enumeration approach was used. The methodology of cropping system analysis comprises of the following functional

Figure-2: Details of the Steps Involved in Digital Analysis



Sources: Authors Compilation

RESULTS AND DISCUSSION

Cropping Systems Analysis of Maham Block

Kharif Cropping Pattern of Maham Block

Kharif cropping pattern of Maham Block indicates that Cotton is the major crop in kharif season, which occupies the 11.5 ('000 h) area. Paddy, Sugarcane, Cotton, Bajra/Jawar are also shown area as can be seen in Table-1.

Table-1: Kharif Season Cropping Pattern

S. No.	Class	Area in (000'h)
1	Paddy	4.6
2	Sugarcane	4.1
3	Bajra/Jawar	4.04
4	Cotton	11.5
5	Other	4.5
6	Fallow	5.5

Sources: Authors Compilation

Rabi Season Cropping of Meham Block

Analysis of Meham block indicates that Wheat is the major crop followed by Mustard, Gram crop during Rabi season derived from RS data. The area occupied by Wheat, Mustard, Other crops and Fallow land depicted in Table 2. Area of different crops which are derived from RS data, are very close to with what obtained from Department of Agriculture (DOA) estimates for the same year .

Table-2: Rabi Season Cropping Pattern of Meham Block Derived From RS Data

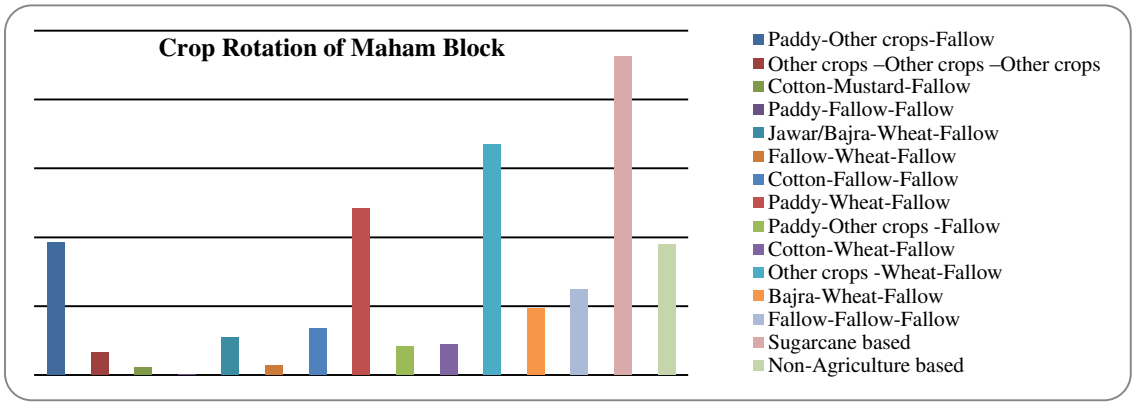
S. No.	Classes	Area in ('000 ha.) derived from RS data
1	Wheat	31.9
2	Mustard	4.40
3	Other Crops	2.76
4	Fallow	2.89

Sources: Authors Compilation

Crop Rotation of Maham Block

Maham Block has the major crop rotations of based on Sugarcane and Other crops -Wheat-Fallow. These rotations occupy 23.14 and 16.7 area respectively based of three seasons Kharif, Rabi and summer.

Figure-3: Crop Rotation of Mehem Block



Sources: Authors Compilation

CONCLUSION

Crop production is the resultant effects of interaction between different natural resources such as soil, water, weather and external inputs like fertilizer, management practices etc. Thus, the production system is a complex one, the interactions are intricately woven, and interlinked Cropping System Mapping is essential to understand the total agriculture scenario of a region, and thereby to carry out proper planning for agriculture development. Major Crop rotation of Mehem block of Rohtak District is Fallow-Wheat-Fallow, which covers a lot of area of the block. Remote Sensing data is used to generate seasonal cropping pattern maps for Mehem block. The present study based on Remote Sensing technique introduces a method for analysis of cropping patterns for main crops, other crops, and fallow land of the single year.

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THE SIGNIFICANCE OF BUSINESS INTELLIGENCE IN DECISION MAKING IN E-COMMERCE ORGANIZATIONS: AN EMPIRICAL STUDY

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ABSTRACT

Business decisions are very crucial for any organization irrespective of its industry. Decisions related to the product, services and its improvements are totally based on the feedback of the consumers, and even promotional efforts are directly related with addressing right and relevant consumers. All these decisions or corrective actions can be done properly within the organization if correct and timely feedback or information is given to the decision makers.

This study is based on e-commerce organizations with respect to application of Business intelligence tools. Purpose of this study is to explore significance of Business intelligence in decision making in e-commerce organizations. Effectiveness can be achieved in e-commerce organization by applying Business intelligence tools.

KEYWORDS

Business Intelligence, E-Commerce, Decisions, Inventory etc.

INTRODUCTION

E-commerce denotes the use of Internet in business transactions towards sale and purchase of goods and services. This also includes post-sale support services. This business concept is not new but the new aspect is the use of technology in the sale and purchase transactions of products and services. The same is known as E-commerce, which reaches to global customers. Once products or services has been bought or sold, this does not mean end of E-commerce, it is rather a continuous process that is to be followed on regular basis. Now most of the business houses are having its own website and offers products and services through internet portal. This means that business organizations are depending upon internet commerce heavily. In order to perform their marketing activities through E-commerce it is very important to have data related to customers or own target customers. Data is very important for implementing E-commerce in any organization, as it is the basic kind of information that keeps circulating within the organization. Organizations collect data decoded information and take business decisions based on the extracted information of the same data. It is a normal process of taking decision that involves collection of data, evaluation of data, and analysis of the data. Based on extracted information, the decisions in the respective organization would be taken depending on future course of action. There are many systems related to data like: data warehousing and Enterprise Resource Planning (ERP), which are in use in most of the organizations nowadays. According to Wixom & Watson, 2001 these systems have progressed tremendously in the last few years through making ample amounts of information accessible using data marts and data warehouses. These systems and technology facilitate analyzing the data as per the requirements of the business concerned. Decision-making becomes easier for the organizations through these systems and technological advancements. Right Decision making totally depends on using the data effectively. If data have not been used effectively as right data, in right form, at right time etc., decision will not be correct for the business organization and there might be adverse impact in the business. So right decision is depending on effective use of data, moreover, the effective use of data is based on Business Intelligence.

Business Intelligence is a new concept in E-commerce business. In according with Olszak and Ziemba, 2006 Business intelligence by definition is simply used to create knowledge to enable business decision making. As the name suggests, BI corresponds to business and similar to many terminology in this area. So far, it has no standard definition like in many scientific terms. However, most of the Business Intelligence literature has come from and within the business world, the IT industry, and vendors (Arnott, D., Gibson, M., and Jagielska I., 2004). As per Anderson, D., Fries, H., and Johansson, P. 2008, "Business Intelligence is a set of technologies and processes that use data to understand and analyze organization performance". Bisignani, D., and Brizee, A., 2010 explained Business Intelligence as "the use of information to drive business insight". Based on the aforementioned definitions the authors would like to add to its meaning that, the BI is an approach or a technique that provides a basis for the decision makers through facilitating right information in a right form and in a right quality and even at a right time.

RESEARCH OBJECTIVES / HYPOTHESES

The need for the study is to highlight the significance of business intelligence in E-commerce organizations.

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Objectives of Study

- To investigate the use of BI in E-commerce-based organizations.
- To investigate the utilization of Business Intelligence (in terms of decision-making) to attain a more effective E-commerce.

To achieve that, the work states the following hypotheses:

Hypothesis 1
H_0: There is no impact on quality of information through using Business Intelligence tools.
H_1: There is impact on the quality of information through using Business Intelligence tools.

Hypothesis 2
H_0: There is no impact on decision making through using Business Intelligence tools.
H_1: There is impact on decision making through using Business Intelligence tools.

REVIEW OF THE LITERATURE

The scope of this research has been consolidated through scanning the available literature. The nature of the study is to analyze the participation of Business Intelligence in effective management of E-commerce. The authors have referred to many journals, books, articles published by different authors on the same topic, which gave deep understanding of key terms and the utility of Business Intelligence.

E-commerce

"Dot com" is a term associated with modern business organizations names. These various organizations differ from each other in vision and mission, yet they are all share the "dot com" label. However, in today's world we are more associated with organizations having "dot com" in their names. They are nothing but different organizations, which may or may not have physical existence but they are available on the internet. Therefore, these organizations are intrinsically internet-based organizations, which facilitate sale and purchase of goods and services through internet only. This sale and purchase of online is called online transition or E-commerce. In E-commerce, business transactions happen through network telecommunication upon the cyber world. It is buying and selling of products and services through computer networks that include the internet. It is doing business electronically (Rhodes, Carter, 1998).

Key Drivers of E-commerce

Key drivers of E-commerce can be used to measure stages of advancement of E-commerce in respective countries. These drivers can be considered as criteria of E-commerce comparison or assessment. Amongst these are technological factors, Political factors (like role of government in initiatives and funding to support e-commerce), Social factors (like IT education and training that enable increasing potential buyer through E-commerce), and Economical factors (like commercial health of the country concerned). Further, there exists some organizational culture in the E-commerce organizations world.

Business Intelligence

The term Business Intelligence is associated with software terminology. It is like an umbrella term that helps collecting of data, analysis of data, and presentation of information related to the business. Business Intelligence contains different programs and software that helps business extraction of data besides its information analytics. As such, the same can be exploited to become significant for business organizations. As per Negash 2004, BI gave understanding of the capabilities of the organization that exists within the organization. Those capabilities can be known through the trends, future directions in the markets, regulatory environment (which is external business environment and the technologies as well). Arnott et al. 2004 explained the role of business intelligence as to extract the main information or central information of the business and utilizing data to get the said information. This is a kind of support in decision making to help managers. Koronios and Yeoh 2009 explained to business intelligence as a set of tools and technologies that are being utilized to collect the information, integrate the information and facilitate different kind of data's that are required in the organization for the decision making.

Key Components of Business Intelligence Systems

As per Olszak and Ziemba 2006, key components of business intelligence systems include: (a) data warehouses, (b) Extract-Transform-Load (ETL) tools, (c) Online Analytical Processing (OLAP) techniques, and (d) data mining. Cella, Golfarelli and Rizzi, 2004, suggested that business intelligence system components are used to support a set of managerial decision-making

actions. Olszak and Ziemba 2007 elucidated that this involves several issues such as: Collection of Data supported by data warehousing system, Analysis of Data supported by the use of on-line analytical products, as well as Producing of Reports supported by data mining component of business intelligence systems.

Applications of Business Intelligence Tools in E-commerce

This comprehends but not limited to the following (Olszak & Ziemba, 2007).

- Gaining better understanding of buying patterns among different segments of customers.
- Creating data-driven promotions that are targeted based on customer behavior.
- Tracking the sales and performance margin of different products, allowing inventory and marketing to focus on higher value items.
- Targeting marketing and relationship management to attract the most valuable customers.

Utilization of Business Intelligence Tools in Decision Making in E-Commerce Industry

Organizations dealing in E-commerce business get better understanding of buying patterns of their customers with the help of BI tools. Such information become as a basis towards knowing their needs for better services. With the help of information provided by BI tools, organization can take right decisions that help achieving customer satisfaction. Once the customers' behaviors are known to the E-commerce-based organizations with the help of BI tools, organizations get help in their promotions targeting to right customer segments with the help of data-driven promotion.

With the help of BI tools, organizations can take decisions related to sales i.e. whether there is need to boost the sales in the target market or segment, or whether there is need to take decisions related to the performance of products from their margin point of view. Margin is that part of the revenue, which comes after the deduction of variable cost from the sales revenue. So whether there were sufficient margin of profit in the particular product or not, such case can be manage through effective decisions.

There are certain decisions that are related to the inventory management of the particular product. Inventory management is concerned with categorization of inventory in different standard category such as 'A' category, 'B' category and 'C' category. Hereby, 'A' category stands for high value products, 'B' is moderate and 'C' is less value product. As far as management of inventory is concerned, it is 'A' category items that are in less quantity compared to 'B' category inventory and 'C' category items. 'C' category items are large in quantity compared to 'B' and 'A' category. Therefore, these decisions and management can be done properly by taking right decision of procurement, which can be made easily by BI tools. It is business decisions that help running business effectively and on the other hand, it is BI tools that help management taking right decision with the help of right information provided by BI tools at right time and in right form as well.

RESEARCH METHODOLOGY

Both primary and secondary data types in this work have been utilized. Secondary data have been collected through books and journals, whereas primary data have been collected from E-commerce-based organizations. First, list of organizations has been created as a field, and simple random sampling technique has been applied to choose samples from this field. Thirty organizations have been chosen for sampling, and there were 4 employees from each organization have been approached. Sample size of all organizations was therefore 120. Tools of data collection were questionnaires only.

ANALYSIS AND DISCUSSION

The frequency chart and chi square test for testing hypothesis are exhibited below:

Table-1: The Number of Respondents

non BI users	12 respondents	10%
BI users	108 respondents	90%

Sources: Authors Compilation

Out of 120 samples, 12 i.e. 10% respondents responded as non user of modern tools of business intelligence, rather they use their IT department for the collection of data and analysis of the same, which is a traditional approach. On the other hand, there are 108 respondents i.e. 90% respondents use BI tools for the management of their data and extracting vital information to bring the difference in the business operation and growth.

Hypothesis Test Findings

Hypothesis 1
H_0: There is no impact on quality of information by using business intelligence tools
H_1: There is impact on the quality of information by using business intelligence tools.

Table-2: Case-Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
User * Response	120	100.0%	0	.0%	120	100.0%

Sources: Authors Compilation

Table-3: User Response Cross tabulation

Count		Response		
		Agree	Strongly Agree	Total
User	Non User of BI Tools	6	6	12
	Use BI Tools	0	108	108
Total		6	114	120

Sources: Authors Compilation

Table-4: Chi-Square Tests

	Value	d.f.	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	56.842a	1	.000		
Continuity Correction	46.803	1	.000		
Likelihood Ratio	31.008	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	56.368	1	.000		
N of Valid Cases	120				

Note: a. 1 cells (25.0%) have expected count less than 5.
The minimum expected count is .60.
b. Computed only for a 2x2 table

Sources: Authors Compilation

Since Sig<0.05 H0 is rejected which means there is an association or using tools of business intelligence for facilitation of right data and information at right time and in right form is possible for BI users.

Hypothesis 2
H_0: There is no impact on decision making by using business intelligence tools
H_1: There is impact on decision making by using business intelligence tools.

Table-5: Case-Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
User * Response	120	100.0%	0	.0%	120	100.0%

Sources: Authors Compilation

Table-6: User Response Cross Tabulation

Count		Response		Total
		Agree	Strongly Agree	
User	Non User of BI Tools	2	10	12
	Use BI Tools	0	108	108
Total		2	118	120

Sources: Authors Compilation

Table-7: Chi-Square Tests

	Value	d.f.	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	18.305a	1	.000		
Continuity Correction	9.548	1	.002		
Likelihood Ratio	9.530	1	.002		
Fisher's Exact Test				.009	.009
Linear-by-Linear Association	18.153	1	.000		
N of Valid Cases	120				
Note: a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .20. b. Computed only for a 2x2 table					

Sources: Authors Compilation

Since Sig<0.05 H0 is rejected which means there is an association or data and information provide by business intelligence tools is required for right decision making.

CONCLUSION AND SUGGESTIONS

Most of the respondents are using BI tools for managing their data and achieving effectiveness in decision-making. The same has been shown in the pie chart exhibited in **Figure-1** above, showing the two categories of respondents; BI users and non-BI users. Two hypotheses have been developed and tested to know whether there is similarity in opinion or not of both groups regarding the use of BI. It has been found that there is Impact on quality of information through using BI tools for the same. The title of this paper, which is focused on decision-making, is directly linked with the stated relevant hypothesis. Outcome of hypotheses test suggests that there is impact on decision making by using BI tools for the same. This implies that though there are some of the respondents who are not using BI but still they believe that there is addition in the quality of information through applying BI. Decision-making becomes easier and more effective through information provided by BI. Therefore, it is advisable that using BI will be very much beneficial to even those who are not using BI in their organization.

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EDUCATION AND TECHNOLOGY: AN OVERVIEW OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AS RISING PROTAGONIST IN HIGHER EDUCATION

Abiresh Abraham[28] Dr. V. D. Nandavadekar[29]

ABSTRACT

Quality and outreach of higher education need to be rethought. Every Indian learner has the right to be given a chance to have the highest quality education. Considering the ever-increasing importance of Information and communication Technology (ICT) in every sphere of life ICT can fulfill this need. In this paper, the authors have studied various research papers, journals and reports to analyze the need, role and usability of ICT in the area of higher education globally and particularly in the Indian context. It also studies the various ways by which the governments of the land, NGOs, international organizations and private sector are doing their bit in creating awareness ICT in academics and creating effective ICT infrastructure. Due consideration has also been given to various challenges that are being faced in setting up, maintenance and up-gradation of ICT infrastructure in higher educational institutions.

KEYWORDS

ICT, Higher Education, IT, Information Technology, Information and Communication Technology, E-Learning etc.

INTRODUCTION

For India to emerge as knowledge super powers of the world in the shortest possible time it is important to convert our demographic advantage into knowledge powerhouse. This can be achieved by nurturing the working population into knowledge enabled working population.

The Right of Children to Free and Compulsory Education Act or Right to Education Act (RTE), is an Act of the Parliament of India enacted on 4 August 2009 calls for education under Article 21A of the Indian Constitution. Education only until school level is not enough for the country to become a superpower.

Information and Communications Technology (ICT) is often used as an extension for Information Technology (IT). In broader terms, it covers the telecommunications (telephone lines and wireless signals), computers, software, middleware, hardware, storage, and audio-visual systems, etc. The basic main is to enable users to access, store, transmit, and manipulate information.

Because logic applies everywhere, the potential applications of computer technology appear limitless! The computer is the nearest thing we have to a universal tool. Indeed, the limits of computers are largely the limits of our own creativity!

IMPORTANCE OF ICT

Samuel Johnson quotes "*The next best thing to knowing something knows where to find it*".

ICT has come out as the best place to get answers to nearly every question. Google.com is one of the most powerful inventions of the century with regards of this. It was prophesied that one-day machines would give answers to every question; Google has shown that this is true.

The ICT concepts, methods and applications are constantly evolving on an almost daily basis. Anyhow, ICT covers any product that is capable of storing, retrieving, manipulating, transmitting or receiving information electronically in a digital form. We can, thus, include personal computers, digital television, email, robots, internet, etc. to a part of the vast ICT fraternity.

ITU (2015)[2] Global Internet User Trends are quite interesting and convincing. As the UN specialized agency for ICTs, ITU is the official source for global ICT statistics As per end-2015 estimates for key telecommunication/ICT indicators, including on mobile-cellular subscriptions, Internet use, fixed and mobile broadband services, home ICT access, and more, the table (table-1) below shows a phenomenon increase in the internet users today.

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Table-1: **Growth trend of ICT users between years 200 and 2015**

Year	Country Type	Internet users (100 Million)	Total ICT users
2000	Developed	3	400 Million
	Developing	1	
2015	Developed	10	3.2 Billion
	Developing	22	

Sources: ITU

IMPORTANCE OF HIGHER EDUCATION: A GLOBAL PROSPECT

As science and technology is advancing, higher level of education and knowledge (especially technical) is needed by the society. This is necessary as all people want better jobs and better earning.

Immerwahr (May 2002)[1] as per finding of his survey published as *The Affordability of Higher Education: A Review of Recent Survey Research*, Americans believe that a college education has now taken on the importance that a high school education had in the past, and has become a necessary ingredient for a good job and comfortable lifestyle (refer table-1).

Table-2

Is College Degree Important To Get Ahead	
Yes	84%
No	11%
Can't say	5%

Sources: Authors Compilation

Further, Immerwah claims that 66% of those who did not go to college wish that they had, and 62% of those who did not go to college feel that having gone to college would have made a significant difference in their current standard of living like parents pass on their life experiences and characteristics to their children through their DNA, same way knowledge needs to be passed from experts (professionals and / or teachers) to students, from generation to generation for retention and further development of knowledge.

Other important reasons for going in for higher education that are noteworthy and un-ignorable include points like students learn how to solve problems and learn how to deal with other people. In addition, Higher education skills help students find a lucrative career while teaching you how to deal with a variety of other real-life situations.

HIGHER EDUCATION TRENDS IN INDIA

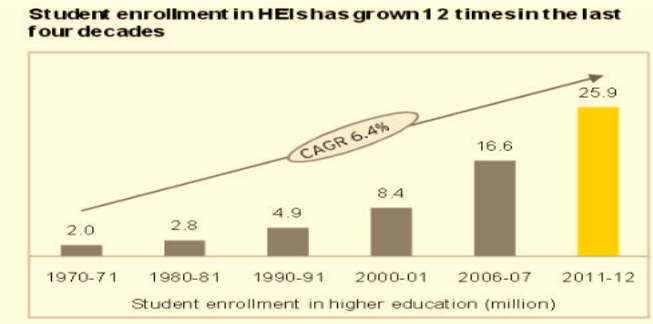
Ernst and Young and FICCI(2011)[4] summit report states that the Indian higher education system has emerged as one of the largest in the world, with 14.6 million students enrolled in more than 31,000 institutions.

Over the past decade, the number of universities in the country has increased at a CAGR (*Compound Annual Growth Rate*) of 7.5% (from 272 to 556) while the number of colleges has grown at a CAGR of 11% (from 11,146 to 31,324).

Government of India has taken effective steps to enrich the higher education sector in the country. Various bills have been passed from time to time for this purpose. These include : National Council for Higher Education and Research Bill, 2010 The National Accreditation Regulatory Authority for Higher Educational Institutions Bill, 2010, Prohibition of Unfair Practices in Technical, Medical Educational Institutions and Universities Bill, 2010, Foreign Educational Institutions Bill, 2010, and The Educational Tribunal Bill, 2010 to name a few.

Talking about the trends of student enrolment, report published by Ernst and Young and FICCI (2012)[5] states that while only 2 million students were registered for higher education in 1970-71 this figure has grown nearly 12 times in last 4 decades to 25.9 million in 2011-2012.

Figure-1: Chart Depicting the Growth Rate Trends of Student Enrollment in Higher Education Institutions



Sources: Authors Compilation

SCOPE OF STUDY

The scope of this research paper is limited to the penetration and usability of Information and Communication Technology in the field of academics particularly the higher education.

OBJECTIVE OF STUDY

Reflecting the terms of reference for the literature review, the impacts, which this research paper focuses on, are primarily:

- To study the wider impacts of ICT on higher education and students undergoing higher education.
- To study the various steps taken by government to help ICT reach the further corners of the country and aid in providing Higher education to the students in both urban and rural areas.
- To study the usage pattern of ICT in higher education institutions.

INFORMATION AND COMMUNICATION TECHNOLOGY IN HIGHER EDUCATION INSTITUTIONS: NEED AND USAGE PATTERN

- Though many institutions like IIMs, IISs, and IITs have been established, still no students can have an opportunity to study in them or have access to the faculty members, scholarly items, etc. At current rate of population explosion in the country, we cannot hope to quickly make a dent on the base line educational status of the population.

- University of Cambridge (2013)[6] published "Information Technology: Principles and Strategic Aims" (2013) as part of its IT strategy documents. It lays emphasis on following four important agendas from user need point of view.

- As part of **Campus Experience,** the focus is on general needs of students and staff, while studying and working in the University. It aims at ubiquitous on-line information provision and universal wireless network access. The **Teaching and Learning** focuses on support for teaching making all materials available on-line and readily accessible via the provision of wireless access. In addition, creation of 'virtual learning environments' (VLEs).

- As part of **Support for Research,** it emphasizes focusing on the various and varied forms of IT support required for carrying out research within the University. A futuristic approach provisions a University-wide high-performance computing; management and protection of research data; collaborative working support; and on-line bibliographic summaries for academic profiles.

- The strategic document also focuses on Management Systems, which are inclined towards University administration, which includes services like finance, student records, human resources etc. This requires interoperation at the level of data exchange, with comprehensive data validation on input and output.

- We cannot hope to quickly make a dent on the educational status of the population. ICT can aid the conventional approach by making available the knowledge resources to every learner as per his / her convenience and just in time.

- C. N. Mahopatra, (2000), in their paper titled, "Educational Planning and Administration" has opined that adoption of information and communication technologies have been found helpful in enriching curriculum. Further computer-assisted instructions provide flexibility in the curriculum.

- We have Abundance of un-nurtured talent. Lack of timely and easy availability of knowledge and information resources to all has repeatedly indicated that we have lost so many opportunities. There has been a lack of collaborative learning and the quality of teaching at various places is highly questionable. This can be solved through implementation of ICT.

- Non-standardized testing poses a lot of problem. The students are unable to under the type of qualification and certification needed for prescribed requirements for the job.

- ICT can help in personalized monitoring and long-term tracking of growth and enhancement in learning, skill and performance.

- It is evident that there is a Time mismatch between college hours and employment hours for those learners who have to simultaneously earn the livelihood for their families. ICT provide access to lectures, etc. to such students

- In their paper titled "Managing ICT Infrastructure in Higher Educational Institutions", the authors Soria A. S., Onashoga S. A. and Rosanwo, O. D., (2008)[7], collected samples from 15 higher education institutes in Nigeria involved in various streams. They found the various usages of ICT at these institutions.

Table-3: Usage Pattern of ICT in Higher Educational Institutes in Nigeria

Usage types	%age	Usage types	%age
Student management	95	Staff Management	30
E-portal	55	Internet Access	35
Telecommunication Services	35	Strategic decision making	15
Finance and Asset Management	65	Others	5
Learning management	25		

Sources: Authors Compilation

CHALLENGES TO INTRODUCTION OF ICT IN HIGHER EDUCATION

C. Sanga, A. Sife, E. Lwoga (2007)[10], paper "New Technologies for Teaching and Learning: Challenges For Higher Learning Institutions In Developing Countries" claims that the application of information and communication technology has changed the organization and delivery system of higher education. The authors have also discussed the challenges related to integrating these technologies in higher educational institutions.

Table-4

Service	Challenges
TV / radio	• One-way communication, • Costly in terms of TV/radio production, which includes, animation and graphic designers, hardware, access to the broadcast network,
Web-based Technologies	• Permanent accessibility needed with speed, direct communication, links to related topics and up-to-date notes, • Fast computers with sound cards, • A programmer, author and graphic artist needed, • Hardware, technical expertise and Internet subscriptions costs,
Video Conferencing	• Requires Sound proofing and controlling the lighting conditions; Audio-visual peripherals – TV monitor or video projector, camera(s), microphone(s) and sound playback; Videoconferencing equipment, • High bandwidth, • High operational costs,
e-learning Platforms	• Continuously adding and changing content, • Server platform hardware requirements, • Client platform hardware requirements, • Operating system/cross platform, • Organization/ registration/ administration, and • The learning content should be in standard formats.

Sources: Authors Compilation

Authors have concluded that the socio economic and pedagogical factors that have driven the higher educational institutions to adopt and implement ICT includes, greater information access, the communication, pedagogical improvement etc., According to them a very big reason why higher education institutions in developing countries have not implemented is the poor economic condition and technological barriers.

A Study article by Soria A. S., Onashoga S. A. and Rosanwo, O. D., (2008), titled, "Managing ICT Infrastructure in Higher Educational Institutions". This study was based on a random sample of 15 higher educational institutions in Nigeria. The result of study generally shows that, the mean time to failure of information and communication technology tool is high. This is very important factor, which affects the overall success of ICT in any sector including higher education sector. A noteworthy finding of this study is that trained ICT support personnel are inadequately available in such institutions (- 55%). Moreover, investment in ICT infrastructure for higher educational institutions is low.

A case study published by Calsoftlabs (2012)[9] titled IT/ICT Adoption in Indian Higher Education, further quotes a report by The 2011 Ernst & Young – FICCI report on Higher Education which points out that Insufficient infrastructure to meet the growing demand for higher education is worrying. In 2011, 14.6 million students enrolled in higher education in India. The report further states that there is significant difference in ICT usage between institutions in urban areas and those in semi - urban/rural parts of the country.

The quality of ICT infrastructure and its use is limited in a large percentage of Autonomous/Affiliated Colleges. This is due to lack of trained IT staff, connectivity issues and shortage of funds.

A very low percentage of digital literacy and Lack of encouragement to excel have also come a long way in implementation of ICT. Government and Private sector are both doing commendable work but it is a fact that Substantial duplication of efforts at various levels is taking place.

GOVERNMENT INITIATIVES FOR SUPPORTING ICT AS A CATALYST IN HIGHER EDUCATION SECTOR IN INDIA

Since the last 2 decades, the Government of India is taking various steps towards providing quality ICT infrastructure in the colleges in the country. The ministry of HRD and UGC is providing funds to central and state universities for the purpose. Universities in turn distribute these funds for infrastructure developments to affiliated colleges and university departments through various programs including Quality Improvement Programs, Infrastructure Development Programs, etc.

MHRD (n.d.)[15] Under the draft National policy on Education (1986, modified 1992), the IT/ICT policy in Education aims to improve Access, Equity and Quality of Higher Education through universal, equitable, open and free access to state – of – the - art IT/ICT enabled tools and resources to all students and teachers. Promoting development of localized quality content and enable students and teachers to collaborate in the development and critical use of shared digital resource has been the core objective of this policy.

IIT Powai (2013)[11] talks about Initiatives like the Spoken Tutorials (http://spoken-tutorial.org/) by the Ministry of HRD (developed by IIT Bombay), under its National Mission on Education through ICT are some of the highly appreciable works for spoken tutorials on free and open source software (FOSS) available in several Indian languages.

Under the draft National policy on Education (1986, modified 1992), the IT/ICT policy in Education aims at preparing youth to participate actively in the establishment, sustenance and growth of a knowledge society leading to all round socio-economic development of the nation and enhanced global competitiveness. Its mission is to Device, catalyze, support and sustain IT/ICT and enabled activities and processes in order to improve Access, Equity and Quality of Higher Education.

Promoting universal, equitable, open and free access to state – of – the - art IT/ICT enabled tools and resources to all students and teachers as well as to Promote development of localized quality content and enable students and teachers to partner in the development and critical use of shared digital resource has been the core objective of this policy.

Ministry of HRD, Government of India (2015, April)[12] discusses about National Mission on Education through Information and Communication Technology (NMEICT) was established by the MHRD, Government of India. This was done to create a proper balance between content generation, research in critical areas relating to imparting of education and connectivity for integrating our knowledge with the advancements. There are three guiding philosophies include [a] no talent of the country should be allowed to go waste, [b] all the services available through the content delivery portal Sakshat should be free and [c] freely available material on the web should be used to avoid reinventing the wheel. Making broadband affordable for every learner is one of the stepping-stones towards success.

NON-GOVERNMENTAL ORGANIZATIONS ROLE IN SPREAD OF EDUCATION THROUGH ICT

UNESCO Bangkok (2011)[13] UNESCO takes a holistic and comprehensive approach to promoting ICT in education. The Organization's Intersectoral Platform for ICT in education focuses on issues like Access, inclusion and quality through the joint work of three of its sectors: Communication & Information, Education and Science.

UNESCO Institute for Information Technologies in Education (IITE), Moscow, has been established with an aim of information exchange, research and training on the integration of ICT in education. UNESCO through its Bangkok office has involved itself for spread ICT for Education in Asia and the Pacific.

CONCLUSION

The previous sections effectively state that ICT can play a vital role in nurturing Higher education in the country. Faculty members and students to create a knowledge base can use it.

The ICT can be effectively used for the improvement of Higher education not only in India but globally too. It needs to be acknowledged at the outset, however, that ICT has impacted on the wider higher education institutions through a whole range of functions, interactions, facilities to name a few. It will, however, take time, money, and a combined effort on the part of both government and private sector.

Government, Private sector and NGOs have done fantastic job by setting up computer labs in rural school and distributing free laptops. On the other hand, IITs and other organizations have developed Audio-video e-learning materials available on Internet and YouTube. However, Internet is not available in all areas and so students are not able to access them. Moreover, these materials are not multi-lingual. Outreach to internet at colleges by installing V-SATs at colleges and community organizations and libraries would help improve access to e-learning materials online.

Making computer literacy compulsory for faculty members of higher education institutions and its use by them for lecture delivery will greatly improve effectiveness. Government, like privately run self-financed institutions, should not only focus on setting up ICT infrastructure but also should have a concrete budget and plan for its maintenance and up grading.

Access to teaching material of foreign universities will greatly help in creating an excellent curriculum. It will also help faculty members get the best resources available in their respective field of expertise, which will surely benefit students. Training students and staff to maintain their own ICT infrastructure will greatly reduce the maintenance labor crunch. If these programs and ideas can be implemented, we will surely see that every Indian learner has the right to be given a chance to have the highest quality of higher education.

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EMPLOYEE TURNOVER IN "IT" INDUSTRY WITH SPECIAL REFERENCE TO ODISHA: AN EXPLORATORY STUDY

Tamrisha Patnaik[30] Dr. Satyanarayan Pathi[31]

ABSTRACT

When a person is employed, it is expected of him to continue to work for the organization all through his active work life. Similarly, the employer who engages him is supposed to provide work to him until he is physically fit to work as per the job specifications and his expectations. The employment of a person in an organization implies that there is an obligation on the part of both the employee and the employer to maintain the employment relations implying mutual obligations, mutual dependence or interdependence benefitting both. It means mutuality and reciprocity of relations in which both are interested for defining and redefining the framework of their relations The employee turnover springs up as a vital issue in IT businesses. The objective of this article is to find the level of job satisfaction, safety measures, retaining the employees, working conditions & workload and its reason for Employees Turnover in IT Industries The researchers had taken 150 respondents as their sample size from universe and descriptive research design was adopted. This research study uses various methods to analyze the reasons and causes for employee turnover in IT businesses. The tools used are Chi-square analysis, weighted average method. Based on the analysis and interpretation, it is inferred that the IT Industry has to implement the Retention Plan by compensation Policies, Changes in work Requirements & improvement in working conditions.

KEYWORDS

Level of Job Satisfaction, Safety Measures, Retaining Employees, Working Conditions, Work Load etc.

INTRODUCTION

Employee Turnover

Employee turnover is a ratio comparison of the number of employees a company must replace in a given time period to the average number of total employees. A huge concern to most companies, employee turnover is a costly expense especially in lower paying job roles, for which the employee turnover rate is highest. Many factors play a role in the employee turnover rate of any company, and these can stem from both the employer and the employees. Wages, company benefits, employee attendance, and job performance are all factors that play a significant role in employee turnover.

Causes of Turnover

There are a number of factors that contribute to employee turnover. We explore some of these factors in more detail below:

- **The Economy:** Some minimum wage workers report leaving one job for another that pays only 50 cents an hour more. Obviously, in a better economy, the availability of alternative jobs plays a role in turnover, but this tends to be overstated in exit interviews.
- **The Performance of the Organization** - an organization perceived to be in economic difficulty will also raise the specter of impending layoffs. Workers believe that it is rational to seek other employment.
- **The Organizational Culture** much has been written about organizational culture. It is sufficient to note here that the reward system, the strength of leadership, the ability of the organizations to elicit a sense of commitment on the part of workers, and its development of a sense of shared goals, among other factors, will influence such indices of job satisfaction as turnover intentions and turnover rate.
- **The Characteristics of the Job** some jobs are intrinsically more attractive than others. A job's attractiveness will be affected by many characteristics, including its repetitiveness, challenge, danger, perceived importance, and capacity to elicit a sense of accomplishment. A job's status is also important, as are many other factors.
- **Unrealistic Expectations** - Another factor is the unrealistic expectations and general lack of knowledge that many job applicants has about the job at the time that they receive an offer. When these unrealistic expectations are not realized, the worker becomes disillusioned and decides to quit.

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- **Demographics** - Empirical studies have demonstrated that turnover is associated in particular situations with demographic and biographical characteristics of workers. However, to use lifestyle factors (e.g. smoking) or past employment history (e.g. many job changes) as an explicit basis for screening applicants, it is important for legality and fairness to job applicants to verify such bio-data empirically.

- **The Person** - These include both personal and trait-based factors. Personal factors include things such as changes in family situation, a desire to learn a new skill or trade, or an unsolicited job offer. These traits are some of the same characteristics that predict job performance and counterproductive behaviors such as loafing, absenteeism, theft, substance abuse on the job, and sabotage of employer's equipment or production. These traits can be measured and used in employee screening to identify individuals showing lower probability of turnover.

Trends in IT Industry

While the global IT players are aggressively scaling up their operations in India, due to the advantages that the Indian industry offers, the Indian IT companies are also preparing to tap the global market. The companies are witnessing significant change with regard to their service offerings and geographical concentration. Today, companies are expanding their service offerings from application development and maintenance to high-end services like testing, consulting and engineering designing. The global delivery model has not only facilitated the companies in delivering quality of work but also helped them to control costs. Presently, the Indian IT companies are on a hiring spree, which indicates their bullishness on their order flows. All the major players have increased their manpower by 15-50%, and the trend is expected to continue further. As a result, the companies are expected to scale up their operations. The Indian IT companies are also vying for inorganic growth, with a quest for newer geographical areas, service offerings, domain expertise, customers and markets. Nearly 55% of Indian employees expressed concerns about the fairness of their compensation and the extent to which benefits meet their needs (48%). One in every three employees expressed concern over a lack confidence in being able to achieve their career objectives with their current employers (37%); as a result, they are concerned about opportunities for learning and development (39%) and supervisory coaching for their development (36%).

LITERATURE REVIEW

- Costly et al. (1987) points out that a high labour turnover may mean poor personnel policies, poor recruitment policies, poor supervisory practices, poor grievance procedures, or lack of motivation. All these factors contribute to high employee turnover in the sense that there is no proper management practices and policies on personnel matters hence employees are not recruited scientifically, promotions of employees are not based on spelled out policies, no grievance procedures in place and thus employees decides to quit.

- Magner et al. (1996) argues that employees feel comfortable to stay longer, in positions where they are involved in some level of the decision-making process. That is employees should fully understand about issues that affect their working atmosphere.

- Williams and Hazer (1986) has differentiated between job satisfaction and commitment by explaining the former as an emotional reaction to specific aspects of job and the latter as an emotional reaction to the whole organization. Both the individual factors as well as the organizational factors influence organizational commitment that eventually influences turnover intentions amongst employees.

- Price & Muller (1981) observed that job dissatisfaction influenced actual turnover indirectly through its direct effect on turnover intention. The variables that affect job satisfaction are pay, promotion opportunities, immediate supervisor, fringe benefits, contingent rewards, rules and procedures, relation with co-workers, type of work done, and communication within the organization.

- Labov, (1997) has highlighted that employees have a strong need to be informed. Organization with strong communication systems enjoyed lower turnover of staff.

- Mobley (1977) first proposed a model explaining the relationship between job satisfaction and thoughts of quitting which, ultimately led to actual turnover.

- Trevor (2001) argues that local unemployment rates interact with job satisfaction to predict turnover in the market. Role stressors also lead to employees' turnover. Role ambiguity refers to the difference between what people expect of us on the job and what we feel we should do. This causes uncertainty about what our role should be. It can be a result of misunderstanding what is expected, how to meet the expectations, or the employee thinking the job should be different.

OBJECTIVES OF STUDY

- A study on employee turnover in IT industry with special reference to Odisha,
- To examine the working conditions prevailing in the industry,
- To know the job satisfaction level of the employee working in the industry,
- To provide some suggestion to reduce the employee turnover and retain the employees.

RESEARCH METHODOLOGY

In this research study, a Descriptive Research design was adopted. The source of data is primary and secondary. The Primary data were collected from 150 respondents through structured Questionnaires and it from Executive and Non-Executive Employees. The secondary data were used from Journals and Newspapers. The simple random sampling was used in this study and tools used are:

- Percentage Analysis,
- Weighted average method

ANALYSIS & INTERPRETATION

Table-1: Social-Demographic Factors of the Employees

Respondents Social – Demographic Factors					
Gender			**Designation**		
Sex	**Respondents**	**%**	**Designation**	**Respondents**	**%**
Male	105	70	Executive	110	73
Female	45	30	Non executive	40	27
Total	**150**	**100**	**Total**	**150**	**100**
Age			**Years of Service**		
Less than 20 years	20	13.5	Less than 5 years	62	41.5
20-30	60	40	5-10 years	35	23.5
30-40	50	33	10-15 years	28	18.5
Above 40	20	13.5	Above 15 years	25	16.5
Total	**150**	**100**	**Total**	**150**	**100**
Monthly Income			**Qualification**		
Monthly Income in Rs.	**Respondents**	**%**	**Qualification**	**Respondents**	**%**
Below 10000	32	21.5	Diploma	36	24
10000-20000	56	37.5	U.G(BCA/B-Tech)	78	52
20000-30000	30	20	PG(MCA/M-Tech)	27	18
30000-40000	22	14.5	Above PG	09	6
Above 40000	10	6.5			
Total	**150**	**100**	**Total**	**150**	**100**

Sources: Authors Compilation

Table-2: Reasons for Leaving the Organization Using Weighted Average Method

S. No.	**Factors**	**X**	**W**	**XW**	**XW/ΣW**	**Rank**
1.	Nature of the job	76	5	380	25.34	1
2.	Problems with management	12	4	48	3.2	3
3.	Maternity	38	3	114	7.6	2
4.	Relocation to another area	14	2	28	1.86	4
5.	Others	10	1	10	.66	5
Total		150	15	580	38.66	

Sources: Authors Compilation

FINDINGS

- The demographic factors in the study reveals that the major respondents are male 70%, the maximum respondents belong to the age group 20-30 years i.e., 40%, and the majority of respondents belongs to executive level i.e., 73% and the majority of respondents experience is below 5 years and the monthly income earned by majority of respondents

belongs to 10,000-20,000 i.e. 31.5% and the majority of the respondents qualification belongs to undergraduate i.e., 52%.

- The relationship between training program provided to employees and the reasons for leaving the organization
- The work environment has no significance over safety measures

CONCLUSION

The researcher has attempted to study some of the factors, which may be the possible reasons for an employee to leave the organization. This research will help the organization to make the necessary measures to retain the employees. This will certainly bring down the causes for employee turnover and helps the management to reduce the employee turnover level. To reduce the employee turnover rate the company has to concentrate more on working condition and Safety measures. Therefore, it leads the organization to retain their employees.

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E-LEARNING SERVICES FRAME WORK ON CLOUD PLATFORM

Sonia Duggal[32] Dr. M. K. Sharma[33]

ABSTRACT

Cloud computing framework makes us convenient to offer e-learning services in many remote areas of India. By using cloud based E-Learning model, many benefits will be there in schools, colleges or universities in India. This paper proposes a Conceptual Model to offer e-learning services using cloud-computing platform.

KEYWORDS

Cloud, E-Learning, LMS, Server, e-Book etc.

INTRODUCTION

Implementation of e-learning services in less developed states through cloud computing may provide the simpler and effective way of storing patient data. This also helps in development of Electronic books, study material, exams. Development of cloud server by using existing SWAN [1] architecture allows us to provide better E-Learning services in deprived areas of many states of India. In the present paper, deployment of E-Learning services at University or College level has shown. Paper also discusses the role of cloud computing by showing a proposed model for developing cloud based online education applications.

E-LEARNING

There are many advantages in using e-learning. One key example is Electronic study material, which can be shared all over India to millions of students in very less cost.

In recent years, e-learning has grown into a widely accepted way of learning, and the usage of the global network is inevitable in every education process. Ubiquitous learning integrates wireless, mobile and context awareness technologies in order to detect the situation of the learners and provide more seamless adaptive support beyond formal learning process (Shih, Chu, Hwang, & Kinshuk, 2011; Hwang, Chih-Hsiang, Tseng, & Huang, 2011, El-Bakry & Mastorakis, 2009; [2] Yang, 2006). [4] In order to support modern pedagogical approaches, as well as a variety of heterogenic learning resources within courses, ubiquitous learning environments need to be based on a powerful IT infrastructure. At the same time, in order to be efficient, ubiquitous learning environments need to be based on learning management systems (LMS) and integrated into an existing e-learning environment of educational institutions. [5]

CLOUD COMPUTING

Cloud Platform is largely a combination of existing technologies, which have already been around since the early 1990's.

Cloud computing is the technology which uses the internet and central remote servers to maintain applications and data. It allows end-users and businesses to use applications without installation and access their personal files via any computer that has an internet access. Cloud computing allows computing to be much more efficient by centralizing data storage, processing and bandwidth at one point.

Cloud computing is a framework [3] that makes convenient, on-demand network access to a shared pool of configurable computing resources enabled. Cloud is a combination of hardware and software, which are being delivered through Services.

Benefits of Cloud Computing

Benefits of cloud computing for e-learning domain are:

Cost Cutting

The cloud is a onetime investment with excellent returns in terms of computing capabilities and maintenance costs. The end user reaps the benefit of all the applications without having to spend on huge computing infrastructure and data storage space. It

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reduces the cost of hardware and server installation as most of the terminals will run on remote login as well software application can be shared with all terminals.

Ease for Teachers & Trainers

Cloud based e-learning services like online e-books, study materials may transforms the role of a teacher to a facilitator and ultimately results in better and easy available learning as the instructor spends less time in direct lectures and more on engaging learners through different online educational services. The teacher can update courses, syllabus while online, and they can save and share good quality study materials among students and learners.

Technical Benefits

Following are the technical advantages of cloud computing [4].

- **Power Saving:** The virtual terminal will use very less power compare to old Personal Computers and CRT monitors, even students can use mini tabs to connect with cloud sever.
- **Fast Scalability:** It is the one of the main positive aspects of cloud computing. If peak load and high number of students will be there to use the e-learning system of a university or college, the scaling of data is very much fast without any additional hardware.
- **Large Data Storage:** Various kinds of data text, audio, video lectures are there to be stored, and cloud based data center will makes it easy for any school or college to access and store large amount of educational data.
- **Efficiency and other benefits:** Cloud model allows users the same experience on any internet-connected device with minimal software requirements. The requirement to download and install specific software not needed in cloud-based technology. The cost of licensing and upgrading software and hardware can be only on data center rather that at the local level.

BARRIERS OF E-LEARNING

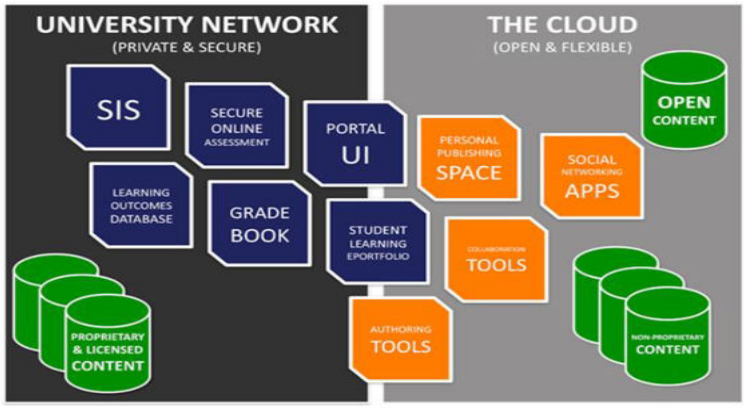
The cost of implementing e-learning solutions can be very high for a college or government University and this does not even include the requirement of hiring teams of ICT professionals to support and maintain the e-learning system. Since the cloud infrastructure is entirely owned, managed and monitored by the service provider, it transfers minimal control over to the teacher or trainers. The Trainer can only control and manage the educational applications, study data and other services operated on top of that, not the backend infrastructure itself.

PROPOSED FRAME WORK OF CLOUD TO DEPLOY E-LEARNING SERVICES

As shown in figure the proposed framework of e-learning model for this study, to be implemented under two phases.

Initially, the proposed model can be developed by using the cloud services provided by various authorized private agencies like Microsoft, IBM, Red Hat etc. even the government of any state can develop its own cloud server by using the existing state data center and available state wide area network [1].

Figure-1



Sources: Authors Compilation

For proving a hypothetical model a basic framework [9, 10] of phase I and II, can be implemented with the help of Open Shift server, a freeware facility provided by Red Hat Corporation. Open shift [15] is a next generation platform for developing, deploying and scaling the private and public cloud applications. As per the process of cloud application development [11, 12 and 13], the following steps are to be followed by the cloud developers.

CLOUD FRAMEWORK

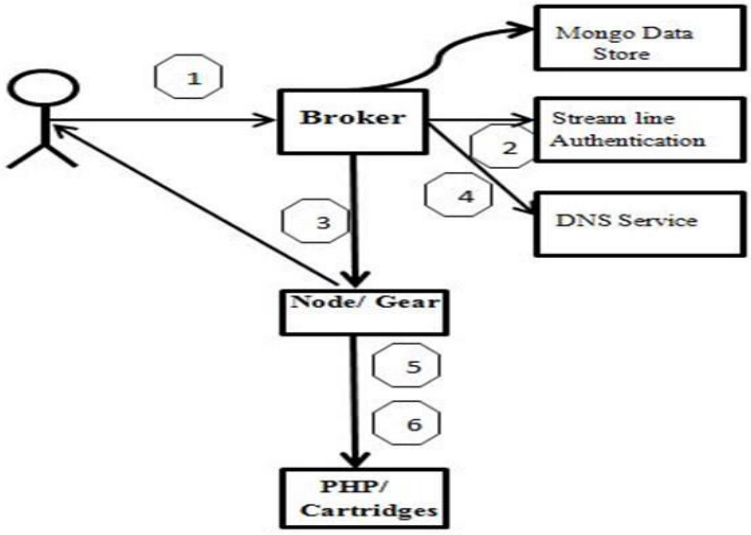
Step 1: Develop the application with the language and tools we want as per our requirement (As shown in fig below).Initially we have to select the programming language we need for developing our application. Under this step, we can publish our code by using the IDE provided by them.

Step 2: Under this step, we have to deploy our application. Deploying of applications needs to choose the technologies by adding cartridges. Cartridges represent pluggable components that can be combined within a single application. These include programming languages, database engines, and various management tools. Users can choose from built-in cartridges that are served directly through Open Shift Origin, or from community cartridges that can be imported from a get repository. The built-in cartridges require the associated languages and database engines to be installed on every Node server.

Step 3: After developing an application next step is to build, the application i.e. run the code developed in step1 and 2. Under Open shift server Jenkins continuous integration server can be used to run our application located in Open shift.

Step 4: After successfully Building / Running the cloud application we can monitor, debug and tune the application by making various allotments and making proper scaling.

Figure-2



Sources: Authors Compilation

Step 1: User requests a new application to the Broker (an application that manages all application control, DNS management, and user authentication).

Step 2: User Authentication was performed by the broker.

Step 3: If user is authentic a new gear is to be created. Gear is always created for a node, under this CPU, RAM shares are allocated for it, and a suitable directory structure is developed.

Step 4: under this, a DNS entry is done at Cloud server.

Step 5: in this we have to configure a PHP as per our requirement, i.e. language or database cartridges are developed.

Step 6: After configuring PHP, a GIT repository is required to be developed.

Table-1: Basic Requirements for a Cloud Server

Operating System	Cent-OS/RHEL 6.3+ or Ubuntu 12.04(.1)
Processor	64- Bit x86 CPU
RAM	At least 4 GB
Disk	500 GB- 1 TB

Sources: Authors Compilation

In our proposed model, at first we suggest the development of cloud server under IaaS (Infrastructure as a Service) layer of a cloud. The cloud server can be built with the help of State data center. Companies like amazon, Red Hat or Microsoft can help the government in developing the cloud-based server. Some basic hardware requirements for cloud-based server are shown above [16].

CONCLUSION

We have discussed the main components of e-Learning, focusing on the flexibility, convenience, easy accessibility, consistency and repeatability of this kind of systems. In this manner, an E-learning system is facing challenges of large-scale resource management in schools or colleges, because of the huge number of users, services, education contents and examination papers. There are several approaches that have been already proposed for addressing e-Learning on Cloud Computing, describing these models and how they take advantage of this environment to enhance the features of the educational system. However, we must stress that these are just initial steps towards an open line for research and exploitation of elearning and cloud computing platforms.

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STRESS AMONG EXPATRIATES IN IT INDUSTRY WITH SPECIAL REFERENCE TO CHENNAI: A STUDY

P. Vanitha[34] Dr. S. Prakash[35]

ABSTRACT

Globalization is the rapid process in today's highly challenging and competitive world. All the sectors are seeking opportunity in all possible means to spread their wings globally and win over the market with international contracts. Among all the major domains, Information Technology is the leading sector, exploring global market and managing the human resource effectively to take up international assignments. Therefore, expatriates resources have real time challenges in global business scenario. An international assignment along with exposure and excitement boosts stress level to the expatriates. Potential stress factors like cultural shock, new language barriers, and family pressure due to separation will eventually have a serious impact on the performance and productivity of the expatriates and incurs cost to the firm. An attempt has been made in this study to find the major problems and stress factors of the expatriates. ***This paper mainly focuses on Indian IT expatriates travelling to US because of the high demand from US market****. In addition, this paper highlights on stress process, factors, and strategies to manage the stress.*

KEYWORDS

Expatriate, Stress Factors, Stress, Indian Software Industry, Cross Cultural, Cultural Shock Etc.

INTRODUCTION

According to Longman Dictionary of Contemporary English (1998), an **Expatriate** refers to "a person who is living or working in a foreign country for a short term or long term assignments", also called as "Expatriates". In the strict sense, expatriates differ from 'immigrants' who usually plan to reside permanently in a new country and acquire permanent citizenship there whereas expatriates are skilled workers who are temporarily working in foreign country. **Expatriation** is "the process of sending managers to another country for an assignment of a multinational organization. Before departure, the process should include an extensive period of training and preparation to ensure that the managers are familiar with cultural differences and to reduce the likelihood of culture shock" (Dictionary of Human Resource Management 2001, p. 120) These expatriates on assignment to foreign countries meet new cultural environments that they must try to make sense of in order to function properly. In today's global competition, business demands for IT multinational management companies (MNC's) in the parent country influencing the firms to send their best resources to develop international relationships and to create an international corporate existence. Besides generating domestic employment, the need for onsite support (international) has led to a large number of expatriates being sent on international assignments to multiple locations across the globe. Increasingly, IT MNC's have started recognizing that their expatriates are the major contributors to their development globally (Van Emmerik & Euwema, 2008).

Thus, the expatriates though perceive the international assignments as a tool towards rewarding career progression and monetary benefits, often face problems towards various political, economic and cultural environmental factors of the host countries where the assignments are allotted. If those factors are ignored, these adjustment problems result in high level of stress, both in personal and professional lives of expatriate which may result in high turnover; low productivity, low morale and project failure. It also damages the organization reputation in the international market. The failure in the expatriate assignment may also affect the dynamics of the group by the way of de-motivation and commitment towards the work will decrease which in turn will have impact on the organizational goal. The relationships and contractual obligations between the host and parent countries may also be significantly affected. The productivity of the international operations may go down; the ability to operate in the offshore team may be lessened, the company may not win the market share and loosing the competition and its reputation with the clients will be damaged. Failures will have adverse effects on the expatriates themselves by ruining their career growth, causing personal blows to their self-esteem and ego, and may be taxing on their family life both physically and psychologically (Yavas and Bodur, 1999; Mendenhall and Oddou, 1985). The consequences of stress in an international assignment can take on many negative implications such as, absenteeism, drug abuse and alcohol, turnover, early return to the parent organization, aggressive behaviour within and outside the organization, extended leaves, or any combination of these negative behaviors (Lange & McCune 1989, Jong & McMullen 1992, Liese et al. 1997, Darby 1998, McIntosh et al. 1998). International assignments end in failure also known as a premature return because of many factors that potentially affect the adjustment of expatriates such as selection mechanisms and

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criteria, previous international experience, cross-cultural training, individual factors, job factors, organizational culture, organizational socialization as well as various non-work factors (Black, et al., 1991).

Stress Factors on Expatriates

In general, expatriates will encounter greater work stress when working in different countries. Work stress became a highlighted concern in this study since it will have negative impact on expatriates' mental and physical health. Fitzgerald (2004) suggests that work stress will significantly affect expatriates' performances. The demand for IT professionals is increasing in foreign countries. Indian companies are competing to win the contract abroad and send IT expatriates to foreign country. The companies are spending high budget in Training, Visa processing and many other facilities to comfort expatriates. In spite of the effort taken by those companies, Expatriates faces challenges in the host country, which creates stress resulting in low performance and premature return. It is significant to know about the stress factors and thereby in future, these IT organizations can focus on those factors and take decisions, which benefit both expatriates and the organisations. The factors are:

Personal Factors

Family: The family of the expatriates experience cultural shock in the host country. Unlike, expatriates, no specific training is provided to the family members, hence it is a challenging job for them. Expatriates wife and kids are in to major trauma in handling the cultural differences in almost all the places including schools, shopping places, neighborhood areas, etc. Thus, this stress is imposed on expatriates, as they need major support from their family members to perform their work effectively.

Financial Issues: The financial stress plays a significant part in the Expatriates life in host country. Currency value changes across countries and thus, adapting and managing those financial terms is a major stress for expatriates. Finance for living, schooling, shopping, credit cards, etc., should be carefully planned as it is going to be a completely new process in payment. In countries like USA, individual credit worthiness is calculated based on the credit card payments and based on the worthiness, all types of loans are granted to the expatriates, thus, complete knowledge about the same is vital. Hence, it results in stress among expatriates to adapt to the new financing rules and regulations.

Psychological Aspects: Emotional Immaturity plays a vital role in increasing the stress level among expatriates. International assignments lead to added responsibility and change in social status for the expatriates in the host country. Thus, if emotional stability is not managed, the immature behavior will lead to ignoring the responsibilities and fail to resist temptations leading to self-destruction.

Health Conditions: Expatriates are excited to gain international experiences leading to more work load and also immediate change in the country climate will cause physical exhaustion and hence health conditions gets affected which gives more stress towards the accomplishment of task at a given time.

Job Related Factors

Cultural differences: Cultural shock is a significant factor for stress among expatriates. The home country firms to manage the cultural difference provide Pre departure training. Unfamiliar culture is a real stress for expatriates in engaging themselves in work and earning desired result. Various environmental factors and personality plays a role in expatriate's adjustment towards the cultural differences. Cultural transition will be effective if adequate support is received from family and friends. The emotional support at the initial stage of transition will help the expatriates to overcome the negative feeling and hence will have a smooth transition. The cultural adjustment is influenced by expatriates' motivation for accepting the new assignment and stress experiencing in the international assignment. Sometimes stressful situation will lead to adjusting and overcoming and thus stimuli are created by stress and response is generated. Personality traits like many extrovert, openness and agreeableness expatriates interact effectively with people in the new set up and try to adjust the culture. Finally, the cross-cultural acceptance will lead to performance and difficulty to accept lead to termination and early return to the home country.

Communication: The expatriates should be aware of the language in the host country. Mostly IT expatriates needs to have effective English knowledge as it is accepted in most of the foreign countries. Expatriates have added responsibility in learning the terminology used by the clients and thus, enabling them to have smooth communication among them to transfer the client requirements to the team in the home country and vice versa.

Social Factors

Safety & Security: Nowadays, many foreign countries is undergoing severe security threats such as usage of Gun in US, terrorist threats, religion differentiation etc., expatriates and their families are undergoing more stress when safety aspect is concerned.

Schools/Colleges for Kids: Education system is different in countries. Kid's adaptation towards the foreign system creates stress among expatriates as it imposes direct impact on them by their kids. Transition from one system to other involves great deal of time and effort.

Government Rules and Regulations: Each country follows different rules and regulations. Expatriates should be aware of those rules, as they should not end up in any legal issues in the host country. Rules for driving, handling kids in public places, payments, etc., should be known in advance and thus playing a major stress factor for Expatriates.

Neighborhood: Socializing is not a very easy task when it comes to different country holding different religions and beliefs. Making friends and adjusting to their culture is a challenging task to expatriates.

Food: The other stressor is food habits in foreign countries. Different countries follow their own food habits. Adjusting and accepting is the need for expatriates to survive.

LITERATURE VIEWS

Indian IT industry in Global Stage

India's software and services exports have been growing rapidly over the last decade. The growth in the IT sector is driven by steady increase in scale and depth of existing service lines; inclusion of newer vertical specific domains and emerging new business services, frequent expansion of service portfolios and high value in processes .The IT industry is highly export oriented. Indian IT companies have already moved into value added segments such as mission- critical applications, development and support, product design, HR management, knowledge process outsourcing (KPO's), Business process Management (BPM) for large complex projects entering into many verticals like healthcare, retailing, manufacturing etc. The growth of the Indian software industry has provided substantial benefits to international firms. They can tap a source that is flexible, cost effective, and willing to work on mundane tasks, freeing up in-house staff for more creative work (Arora et al 1999). Majority of the demand in IT to India is coming from global market. Every year more number of expatriates is travelling abroad for assignments. The demand in global market is high for the IT industry in India. Thus Indian IT companies are competing to win the contracts and hence IT sale professionals and technical project managers travel abroad to deliver the products and manage the client effectively. It is a challenging task for the IT companies to manage the expatriates and train them with accordingly to manage the stress in dealing with the international client.

Many researchers (Arunachalam, Asundi & Fernandas, 2001; Athreya, 2005, Sahoo & Patnaik, 2010) have analysed the growth of Indian IT sector and more number of English speaking resources providing good quality of work at lower cost is the vital competitive advantage of India IT companies. Agarwal and Thite (2006) established many issues faced by HR in Indian IT industry concerning to high turnover rates due to stress in the assignments and also issues on offshore-onsite model adopted by the organisations. The offfshore business model will help the Indian IT companies to create jobs at onsite locations and there by large number of IT expatriates take up assignments abroad. There are 5 business models (Source: E-business Strategies (EBS).

Global Delivery Model: To distribute and manage engagements and resources across multiple global locations, thereby allowing the service provider to better responds to client requirements from around the globe; *Hybrid Delivery Model*- A team in the onsite with the client would oversee the project's contract and program management. They face the client in requirements gathering and user-interface development. The onsite team would control the defined portion of the project that required interaction with the business subject matter experts and software architects onsite. Meanwhile, the team based at the provider's offshore facilities would take care of the coding, testing, and bug fixing so work could be performed around the clock.**;** *Global shared service model*- Global shared services centers, also known as captive centers or offshore in-sourcing, consolidate organizations' internal service operations into mega-service centers. ; *Build-Operate-Transfer Model (BOTS)*- Some companies, rather than outsourcing, opt to start their own foreign subsidiaries contains lot of obstacles legally in the entire process; *Offshore-Multisourcing model***-** Multisourcing is the practice of using multiple offshore suppliers to reduce the power that a single monopoly supplier might have. Hybrid Delivery model is the flexible model adopted by many Indian software giants and thereby creating more opportunities to IT expatriates to travel abroad and face the challenges.

IT employees travel abroad to client locations based on working visa. New data reveals that 86% of the total working visas issued in 2014 for technology firms were used to hire IT professionals from India. The data accessed by Computerworld through Right of Information Act, reveals that a lion share of visas issued for computer jobs are claimed by Indians. Lindsay Lowell, director of policy studies at Georgetown University's Institute for the Study of International Migration was quoted by Computerworld saying, Offshore companies that provide IT services prefer young programmers because the visa offers control over this contracted short-term workforce, it permits them to pay less than they would for experienced natives and they cultivate programmers who can better serve their clients after returning home to India"

Expatriation and Stress process

The literature of IHRM has identified several reasons for international assignments and employment of expatriates; the most common reasons are to fill the skill gap; to launch a new business; to transfer technology (Bonache, Harzing, 2001). Welch and Fenwick (2009) note that firms use a variety of expatriation methods namely, exporting, joint ventures, licensing, off shoring, management contracts, subcontracting and consultancy.

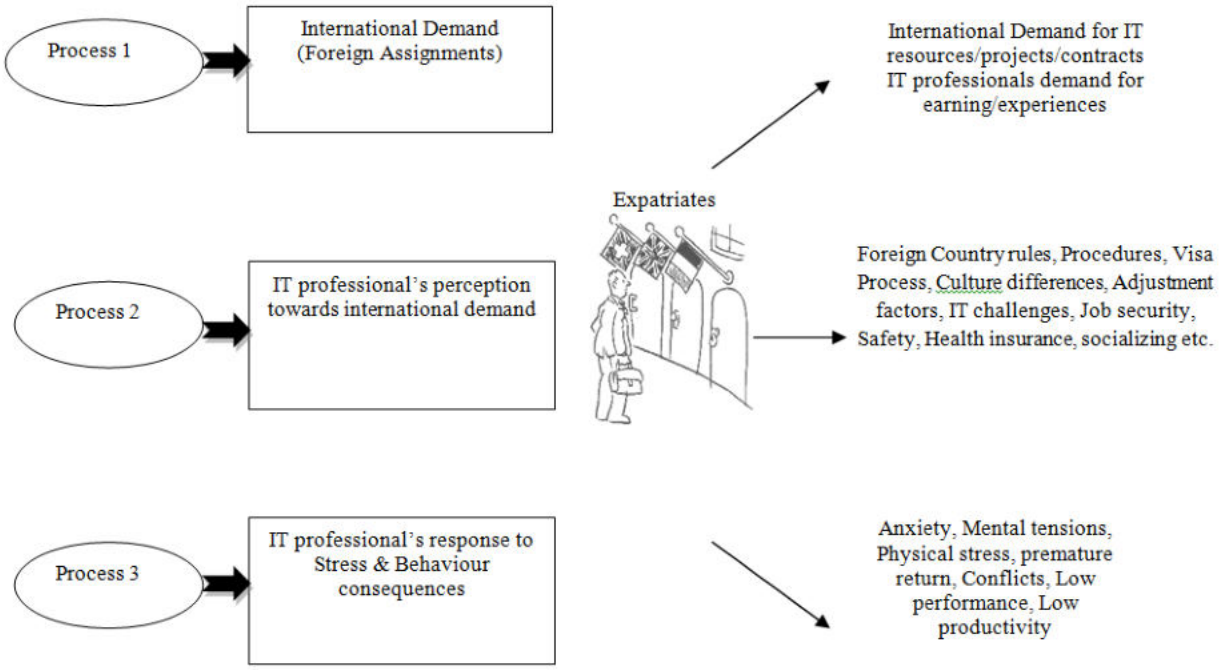
With many Indian IT MNCs offering specialised end-to-end services, the IT expatriates sent to client sites are no longer subject to body shopping, they are involved in onboard support at the client sites, liaison between clients and offshore teams, relationship building with the clients, and sourcing more business for the MNCs (Upadhya & Vasavi, 2010). A major challenge for IT organisations involved in the globalization of the business is managing expatriates. As such, researchers and practitioners are interested in identifying ways for expatriate success on international assignment and stress free process in the adjustment and adaptation. In a global economy, expatriates face many challenges, which have compelled multinationals to review their IHRM practices (Steven 2000). Studies on Indian IHRM expatriation perspectives and from IT workers expatriate standpoints on stress are scarce (Lakha, Vasavi, 2012). Thus present study looks at Indian IT expatriates practices and stress dimensions and factors from the viewpoint of IT expatriates on an international assignment at a client site.

The expatriates comments on two important factors which gives them stress, the time to prepare themselves prior to the project and pre-departure training. Expatriates commented that the MNCs apply for work visas for a set of people in anticipation of a project from the client, thus, they have resources ready for projects to be sent to the client locations. Hence, it was affirmed that having a working visa was not a guarantee for a project. Moreover, with the more work stress, IT professionals argued that they did not have sufficient time to start preparing unless they knew they were going on the project. One of the expat who has been interviewed says: 'There is no other option, it took one month to get the visa but I was told I may have to go anytime but I wasn't given a proper date, but only 2 to 3 days were given before I had to leave… It would have been better if we have little more time, so we could prepare better. We did not have time to do shopping, packing, locate places, as we did not know when we were going. Therefore, we did not have any arrangements about accommodation, travel etc… There are trainings but I did not get a chance to attend that. There was no other preparation prior to leaving' (Dhara Shah, 2012). Issues related to lack of time to prepare seems to be one of the major stress among expatriates.

It was assumed that most of the expatriates are provided pre-departure training before their travel. But the key is the effectiveness of training and also to determine whether the training actually helped the expatriates to relive the stress in handling cross-cultural environment. One of the expatriates spoke about relevance of training: 'You do get trained ... how to react and how to behave ... They give you a description of how to interact with the client … I think they could have done better, they give you all the business side but how to cope there ... the climatic conditions here, you are not prepared. It was a pretty bad experience for me outside work' (Dhara Shah, 2012). Lack of effective training impeded on the expatriates outside work, which further affected their confidence. The importance of comprehensive cultural training has been pointed out by many researchers (Black, Gregersen & Mendenhall 1992, Hutchings 2003). Improper training programs leads to increase stress among expatriates and poor performance or even failure for some expatriates on project. One of the expatriates explained about difficulties faced due to lack of training: 'The thing is, you don't know whether you are doing the right thing or the wrong thing unless you are shrewd enough to immediately understand what the other people think. Generally, the Westerners do not usually react immediately, they may be so gentle and they may react in a different way, especially at the work places. So it is much better to have the training in advance' (Raj). Thus, lack of time during the pre-departure preparation on the IT expatriates which have an impact on their initial adjustment. The IT companies have to implement appropriate pre-departure training and adequate preparation to maximize the benefits of expatriation and management of stress. It is therefore significant for expatriates to have realistic expectations about the conditions of the country of project and work, knowledge of the clients, and more significantly, about the social support available.

According to Jay, 2008 most expatriates came from different region or countries that have different cultures, and religion. They have to learn to adapt the working culture when dealing with different groups of people, this leads to more mental stress among expatriates. Abdullah & Cheam (2011), the expatriates are having a work stress when they cannot coop well with the colleagues. Jay, (2008) believe that overloaded work stress can negatively affect the health of expatriates. Relationship between colleagues is very important. However, instead of important, it is not easy to really coop with them. According to them, most probably the main factor is the communication barriers and lack of social time together. In today's competitive world, Workplace environment become one of the significant part that can create great deal of stress in our individual lives. In specific to IT sector, working hours, organizational targets, global level meetings, on time delivery of projects, update technology knowledge, layoff's etc., cause great deal of stress among software professionals to retain the job. Indian companies striving hard to win over international assignments and go global and thus, the percentage of expatriates grow at higher level to gain entry in to foreign markets and to enjoy the benefits of mobilization. During this process of mobilization, expatriates undergo the stress in different stages. However, knowingly or unknowingly the work stress has increased dramatically among those expatriates and have a negative impact on them and their work.

Figure-1: Stress process of IT Expatriates



Sources: Authors Compilation

The above diagram depicts the stress process of IT professionals, who got a demand from international market towards an assignment and the perception of those professionals result in personal, social, cultural, safety and environmental issues that leads to stress and hence the consequence is the behavioural change physically and mentally. Once the process is understood, the employers can provide adequate training and coping strategies can be imparted to those professionals to manage the stress to take up the international assignments. Applying the model of the Selyeís (1976), General Adaptation Syndrome [GAS], four stages of expatriate stress among IT professionals can be identified: The stages are as follows:

Pre-alarm: IT expatriate professionals are very unaware of the process in the foreign nation. Organization in the home country provides them adequate software technical and psychological training to cope up the stress arises because of the challenges in the new environment. In addition, they are trained to adjust in cross-cultural differences in the foreign country.

Alarm: The stage of alarm starts when an IT expatriates reaches the host country and meeting the people in the foreign organisations. The whole set up will be different for them comparing to their home set up. They face tough challenges and finds the environment is not secured in spite of the training provided them. They also find the attitude, behaviour of a foreign national seems to be no match for them and hence stressed out leading to undesired result in client management, and software process will not be effectively followed. They also find the environment ask for new demands for which expatriates has no culturally appropriate responses.

Resistance: In this stage, Expatriates tries to adapt themselves in the new environment and takes effort to adjust among the people. Expatriates implements physical and psychological resources to overcome the discrepancies and meet the demand from the new IT setup.

Exhaustion: If the expatriates are confident enough to adjust to the new set up in the host country and accepts the new culture; they will produce effective desired result and increases the productivity. On other hand, if expatriates is not able to cope up the stress of cultural, personal, process differences they will be exhausted and will lead to 'pre-mature return to their home country, which is the huge loss to the organisations as well as emotional setback for the expatriates.

RESEARCH PROBLEM

It is imperative that international HR practices be designed to enable expatriate stress management, which in turn would manifest into the firm's success in the global arena. The following study looks at the factors influencing stress on expatriate assignments from the perspectives of Indian nationals on expatriate assignments in foreign nation. Having done a thorough review of the

existing literature, most of the studies are on expatriate issues relating to one single problem faced. In most of the studies, the key variables used are cross cultural issues, language, personal factors, organizational factors and the environmental variables. European countries, Japan, China and other countries do most of the studies from Middle East. There is no specific and comprehensive study from India on the problems and issues of expatriates. Currently, due to high stress among expatriates, the failure rate is high and thus causing the organization not attaining the project objective and losing the market share. Since, globalization plays a significant role for our society in terms of revenue growth; This failure of expatriation process may affect the Nation's success. Hence, the gap is identified in this area and focused to study the problems of expatriates from India.

RESEARCH METHODOLOGY

The Descriptive research design was adopted due to the nature of the study. Descriptive research, also known as statistical research, describes data and characteristics about the population or phenomenon being studied. Descriptive research answers the questions who, what, where, when and how. Thus, based on the above, the descriptive research designs were appropriate for the present study as it was important to gauge the various stress factors/dimensions that have an impact towards expatriation process.

The study is mainly based on primary data, which was collected from the 334 expatriates from the firms in Chennai. Questionnaire was sent to 500 expatriates but only 334 expatriates got international experience and hence chose for the study. Sampling method that has been used in this study is non-probability sampling. C. R. Kothari (2006), In Non-probability sampling, Items for the researcher selects the sample deliberately. In other words, under this sampling technique, the researcher purposively choose the particular units of the universe for constituting a sample on the basis that small mass that they so select out of a huge one will be typical or representative of the whole.

Thus, in this study, Non-Probability sampling design is adopted that relies on the personal judgment of the researcher rather than the chance to select the sample size. Instrument used for data collection is questionnaire. They were sent to these companies with a request to get these filled from the software professionals having an international experience of more than 2 years of handling software projects.

Table-1: List of Companies

Rank 2014	Rank 2013	Company	Revenue (₹ Cr)
13	18	Tata Consultancy Services Ltd.	83446.10
22	26	Infosys Ltd.	52797.00
29	28	Wipro Ltd.	45345.70
39	42	HCL Technologies Ltd.	32821.06
67	148	Tech Mahindra Ltd.	19064.40

Sources: Economic Times Ranking – (Online – ET 500 Companies, October 29th 2015)

Initially a pilot study was conducted with 120 expatriates from the Chennai city. The respondents are from IT sector. The relevance of some questions was slightly modified for final version of questionnaire. The reliability coefficient of the questionnaire is computed using Corn Bach's Alpha and the value is 0.794, which shows that the instrument is reliable.

OBJECTIVES OF STUDY

The present study was undertaken with the following objectives:

- To study the profile of the Indian Expatriates working in different sectors in the sample area.
- To review the expatriate management in the context of cross culture and its impact on stress among the expatriates.
- To study the reasons for expatriation (intentions/motives)
- To find out the various dimensions of stress.
- To offer some suggestions to overcome the stress faced by the expatriates during the expatriation and to improve the performance at work.

DATA ANALYSIS

Percentage Analysis is used for the identification of the demographic profile of the expatriates in the sample. It helps in identifying the basic characteristics of expatriates and their professional credentials, which are background to the study. T-test is applied in the appropriate places for better understanding of the statistical results and to make the suitable interpretations. The various dimensions in which t-test is administered include demographics and perceptions on expatriate climate, motivating factors and problems of stress faced during expatriation. A can help is assessing the degree of problems and dimensions of problems faced by the expatriates in the sample. Chi-square Analysis is used to test the association between the overall perceptions on the expatriate environment and culture prevailing and the demographical attributes of the expatriates in the sample. ANOVA- test is applied to find out the relationship between the various multiple demographical attributes between the perceptions on expatriate climate, motivating factors and problems of stress faced during expatriation. The dimension in which ANOVA is administered includes each of the personal demographical variable and perceptions on expatriate climate, motivating factors and problems faced during expatriation.

Data Analysis Using Percentage Analysis

Table-2: Expats Profile Analysis

Variables	Frequency	Percentage	Variables	Frequency	Percentage
Gender			**Experience**		
Male	**200**	**59.9**	Below 5	**117**	**35.0**
Female	134	40.1	5-10	**94**	**28.1**
Age			10-15	22	6.6
Upto 25	48	14.4	15-20	43	12.9
26-35	**147**	**44.0**	Above 20	58	17.4
36-45	66	19.8	**Offshore Countries**		
Above 45	**73**	**21.9**	USA & Canada	**107**	**32.0**
Education			Germany	40	12.0
Upto HSC	43	12.9	Japan	21	6.3
Diploma	52	15.6	Middle East	**85**	**25.4**
UG	26	7.8	Singapore /Malaysia	24	7.2
PG	**129**	**38.6**	Africa	**57**	**17.1**
Professional	**84**	**25.1**	**Work Domain**		
Levels			Design and development	**107**	**32.0**
Programmers	102	30.5	Production/Construction	**60**	**18.0**
Project Managers	**163**	**48.8**	Networking	50	15.0
Top Management	69	20.7	Consultancy	**79**	**23.7**
			Marketing	38	11.4

Sources: Authors Compilation

The majority of the men prefer to go abroad for career up gradation, employment stability, financial reasons and other organizational needs. However, the women as an expat have many issues to be considered at home and in the society. The younger age group is interested in expatriation due to earning potential and career prospects. Whereas senior executives prefer to have difference cultural management experience to equip them and to learn new aspects of technology and management dynamics in different business environment. The role of qualification in expatriation acts as a one of the decision variable while selection of the executives for expatriation and for onsite jobs abroad. The possibility of expatriation is high when an executive is having post graduate and professional degrees. Indians are expatriating to many countries in the globe. USA & Canada are the largest destinations for immigration and expatriation from India. This is due to the lucrative onsite opportunities prevailing in the country.

Data Analysis using Chi -Square Analysis

Association between Level of fluency of local language and Level of Expatriate Management Environment and Prevailing Culture

Null Hypothesis: There is no association between the level of fluency of local language and the perceptions on the Expatriate management environment and culture prevailing in the economy among the sample respondents.

Since p value is less than 0.01, the null hypothesis, There is no association between the level of fluency of local language and the perceptions on the Expatriate management environment and culture prevailing in the economy among the sample respondents is

rejected at 1% level of significance. Hence, it is concluded that, there is a strong association between the level of fluency of local language and the perceptions on the Expatriate management environment and culture prevailing in the economy among the sample respondents. Employees fluent with the local language of country of expatriation are positively perceived the expatriate environment when compared to others in the sample. This may be due to accessibility to information available in local language related to expatriation rules and other socio cultural data. This can help in understanding the society, people and work culture in a better way.

Association between Level of fluency of local language and Level of Motivating factors of expatriation / Intensions

Null Hypothesis: There is no Association between level of fluency of local language and Level of Motivating factors of expatriation among the sample

Since p value is less than 0.01, the null hypothesis, There is no Association between level of fluency of local language and Level of Motivating factors of expatriation among the sample is rejected at 1% level of significance. Hence, it is concluded that, there is a strong Association between level of fluency of local language and Level of Motivating factors of expatriation among the sample.

Association between Level of fluency of local language and Level of Problems of stress faced by the expatriates / challenges

Null Hypothesis: There is no association between the level of fluency of local language and Level of Problems of stress faced during expatriation among the sample.

The p value observed as less than 0.01, the null hypothesis, there is no association between the level of fluency of local language and Level of Problems of stress faced during expatriation among the sample is rejected at 1% level of significance. Hence, it is concluded that, there is a strong association between the level of fluency of local language and Level of Problems of stress faced during expatriation among the sample. Employees are not aware of the language al all are facing higher degree of problems of stress in expatriation when compared to others in the sample. This is quite common and reasonable. Lack of command over a Language is a basic barrier in international expatriation.

Data Analysis using T-test and ANOVA

Null Hypothesis: There is no significant difference between the perceptions of male and female with regard to problems of stress faced by the expatriates among the sample respondents (T-Test).

Since p value is observed at less than 0.01, the null hypothesis, There is no significant difference between the perceptions of male and female with regard to problems of stress faced by the expatriates among the sample respondents is rejected at 1% level of significance. Based on the same, statistically, it is inferred that there is a highly significant difference between the perceptions of male and female with regard to problems of stress faced by the expatriates among the sample respondents. On the other hand, it is noted that the high level of problems of stress in the expatriation is observed among the female members when compared to male in the sample. It may be due to immovability, safety issues, family responsibility and other socio cultural aspects of women in family and society.

Null Hypothesis: There is no relationship between work domains worked or working and the problems of stress faced during the expatriation among the sample.

Since p value is less than 0.01, the null hypothesis, There is no relationship between natures of field of worked or working and problems of stress faced during the expatriation among the sample is rejected at 1% level of significance. There is a highly significant relationship between nature of field of worked or working and the perceptions on problems of stress faced during the expatriation among the sample. Based on the mean value, it is noted that, personal problems are more among the expatriates in Technology (IT) field and the social, cultural, security and self-ego problems are more among the expatriates working in Healthcare. This may be due the dealing with people and training them in the selected field of study.

MAJOR FINDINGS

- Gender has high level of association with the expatriation status. The majority of the men prefer to go abroad for career up gradation, employment stability, financial reasons and other organizational needs. The younger age group is interested in expatriation due to earning potential and career prospects. Whereas senior executives prefer to have difference cultural management experience to equip them and to learn new aspects of technology and management dynamics in different business environment. Expatriation is not requires lot of work experience but it requires attitude to work.

- Expatriate management environment and prevailing culture prevailing in the economies are broadly classified into three types: The first kind of environment prevailing is highly positive and systematic and hassle free. These countries are developed countries in terms of expatriate management. The second kind of countries are trying to get the best of services from the expatriates where the environment is in the process of design and developing state. These are developing countries. The next kind of countries where a hostile expatriate management culture is prevailing and trying to improve on the expatriate management culture and management.

- Motivating variables, which influences expatriates to enter into foreign assignments, are due to career related progress by gaining more experience abroad and exposure to future positions in the parent organization. In addition, security variables like Job security at site, financial security and better level of compensation motivates the expatriates to accept onsite opportunities.

- The major stress is due to personal and cultural related problems faced by expatriates. Since the family is also forced to accept the change, high stress level is due to family acceptance to the new culture and to manage the effective cost of living is the key stress factor. Adjusting and accommodating to the new work culture including and not limited to language, attitude, procedures, food, mannerism etc., plays a significant part among expatriates.

- Social interactions also impose high level of stress due to uncertainty in the societal behavior and making friends among different race is a challenge for expatriates.

- To improve the expatriate environment culture, proper cross-cultural training is to be provided, proper compensation, creating trust; career growth prospects etc., are identified.

SUGGESTIONS

Motivation of Expatriates: During training, expatriates have to be motivated and given confidence to face the international climate and thus, stress level is reduced. If they are discourages they lose confidence and will not be able to adjust and accommodate to the new environment in the host country.

HR Department Support: HR department has good knowledge about host country's rules, customs, culture, cost of living, education details for kids, etc. Thus, expatriates can be trained to get that knowledge and help them to face the host country's rules and living regulations without fear and reduced stress level.

Personality Test and Development: A resource is selected not just with IT technical skills but also their personality should be assessed. Openness and agreeableness of the expatriates will help to adjust to the culture difference and emotional stability to tolerate stress in the new work set up. Adequate training should be provided to impart personality development skills among the expatriates.

Candidate Selection: IT firms should have systematic process to select the appropriate candidate for the project to travel abroad. Project heads and managers should take up interviews to assess his ability to manage and adjust to the new culture and checks his confidence and communication to face the client onsite. Apart from psychological competency, expatriates should be assessed for technical knowledge as well to gain confidence in the domain they will work.

Assignment Orientation Training: In IT industry, orientation training plays a vital role to make the expatriates aware of the project process and usage of applications on the client's site. Apart from technical orientation, management has to provide training towards the assignment constraints and requirements and help the expatriates gain knowledge about their entire work process before they land the host country.

Cross-Cultural and Language Training: Training has to be provided before and after expatriates reaching the host country. They should be able to appreciate the foreign culture and should know to adjust to their culture. The training should focus on remedies for culture shock and help the expatriates to reduce the stress towards cultural adjustment. Knowledge and fluency of the communicative language is very vital to cope up the stress while handling the client. Thus, adequate training is essential for the same.

Job Training: Adequate technical training on handling applications in clients place has to be provided by the managers. Previously gone expatriates have to be chosen to train new expatriates in usage of system in the host country.

Coaching and Mentoring: Every expatriates have to be assigned to a coach in home country usually a project head and HR professional who will monitor their progress and help them in need to provide information on their trouble areas both technically and psychologically which will relieve them from major stress in host country in job as well as handling people.

Behavioural Strategies: Appropriate behavioral norms have to understood and adopted when handling the clients like greeting, hand shake, etc. Initially, host country's norms seem to be unusual, but if individually, expatriates follow and understand their norms, they can get along.

Physical Exercise: Physical exercises to relax as if walking, yoga, meditation, cycling, etc., will relax the mind and body and act as a great stress controller or buster for the expatriates.

CONCLUSION

This paper mainly focused on the stress associated to the IT professionals who are travelling onsite (Expatriates) and also the process, factors and strategies are identified. In today's competitive world, to reach family and personal goal, all individuals are facing stress in all the ways. The success lies on the person who faces with confidence and adopting the right strategies to overcome stress.

As mentioned in the paper, many statistics proves, expatriates are increasing at a faster rate in IT industry. They wanted to focus on the financial benefit, advancement in career, opportunity for kids and spouse, societal growth, global experience, etc. thus, expatriates are ready to take risk in entering the host country and facing challenges to attain their goal.

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SPATIAL ANALYSIS OF MULE DISTRIBUTION IN HARYANA

Vikash Sharma[36] Savit Pal[37] Mohit Kumar[38] Mona Yadav[39] Vikas Sihag[40] Bhanu Pratap Singh[41]

ABSTRACT

Haryana has a small equine population of 0.41 lakh (8th livestock census, 2007) which is comprised of 19,658 horses, 10,772 mules, 3,920 donkeys and 4,247 ponies. In this study the Mules species is analyzed, Moran's I coefficient of autocorrelation was used to investigate the spatial distribution of Mules to analyses clustering of the population in Haryana using Tehsil as a real unit. Equine census data was used to link the heterogeneity in the Mules distribution with regard to agro-ecosystems and other environmental factors related to agro-ecological zones in the state of Haryana. Comparatively lower population density (0-0.2/ sq. km) of mules was observed in Haryana. Moran's I statistic revealed that the distribution of all types of equines was clustered. The distribution of the mules was characterized in terms of agro-ecosystem prevalent in the area. This ecosystem approach to characterize livestock distribution is useful in livestock production systems research planning.

KEYWORDS

Mules Species, Spatial Analysis, Agro-Ecological Zone, GIS, Livestock Censes etc.

INTRODUCTION

The state of Haryana has a geographical area of 44.20 lakh hectare. About 86% of the geographical area is cultivable, of which 96% has already been brought under plough. Therefore, there is hardly any scope for bringing additional area under cultivation, except for reclamation of degraded lands affected by water logging, salinity and alkalinity. While crop production has reached at a plateau, livestock production is still growing. Animal husbandry has been taken up as an integral component of diversified agriculture. Haryana has a Small equine 0.41 lakh population (18th livestock census, 2007). Livestock production systems are determined by factors such as ecological zones, livestock species, desired products, functions, management, markets and government policy (Ruthenberg1980; Simpson 1988). Livestock resources of a region are decided mainly by those factors, which determine overall ecological setting for feeding, breeding and rearing of appropriate livestock species for the region. These decisions with respect to choice of livestock and cropping systems are further influenced by several other factors related to infrastructure facilities, socio-economic factors and technological developments. As described by Saxena et al. (2001) these factors include: Infrastructure facilities like animal housing, water availability, feed and fodder availability, transport, trade and marketing, animal products handling, processing and marketing etc.; socio-economic factors like social acceptance for a particular livestock species, financial resource base, land ownership, size and type of land holding, household needs of food, animal products, fuel, fiber and finance, labor availability etc. and technological factors like improved breeds of animals, fodder and crop varieties, mechanization, disease protection, access to veterinary care, access to information etc. Under influence of all above factors, livestock resources remain dynamic in time and space, making it difficult to precisely determine their spread using conventional methods, over a large territory. A geodatabase of livestock in relation to the crop rotation and agro-ecological zones is an essential tool for animal husbandry planning and management.

AGRO-ECOLOGICAL ZONES

Haryana is an agrarian State wherein about 85 per cent of its area is under cultivation and engaging about 78 per cent of its population in agriculture. The climate of the State ranges from dry sub humid to hot arid. The annual rainfall varies from less than 300 mm in the southwestern parts to over 1000 mm in the hilly tracts of the Siwalik. Major parts of the State falls under the most fertile tract of indo-Gangetic alluvial plain. Soil temperature regime is Hyperthermic and the soil moisture regimes are ustic and Aridic. The State has 3 main climatic regions having average annual rainfall and air temperature as under: An ecosystem is a homogenous geographical area. The production environment of the region in terms of agro-climate, resource endowments and

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socioeconomic conditions is homogenous, and majority of the farmers have similar production constraints and research needs. Specific advantages of ecosystem approach for research planning (Saxena et al. 2001) are: (i) better identification of production constraints and research needs, (ii) better targeting of prospective technologies, (iii) improved assessment of farmers' responses to new technologies, and (iv) wider adoption and larger impact of research outputs.

OBJECTIVES

The geographical distribution of mules in Haryana in terms of agro-ecological zones and crop-based agro-ecosystems would be studied with the following objectives:

- To determine the mules distribution characteristics in Haryana with regard to the different agro-ecological zones.
- To determine the mules distribution characteristics in Haryana with regard to the Crop based agro-ecosystems.

Table-1: Mean Rainfall and Mean Temperature for Different Climatic Regions

Climatic Region	Mean Rainfall (mm)	Mean Temperature (C)
Hot Arid Region	300-500	27
Hot Semi-Arid Region	500-700	26
Hot Sub Humid Region	700-1050	24

Sources: Authors Compilation

MATERIAL AND METHODS

Study Area

The study area included the entire state of Haryana extending over an area of 44,212 square km. from $27^0$39' N to $30^0$55'5" N latitudes and $74^0$27'8" E to $77^0$36'5"E longitudes.

Spatial Data

- Agro-ecozones of Haryana as per the Resource Atlas of Haryana (2004)
- Crop based agro-ecosystems of Haryana based on IRS-P6, LISS 3 data of the year 2007-08.
- Administrative boundary of Haryana up to Tehsil level.

Attribute Data

Database of the 18th Livestock census (2007) of Haryana (Department of Animal Husbandry & Dairying and Fisheries, Ministry of Agriculture, Govt. India)

Software

Arc Map 10
ERDAS Imagine 11.0
MS Office 2007

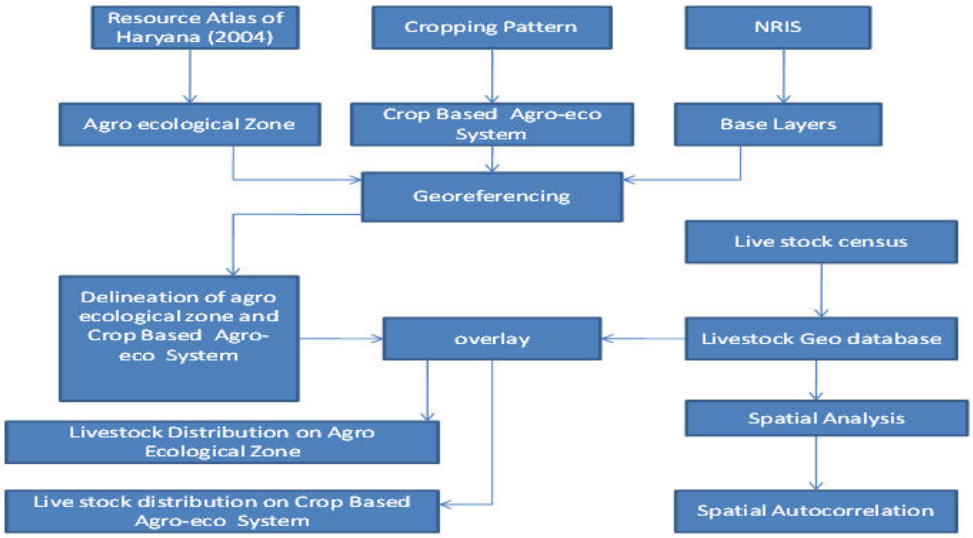
ENVIRONMENTAL CHARACTERIZATION OF LIVESTOCK DISTRIBUTION

GIS layers of agro-eco zones and crop-based agro-ecosystems were combined with the livestock distribution maps for environmental characterization of livestock distribution in Haryana. The flow chart of the methodology for the environmental characterization of livestock distribution is depicted in Figure 1.

Spatial Autocorrelation

Autocorrelation statistic i.e. Moran's I coefficient of autocorrelation was used to investigate spatial autocorrelations based on livestock density and Tehsil location to find out broad trends (dispersed, random or clustered) in the spatial distribution of livestock in Haryana.

Figure-1



Sources: Authors Compilation

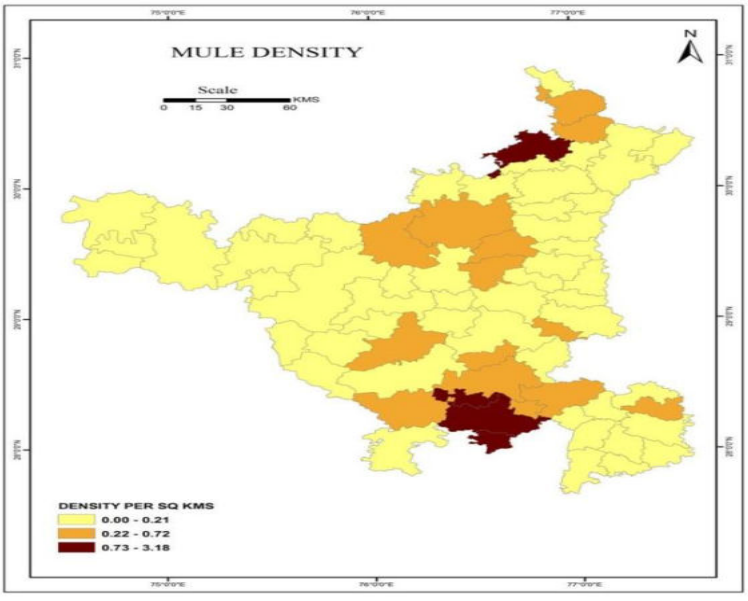
CLASSIFICATION AND DENSITY MAPPING OF MULES SPECIES

Density mapping for py was accomplished using Jenk's Natural Breaks method (Jenk's 1967) and the number of classes was kept at three representing High, Medium and Low densities. The Jenks optimization method, also called the Jenks natural breaks classification method, it is a data classification method designed to determine the best arrangement of values into different classes. This is done by seeking to minimize each class's average deviation from the class mean, while maximizing each class's deviation from the means of the other groups. In other words, the method seeks to reduce the variance within classes and maximize the variance between classes (Jenks 1967).

RESULTS AND DISCUSSION

Mule's density in Haryana is low comparison of other animals. Range of density of mule is 0 to 3.2 based on natural breaks method as shown in figure 2. High (0.8-3.2) density lies only two agro-ecological zones and only three Crop based Agro-ecosystem zones; Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period and Rugged hilly terrain of Aravalli range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. Crop based agro-ecosystem zones are Rice / Wheat, Bajra / Jawar / Guwar / Fallow-Wheat / Others and Bajra / Fallow-Mustard Show in table-2. High density of mules lays only three tehsil (Kosli, Rewari, Bawal, and Ambala) of Haryana. Medium density of mules lies in major six agro-ecological zones and four crops based agro-ecosystem zones. Medium density lies in central and southern part of Haryana state. Low (0.-0.2) density of mules is observed in all agro-ecosystems and all Agro-Eco zones shows in figure-2 and table-2.

Figure-2



Sources: Authors Compilation

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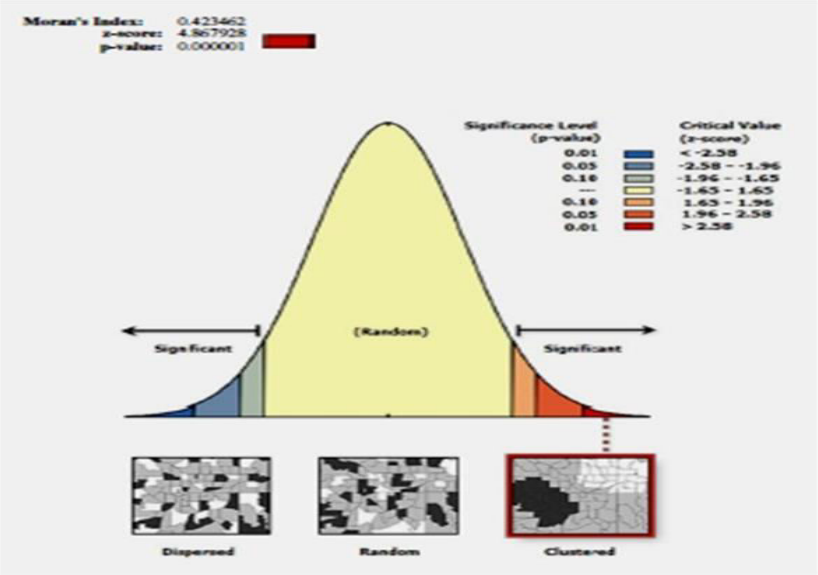
Spatial Autocorrelation Report of Mule Density

Moran's Index: 0.46991
z-score: 6.26218
P-value: 0

Figure-3



Sources: Authors Compilation

Figure-4

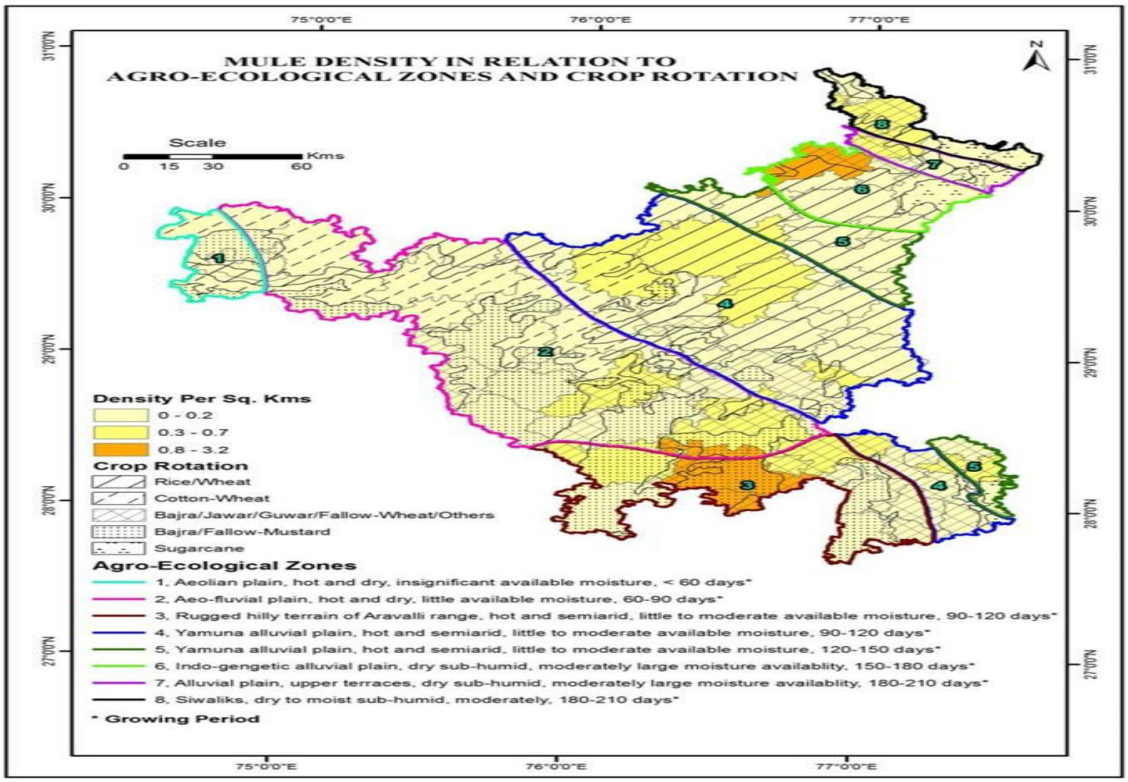


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Table-2: Mules Density in Relation to Agro-ecological Zones and Crop based Agro-ecosystem

Mules Density (Per sq. Km)	Tehsil	Agro-ecological zones	Crop based agro-ecosystem
High (0.8 - 3.2)	Kosli, Rewari, Bawal, Ambala	2. Aeo-fluvial plain, hot and dry, little available moisture, 60-90 Days growing period. 3. Rugged hilly terrain of Aravalli range, hot and semiarid, little to moderate available moisture, 90-120 days growing period.	Rice/Wheat Bajra/Jwar/Guwar/FallowWheat/Others Bajra/Fallow-Mustard
Medium (0.3 - 0.7)	Assandh, Ballabgarh, Beri, Bhiwani, Gurgaon, Jhajjar, Kaithal, Kharkhoda, Mahendragarh, Naraingarh, Narwana, Panchkula, Pataudi,Safidon	2. Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. 3. Rugged hilly terrain of Aravalli range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. 4. Yamuna alluvial plain, hot and semiarid, little to moderate availablemoisture, 90-120 days growing period. 5. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. 7. Alluvial plain, upper terraces, dry sub-humid, moderately large moisture availability, 180-210 days growing period. 8. Siwaliks, dry to moist sub-humid, moderately, 180-210 days growing period.	Rice/Wheat Cotten-Wheat Bajra/Jwar/Guwar/Fallow-WheatOthers Bajra/Fallow-Mustard
Low (0 - 0.2)	Adampur, Bahadurgarh, Barara, Bawani Khera, Chhachhrauli, Dabwali, Dadri, Ellenabad, Faridabad, Fatehabad, Ferozepur Jhirk, Ganaur, Gharaunda, Gohana, Guhla, Hansi, Hathin, Hisar, Hodal, Indri, Israna, Jagadhri, Jind, Julana, Kalka, Karnal, Loharu, Maham, Narnaul, Narnaund, Nilokheri, Nuh, Palwal, Panipat, Pehowa, Punahana, Rania, Ratia, Rohtak, Samalkh, Shahbad, Sirsa, Siwani, Sohna, Sonipat.	1. Aeolian plain, hot and dry, insignificant available moisture, < 60 days growing period. 2. Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. 3. Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. 4. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period. 5. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. 6. Indo-gengetic alluvial plain, dry sub-humid, moderately large moisture availability, 150-180 days growing period. 7. Alluvial plain, upper terraces, dry sub-humid, moderately large moisture availability, 180-210 days growing period. 8. Siwaliks, dry to moist sub-humid, moderately, 180-210 days growing period.	Rice/Wheat Cotton-Wheat Bajra/Jawar/Guwar/ FallowWheatOthers Bajra/Fallow-Mustard Sugarcane

Sources: Authors Compilation

CONCLUSION

The geographical distribution of livestock resources in Haryana in terms of agro-ecological zones and crop-based agro-ecosystems were studied to determine the distribution characteristics of mules in Haryana with regard to the different agro ecological zones. The livestock data from 18th Livestock census of Haryana 2007 (Department of Animal Husbandry & Dairying and Fisheries, Ministry of Agriculture, Govt. India) was used to create Haryana Livestock Geodatabase having Tehsil wise population of mules. This livestock geodatabase is a ready source of livestock census in relation to the map of Haryana where queries related to livestock populations at district and Tehsil level can be answered. The broad spatial distribution trends of the different livestock species in Haryana using Tehsil as the areal unit were identified and livestock distribution maps for each species were created using Jenk's Natural Breaks method with three classes representing High, Medium and Low densities. Moran's I Statistic investigated if the spatial distribution of various domestic animal species and breeds in Haryana, was clustered, random or dispersed. The Global Moran's I statistic was used to measures spatial autocorrelation based on both Tehsil locations and animal density values simultaneously. The z-score and p-value were used to evaluate the significance of Moran's I statistic. The Moran's I statistic revealed that the distribution of all the animal species studied was clustered except indigenous female cattle which were found randomly distributed. Clustered distribution of all animal species was highly significant ($p = 0.000019$, Z score = 4.281135). Heterogeneity in livestock distribution was analyzed in relation to the five major cropping patterns representing crop-based agro-ecosystems and the eight agro-ecological zones of Haryana based on soil, physiography, bio-climate and length of growing period. The five major crop rotations were Rice/Wheat, Cotton- Wheat, Bajra/Jawar/Guwar/Fallow - Wheat/Others, Bajra/Fallow-Mustard and Sugarcane. Mule's population is spatially clustered in central Haryana characterized by Bajra/Jawar/Guwar/Fallow-Wheat/Others, Bajra/Fallow-Mustard. This area is characterized by hot and dry aeo-fluvial plains with mainly Bajra/Mustard and Cotton-Wheat crop rotation

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SPATIAL ANALYSIS OF DONKEY DISTRIBUTION IN HARYANA

Vikash Sharma[42] Mona Yadav[43] Savit Pal[44] Bhanu Pratap Singh[45] Mohit Kumar[46]

ABSTRACT

Haryana has a small equine population of 0.41 lakh (18th livestock census, 2007) which is comprised of 19,658 horses, 10,772 mules, 3,920 donkeys and 4,247 ponies. In this study the Donkey species is analyzed, Moran's I coefficient of autocorrelation was used to investigate the spatial distribution of Donkey to analyze clustering of the population in Haryana using Tehsil as a real unit. Equine census data was used to link the heterogeneity in the Donkey distribution with regard to agro-ecosystems and other environmental factors related to agro-ecological zones in the state of Haryana. Comparatively lower population density (0–1.2 / sq km) of donkey was observed in Haryana. Moran's I statistic revealed that the distribution of all types of equines was clustered. The distribution of the donkey was characterized in terms of agro-ecosystem prevalent in the area. This ecosystem approach to characterize livestock distribution is useful in livestock production systems research planning.

KEYWORDS

Donkey Species, Spatial Analysis, Agro-Ecological Zone, GIS, Livestock Censes etc.

INTRODUCTION

The state of Haryana has a geographical area of 44.20 lakh hectare. About 86% of the geographical area is cultivable, of which 96% has already been brought under plough. Therefore, there is hardly any scope for bringing additional area under cultivation, except for reclamation of degraded lands affected by water logging, salinity and alkalinity. While crop production has reached at a plateau, livestock production is still growing. Animal husbandry has been taken up as an integral component of diversified agriculture. Haryana has a Small equine 0.41 lakh population (18th livestock census, 2007).

Livestock production systems are determined by factors such as ecological zones, livestock species, desired products, functions, management, markets and government policy (Ruthenberg1980; Simpson 1988). Livestock resources of a region are decided mainly by those factors, which determine overall ecological setting for feeding, breeding and rearing of appropriate livestock species for the region. These decisions with respect to choice of livestock and cropping systems are further influenced by several other factors related to infrastructure facilities, socio-economic factors and technological developments. As described by Saxena et al. (2001) these factors include: Infrastructure facilities like animal housing, water availability, feed and fodder availability, transport, trade and marketing, animal products handling, processing and marketing etc.; socio-economic factors like social acceptance for a particular livestock species, financial resource base, land ownership, size and type of land holding, household needs of food, animal products, fuel, fiber and finance, labor availability etc. and technological factors like improved breeds of animals, fodder and crop varieties, mechanization, disease protection, access to veterinary care, access to information etc. Under influence of all above factors, livestock resources remain dynamic in time and space, making it difficult to precisely determine their spread using conventional methods, over a large territory. A geodatabase of livestock in relation to the crop rotation and agro-ecological zones is an essential tool for animal husbandry planning and management.

AGRO-ECOLOGICAL ZONES

Haryana is an agrarian State wherein about 85 per cent of its area is under cultivation and engaging about 78 per cent of its population in agriculture. The climate of the State ranges from dry sub humid to hot arid. The annual rainfall varies from less than 300 mm in the southwestern parts to over 1000 mm in the hilly tracts of the Siwalik. Major parts of the State falls under the most fertile tract of indo-Gangetic alluvial plain. Soil temperature regime is Hyperthermic and the soil moisture regimes are ustic and Aridic. The State has three main climatic regions having average annual rainfall and air temperature as under:

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[46] Project Fellow (Haryana Space Applications Centre) Education, M. Tech., Geo-Informatics, Haryana, India, mohitkumar960@gmail.com

An ecosystem is a homogenous geographical area. The production environment of the region in terms of agro-climate, resource endowments and socioeconomic conditions is homogenous, and majority of the farmers have similar production constraints and research needs. Specific advantages of ecosystem approach for research planning (Saxena et. al., 2001) are: (i) better identification of production constraints and research needs, (ii) better targeting of prospective technologies, (iii) improved assessment of farmers' responses to new technologies, and (iv) wider adoption and larger impact of research outputs.

OBJECTIVES

The geographical distribution of donkey in Haryana in terms of agro-ecological zones and crop-based agro-ecosystems would be studied with the following objectives:

- To determine the donkey distribution characteristics in Haryana with regard to the different agro-ecological zones.
- To determine the donkey distribution characteristics in Haryana with regard to the Crop based agro-ecosystems.

Table-1: Mean Rainfall and Mean Temperature for Different Climatic Regions

Climatic Region	Mean Rainfall (mm)	Mean Temperature (C)
Hot Arid Region	300-500	27
Hot Semi-Arid Region	500-700	26
Hot Sub Humid Region	700-1050	24

Sources: Authors Compilation

MATERIAL AND METHODS

Study Area

The study area included the entire state of Haryana extending over an area of 44,212 square km. from $27^0$39' N to $30^0$55'5" N latitudes and $74^0$27'8" E to $77^0$36'5"E longitudes.

Spatial Data

- Agro-ecozones of Haryana as per the Resource Atlas of Haryana (2004)
- Crop based agro-ecosystems of Haryana based on IRS-P6, LISS 3 data of the year 2007-08.
- Administrative boundary of Haryana up to Tehsil level.

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Software

Arc Map 10
ERDAS Imagine 11.0
MS Office 2007

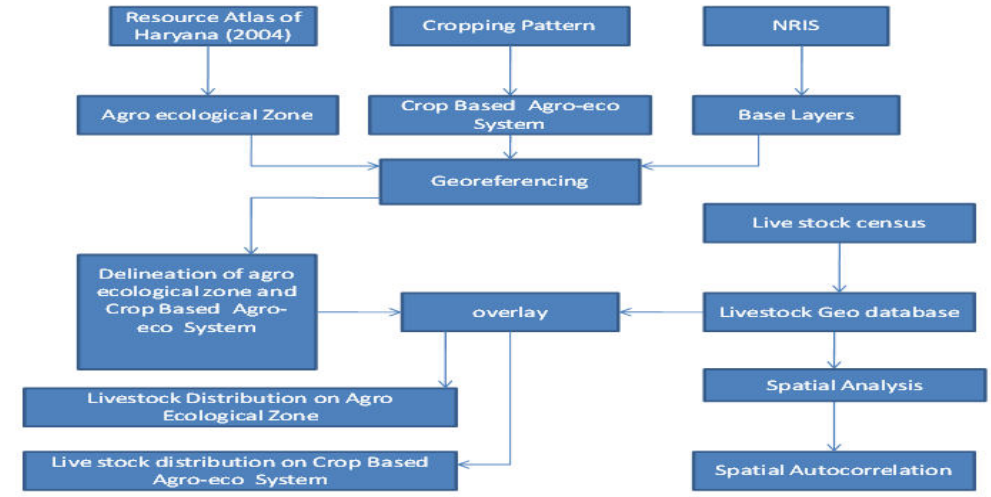
ENVIRONMENTAL CHARACTERIZATION OF LIVESTOCK DISTRIBUTION

GIS layers of agro-eco zones and crop-based agro-ecosystems were combined with the livestock distribution maps for environmental characterization of livestock distribution in Haryana. The flow chart of the methodology for the environmental characterization of livestock distribution is depicted in Figure 1.

Spatial Autocorrelation

Autocorrelation statistic i.e. Moran's I coefficient of autocorrelation was used to investigate spatial autocorrelations based on livestock density and Tehsil location to find out broad trends (dispersed, random or clustered) in the spatial distribution of livestock in Haryana.

Figure-1



Sources: Authors Compilation

CLASSIFICATION AND DENSITY MAPPING OF DONKEY SPECIES

Density mapping for denkey was accomplished using Jenk's Natural Breaks method (Jenk's 1967) and the number of classes was kept at three representing High, Medium and Low densities. The Jenks optimization method, also called the Jenks natural breaks classification method, it is a data classification method designed to determine the best arrangement of values into different classes. This is done by seeking to minimize each class's average deviation from the class mean, while maximizing each class's deviation from the means of the other groups. In other words, the method seeks to reduce the variance within classes and maximize the variance between classes (Jenks 1967)

SPATIAL TRENDS IN THE DISTRIBUTION OF DOMESTIC ANIMALS IN HARYANA

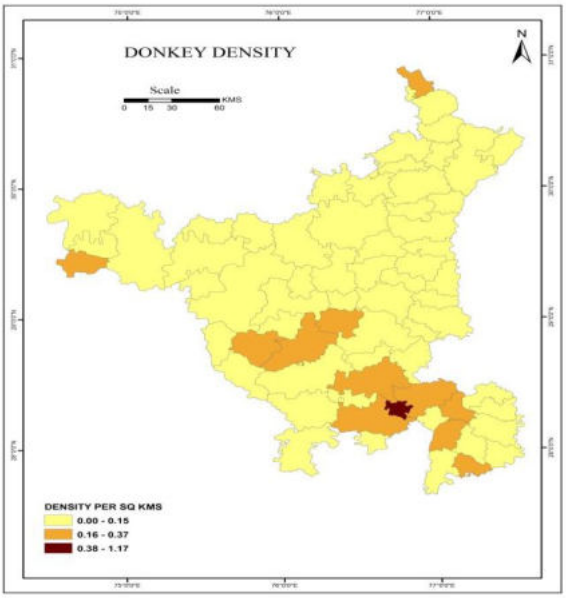
The Global Moran's I statistic was used to measures spatial autocorrelation based on both Tehsil location and animal density values simultaneously. The z-score and p-value were used to evaluate the significance of Moran's I statistic. The results of spatial auto-correlation in distribution of domestic animal populations based on Tehsil boundaries are depicted in Table-1.

RESULTS AND DISCUSSION

Donkey density in Haryana is low comparison of other animals. Range of density of donkey is 0 to 1.2 based on natural breaks method as shown in figure 2. High (0.5-1.2) density lies only one agro-ecological zones and only one Crop based agro-ecosystem zones; Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture and its 90-120 days growing season. Crop based agro-ecosystem zones are Bajra / Jawar / Guwar / Fallow-Wheat / Others Show in table-1. High density of donkey lays only one tehsil (Pataudi) of southern Haryana.

Medium density of donkey lies in ten tehsils show in table1. Its lie in all agro-ecological zones except 1st zone and four Crops based agro-ecosystem zones. Medium density also lies in southern part of Haryana state. Low (0.-0.2) density of donkey is observe in all agro-ecosystems and 6 Agro-ecozones shows in figure-2 and table-1.

Figure-2



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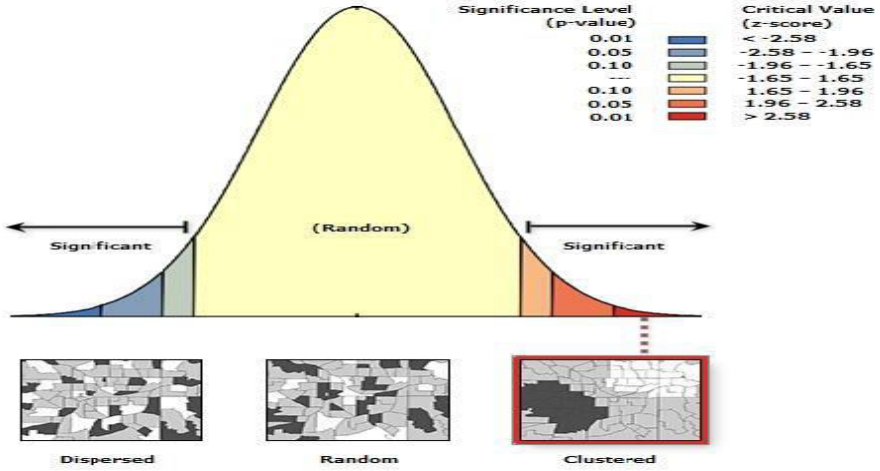
Spatial Autocorrelation Report of donkey Density

Moran's Index: 0.273189
z-score: 4.217725
P-value: 0.000025

Figure-3



Sources: Authors Compilation

Figure-4

Sources: Authors Compilation

Table-2: Donkey Density in Relation to Agro-Ecological Zones and Crop based Agro-Ecosystem

Donkey Density (Per sq. Km)	Tehsil	Agro-Ecological Zones	Crop Based Agro-ecosystem
High (0.5 - 1.2)	Pataudi	• Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture, 90-120 days growing period growing period.	• Bajra / Jawar / Guwar / Fallow Wheat / Others
Medium (0.3 - 0.4)	Bhiwani, Ellenabad, Gurgaon, Jhajjar, Kalka, Maham, Nuh, Punahana, Rewari, Sohna, Tosham.	• Aeolian plain, hot and dry, insignificant available moisture, < 60 days growing period. • Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. • Rugged hilly terrain of Aravalli range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Siwaliks, dry to moist sub-humid, moderately, 180-210 days growing period.	• Rice / Wheat • Cotton - Wheat • Bajra / Jawar / Guwar / Fallow Wheat / Others • Bajra / Fallow-Mustard
Low (0 - 0.12)	Adampur, Ambala, Assandh, Bahadurgarh, Ballabgarh, Barara, Bawal, Bawani Khera, Beri, Chhachhrauli, Dabwali, Dadri, Faridabad, Fatehabad, Ferozepur Jhirk, Ganaur, Gharaunda, Gohana, Guhla, Hansi, Hathin, Hisar, Hodal, Indri, Israna, Jagadhri, Jind, Julana, Kaithal, Karnal, Kharkhoda, Kosli, Loharu, Mahendragarh, Naraingarh, Narnaul, Narnaund, Narwana, Nilokheri, Palwal, Panchkula, Panipat, Pehowa, Rania, Ratia, Rohtak, Safidon, Samalkha, Shahbad, Sirsa, Siwani, Sonipat.	• Aeolian plain, hot and dry, insignificant available moisture, < 60 days growing period. • Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. • Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. • Indo-gengetic alluvial plain, dry sub-humid, moderately large moisture availability, 150-180 days growing period. • Alluvial plain, upper terraces, dry sub-humid, moderately large moisture availability, 180-210 days growing period. • Siwaliks, dry to moist sub-humid, moderately, 180-210 days growing period.	• Rice / Wheat • Cotton - Wheat • Bajra / Jawar / Guwar / Fallow-Wheat / Others • Bajra / Fallow-Mustard • Sugarcane

Sources: Authors Compilation

CONCLUSION

The geographical distribution of livestock resources in Haryana in terms of agro-ecological zones and crop-based agro-ecosystems were studied to determine the distribution characteristics of donkey in Haryana with regard to the different agro ecological zones. The livestock data from 18th Livestock census of Haryana 2007 (Department of Animal Husbandry & Dairying and Fisheries, Ministry of Agriculture, Govt. India) was used to create Haryana Livestock Geodatabase having Tehsil wise population of donkey. This livestock geodatabase is a ready source of livestock census in relation to the map of Haryana where queries related to livestock populations at district and Tehsil level can be answered. The broad spatial distribution trends of the different livestock species in Haryana using Tehsil as the areal unit were identified and livestock distribution maps for each species were created using Jenk's Natural Breaks method with three classes representing High, Medium and Low densities. Moran's I Statistic investigated if the spatial distribution of various domestic animal species and breeds in Haryana, was clustered, random or dispersed. The Global Moran's I statistic was used to measures spatial autocorrelation based on both Tehsil locations and animal density values simultaneously. The z-score and p-value were used to evaluate the significance of Moran's I statistic. The Moran's I statistic revealed that the distribution of all the animal species studied was clustered except indigenous female cattle which were found randomly distributed. Clustered distribution of all animal species was highly significant (p=0.000019, Z score=4.281135).

Heterogeneity in livestock distribution was analyzed in relation to the five major cropping patterns representing crop-based agro-ecosystems and the eight agro-ecological zones of Haryana based on soil, physiography, bio-climate and length of growing period. The five major crop rotations were Rice / Wheat, Cotton-Wheat, Bajra / Jawar / Guwar / Fallow-Wheat / Others, Bajra / Fallow-Mustard and Sugarcane. Donkey population is spatially clustered in southern Haryana characterized by Bajra / Jawar / Guwar / Fallow-Wheat / Others, Bajra / Fallow-Mustard. This area is characterized by hot and dry aeo-fluvial plains with mainly Bajra/Mustard and Cotton-Wheat crop rotation.

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SPATIAL ANALYSIS OF PONY DISTRIBUTION IN HARYANA

Vikash Sharma[47] Vikas Sihag[48] Mona Yadav[49] Mohit Kumar[50] Bhanu Pratap Singh[51]

ABSTRACT

Haryana has a small equine population of 0.41 lakh (18th livestock census, 2007) which is comprised of 19,658 horses, 10,772 mules, 3,920 donkeys and 4,247 ponies. In this study the Pony species is analyzed, Moran's I coefficient of autocorrelation was used to investigate the spatial distribution of Pony to analyze clustering of the population in Haryana using Tehsil as a real unit. Equine census data was used to link the heterogeneity in the Pony distribution with regard to agro-ecosystems and other environmental factors related to agro-ecological zones in the state of Haryana. Comparatively lower population density (0-0.09/ sq. km) of pony was observed in Haryana. Moran's I statistic revealed that the distribution of all types of equines was clustered. The distribution of the pony was characterized in terms of agro-ecosystem prevalent in the area. This ecosystem approach to characterize livestock distribution is useful in livestock production systems research planning.

KEYWORDS

Donkey Species, Spatial Analysis, Agro-Ecological Zone, GIS, Livestock Censes etc.

INTRODUCTION

The state of Haryana has a geographical area of 44.20 lakh hectare. About 86% of the geographical area is cultivable, of which 96% has already been brought under plough. Therefore, there is hardly any scope for bringing additional area under cultivation, except for reclamation of degraded lands affected by water logging, salinity and alkalinity. While crop production has reached at a plateau, livestock production is still growing. Animal husbandry has been taken up as an integral component of diversified agriculture. Haryana has a Small equine 0.41 lakh population (18th livestock census, 2007).

Livestock production systems are determined by factors such as ecological zones, livestock species, desired products, functions, management, markets and government policy (Ruthenberg1980; Simpson 1988). Livestock resources of a region are decided mainly by those factors, which determine overall ecological setting for feeding, breeding and rearing of appropriate livestock species for the region. These decisions with respect to choice of livestock and cropping systems are further influenced by several other factors related to infrastructure facilities, socio-economic factors and technological developments. As described by Saxena et al. (2001) these factors include: Infrastructure facilities like animal housing, water availability, feed and fodder availability, transport, trade and marketing, animal products handling, processing and marketing etc.; socio-economic factors like social acceptance for a particular livestock species, financial resource base, land ownership, size and type of land holding, household needs of food, animal products, fuel, fiber and finance, labor availability etc. and technological factors like improved breeds of animals, fodder and crop varieties, mechanization, disease protection, access to veterinary care, access to information etc. Under influence of all above factors, livestock resources remain dynamic in time and space, making it difficult to precisely determine their spread using conventional methods, over a large territory. A geodatabase of livestock in relation to the crop rotation and agro-ecological zones is an essential tool for animal husbandry planning and management.

Agro-Ecological Zones

Haryana is an agrarian State wherein about 85 per cent of its area is under cultivation and engaging about 78 per cent of its population in agriculture. The climate of the State ranges from dry sub humid to hot arid. The annual rainfall varies from less than 300 mm in the southwestern parts to over 1000 mm in the hilly tracts of the Siwalik. Major parts of the State falls under the most fertile tract of indo-Gangetic alluvial plain. Soil temperature regime is Hyperthermic and the soil moisture regimes are ustic and Aridic. The State has 3 main climatic regions having average annual rainfall and air temperature as under:

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An ecosystem is a homogenous geographical area. The production environment of the region in terms of agro-climate, resource endowments and socioeconomic conditions is homogenous, and majority of the farmers have similar production constraints and research needs. Specific advantages of ecosystem approach for research planning (Saxena et al.2001) are: (i) better identification of production constraints and research needs, (ii) better targeting of prospective technologies, (iii) improved assessment of farmers' responses to new technologies, and (iv) wider adoption and larger impact of research outputs.

OBJECTIVES

The geographical distribution of pony in Haryana in terms of agro-ecological zones and crop-based agro-ecosystems would be studied with the following objectives:

- To determine the pony distribution characteristics in Haryana with regard to the different agro-ecological zones.
- To determine the pony distribution characteristics in Haryana with regard to the Crop based agro-ecosystems.

Table-1: Mean Rainfall and Mean Temperature for Different Climatic Regions

Climatic Region	Mean Rainfall (mm)	Mean Temperature (C)
Hot Arid Region	300-500	27
Hot Semi-Arid Region	500-700	26
Hot Sub Humid Region	700-1050	24

Sources: Authors Compilation

MATERIAL AND METHODS

Study Area

The study area included the entire state of Haryana extending over an area of 44,212 square km. from $27^0$39' N to $30^0$55'5" N latitudes and $74^0$27'8" E to $77^0$36'5"E longitudes.

Spatial Data

- Agro-ecozones of Haryana as per the Resource Atlas of Haryana (2004)
- Crop based agro-ecosystems of Haryana based on IRS-P6, LISS 3 data of the year 2007-08.
- Administrative boundary of Haryana up to Tehsil level.

Attribute Data

Database of the 18th Livestock census (2007) of Haryana (Department of Animal Husbandry & Dairying and Fisheries, Ministry of Agriculture, Govt. India)

Software

Arc Map 10
ERDAS Imagine 11.0
MS Office 2007

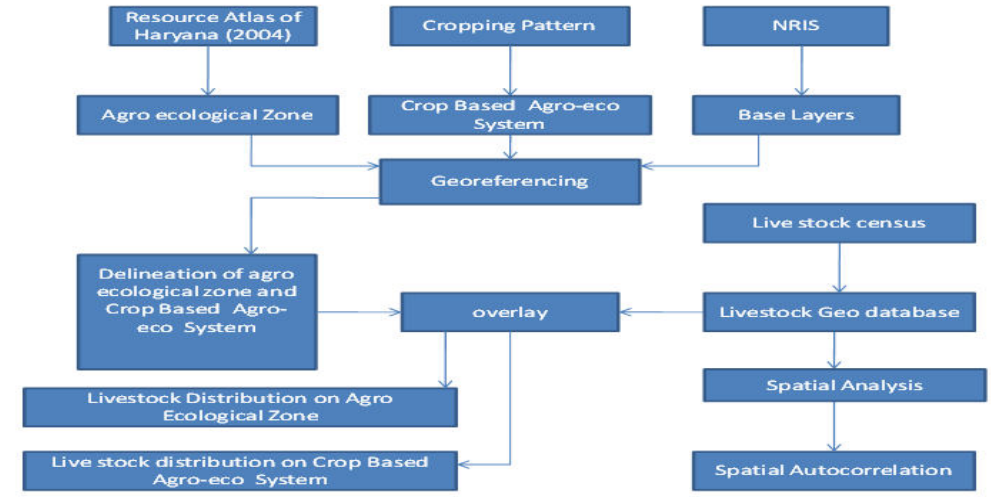
ENVIRONMENTAL CHARACTERIZATION OF LIVESTOCK DISTRIBUTION

GIS layers of agro-eco zones and crop-based agro-ecosystems were combined with the livestock distribution maps for environmental characterization of livestock distribution in Haryana. The flow chart of the methodology for the environmental characterization of livestock distribution is depicted in Figure 1.

Spatial Autocorrelation

Autocorrelation statistic i.e. Moran's I coefficient of autocorrelation was used to investigate spatial autocorrelations based on livestock density and Tehsil location to find out broad trends (dispersed, random or clustered) in the spatial distribution of livestock in Haryana.

Figure-1



Sources: Authors Compilation

CLASSIFICATION AND DENSITY MAPPING OF PONY SPECIES

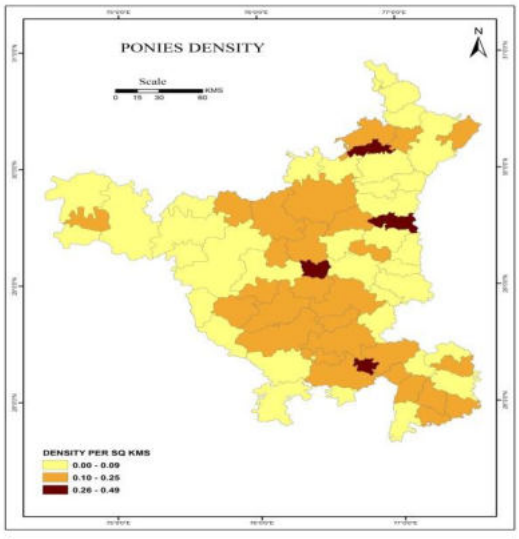
Density mapping for pony was accomplished using Jenk's Natural Breaks method (Jenk's 1967) and the number of classes was kept at three representing High, Medium and Low densities. The Jenks optimization method, also called the Jenks natural breaks classification method, it is a data classification method designed to determine the best arrangement of values into different classes. This is done by seeking to minimize each class's average deviation from the class mean, while maximizing each class's deviation from the means of the other groups. In other words, the method seeks to reduce the variance within classes and maximize the variance between classes (Jenks 1967).

SPATIAL TRENDS IN THE DISTRIBUTION OF DOMESTIC ANIMALS IN HARYANA

The Global Moran's I statistic was used to measures spatial autocorrelation based on both Tehsil location and animal density values simultaneously. The z-score and p-value were used to evaluate the significance of Moran's-I statistic. The results of spatial autocorrelation in distribution of domestic animal populations based on Tehsil boundaries are depicted in Table-1.

Pony density in Haryana is low comparison of other animals. Range of density of pony is 0 to 0.49 based on natural breaks method as shown in figure 2. High (0.26-0.49) density lies five agro-ecological zones and only two Crop based agro-ecosystem zones; Rugged hilly terrain of Aravalli range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. Indo-gengetic alluvial plain, dry sub-humid, moderately large moisture availability, 150-180 days growing period. Crop based agro-ecosystem zones are Bajra / Jawar / Guwar / Fallow-Wheat / Others Show in table-1. High density of pony lays only three tehsil (Gharaunda, Julana, and Pataudi) of Haryana.

Figure-2



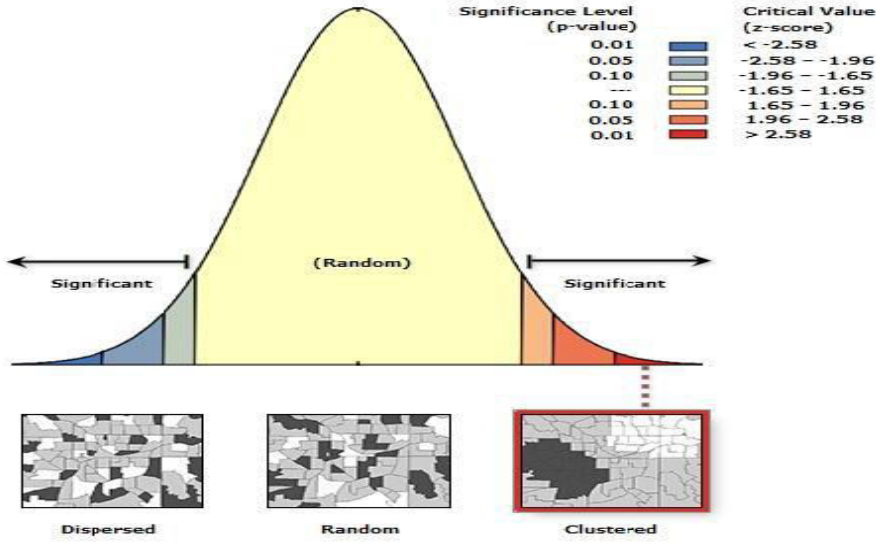
Sources: Authors Compilation

Medium density of pony lies in twenty-eight tehsils show in table1. Its lie in all agro-ecological zones except 1st zone and all Crops based agro-ecosystem zones. Medium density lies in central and southern part of Haryana state. Low (0.-0.09) density of pony is observed in all agro-ecosystems and all Agro-ecozones shows in figure-2 and table-1.

Spatial Autocorrelation Report of pony Density

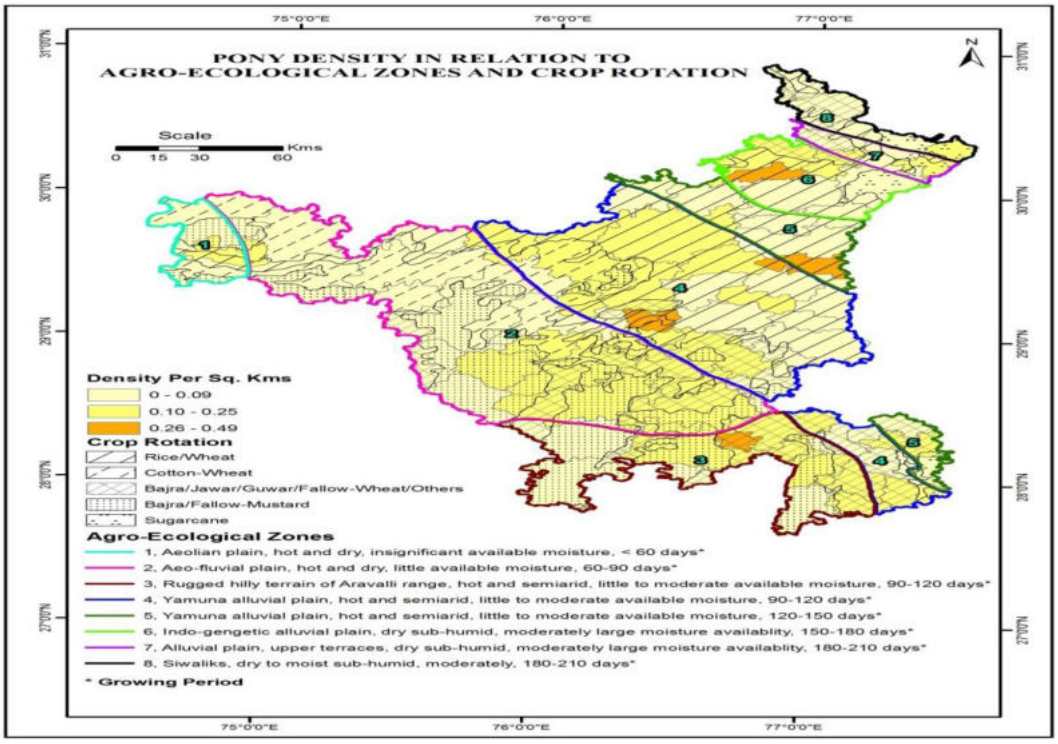
Moran's Index: 0.164021
z-score: 2.068581
P-value: 0.038585

Figure-3



Sources: Authors Compilation

Figure-4



Sources: Authors Compilation

Table-2: Pony Density in Relation to Agro-Ecological Zones and Crop Based Agro-Ecosystem

Donkey Density (Per sq. Km)	Tehsil	Agro-Ecological Zones	Crop Based Agro-ecosystem
High (0.26 - 0.49)	Gharaunda, Julana, Pataudi	• Rugged hilly terrain of Aravalli range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. • Indo-gengetic alluvial plain, dry sub-humid, moderately large moisture availability, 150-180 days growing period.	• Rice / Wheat • Bajra / Jawar / Guwar / Fallow-Wheat / Others
Medium (0.10 - 0.25)	Rania, Tohana, Narwana, Kaithal, Assandh, Jind, Narnaund, Israna, Maham, Bhiwani, Bawani Khera, Tosham, Dadri, Rohtak, Beri, Jhajjar, Kosli, Rewari, Gurgaon, Taoru, Nuh, Hathin, Hodal, Punahana, Ballabgarh, Chhachhrauli, Barara, Ambala.	• Aeolian plain, hot and dry, insignificant available moisture, < 60 days growing period. • Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. • Rugged hilly terrain of Aravali range, hot and semiarid, little tomoderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderateavailable moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. • Indo-gengetic alluvial plain, dry sub-humid, moderately large moisture availability, 150-180 days growing period. • Alluvial plain, upper terraces, dry sub-humid, moderately large moisture availability, 180-210 days growing period. • Siwaliks, dry to moist sub-humid, moderately, 180-210 days growing period.	• Rice / Wheat • Cotton-Wheat • Bajra / Jawar / Guwar / Fallow-Wheat / Others • Bajra / Fallow-Mustard • Sugarcane
Low (0 - 0.09)	Dabwali, Ellenabad, Sirsa, Fatehabad, Ratia, Adampur, Hisar, Hansi, Siwani, Guhla, Pehowa, Thanesar, Jagadhri, Naraingarh, Panchkula, Kalka, Indri, Nilokheri, Karnal, Panipat, Safidon, Gohana, Samalkha, Ganaur, Sonipat, Kharkhoda, Bahadurgarh, Loharu, Mahendragarh, Narnaul, Bawal, Ferozepur Jhirk, Palwal.	• Aeolian plain, hot and dry, insignificant available moisture, < 60 days growing period. • Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. • Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90- 120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. • Indo-gengetic alluvial plain, dry sub-humid, moderately large moisture availability, 150-180 days growing period. • Alluvial plain, upper terraces, dry sub-humid, moderately large moisture availability, 180-210 days growing period. • Siwaliks, dry to moist sub-humid, moderately, 180-210 days growing period.	• Rice / Wheat • Cotton-Wheat • Bajra / Jawar / Guwar / Fallow-Wheat / Others • Bajra / Fallow-Mustard • Sugarcane

Sources: Authors Compilation

CONCLUSION

The geographical distribution of livestock resources in Haryana in terms of agro-ecological zones and crop-based agro-ecosystems were studied to determine the distribution characteristics of pony in Haryana with regard to the different agro ecological zones. The livestock data from 18th Livestock census of Haryana 2007 (Department of Animal Husbandry & Dairying and Fisheries,

Ministry of Agriculture, Govt. India) was used to create Haryana Livestock Geodatabase having Tehsil wise population of pony. This livestock geodatabase is a ready source of livestock census in relation to the map of Haryana where queries related to livestock populations at district and Tehsil level can be answered. The broad spatial distribution trends of the different livestock species in Haryana using Tehsil as the areal unit were identified and livestock distribution maps for each species were created using Jenk's Natural Breaks method with three classes representing High, Medium and Low densities. Moran's I Statistic investigated if the spatial distribution of various domestic animal species and breeds in Haryana, was clustered, random or dispersed. The Global Moran's I statistic was used to measures spatial autocorrelation based on both Tehsil locations and animal density values simultaneously. The z-score and p-value were used to evaluate the significance of Moran's I statistic. The Moran's I statistic revealed that the distribution of all the animal species studied was clustered except indigenous female cattle which were found randomly distributed. Clustered distribution of all animal species was highly significant (p = 0.000019, Z score = 4.281135). Heterogeneity in livestock distribution was analyzed in relation to the five major cropping patterns representing crop-based agro-ecosystems and the eight agro-ecological zones of Haryana based on soil, physiography, bio-climate and length of growing period. The five major crop rotations were Rice / Wheat, Cotton-Wheat, Bajra / Jawar / Guwar / Fallow-Wheat / Others, Bajra / Fallow-Mustard and Sugarcane. Pony population is spatially clustered in central Haryana characterized by Bajra / Jawar / Guwar / Fallow-Wheat / Others, Bajra / Fallow-Mustard. This area is characterized by hot and dry aeo-fluvial plains with mainly Bajra/Mustard and Cotton-Wheat crop rotation.

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SPATIAL ANALYSIS OF SHEEP DISTRIBUTION IN HARYANA

Vikash Sharma[52] Vikas Sihag[53] Mona Yadav[54] Mohit Kumar[55]

ABSTRACT

Haryana has a small sheep 6.01 lakh population (18th livestock census, 2007. In this study the sheep species is analyzed, Moran's I coefficient of autocorrelation was used to investigate the spatial distribution of sheep to analyze clustering of the population in Haryana using Tehsil as a real unit. Sheep census data was used to link the heterogeneity in the Sheep distribution with regard to agro-ecosystems and other environmental factors related to agro-ecological zones in the state of Haryana. Comparatively lower population density (0 - 9/ sq. km) of sheep was observed in North eastern Haryana. Moran's I statistic revealed that the distribution of all types of sheep was clustered. The distribution of the sheep was characterized in terms of agro-ecosystem prevalent in the area. This ecosystem approach to characterize livestock distribution is useful in livestock production systems research planning.

KEYWORDS

Sheep Species, Spatial Analysis, Agro-Ecological Zone, GIS, Livestock Censes etc.

INTRODUCTION

The state of Haryana has a geographical area of 44.20 lakh hectare. About 86% of the geographical area is cultivable, of which 96% has already been brought under plough. Therefore, there is hardly any scope for bringing additional area under cultivation, except for reclamation of degraded lands affected by water logging, salinity and alkalinity. While crop production has reached at a plateau, livestock production is still growing. Animal husbandry has been taken up as an integral component of diversified agriculture. Haryana has a Small sheep 6.01 lakh population (18th livestock census, 2007).

Livestock production systems are determined by factors such as ecological zones, livestock species, desired products, functions, management, markets and government policy (Ruthenberg1980; Simpson 1988). Livestock resources of a region are decided mainly by those factors, which determine overall ecological setting for feeding, breeding and rearing of appropriate livestock species for the region. These decisions with respect to choice of livestock and cropping systems are further influenced by several other factors related to infrastructure facilities, socio-economic factors and technological developments. As described by Saxena et al. (2001) these factors include: Infrastructure facilities like animal housing, water availability, feed and fodder availability, transport, trade and marketing, animal products handling, processing and marketing etc.; socio-economic factors like social acceptance for a particular livestock species, financial resource base, land ownership, size and type of land holding, household needs of food, animal products, fuel, fiber and finance, labor availability etc. and technological factors like improved breeds of animals, fodder and crop varieties, mechanization, disease protection, access to veterinary care, access to information etc. Under influence of all above factors, livestock resources remain dynamic in time and space, making it difficult to precisely determine their spread using conventional methods, over a large territory. A geodatabase of livestock in relation to the crop rotation and agro-ecological zones is an essential tool for animal husbandry planning and management.

Agro-Ecological Zones

Haryana is an agrarian State wherein about 85 per cent of its area is under cultivation and engaging about 78 per cent of its population in agriculture. The climate of the State ranges from dry sub humid to hot arid. The annual rainfall varies from less than 300 mm in the southwestern parts to over 1000 mm in the hilly tracts of the Siwalik. Major parts of the State falls under the most fertile tract of indo-Gangetic alluvial plain. Soil temperature regime is Hyperthermic and the soil moisture regimes are ustic and Aridic. The State has three main climatic regions having average annual rainfall and air temperature as under:

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[53] Project Fellow (Haryana Space Applications Centre) Education, M. Tech., Geo-Informatics, Haryana, India, vks.sihag@gmail.com
[54] Project Fellow (Haryana Space Applications Centre) Education, M. Tech., Geo-Informatics, Haryana, India, r41moni@gmail.com
[55] Project Fellow (Haryana Space Applications Centre) Education, M. Tech., Geo-Informatics, Haryana, India, mohitkumar960@gmail.com

An ecosystem is a homogenous geographical area. The production environment of the region in terms of agro-climate, resource endowments and socioeconomic conditions is homogenous, and majority of the farmers have similar production constraints and research needs. Specific advantages of ecosystem approach for research planning (Saxena et al.2001) are: (i) better identification of production constraints and research needs, (ii) better targeting of prospective technologies, (iii) improved assessment of farmers' responses to new technologies, and (iv) wider adoption and larger impact of research outputs.

OBJECTIVES

The geographical distribution of sheeps in Haryana in terms of agro-ecological zones and crop-based agro-ecosystems would be studied with the following objectives:

- To determine the sheep distribution characteristics in Haryana with regard to the different agro-ecological zones.
- To determine the sheep distribution characteristics in Haryana with regard to the Crop based agro-ecosystems.

Table-1: Mean Rainfall and Mean Temperature for Different Climatic Regions

Climatic Region	Mean Rainfall (mm)	Mean Temperature (C)
Hot Arid Region	300-500	27
Hot Semi-Arid Region	500-700	26
Hot Sub Humid Region	700-1050	24

Sources: Authors Compilation

MATERIAL AND METHODS

Study Area

The study area included the entire state of Haryana extending over an area of 44,212 square km. from $27^0$39' N to $30^0$55'5" N latitudes and $74^0$27'8" E to $77^0$36'5"E longitudes.

Spatial Data

- Agro-ecozones of Haryana as per the Resource Atlas of Haryana (2004)
- Crop based agro-ecosystems of Haryana based on IRS-P6, LISS 3 data of the year 2007-08.
- Administrative boundary of Haryana up to Tehsil level.

Attribute Data

Database of the 18th Livestock census (2007) of Haryana (Department of Animal Husbandry & Dairying and Fisheries, Ministry of Agriculture, Govt. India)

Software

Arc Map 10
ERDAS Imagine 11.0
MS Office 2007

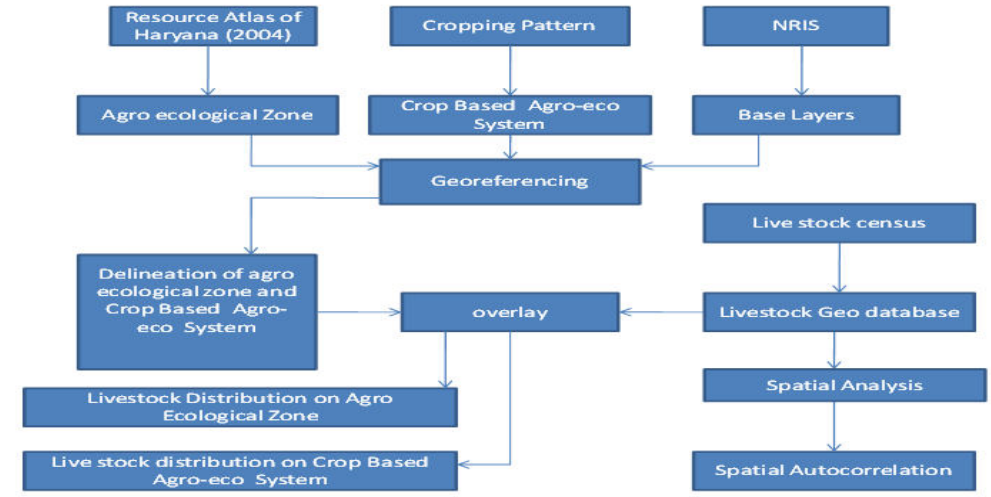
ENVIRONMENTAL CHARACTERIZATION OF LIVESTOCK DISTRIBUTION

GIS layers of agro-eco zones and crop-based agro-ecosystems were combined with the livestock distribution maps for environmental characterization of livestock distribution in Haryana. The flow chart of the methodology for the environmental characterization of livestock distribution is depicted in Figure 1.

Spatial Autocorrelation

Autocorrelation statistic i.e. Moran's I coefficient of autocorrelation was used to investigate spatial autocorrelations based on livestock density and Tehsil location to find out broad trends (dispersed, random or clustered) in the spatial distribution of livestock in Haryana.

Figure-1



Sources: Authors Compilation

CLASSIFICATION AND DENSITY MAPPING OF SHEEP SPECIES

Density mapping for sheep was accomplished using Jenk's Natural Breaks method (Jenk's 1967) and the number of classes was kept at three representing High, Medium and Low densities. The Jenks optimization method, also called the Jenks natural breaks classification method, it is a data classification method designed to determine the best arrangement of values into different classes. This is done by seeking to minimize each class's average deviation from the class mean, while maximizing each class's deviation from the means of the other groups. In other words, the method seeks to reduce the variance within classes and maximize the variance between classes (Jenks 1967).

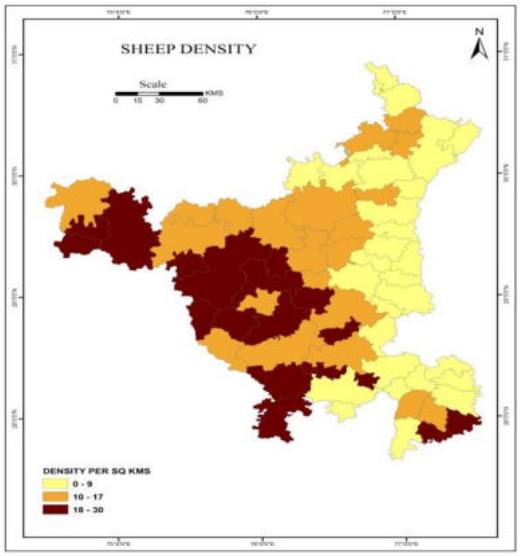
SPATIAL TRENDS IN THE DISTRIBUTION OF DOMESTIC ANIMALS IN HARYANA

The Global Moran's I statistic was used to measures spatial autocorrelation based on both Tehsil location and animal density values simultaneously. The z-score and p-value were used to evaluate the significance of Moran's-I statistic. The results of spatial autocorrelation in distribution of domestic animal populations based on Tehsil boundaries are depicted in Table 1.

RESULTS AND DISCUSSION

Sheep density in Haryana is low comparison of other animals. Range of density of sheep is 0 to 30 based on natural breaks method as shown in figure 2. High (18-30) density lies only four agro-ecological zones and only four Crop based agro-ecosystem zones; Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period. Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture and its 90-120 days growing season, third one is Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period and fourth is Aeolian plain, hot and dry, insignificant available moisture, <60 days growing period. Crop based agro-ecosystem zones are Rice / Wheat Cotton-Wheat, Bajra / Jawar / Guwar / Fallow-Wheat / Others and Bajra / Fallow-Mustard Show in table1. High density of sheep lays eighteen tehsil of southwestern Haryana.

Figure-2



Sources: Authors Compilation

Medium density of sheep lies in twenty-one tehsils show in table1. Its lie in all agro-ecological zones and four Crops based agro-ecosystem zones. Medium density lies in southern and western part of Haryana state. Low (0.-9) density of sheep is observe in all agro-ecosystems and 6 Agro-ecozones shows in figure-2 and table-1.

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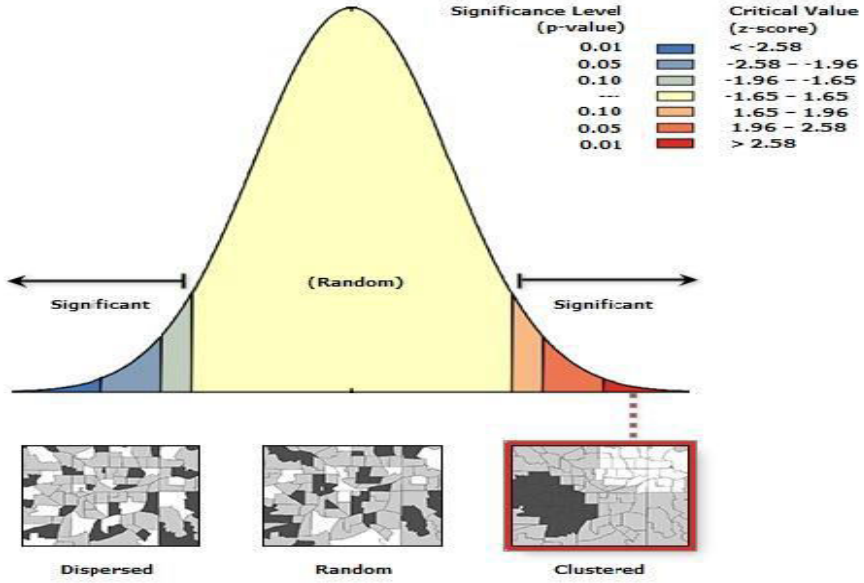
Spatial Autocorrelation Report of sheep Density

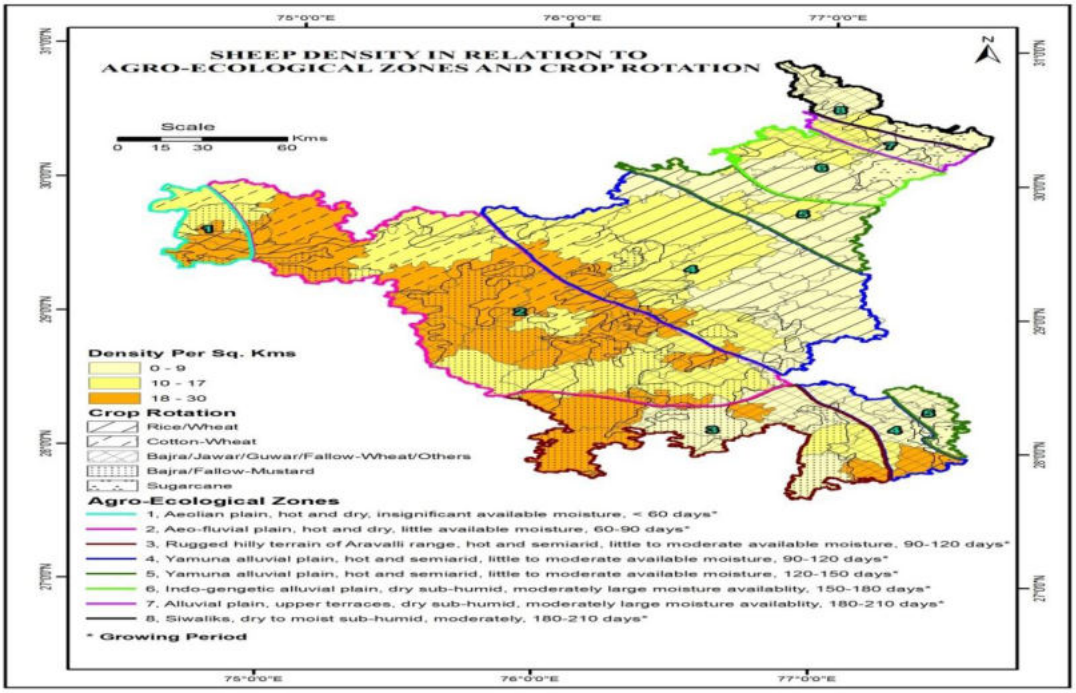
Moran's Index: 0.423462
z-score: 4.867928
P-value: 0.000001

Figure-3



Sources: Authors Compilation

Figure-4



Sources: Authors Compilation

Table-2: Sheep Density in Relation to Agro-Ecological Zones and Crop Based Agro-Ecosystem

Donkey Density (Per sq. Km)	Tehsil	Agro-Ecological Zones	Crop Based Agro-ecosystem
High (0.26 - 0.49)	Adampur, Beri, Bhiwani, Ellenabad, Hansi, Hisar, Hodal, Kosli, Maham, Mahendragarh, Narnaul, Narnaund, Pataudi, Punahana, Rania, Sirsa, Siwani, Tosham	• Aeolian plain, hot and dry, insignificant available moisture, < 60 days growing period. • Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. • Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period.	• Rice/Wheat • Cotten-Wheat • Bajra/Jwar/Guwar/Fallow-Wheat/Others • Bajra/Fallow-Mustard
Medium (0.10 - 0.25)	Ambala, Assandh, Barara, Bawani Khera, Dabwali, Dadri, Fatehabad, Hathin, Jhajjar, Jind, Julana, Kaithal, Loharu, Naraingarh, Narwana, Nilokheri, Nuh, Ratia, Rohtak, Safidon, Tohana	• Aeolian plain, hot and dry, insignificant available moisture, <60 days growing period. • Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. • Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. • Indo-gengetic alluvial plain, dry sub-humid, moderately large moisture availability, 150-180 days growing period. • Alluvial plain, upper terraces, dry sub-humid, moderately large moisture availability, 180-210 days growing period. • Siwaliks, dry to moist sub-humid, moderately, 180- 210 days growing period.	• Rice/Wheat • Cotton-Wheat • Bajra/Jwar/Guwar/Fallow-Wheat/Others • Bajra/Fallow-Mustard
Low (0 - 0.09)	Bahadurgarh, Ballabgarh, Bawal, Chhachhrauli, Faridabad, Ferozepur Jhirk, Ganaur, Gharaunda, Gohana, Guhla, Gurgaon, Indri, Israna, Jagadhri, Kalka, Karnal, Kharkhoda, Palwal, Panchkula, Panipat, Pehowa, Rewari, Samalkha, Shahbad, Sohna, Sonipat, Taoru, Thanesar	• Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. • Rugged hilly terrain of Aravalli range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period. • Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. • Alluvial plain, upper terraces, dry sub-humid, moderately large moisture availability, 180-210 days growing period. • Siwaliks, dry to moist sub-humid, moderately, 180-210 days growing period.	• Rice/Wheat • Cotten-Wheat • Bajra/Jwar/Guwar/Fallow-Wheat/Others • Bajra/Fallow-Mustard • Sugarcane

Sources: Authors Compilation

CONCLUSION

The geographical distribution of livestock resources in Haryana in terms of agro-ecological zones and crop-based agro-ecosystems were studied to determine the distribution characteristics of sheep in Haryana with regard to the different agro ecological zones. The livestock data from 18th Livestock census of Haryana 2007 (Department of Animal Husbandry & Dairying and Fisheries, Ministry of Agriculture, Govt. India) was used to create Haryana Livestock Geodatabase having Tehsil wise population of sheep. This livestock geodatabase is a ready source of livestock census in relation to the map of Haryana where queries related to livestock populations at district and Tehsil level can be answered. The broad spatial distribution trends of the different livestock species in Haryana using Tehsil as the areal unit were identified and livestock distribution maps for each species were created

using Jenk's Natural Breaks method with three classes representing High, Medium and Low densities. Moran's I Statistic investigated if the spatial distribution of various domestic animal species and breeds in Haryana, was clustered, random or dispersed. The Global Moran's I statistic was used to measures spatial autocorrelation based on both Tehsil locations and animal density values simultaneously. The z-score and p-value were used to evaluate the significance of Moran's I statistic. The Moran's I statistic revealed that the distribution of all the animal species studied was clustered except indigenous female cattle which were found randomly distributed. Clustered distribution of all animal species was highly significant (p = 0.000019, Z score = 4.281135). Heterogeneity in livestock distribution was analyzed in relation to the five major cropping patterns representing crop-based agro-ecosystems and the eight agro-ecological zones of Haryana based on soil, physiography, bio-climate and length of growing period. The five major crop rotations were Rice / Wheat, Cotton-Wheat, Bajra / Jawar / Guwar / Fallow-Wheat / Others, Bajra/Fallow-Mustard and Sugarcane. Sheep population is spatially clustered in drier western and southern Haryana characterized by Bajra / Jawar / Guwar / Fallow-Wheat/Others, Bajra/Fallow-Mustard or Cotton-Wheat. This area is characterized by hot and dry aeo-fluvial plains with mainly Bajra/Mustard and Cotton-Wheat crop rotation.

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SPATIAL ANALYSIS OF FEMALE BUFFALO DISTRIBUTION IN HARYANA

Vikash Sharma[56] Mona Yadav[57] Savit Pal[58] Mohit Kumar[59] Sandeep Verma[60] Bhanu Pratap Singh[61]

ABSTRACT

Haryana has a large buffalo's population of 59.53 lakh (8th livestock census, 2007) In this study the Female buffalo species is analysed, Moran's I coefficient of autocorrelation was used to investigate the spatial distribution of female buffaloes to analyses clustering of the population in Haryana using Tehsil as a real unit. Female buffalo census data was used to link the heterogeneity in the female buffalo distribution with regard to agro-ecosystems and other environmental factors related to agro-ecological zones in the state of Haryana. Female Buffalo density is high observed in whole of Haryana Moran's I statistic revealed that the distribution of Buffaloes was clustered. The distribution of the Buffaloes was characterized in terms of agro-ecosystem prevalent in the area. This ecosystem approach to characterize livestock distribution is useful in livestock production systems research planning.

KEYWORDS

Buffalo Species, Spatial Analysis, Agro-Ecological Zone, GIS, Livestock Censes etc.

INTRODUCTION

The state of Haryana has a geographical area of 44.20 lakh hectare. About 86% of the geographical area is cultivable, of which 96% has already been brought under plough. Therefore, there is hardly any scope for bringing additional area under cultivation, except for reclamation of degraded lands affected by water logging, salinity and alkalinity. While crop production has reached at a plateau, livestock production is still growing. Animal husbandry has been taken up as an integral component of diversified agriculture. Haryana has a large female buffalo 59.53 lakh population (18th livestock census, 2007). Livestock production systems are determined by factors such as ecological zones, livestock species, desired products, functions, management, markets and government policy (Ruthenberg1980; Simpson 1988). Livestock resources of a region are decided mainly by those factors, which determine overall ecological setting for feeding, breeding and rearing of appropriate livestock species for the region. These decisions with respect to choice of livestock and cropping systems are further influenced by several other factors related to infrastructure facilities, socio-economic factors and technological developments. As described by Saxena et al. (2001) these factors include: Infrastructure facilities like animal housing, water availability, feed and fodder availability, transport, trade and marketing, animal products handling, processing and marketing etc.; socio-economic factors like social acceptance for a particular livestock species, financial resource base, land ownership, size and type of land holding, household needs of food, animal products, fuel, fiber and finance, labor availability etc. and technological factors like improved breeds of animals, fodder and crop varieties, mechanization, disease protection, access to veterinary care, access to information etc. Under influence of all above factors, livestock resources remain dynamic in time and space, making it difficult to precisely determine their spread using conventional methods, over a large territory. A geodatabase of livestock in relation to the crop rotation and agro-ecological zones is an essential tool for animal husbandry planning and management.

Agro-Ecological Zones

Haryana is an agrarian State wherein about 85 per cent of its area is under cultivation and engaging about 78 per cent of its population in agriculture. The climate of the State ranges from dry sub humid to hot arid. The annual rainfall varies from less than 300 mm in the southwestern parts to over 1000 mm in the hilly tracts of the Siwalik. Major parts of the State falls under the most fertile tract of indo-Gangetic alluvial plain. Soil temperature regime is Hyperthermic and the soil moisture regimes are ustic and Aridic. The State has 3 main climatic regions having average annual rainfall and air temperature as under: An ecosystem is a homogenous geographical area. The production environment of the region in terms of agro-climate, resource endowments and socioeconomic conditions is homogenous, and majority of the farmers have similar production constraints and research needs.

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[59] Project Fellow (Haryana Space Applications Centre) Education, M. Tech., Geo-Informatics, Haryana, India, mohitkumar960@gmail.com
[60]Research Officer (DM), Haryana, India, sandeepverma2286@gmail.com
[61]Senior GIS Executive, Ramtech Software Solutions Private Limited, Noida, India, kanwarbhanu@gmail.com

Specific advantages of ecosystem approach for research planning (Saxena et al.2001) are: (i) better identification of production constraints and research needs, (ii) better targeting of prospective technologies, (iii) improved assessment of farmers' responses to new technologies, and (iv) wider adoption and larger impact of research outputs.

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- To determine the female buffalo distribution characteristics in Haryana with regard to the Crop based agro-ecosystems.

Table-1: Mean Rainfall and Mean Temperature for Different Climatic Regions

Climatic Region	Mean Rainfall (mm)	Mean Temperature (C)
Hot Arid Region	300-500	27
Hot Semi-Arid Region	500-700	26
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Sources: Authors Compilation

MATERIAL AND METHODS

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The study area included the entire state of Haryana extending over an area of 44,212 square km. from $27^0$39' N to $30^0$55'5" N latitudes and $74^0$27'8" E to $77^0$36'5"E longitudes.

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GIS layers of agro-eco zones and crop-based agro-ecosystems were combined with the livestock distribution maps for environmental characterization of livestock distribution in Haryana. The flow chart of the methodology for the environmental characterization of livestock distribution is depicted in Figure 1.

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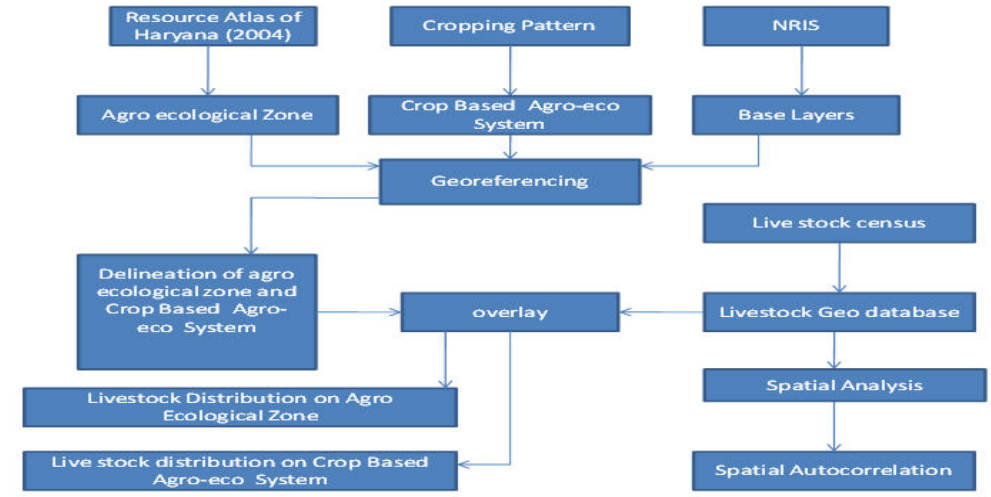
Autocorrelation statistic i.e. Moran's I coefficient of autocorrelation was used to investigate spatial autocorrelations based on livestock density and Tehsil location to find out broad trends (dispersed, random or clustered) in the spatial distribution of livestock in Haryana.

Figure-1



Sources: Authors Compilation

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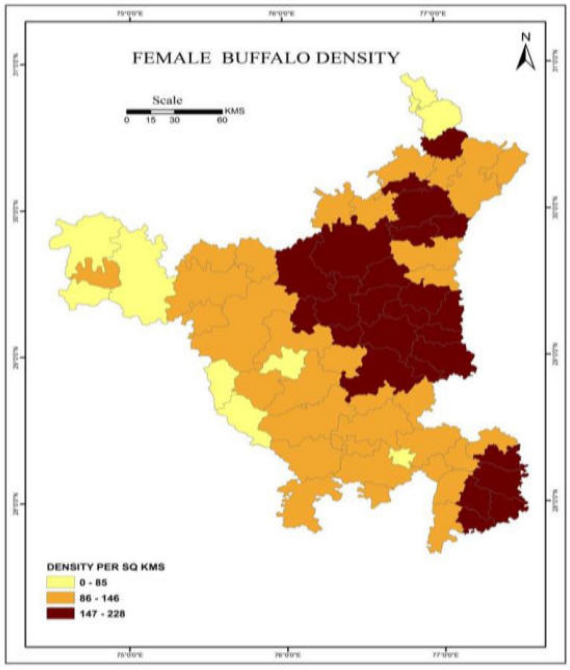
SPATIAL TRENDS IN THE DISTRIBUTION OF DOMESTIC ANIMALS IN HARYANA

The Global Moran's I statistic was used to measures spatial autocorrelation based on both Tehsil locations and animal density values simultaneously. The z-score and p-value were used to evaluate the significance of Moran's I statistic. The results of spatial autocorrelation in distribution of domestic animal populations based on Tehsil boundaries are depicted in Table 1.

RESULTS AND DISCUSSION

Female buffalo's density in Haryana is high comparison of other animals. Range of density of female buffalo is 0 to 228 based on natural breaks method as shown in figure 2. High (147-228) density lies in five agro-ecological zones and all Crop based Agro-ecosystem zones; Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period and Rugged hilly terrain of Aravalli range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. Crop based agro-ecosystem zones are Rice/Wheat, Bajra/Jawar/Guwar/Fallow-Wheat/Others and Bajra/Fallow-Mustard Show in table2. High density of female buffalo lies only eleven tehsil (Israna, Jind, Kaithal, Safidon, Samalkha, Ganaur, Palwal, Hodal, Pataudi, Ballabgarh, Punahana) of Haryana. Medium density of female buffalo lies in all agro-ecological zones and all crops based agro-ecosystem zones. Medium density lies in all part except central part of Haryana state. Low (0.-85) density of female buffalo is observe in four agro-ecosystems and all Agro-ecozones shows in figure-2 and table-2.

Figure-2



Sources: Authors Compilation

Table-2: Female Buffalo Density in Relation to Agro-Ecological Zones and Crop Based Agro-Ecosystem

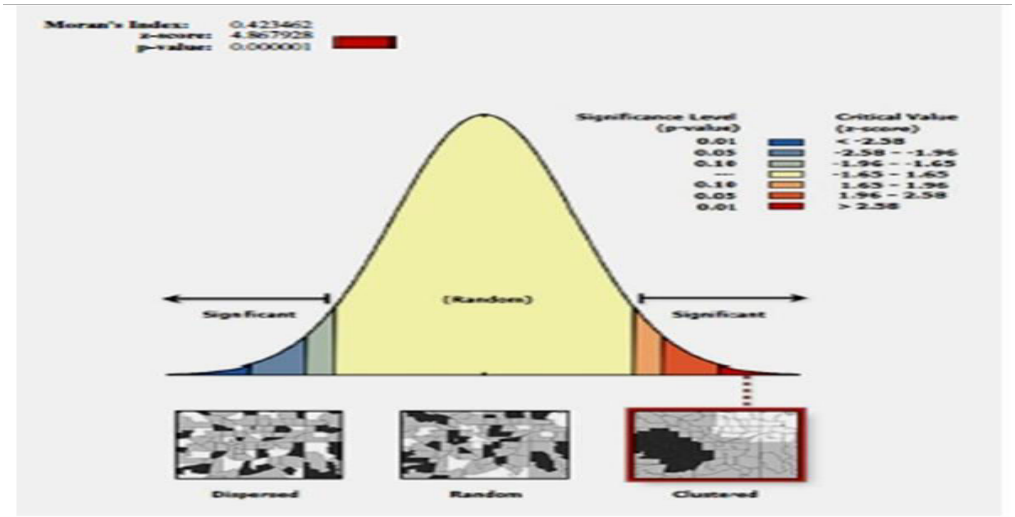
Female Buffalo Density (Per sq. Km)	Tehsil	Agro-ecological zones	Crop based agro-ecosystem
High (147-228)	Israna, Jind, Kaithal, Safidon, Samalkha, Ganaur, Palwal, Hodal, Pataudi, Ballabgarh, Punahana	4. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 daysgrowing period. 5. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. 6. Indo-gengetic alluvial plain, dry sub-humid, moderately large moisture availability, 150-180 days growing period. 7. Alluvial plain, upper terraces, dry sub-humid, moderately large moisture availability, 180-210 daysgrowing period. 8. Siwalik, dry to moist sub-humid, moderately, 180-210 days growing period.	Rice/Wheat Cotton-Wheat Bajra/Jawar/Guwar/ Fallow-Wheat/Others Bajra/Fallow-Mustard Sugarcane
Medium (86 - 147)	Narnnaul, Bawal, Taour, Nuh, Hathin, Ferozepur jhirka, Faridabad,Dadri, Beri, Rohtak, Kharkhoda, Sonipat, Maham, Gohana, Hansi, Julana, Narnaund, Panipat, Narwana, Assandh,Gharaunda,Tohana, Karnal, Nilokheri, Indri,Guhla,Thanesar,Sahabad, Barar, Jagadhari, Ambala, , Naraingarh	1. Aeolian plain, hot and dry, insignificant available moisture, < 60 days growing period. 2. Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. 3. Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. 4. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period. 5. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. 6. Indo-gengetic alluvial plain, dry sub-humid, moderately large moisture availability, 150-180 days growing period. 7. Alluvial plain, upper terraces, dry sub-humid, moderately large moisture availability, 180-210 days growing period. 8. Siwaliks, dry to moist sub-humid, moderately, 180-210 days growing period.	Rice/Wheat Cotton-Wheat Bajra/Jawar/Guwar/ Fallow-Wheat/ Others Bajra/Fallow-Mustard Sugarcane
Low (0-85)	Chhachhrauli,Kalka, Panchkula, Ratia, Fathebad, Hisar, Adampur, Dabwali, Rania, Ellenabad, Siwani, Tosham, Bawani Khera, Bhiwani, Loharu, Jhajjar, Gurgaon, Bahadurgarh, Kosli, Sohna, Rewari, Mahendragarh	1. Aeolian plain, hot and dry, insignificant available moisture, < 60 days. 2. Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. 3. Rugged hilly terrain of Aravalli range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. 8. Siwaliks, dry to moist sub-humid, moderately, 180-210 days growing period.	Rice/Wheat Cotten-Wheat Bajra/Jawar/Guwar/ Fallow-Wheat/Others Bajra/Fallow-Mustard Sugarcane

Sources: Authors Compilation

Spatial Autocorrelation Report of female buffalo Density

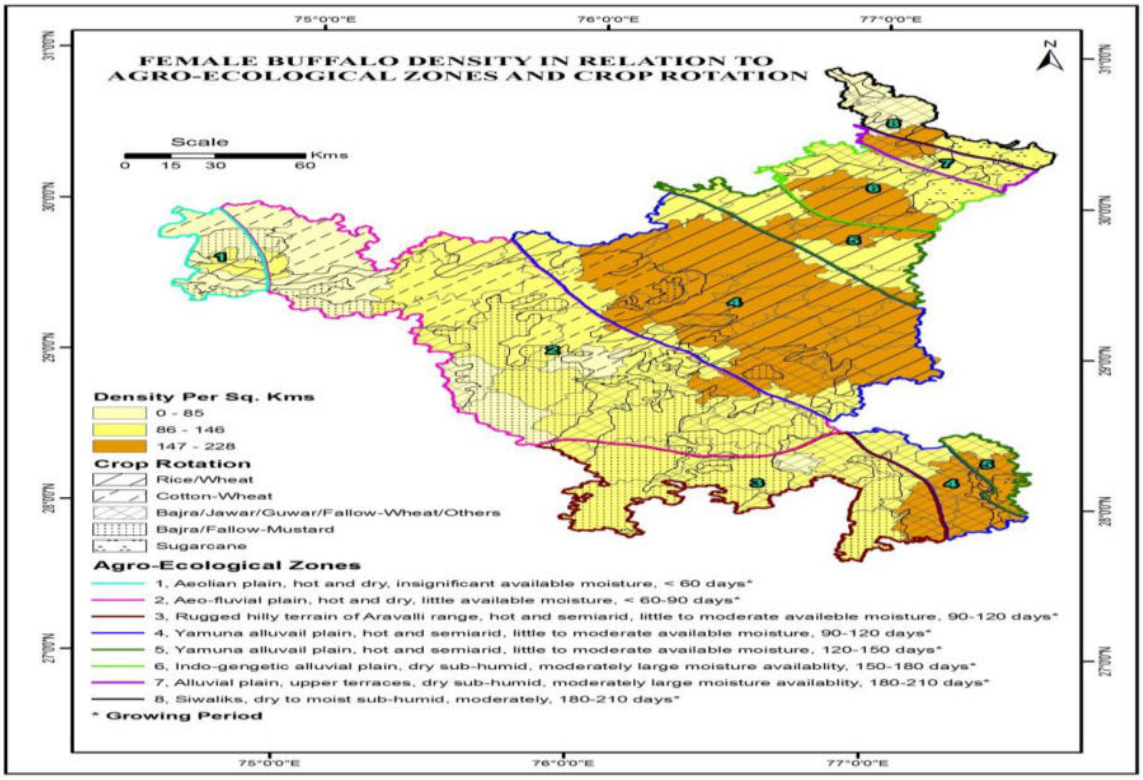
Moran's Index: 0.515906
z-score: 5.934603
P-value: 0

Figure-3



Sources: Authors Compilation

Figure-4



Sources: Authors Compilation

CONCLUSION

The geographical distribution of livestock resources in Haryana in terms of agro-ecological zones and crop-based agro-ecosystems were studied to determine the distribution characteristics of female buffalo in Haryana with regard to the different agro ecological zones. The livestock data from 18th Livestock census of Haryana 2007 (Department of Animal Husbandry & Dairying and Fisheries, Ministry of Agriculture, Government of India) was used to create Haryana Livestock Geodatabase having Tehsil wise population of female buffalo. This livestock geodatabase is a ready source of livestock census in relation to the map of Haryana where queries related to livestock populations at district and Tehsil level can be answered. The broad spatial distribution trends of the different livestock species in Haryana using Tehsil as the areal unit were identified and livestock distribution maps for each species were created using Jenk's Natural Breaks method with three classes representing High, Medium and Low densities. Moran's I Statistic investigated if the spatial distribution of various domestic animal species and breeds in Haryana, was clustered, random or dispersed. The Global Moran's I statistic was used to measures spatial autocorrelation based on both Tehsil locations and animal density values simultaneously. The z-score and p-value were used to evaluate the significance of Moran's I statistic. The Moran's I statistic revealed that the distribution of all the animal species studied was clustered except indigenous female cattle which were found randomly distributed. Clustered distribution of all animal species was highly significant (p = 0.000019, Z score = 4.281135). Heterogeneity in livestock distribution was analyzed in relation to the five major cropping patterns representing crop-based agro-ecosystems and the eight agro-ecological zones of Haryana based on soil, physiography, bio-climate and length of growing period. The five major crop rotations were Rice / Wheat, Cotton- Wheat, Bajra / Jawar / Guwar / Fallow-Wheat / Others, Bajra / Fallow-Mustard and Sugarcane. Female buffalo population is spatially clustered in central Haryana characterized by Bajra / Jawar / Guwar / Fallow-Wheat / Others, Bajra / Fallow-Mustard. This area is characterized by hot and dry aeo-fluvial plains with mainly Bajra/Mustard and Cotton-Wheat crop rotation. Female Buffalo density is high in whole of Haryana.

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BROADBAND SUBSTRATE INTEGRATED WAVEGUIDE CAVITY BACKED DUMBBELL SLOT ANTENNA FOR TRIPLE FREQUENCY APPLICATIONS

Nida Nasir[62]

ABSTRACT

A novel design technique for broadband substrate integrated waveguide (SIW) cavity backed slot antenna is presented in this paper operating in X and Ku Band for satellite and terrestrial networks communications applications. The proposed antenna replaces a conventional narrow rectangular slot with dumbbell slot and is excited by a simple grounded coplanar waveguide (GCPW) feeding technique. This design is retaining the advantages of unidirectional radiation pattern of conventional cavity backed antenna. The proposed antenna shows uniform gain versus frequency characteristics within the range of 7.2-4.8 dB, the broadband response of 0.47-2.6GHz and a unidirectional radiation pattern for the full operating bandwidth.

KEYWORDS

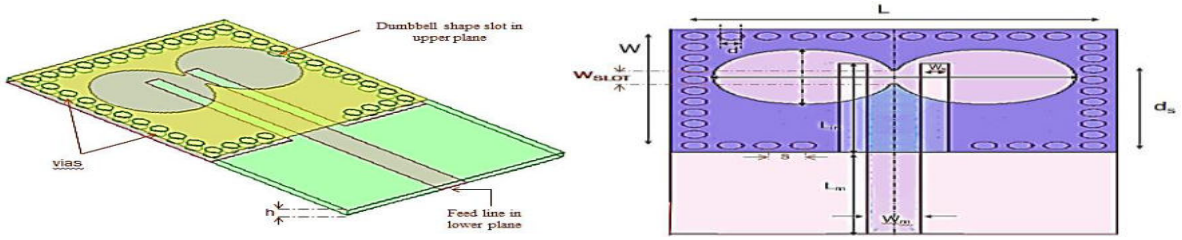
Broadband Antenna, Cavity Backed Antenna, Slot Antenna, Substrate Integrated Waveguide etc.

INTRODUCTION

In recent times, a relatively new technology has emerged known as substrate integrated waveguide (SIW), which incorporates non-planar waveguide structures in a planar substrate by the use of rows of metallic vias that implements the sidewall of the waveguide-based circuits in planar substrates [1]. Researches on designing multi-frequency planar antenna have drawn significant attention to meet the requirement of modern wireless communication system. The slot antennas have been used as one of the most suitable candidates for designing multi-frequency antennas due to its several advantages e.g. low profile, conformability, good isolation from feeding network, easy integration to other planar circuits etc. [2]. Numbers of slots for antenna designs have been proposed in recent years, which show multi-band operation [3], [4], [5]. Several designs of SIW cavity backed slot antenna exhibiting circular polarization, dual polarization have been reported [6], [7]. Attempts has been made to improve the bandwidth performance of the antenna by incorporating shorting pin, removing dielectric substrate, exciting hybrid modes etc. [8], [9], [10]. However, very few efforts have been found so far to implement SIW cavity-backed multi-frequency slot antenna with high gain, high FTBR performance. Design of SIW cavity-backed dual-frequency dual-polarized antenna with crossed slot structure [13], dual band SIW antenna [14], [15] is reported. In [16], design of self -biased and self-oscillating mixing receiver using meta-material based dual band antenna for transponder application is reported. In this research paper, a study on a dumbbell-shaped slot backed by an SIW cavity is presented. The proposed antenna exhibits a broadband response up to 2.6 GHz bandwidth with a high gain and a unidirectional radiation pattern. The placement of the dumbbell shaped slot helps to get a wider bandwidth response. The technique also replaces a complex feeding mechanism with GCPW type feeding technique to simplify the design. The fabricated antenna shows uniform gain over the operating bandwidth while maintaining its planar form.

DESIGN PROCEDURE

The geometry of proposed antenna is shown in Fig. 1. The dumbbell shaped slot is etched at the top metallic plate and placed at a distance of "d_s" from one sidewall of the cavity. The SIW cavity is constructed in a single substrate by four rows of metallic vias implementing four sidewalls of the cavity. The diameter (d) and pitch (s) of the via hole can be adjusted while maintaining the condition $d/s \geq 0.5$ and $d/\lambda_0 \leq 0.1$ to ensure minimum leakage of energy. The material of proposed design is Rogers RT Duroid 5880 whose relative permittivity is 2.2 and dielectric loss tangent is 0.0009.



(a) (b)

Figure-1: Geometry of the proposed design (a) 3D-view (b) L=19.8mm, W=18mm, d=1mm, s=1.6mm, L_{slot}=17.2mm, W_{slot}=8mm, ds=11mm, L_{IN}=13, L_M=12, W_M=2.4mm, W_S=1.2mm

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(A)The design specifications of microstrip Patch antenna are as follows:

2.1 Calculation of width (W) of patch

The width of the microstrip patch antenna is given by:

$$W = \frac{1}{2f_r\sqrt{\mu_0\varepsilon_0}}\sqrt{\frac{2}{\varepsilon_r+1}} = \frac{c}{2f_r}\sqrt{\frac{2}{\varepsilon_r+1}} \quad (1)$$

Where, c=free space velocity of light, ε_r=dielectric constant of substrate, f = operating frequency (10.6 GHz), μ_0=permeability of free space (4π x 10^{-7} Henry per meter), ε_0=permittivity of free space (8.85 x 10^{-12} Farads per meter)

2.2 Height of the substrate (h)

$$h \le \frac{0.3c}{2\pi f\sqrt{\varepsilon_r}} \quad (2)$$

2.3 Effective dielectric constant

$$\varepsilon_{eff} = \frac{\varepsilon_r+1}{2} + \frac{\varepsilon_r-1}{2}\left(\frac{1}{\sqrt{1+\frac{12h}{W}}}\right) \quad (3)$$

2.4 Calculation of length extension (ΔL)

$$\frac{\Delta L}{h} = \frac{(\varepsilon_{eff}+0.3)\left(\frac{w}{h}+0.264\right)}{(\varepsilon_{eff}-0.258)\left(\frac{w}{h}+0.8\right)} \quad (4)$$

2.5 Actual length of the patch (L)

$$L = L_{eff} - 2\Delta L \quad (5)$$

Where,

$$L_{eff} = \frac{c}{2f_r\sqrt{\varepsilon_{eff}}} \quad (6)$$

2.6 Substrate length (L_S) and substrate width (W_S)

$$L_S = 6h + L \quad (7)$$

$$W_S = 6h + W \quad (8)$$

(B) The design specifications of dumbbell having two circular slots are as follows:

2.7 Circular slot Radius

$$a = \frac{F}{\left\{1+\frac{2h}{\pi\varepsilon_r F}\left(\ln\left[\frac{\pi F}{2h}\right]+1.7726\right)\right\}^{\frac{1}{2}}} \quad (9)$$

where,

$$F = \frac{8.791\times10^9}{f_r\sqrt{\varepsilon_r}} \quad (10)$$

2.8 Effective Radius

By taking fringing effect into consideration which makes the slot electrically larger, the effective radius is used and is given by

$$a_e = a\left\{1+\frac{2h}{\pi\varepsilon_r a}\left(\ln\left[\frac{\pi a}{2h}\right]+1.7726\right)\right\}^{\frac{1}{2}} \quad (11)$$

The size of the proposed antenna is 30 mm*19.8 mm*0.6 mm. The design is proposed here is modeled in HFSS 14.0 which is FEM (Finite Element Method) based simulator. The size of the proposed antenna is 30 mm*19.8 mm*0.6 mm.

RESULTS ANALYSIS

The antenna is designed using FEM simulator named High Frequency Structure Simulator software (HFSS 14) and the simulated results are presented in this section.

a) ***Gain***

The gain G (θ,φ) of an antenna in a given direction takes efficiency into account by being defined as the ratio of its radiation intensity U (θ,φ) in that direction to the mean radiation intensity of a perfectly efficient antenna. Since the latter equals $P_{in}/4\pi$, it is therefore given by

$$G(\theta,\varphi)= \frac{U(\theta,\varphi)}{Pin/4\pi} \qquad (12)$$

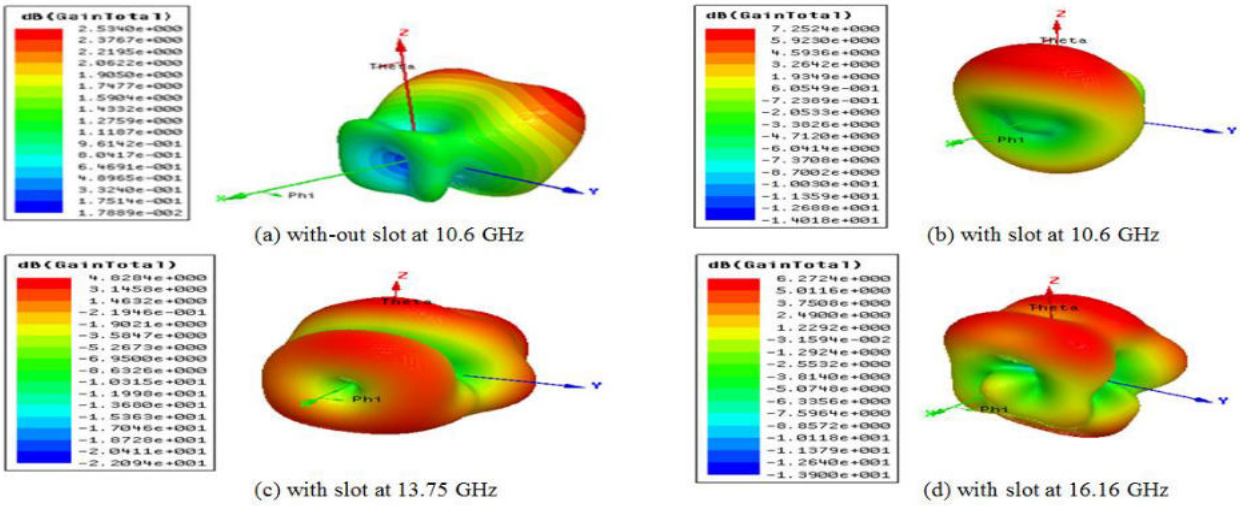


Figure-2: Gain polar plot of the without-slot and proposed antennas.

b) Return Loss (S_{11})

The reflection coefficient (S_{11}) graph with respect to frequency is plotted in Fig.3 having 3 different reverse peak value at 10.6 GHz, 13.75 GHz and16.16 GHz. The value of S_{11} remain below -10dB for this antenna by which the bandwidth of the proposed antenna can be calculated.

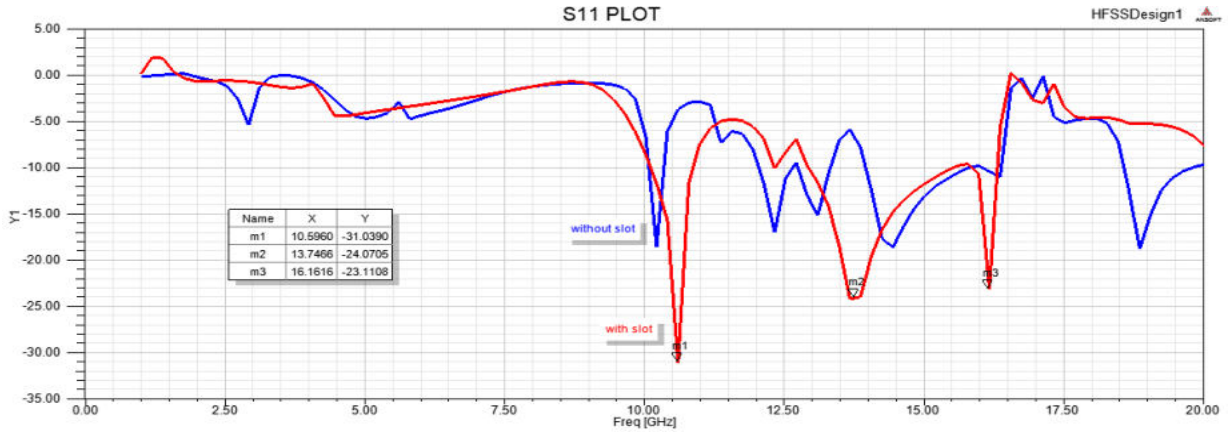


Figure-3: Return Loss magnitude Plot of the with slot and without slot antennas

c) VSWR

Voltage standing wave ratio (VSWR) is a parameter that measures the matching between an antenna and a transmission line. Essentially, it states the power that an antenna will get from a transmission line, in order to be able to radiate as much as possible of that received power. Usually, VSWR is calculated as the ratio of the maximum amplitude to the minimum amplitude of the voltage of a standing wave. It comes as:

$$VSWR = \frac{V_{MAX}}{V_{MIN}} = \frac{1+|\Gamma|}{1-|\Gamma|} = \frac{1+S_{11}}{1-S_{11}} \qquad (13)$$

Where:
V_{MAX} = Maximum amplitude of the voltage of a standing wave in volts (V)
V_{MIN} = Minimum amplitude of the voltage of a standing wave in volts (V)
$|\Gamma|$ = Magnitude of the reflection coefficient, its value is always *less than equal to* 1
$|S_{11}|$= Magnitude of the input reflection coefficient

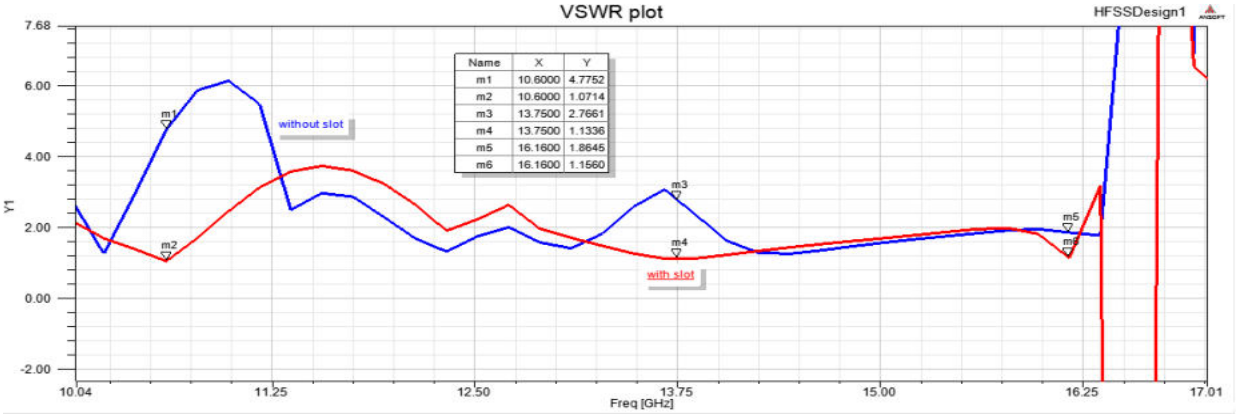
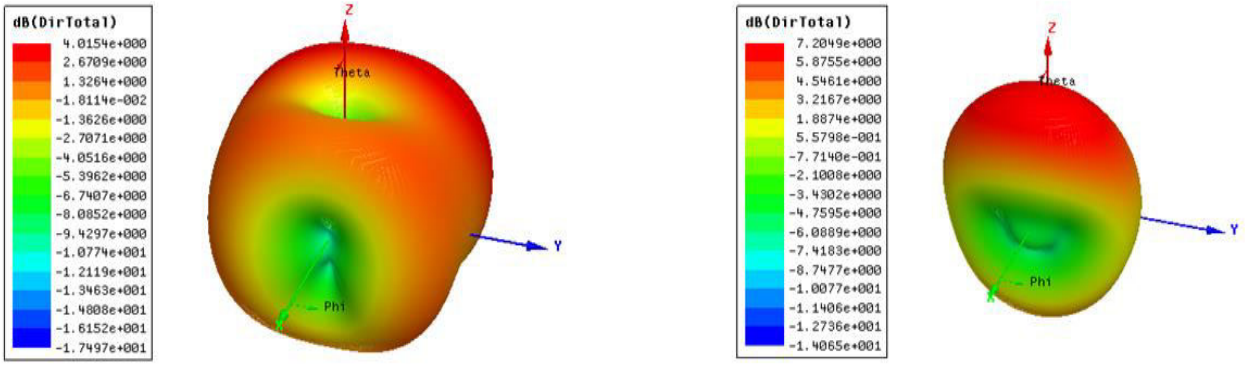


Figure-4: Voltage Standing Wave Ratio of the with slot and without slot antennas

d) Directivity

The directivity, D, of an antenna is the maximum value of its directive gain D (θ,ϕ), and the ratio of the radiation intensity (power per unit solid angle) U (θ,ϕ) to its mean radiation intensity U.

$$D(\theta, \phi) = \frac{U(\theta,\phi),}{U} \qquad (14)$$



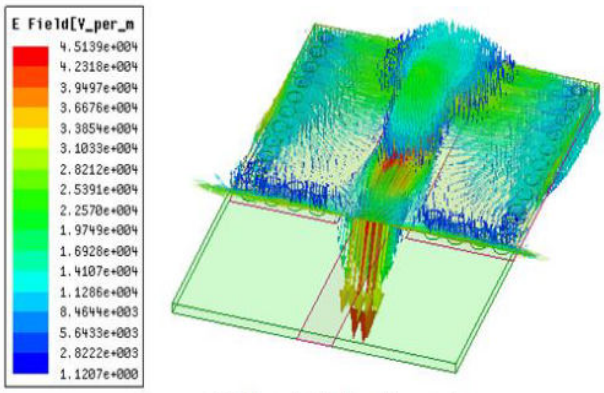
(a) (b)

Figure-5: Directivity plot of the antenna (a) without slot, (b) with slot

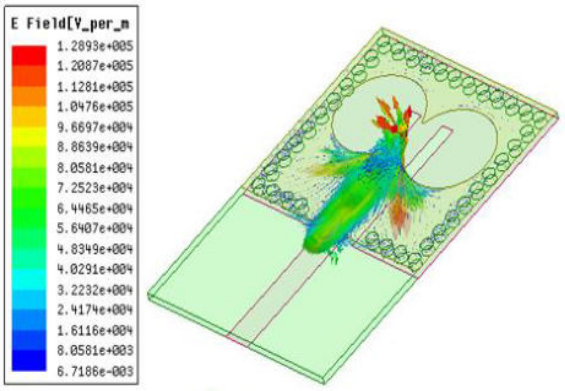
e) Electric field and Surface Current Density

The current distribution must be zero at the ends of the patch as current cant flow off the patch of microstrip antenna. The surface current density of the upper patch in terms of Ampere/meter is shown here. The electric field distribution here represents the orientation of radaition of signals from antenna. This direction of electric field shown here are responsible for the propagation of electric field from the antenna. The electric field at a point in space is a measure of how strong the force would be on a unit point charge hence measure in Volts/meter. A stronger E-Field incident upon an antenna will induce a larger voltage difference across the antenna terminals.

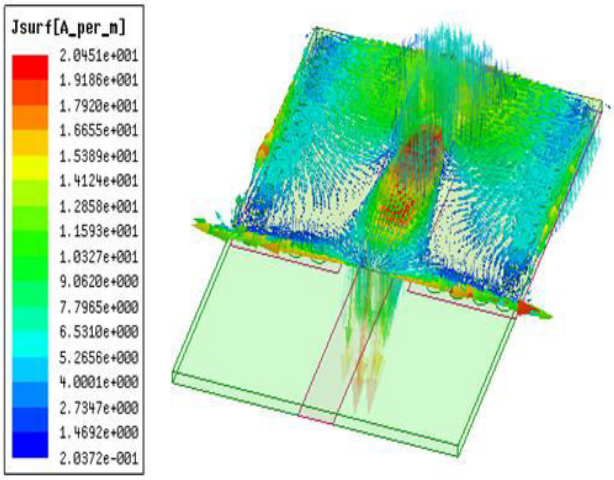
$$V = -\oint E \, . \, dl \tag{15}$$



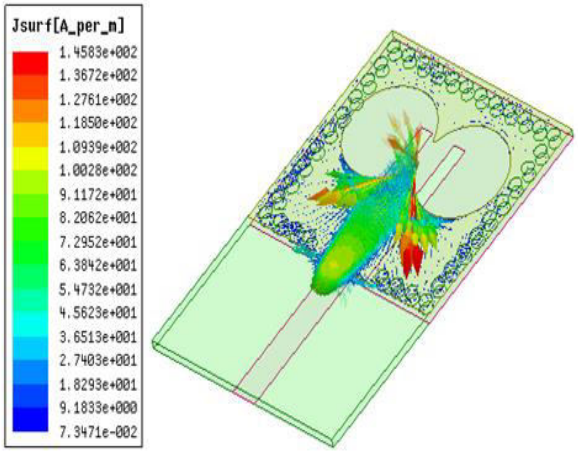
(a) Electric Field with-out slot



(b) Electric Field with slot



(c) Surface Current Density with-out slot



(d) Surface Current Density with slot

Figure-6: Electric Field and Current distribution with slot and without slot antennas

(f) Polarization

The electric field or "E" plane determines the polarization or orientation of the radio wave. A circular polarized wave radiates energy in both the horizontal and vertical planes and all planes in between. If the rotation is clockwise looking in the direction of propagation, the sense is called right-hand-circular (RHC). If the rotation is counterclockwise, the sense is called left-hand circular (LHC). Due to the advanced signal propagation properties, circularly polarized antenna technology offers numerous performance advantages over traditional linear technologies. It allows for more radio channels in the same frequency without interference. If the axial ratio is near 0 dB, the antenna is said to be circular polarized.

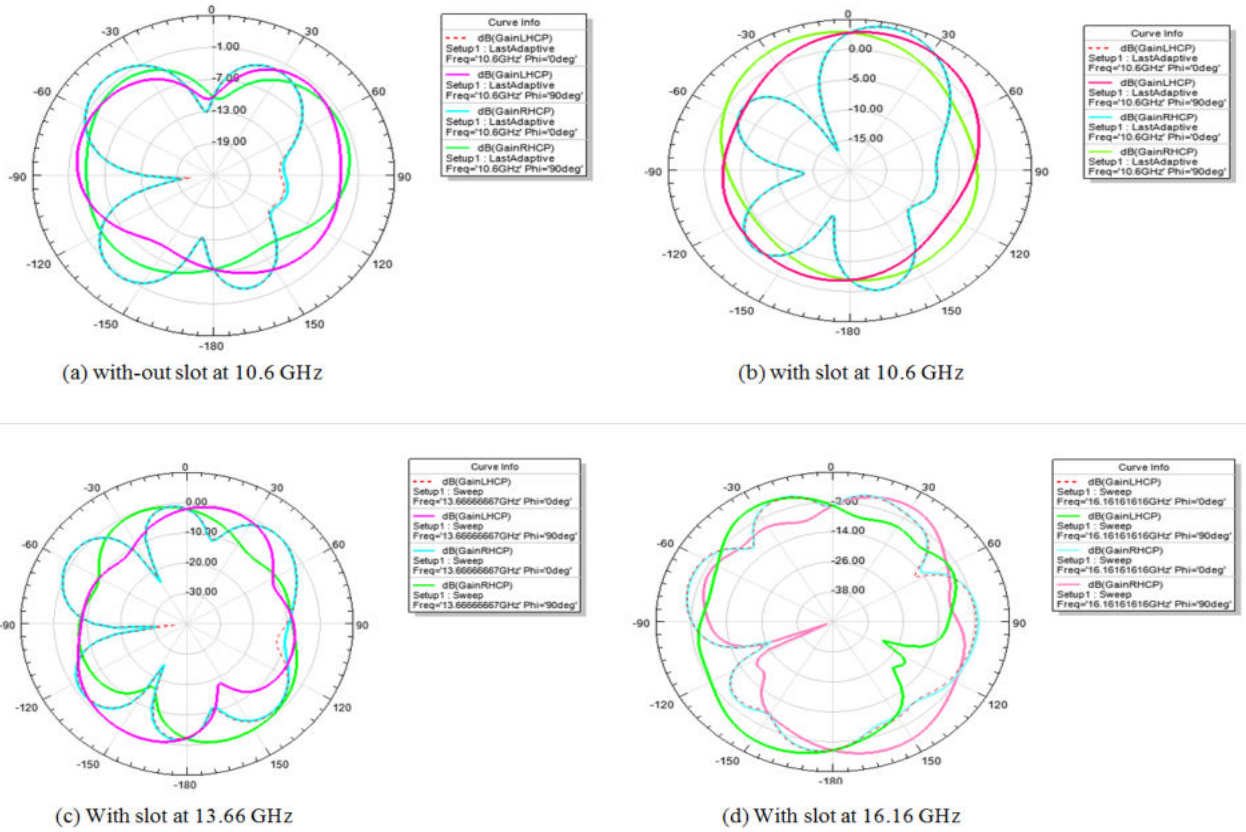


Figure-7: Polarization Radiation Pattern of the Antennas

The other vital results of the proposed antenna is also discussed in comparison with without slot antenna and among its three frequencies in the following tables

Table-I: Comparison between proposed antenna with with-out slot antenna at 10.6 GHz

Parameters	With-out slot at 10.6GHz	With-slot at 10.6GHz
Directivity(dB)	4.015	7.25
Electric Field (Volt per meter)	$4.514x10^4$	$1.29x10^5$
Surface Current Density (Ampere per meter)	20.451	145.83

Table-II: Comparison among the three application frequencies of the proposed antenna

Parameters	10.6GHz (X-Band)	13.66GHz (Ku-Band)	16.16GHz (Ku-Band)
Gain(dB)	7.25	4.82	6.272
FTBR	40.29	3.04	6.468
Bandwidth(GHz)	0.5147	2.6	0.47
VSWR	1.071	1.133	1.156
Return Loss	31.039	24.070	23.110

By analysing all the results of the broadband substrate integrated waveguide cavity backed dumbell slot antenna it is evident with the return loss, gain,VSWR and bandwidth that this antenna is suitable for triple frequency applications at 10.6 GHz, 13.75GHz and 16.16GHz which are the desired frequencies for satellite communication and RADARs. X band primarily used by the military. Used in radar applications including continuous-wave, pulsed, single-polarization, dual- polarization, synthetic aperture radar and phased arrays while Ku band is used for fixed satellite services(FSS) from earth to satellite at 13.75 GHz and 16.16GHz is suitable for direct broadcast satellite services(BSS) that is satellite to earth.

CONCLUSION

A broadband substrate integrated cavity backed dumbbell slot antenna is presented in this paper. The conventional narrow rectangular slot is replaced here by a dumbbell shaped slot and is excited by a simple GCPW feeding technique. The dumbbell

shape of slot leads to broadband response of up to 2.6 GHz that is much higher than that of the conventional SIW cavity backed slot antenna. This design holds the advantages of unidirectional radiation pattern of conventional cavity backed antenna. The proposed antenna shows uniform gain versus frequency characteristics within the range of 7.25-4.82 dB and a unidirectional radiation pattern over the operating bandwidth, which makes it suitable for many practical applications such as RADARs, Terrestrial network communications and satellite communications.

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DESIGNING THE HIGH LEVEL APPROACH FOR DEVELOPING IMPACT ANALYSIS PROCESS: A CASE STUDY

Dr. Lakshmi Vishnu Murthy Tunuguntla[63]

1. CONTEXT

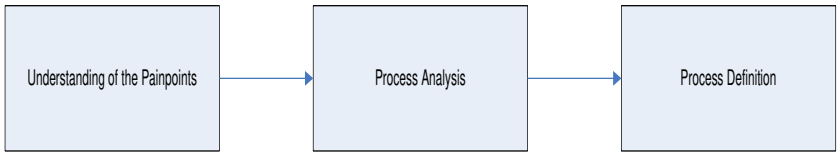
The purpose of this case is to describe the design and implementation of a method for performing the impact analysis because of changes to functionalities. The organization is the IT supporting arm of a global organization dealing in oil and gas that has global operations and vendors supporting IT from multiple continents operating in different time zones. One of the functions of the IT organization is to maintain the current functionality and modify/add new functionality whenever it is needed. The IT organization is offshoring the work and there are multiple vendors involved in the process. So whenever the new requirements come in, often times multiple vendors are involved and there is no consistent way of getting the details of impact analysis from different vendors as each vendor is at a specific level of maturity from CMMI perspective. Therefore, the challenge is to design a specific process to handle the changes and how to complete the impact analysis. This case focuses on the approach and steps involved in the process, benchmark for comparing the process developed and the instrument used to develop the process.

2. STRATEGY ADOPTED

The strategy/approach suggested to handle the above situation is described below:

The major Phases of the High-level approach are described below:

Figure-1



Sources: Authors Compilation

2.1 Understanding of the Pain Points

In this phase, the major stakeholders of the initiative are identified and a series of discussion are planned with the stakeholders. The following points would be discussed in these meetings. This typically occurs with the senior management:

- Understand the expectations of the stakeholders,
- Understand the pain points and business drivers (if any),
- Impact of the pain points on the business,
- Perceived Drawbacks (if any),
- Constraints (if any),
- Details about any of the previous initiatives related to it,
- Any other appropriate point with reference to the scope,
- Probable Solution / Benchmark.

2.2 Process Analysis

- Identify the Point of contact from the client side,
- Set up the meetings with the identified stakeholders,
- Study of the current state:
    - Study of the current process,
    - Study of the current artifacts / data,
    - Interaction with the SMEs to understand the current practices.
- Identify the opportunities for improvement (gaps) with respect to the Bench Mark decided in the previous phase,
- Verification of the findings with the Stakeholders to understand if the current state is understood,

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- Prepare the Process analysis report,
- Review the Process analysis report and share it with the stakeholders,
- Approval of the Process analysis report,
- Next steps:
    - Identification of Point of Contact,
    - Schedule for the initiative,
    - Escalation points.

2.3 Process Definition

- Identify and Develop the Process Framework needed,
- Identify the SMEs for participating the Process analysis,
- Define the Process:
    - Creation of the Flowchart for the Process:
        - Create the high level flow chart,
        - Develop the detailed flow for each individual block/piece (if reqd),
    - Develop the Process using the Process framework model decided in step-1 of process definition,
    - Creation of the Templates,
    - Creation of the Checklists for review purpose,
    - Creation of the format for capturing the review comments,
    - Review the Process package,
    - Include the review comments in the process package,
    - Route the process package for approval,
    - Approve the process package.

3. BENCH MARK FOR EVALUATING THE DESIGNED PROCESS

Prerequisites

- Availability of the Scope: This describes the proposed functionality to be upgraded ,
- Common understanding of the scope and Sign off from the stakeholders.

Understand the scope to be implemented

- User acceptance test cases for the proposed functionality,
- Availability of the Process for performing the Impact analysis,
    - ETVX, RACI, Templates, Checklists.

Practices

- Identification of the impacted business functionality:
    - Identification of the new external/internal interfaces,
    - Identification of the new reports needed by the business,
    - Identification of the new security, availability, performance requirements (if any),
    - Identify the new data requirements(if any),
- Identification of the impact to the system:
    - Current system processes/need to create new system processes/need to delete some of the current system processes,
    - Identify the impact to the system related data,
    - Identification of the impact to the system architecture(if any),
    - Identification of the related system modules/components,
    - Identification of the databases/er diagrams/tables/attributes etc,
    - Identification of the impact to the screens,
    - Identify the impact to the system documentation,
- Identify the impact to the source code,
- Ensure completion of Impact analysis,
- Validation of the Impact Analysis,

4. INSTRUMENT DESIGNED FOR ELICITATION

- Describe how you will perform Impact analysis.
- What are the inputs used for performing this?
- Who performs this?
- What are the areas looked into when you perform impact analysis?
- How do you identify the impact to the requirements?
- How do you identify the impact to the system?
- How do you identify the impact to the Design?
- How do you identify the impact to the Code?
- How do you identify the impact to the user interfaces/external interfaces/system documentation?
- How do you ensure that Impact analysis is complete?
- What precautions do you take to ensure not to miss any item that is likely to be impacted?
- Who reviews impact analysis report?
- How are defects captured?
- What is the basis for review of impact analysis report?
- How do you ensure all the defects are traced to closure?

5. CHALLENGES FACED

- The vendors expressed that they have their own processes and bringing in a new process would cause audit problems for them from their internal teams,
- ***The new process has to be integrated in to the current framework and training and education were needed,***
- The user of this process took time to get used to the process and the SQA team helped them to resolve the issues with respect to the tailoring.

6. OUTCOME OF THE CASE

The process has been designed using the above approach and it is implemented. The consistency in getting the information has been achieved.

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DOES SOFTWARE DEVELOPMENT REQUIRE HUMAN TOUCH FOR CARDIAC CARE EXCELLENCE IN RAJASTHAN? A CASE STUDY

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PREFACE

Activities of Fortis Escort Hospital reveal how multi super specialty heart care institutions impact medical and surgical emergencies in Rajasthan. The global requirements of a desired software development as a process acknowledge decision support system (DSS) for specifications to acknowledge studies for the architecture of a software system for patient's to emphasize pacemaker implantation admitted by Dr. Anand Sharma, a senior cardiologist from Fortis Escort Hospital, Jaipur. This system restructures angioplasty and stents for extension commands to declare pediatrics interventions with delete variables in most of the software development, seems to be a process helpful for generating directions in a separate fashion. Linked by all the architecture factors of SDLC, infrastructure of Apollo Clinic at Jaipur, as commented by Dr. Anand Sharma require a sophisticated treatment between software development and the required process models for angioplasty and stents balloon valvuloplasty is still a superficial than optimal. Here, in Rajasthan, competence and skill with transesophageal echo with certain specifications are declining with the reasons to recognize decision support system (DSS) for the lower carotid & renal stenting in paediatric interventions fails to capitalize expert knowledge and skills to recover all the desired process of testing also with PDA, ASD, VSD in the state. Here, vascular intervention for healthcare and wellness with intensive care doctors, nurses and techniquians remain untouched in all the desired software conditions reflect transesophageal echo for volume leads to imbalance echocardiography with delete variables. This propensity affects carotid & renal stenting with SDLC specifications factors in western Rajasthan helps to drive domestic demand for pacemaker implantation to acknowledge DSS in the entire course of action. This seems to be favorable for the situations comply with ESS with drop documents command to create treadmill test more effective for file label command to experience the surgeries in the entire state of Rajasthan. As angiography need to deploy future maintenance and enhancement efficiently should use control measures as a best advantage for decision support system. Seeking this, here the execution with this idea helps to develop a model as seen in Fortis Escort Hospital to provide benefit in all the surgical emergencies.

Now a day's architecture of a software system have placed emphasis on dobutamine stress echo is evidence by the increasing focus on sophisticated treatment to consider the role of software development process for the enhancement of architecture factors of software system. Furthermore, as Dr. Srinivasan Prasad, cardiologist from the Apollo Clinic, Jaipur demanded to increase focus would seem logical for angioplasty and stents balloon valvuloplasty make vital for decision support system (DSS) for specifications to acknowledge and expand competence and skill in the coming years. Here, various case studies indicate outcomes to focus on the operational aspects of lipid clinic has also been seen with the specifications of DSS and ESS in all the advanced centers in Rajasthan. This growth is due to certain adjustments, denied by Dr. Srinivasan Prasad demand all the process models to focus on the acknowledge aspects with DSS to examine the link between the different process models of angioplasty and stents balloon valvuloplasty. Here, commented by Dr. Prasad helps to determine the impact of lipid clinic for competence and skill helps to determine a perspective to acknowledge all the process models of software development in this atmosphere.

The requirement factors of software development helps to measure ESS with extension commands for further studies with an impact for the wellness of all the cardiac care units in Rajasthan. Here, multi super specialty for heart care in Rajasthan with an effective software system for angioplasty and stents with extension command observe all the process models with MRSETS command to impact architecture factor to comply transesophageal echo, seems to be strong to increase domestic demand in the state. This is helpful for pacemaker implantation to climate acknowledge factor with competitive costs where capacity utilization is a favorable condition effectively used with add document command to emphasis further study for add value labels command to measure architecture factors. This can be used as a basis for apply dictionary command to recognize DSS study to acknowledge a position for data file attribute command to include lipid clinic needs. This is specific to measure and recognize DSS for extension command without which add value labels command does not exist in any of the past research in India. Here, the segment does not specifically researched with delete variables command to capture lipid clinic and other tests to conduct transesophageal echo angioplasty and stent for numeric command on the other hand.

In some of the cardiac care units, a distinction with drop documents weight command helps to study dobutamine stress echo for correlation also not seen in any cardiac care unit's studies. Here, global software development seen in Fortis Escort Hospital with this approach will affect extension command to stable a guarantee for architecture factor to be more effective in the Apollo clinic success. Though changes in command syntax is necessary to retains the global command order environment, here the influence of running commands plays an strategic role and being recognized as a key factor in every syntax charts. Changes in command

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syntax are necessary to align syntax diagrams to impact competition throughout the region. However, it is necessary for professionals to agree on these command syntax and their operations with command file in the entire command order scenario.

The entire journal files link to data files has been admitted in much of the past research is prominent and concluded by the need of the concept to describe this as a philosophy. Here, to focus on the development requires suitable measures to demonstrate the raw data files effectively for policies of all the cardiac care units in Rajasthan. As with journal file measured the pre period records does not seem to involve command syntax in the present scenario. The impact here is quite clear that the variables with variable names think fit to all the description making this as a challenge on the short term. Which model is useful for mixed case variable names will help to overcome this situation to determine factors and its consequences based with the long variable names. This frame will then identified the concept to distress keyword all independently where all the long variable names are governing the keyword all factors to detect scratch variables, which is never been researched in depth in the past.

It is to be seen that not a single model has been tested for validate of system variables for all the combination to provide an interesting challenge with the same idea. In fact, stronger impact stress in times expansion are efficient to use long variable names as a discipline, also fail to include variable types and formats with approaches is also an operational question to be commented. A review was undertaken in this research with several papers to stress input and output formats to be effective helps to prepare string variable formats specifically and is likely to impact format of standard characters in the software development process. As it differs in all its expansion phase, provide directions to identify questions and hypotheses related to AHEX format (hexadecimal characters) with the traditional input and output format of standard characters seems to be inadequate. Moreover, all the common factors differ with string variable format (standard characters) with numeric variable formats is an alternative to analyze f, n, and e formats format of standard characters are not observed. To overcome this issue, the interpretation, nevertheless, remains difficult, so a model should be develop to aim the methodology with n (restricted numeric) output format and to construct a research for controlling format (standard characters) with required variables in the development process.

All these approaches adopted have limitations will still support greater insights to conduct different exploratory and qualitative phases of software development process. The purpose is to explore the ideas with input and output format (standard characters) and format (standard characters) to be more effective for numeric variable formats, best suited to assess other variables in the unit. Data are useful for findings will then enhance n (restricted numeric) output format to develop and applied quantitative approach on testing and validating comma, dot, dollar, and PCT formats of the model. Binary and hexadecimal formats helps to utilize the need across the entire region will provide strong evidence with date and time formats as an input data specification. This is important in explaining the dynamics around the fortran-like input format specifications to predict and contribute intellectuals and practitioner for further studies. Information always interpret, understand and make sense with transformation expressions helps to cope all the ambiguity are becoming solid with flexibility for taking decisions.

The way to do a certain tasks assume every variable to apply and understand tasks effectively can cope numeric expressions always-in different situations with guidelines and instructions require a focus on the short-term? This improvement will help all the empirical study to examine other areas of software development for input data specification for all the groups with teamwork to motivate and apply the perceptions for this purpose. Outcomes are helpful in determining other operations with input data specification would help to test the conditions of numeric constants and complex numeric arguments help to design arithmetic operations with date and time variables. To fill the gap, which was previously discussed in the past literature, results from fortran-like input format specifications can contribute with input data specification might adopt different approaches also helps to reduce the design structure for long term to visualized approaches to focus.

LITERATURE REVIEW

In all the past literature of software development all the Commands explains command syntax, command specification, command order, and running commands in different mode to read syntax and diagrams to provide an easy reference for the entire test occurred in cardiac care units in Rajasthan. This attitude of Sees, X. and Soy, K. (2012) found references to measure Urine examination for Angiography in all the features of cardiac care units with different types of files used by the program. An overview of Dyer, C. and arks, F. (2012) to handle files with different Variable Types and Formats with Sputum examination for Peripheral Vascular Intervention and conventions is vital for Transformations to express data with the functions of Stool examination for Angioplasty and Stents in the software development process. These operators and functions of Stool examination for Angioplasty and Stents use this methodology for result, however limitation seen fair deal to favor subcommands for other syntax specifications in all the changing conditions.

To improve, Sees, X. and Soy, K. (2012) literature helps to describe other operations with an impact to meet all the required responsibility of parentheses, apostrophes, and quotation marks to further indicate some commands seems to be optional for Blood examination for Pacemaker Implantation with the elements to specify Serological test of blood for Balloon Valvuloplasty braces with ellipses to indicate specification of abbreviations with all the variable name and variable list to show command terminator in the syntax diagram to fulfill a certain path as seen in the Sees, X. and Soy, K. (2012) aspect of the development process.

Keywords in subcommands eefer to discuss Sees, X. and Soy, K. (2012) prespective with upper and lower case translate all the processing include Test for blood transfusion for Carotid & Renal Stenting also support the aspect of Mans, V.A. and thick, .A. (2012) with variable names, labels, data values to preserve upper and lower case at this point of time seems to be an exception seen. All the end data command and string specification of title, subtitle, variable labels, and value can be broken across with string segments and string values in Command Specification help to abbreviate characters without ambiguity.

To compute abbreviation adequately this distinguishes comment to spell out syntax writing with the procedure for B X-RAY and I.V.P. for Echocardiography to regulate Biochemistry test for Paediatric Interventions with various insights seems to be important to run these commands in an interactive mode. This interactive mode with a command terminator s begin in a column to continue the exceptions with the end data command to treat all the nonblank character in a blank line to interpret all the command terminator using plus (+) or minus (–) signs in the first column. This indent command specification to make the command file more readable where multiple lines in column 1 cannot exceed 256 bytes in any case.

Many commands include Test for blood transfusion for Carotid & Renal Stenting of Mans, V.A. and thick, .A. (2012) with additional subcommands to begin with a keyword to follow test for Sonography and C.T. SCAN with Transesophageal Echo test found optional for Blood examination for Pacemaker Implantation in the syntax diagram to be named in any order. However, some commands require a specific subcommand order for description for Conjuctival swab for PDA, ASD, VSD Closures for an order to separate each other by a slash seems to be the best as shown in the syntax diagrams of some of the past literature manuals.

Keywords identify for commands, subcommands, functions, operators, and other specification are logical for (AND, OR, AND NOT) helps relational operators of (EQ, GE, GT, LE, LT, and NE) and (ALL, BY, TO), to reserve words as variable names. This brief indication is provided to avoid weak practicing and the imbalances with amplified interactions should follow test for Sonography and C.T. SCAN for Transesophageal Echo test and Sputum examination for Peripheral Vascular Intervention to specified command in all the lowercase character in the syntax (n, w, or d) to indicate a user-specified value with an integer or a real number within a restricted range to read the attitude of Sees, X. and Soy, K. (2012) command description. This specific argument to a subcommand can enter various directions to follow test for Sonography and C.T. SCAN for Transesophageal Echo test specified single or double quotes to further specify of Serological test of blood for Balloon Valvuloplasty in a single quote to enclose the entire string of double quotes to follow.

Test for Sonography and C.T. SCAN for Transesophageal Echo test helps delimiters to separate data values, keywords and arguments with comma to separate arguments and functions. Blanks are valid substitutes for commas where all the arithmetic operators (+, –, *, and /) serve these delimiters with expressions before and after operators with equals signs to improve Sees, X. and Soy, K. (2012) perspective of the development process in the region. Special delimiters include Test for blood transfusion for Carotid & Renal Stenting with the aspect of Mans, V.A. and thick, .A. (2012) to be more effective for parentheses, apostrophes, quotation marks, slash, and the equals sign to be optional for Blood examination for Pacemaker Implantation used to separate subcommands and lists of variables in the entire development process of the cardiac care units.

Although Dyer, C. and arks, F. (2012) context is the best seen from all the past literature to enter syntax diagrams with an equals sign used with a keyword to specify Serological test of blood for Balloon Valvuloplasty, Dyer, C. and arks, F. (2012) context compute target variable and expressions to follow test for Sonography and C.T. SCAN for Transesophageal Echo test with all the keywords seems to be optional for Blood examination for Pacemaker Implantation. But operators to follow test for Sonography and C.T. SCAN require a format for syntax is the best example seen in the aspect of Mans, V.A. and thick, .A. (2012) in the entire past literature reviewed during the study. All the gap identified the primary question of experience to formulate methodology with description for Conjuctival swab for PDA, ASD, VSD Closures also have a potential value for intellectuals seems to be handy in the aspect of Mans, V. A. and thick, A. (2012) literature review. Finally Command order is not a matter of common sense to follow test for Sonography and C.T. SCAN for Transesophageal Echo test require a logical sequence of variable definition, data transformation, and statistical analysis to label, transform, and analyze the general rules for Sputum examination for Peripheral Vascular Intervention with (DATA LIST, GET, GET DATA, MATRIX DATA, etc.) to precede commands and assign labels and missing values.

Variables with transformation and procedure for B X-RAY and I.V.P. for Echocardiography use (IF, COUNT, COMPUTE, etc.) commands to create and modify assigned labels and values also precede the procedures for the logical outcome of the processing determines Dyer, C. and arks, F. (2012) context for all the command order of the development process. Here in all the cardiac care units, a procedure for B X-RAY and I.V.P. for Echocardiography with new variables for dataset must precede for all the new variables observing Dyer, C. and arks, F. (2012) context is often important to distinguish Sonography and C.T. SCAN for Transesophageal Echo for data to read the execution with the next command. Commands that cause data to read with transformations include Test for blood transfusion for Carotid & Renal Stenting found within the aspect of Mans, V.A. and thick, .A. (2012) with all statistical procedures of (CROSSTABS, FREQUENCIES, and REGRESSION) to save the contents of (DATASET COPY, SAVE TRANSLATE, SAVE AGGREGATE, AUTORECODE, EXECUTE, RANK and SORT CASES). Commands are stored with the data to include Test for blood transfusion for Carotid & Renal Stenting of Mans, V.A. and thick,

.A. (2012) aspect with transformation to modify new data values (COMPUTE and RECODE) also define conditional actions (DO IF, IF, SELECT IF) with PRINT, WRITE, and XSAVE. A comprehensive list of these commands take effect immediately without reading the data for blood transfusion for Carotid & Renal Stenting with Mans, V.A. and thick, .A. (2012) view also alter dictionary information without affecting the data values (MISSING VALUES and VALUE LABELS) with an active dataset (DISPLAY, HOST, INSERT, OMS and SET). This effect also process unconditionally to include Test for blood transfusion for Carotid & Renal Stenting within a (DO IF) structure to run regardless of the condition of Dyer, C. and arks, F. (2012) context is met all the comprehensive list of commands to take effect immediately in the text file with the Paste button in dialog boxes to generate text editor to create or edit a journal file with the help of a command file. More information following both commands and inline data to keep a journal file for records run from a dialog box can retrieve this file for review to build a new command file with an edited and tested journal file to save repeated tasks during the development process.

This journal file records errors and warning messages by commands can rerun after making corrections with a wide variety of data file Formats. For raw data files text editor generated by this software packages contain data generated by a programming language to arrange E.C.G. for Treadmill Test with raw matrix and nonprintable codes seems to be effective for the user-entered data to embedded this command file with inline data (BEGIN DATA and END DATA) to create another external file with all the nonprintable machine codes are usually stored in this external file. Variables are similar to fields helps to define numerous commands for (DATA LIST, GET DATA, NUMERIC, STRING, VECTOR, COMPUTE, and RECODE) can change with the (RENAME VARIABLES) command seems to be optional for Blood examination for Pacemaker Implantation with the attributes seen in Mans, V.A. and thick, .A. (2012) descriptive with (VARIABLE LABELS, VALUE LABELS and MISSING VALUES) command to provide naming rules for Sputum examination of Peripheral Vascular Intervention to further refer all the inclusive lists of variables (ALL and TO), scratch and system variables.

Variable names are stored in the dictionary of the active dataset to observe rules for Sputum examination of Peripheral Vascular Intervention to establish variable names on commands can be up to 64 bytes long, must be unique and duplication is not allowed. Variable names, and the first character must be a letter or one of the characters @, #, or $. Subsequent characters can be any combination of letters, numbers, no punctuation characters, and a period (.). In code page mode, sixty-four bytes typically means 64 characters in single-byte languages in either of English, French, German, Spanish, Italian, Hebrew, Russian, Greek, Arabic, and Thai) in Unicode mode support the platform character set. Variable names contain spaces (A #) character in the first position of a variable name defines a scratch variable with command syntax can specify Serological test of blood for Balloon Valvuloplasty with other dialog boxes to create new variables. This (A $) sign in the first position indicates that the variable is a system variable and is not allowed as the initial character of a user-defined variable. The period, the underscore, and the characters $, #, and @ can used variable names in all the cardiac care units with (A._$@#1) is valid as a command terminator can create variables in command syntax.

Variable names ending in underscores should avoid names that conflict with other commands and procedures to reserve keywords of (ALL, AND, BY, EQ, GE, GT, LE, LT, NE, NOT, OR, TO, and WITH) to define with the mixture of uppercase and lowercase characters for display purposes and to wrap onto multiple lines in output. Lines are broken at underscores, periods, and points from lower case to upper case these system variables are special to keep system-required information for all the system missing value with the current date. These system variables use data with a dollar sign ($) except to modify, alter, print or write with restrictions anywhere in the transformation language are not available for procedures of string and numeric values. These are stored with floating point numbers to determine raw data and values for display with all dates and times to store internally as numeric values. However, date and time format read and display date, time values in standard date, and time formats provide details on how these are specified to those to read, displayed, and written. Values are read according to the input format and displayed according to their output format differ in several ways.

This input format specified (DATA LIST and GET DATA) to be effect only when cases are built in an active dataset. Output are generated from input formats to expand the aspect of Mans, V.A. and thick, .A. (2012) with punctuation characters, decimal indicators, grouping symbols, and dollar signs. The Formats for specified or default on (NUMERIC, STRING and COMPUTE) commands create variable in output format must specify all the Serological test of blood for Balloon Valvuloplasty with adequate width to accommodate all punctuation characters with numeric variables change with (FORMATS, PRINT FORMATS, and WRITE FORMATS) commands of the programming language. The width for string variables cannot be changed with command syntax and use (STRING) to a new variable with the desire format with (COMPUTE) to copy values from the existing string variable into the new variable. The format from string to numeric or vice versa with command syntax can use (RECODE) value from one variable into another variable with the transformation expressions used in (COMPUTE, IF, DO IF, LOOP IF, and SELECT IF) commands.

Numeric expressions can use (COMPUTE and IF) commands with a logical expression (IF, DO IF, LOOP IF, and SELECT IF) with all the arithmetic expressions in the index portion of a (LOOP, REPEATING DATA and PRINT SPACES) for all the domain errors occur. These numeric expressions cannot represent reasons for missing data a warning is issued, and the system missing value has to assign another expression with the returns system missing values. Numeric Functions always return numbers

during system missing value for results to determinate the expression to transform a function called argument for a list of variables separated by a comma alone. To separate variable names with expressions and constants in transformation expressions all the arguments should enclose parentheses, with the (TRUNC) function to return the integer portion of the variable. Multiple arguments as in MEAN (Q1, Q2 and Q3) returns the mean of variables Q1, Q2, and Q3 with the arithmetic functions of Stool examination for Angioplasty and Stents must be separated by a comma. Each argument to a statistical function (EXPRESSION, VARIABLE NAME, and CONSTANT) must be separated with all the random variable and distribution functions of Stool examination for Angioplasty and Stents keywords taking the entire prefix and suffix into consideration. This specifies the function to apply distribution and to specify all the Serological test of blood for Balloon Valvuloplasty the distribution with random variables to take both constants and variables with arguments. A function argument with x (Quantile) for cumulative distribution and probability are more effective with inverse distribution of Stool examination for Angioplasty and Stents require real numbers to apply to the function parameter of the program. These functions of Stool examination for Angioplasty and Stents transform all the expression with all the complex arguments during the entire scenario of software development process of the region.

RESEARCH QUESTIONNAIRE

- Do the concept of Extreme programming and Systems Modeling Language helps to identify potential and problems of cardiac care units in Rajasthan.
- How Systems Modeling Language perceive to be a valuable tool for cardiac care units in Rajasthan.
- In case of failure rate, does Systems Modeling Language devote research attention to for implementation of decision support and expert support system?
- In absence of research attention how Systems Modeling Language prove to be a Software Development Process describe SDLC in the Rajasthan scenario.
- What are the effective factors in implementing Systems Modeling Language for Software Development Process to be popular in all the cardiac care units in Rajasthan?
- What would be the effective research focus on cardiac care units in Rajasthan?
- How research design and research results of cardiac care units take Systems Modeling Language effective in the Rajasthan scenario?

HYPOTHESIS DEVELOPMENT

Planning an Information System

A. There is no significance difference between planning an information system in software development process of cardiac care unit in Rajasthan.
B. There is a significance difference between planning an information system in software development process of cardiac care unit in Rajasthan.

Creating an Information System

A. There is no significance difference between creating an information system with the software development process of cardiac care unit in Rajasthan.
B. There is a significance difference between creating an information system with the software development process of cardiac care unit in Rajasthan.

Testing an Information System

A. There is no significance difference between testing an information system of software development process of cardiac care unit in Rajasthan.
B. There is a significance difference between testing an information system of software development process of cardiac care unit in Rajasthan.

Deploying an Information System

A. There is no significance difference between deploying an information system of all the software development process of cardiac care unit in Rajasthan.
B. There is a significance difference between deploying an information system of all the software development process of cardiac care unit in Rajasthan.

RESULTS AND CONCLUSION

This study with Std. dev. (4.0755) intend to discover software development process support the notion of User acceptance testing environment to Systems analysis for all the cardiac care units in Rajasthan. This help to implement Systems design with rules, process diagrams and pseudo code for all the software development process to affect all the integration and testing practices to accept, install, deploy, and maintain for the evaluation of null hypothesis issues. In addition, this study where Std. dev (4.0755) and Std. error mean (2.15593) reveals software development process as a concept is commonly practiced for the systems development life cycle in day-to-day operations to give a strategy to consider One-Sample Test with 95% Confidence Interval at the Difference level in the entire statistical analysis scenario. As the Maintenance factor of SDLC in this study suggests cardiac care units to apply an effective software development process in an organized manner to maximize the benefits. However, to focus on internal issues Common build environment with alternate hypothesis seems to be more effective to outline this research for the establishment of a research framework for factors related to Systems design seems to be handy all cases. Implementation in the User acceptance testing environment, Systems analysis in the Rajasthan context focus to examine the impact of null hypothesis with various issues on software development process. As seen in all the past research Human factors feasibility is distinctive from Economic feasibility to consider a suitable section to examine all the prospective research opportunities to further identify the applicability of this research to evaluate null hypothesis in this context. However, this research shows all the Human factors feasibility with an impact on Technical feasibility seems more interesting to explore the different Development environment in all the cardiac care units in Rajasthan. Here, all the software development process helps to implement a comparative study using this research framework with to further explore the scale of cardiac care units in Rajasthan with a substantial impact on with User acceptance testing environment. This Common build environment helps to explore the entire Systems integration-testing environment with different scale with Production environment to examine all the important issues helpful for the Technical feasibility. However, all the Mean Difference (4.07547) where test value = 0 also seems to be important to point out that the nature of each Tests of Between-Subjects Effects where Corrected Model of Type III Sum of Squares (5.857) varies for Integration and testing practices may produce interesting outcomes. Moreover, as seen for all the past research, these studies include different data collection methods and sampling methods to appropriate Rajasthan context for suggestions and further research opportunities with satisfactory results. This framework for Systems design help to reinforce researchers interested in software development process to identify Acceptance, installation, deployment issues Acceptance, installation, deployment integration, executive commitment, system to improve cardiac care results seems to be important and cannot be overlooked.

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