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THE INTEGRATED INFORMATION PLATFORM FOR WATER RESOURCE IN TAIWAN

Jia-Wei Lin[1] Mei-Shin Chen[2] Tien-Yin Chou[3]

ABSTRACT

This study describes the experience regarding water resource information integration management system. Effectively managing reservoirs is an important issue in Taiwan because reservoirs exist in various catchment areas. For ensuring that the water quality is in accordance with civil usage, reservoir managers have to monitor these reservoirs, including rainfall, water level, water flow, water quality, and sediment. Therefore, this study integrates mobile and geographic information techniques to construct a management system to assist reservoir managers. When reservoir managers investigate various monitoring stations, they can use mobile devices to complete managerial businesses. In sum, based on the testing results, this study is helpful for water resource management.

KEYWORDS

Water Resource, Information Management, Reservoir Watershed, Hydrological Monitoring, GIS etc.

I. INTRODUCTION

Recently, due to climate changes, unusual weather frequently occurs worldwide. Drought and heavy rain have also affected Taiwan. The policies regarding water resources are an important issue for the development of society and country. Moreover, Taiwan's water resources are limited by its terrain environment. This condition highlights the importance of water resource management. Therefore, effective usage of water resource is an urgent requirement. For ensuring that the water quality is in accordance with civil usage, Taiwanese government faces a problem, namely, how to effectively manage these reservoirs. For example, when a monitoring station alerts unusual information, reservoir managers have difficulties on comprehending the location of the monitoring station immediately.

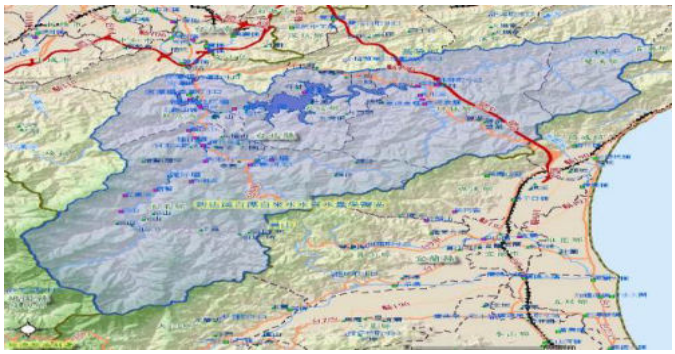
For resolving the abovementioned problem, this study cooperates with Taipei water resource district to develop a water resource information integration management system. The section two introduces the research background. The research problems are, then, described in the Section Three. This study proposes the approach in the Section Four and reaches the implementation in the Section Five. Section Six shows the testing results. The findings are discussed in the Section Seven. Finally, the conclusion is presented in the Section Eight.

II. BACKGOUND

The scope of the Taipei Water Source Domain covers Hsin-Dian, Wulai, Hsu-Din, Pinlin and Shuangsi, mainly five townships of the Taipei County. This extensive area is about 717 square kilometers and accounts for 1/3 of the whole Taipei county administration area. It supplies the civil water for 5 million residents. Based on the urban planning in Taiwan,

Figure 1 shows that Taipei Water Management Office (termed as TWRO) classified Taipei Water Source Domain into several areas, including vegetation reservation area, ecology reservation area, reservoir protection area, residential area and agricultural area. TWRO would monitor and manage these areas.

Figure-1: Taipei Water Resource District and Monitoring Stations



Sources: Authors Compilation

Meantime, TWRO adopts various strategies to ensure the safeness and cleanness of water sources, water quality and capacity [1]. These strategies include business planning; city planning; construction management; management on land usage; water and soil conservation; water pollution prevention and cure; environment maintenance and improvement; and operation and maintenance of

[1]Ph.D. Candidate, PhD Program in Civil and Hydraulic Engineering, Feng-Chia University, Taichung, Taiwan, waynelin@gis.tw
[2]Assistant Professor, GIS Research Center, Feng-Chia University, Taichung, Taiwan, ivy@gis.tw
[3]Professor, GIS Research Center, Feng-Chia University, Taichung, Taiwan, jimmy@gis.tw

the sanitary sewer system. For example, TWRO executed the constructions of water and soil conservation since 1986. By the end of 2014, TWRO had spent 9.9 billion for completing 365 cases of maintenance engineering.

III. PROBLEMS

After this study discusses managerial businesses regarding water resource management with reservoir managers in TWRO, this study recognizes two problems, including:

- Through numerous sensors for monitoring water quality, reservoir managers may obtain incorrect analytical results when they could not collect complete data. Moreover, when reservoir managers investigate the monitoring stations on sites, they report the monitoring results with laptops inconveniently.

- Managerial businesses are performed by various sections, including planning section, water quality section, conservation section, management section and construction management section as Figure 2 shown. Clearly, many managerial businesses are not individual [2]. For example, planning section and management section cooperate to draw up the policies regarding urban planning. When the communication between these two sections is hindered, the managerial businesses are also impacted.

Figure-2: The Organization in TWRO

Sources: Authors Compilation

Recently, due to that information technology (termed as IT) grows up rapidly, applying IT for water resource management has become popular. For the abovementioned problems, improving information transmission and increasing working mobility are necessary. Therefore, this study constructs a water resource information integration management system (termed as WRIIMS). Moreover, monitoring stations could be presented through geographic information. The main advances of this approach involve:

- **Collecting Data Easily and Synchronously**: WRIIMS would automatically collect five different data through various monitoring stations, including rainfall, water level, water flow, water quality and sediment. If the monitoring stations were deviant, WRIIMS would alert reservoir managers.

- **Enabling Online Data Analysis**: Measuring water quality requires various formulas. For simplifying time-consuming calculation processes, reservoir managers could complete data analysis through WRIIMS.

- **Producing Analysis Reports Automatically**: Based on the analysis results, WRIIMS could offer analysis reports for reservoir managers. Moreover, reservoir managers could investigate historical analysis results for understanding the changes regarding water resources.

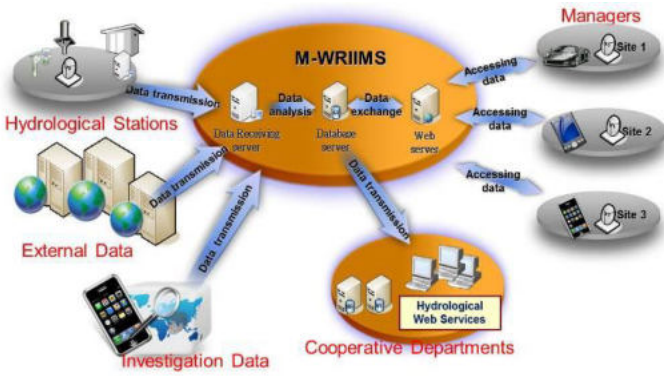
- **Connecting Various Managerial Businesses**: WRIIMS would record and trace the execution statuses of managerial businesses from various sections. Therefore, when reservoir managers need complete information regarding Taipei water resource district, they could use this system to confirm the latest development progressing.

- **Providing Geospatial Information**: WRIIMS is also a geospatial information system (GIS) based water resource management system. Since the distribution of monitoring stations is represented clearly, reservoir managers could integrate the analysis results and the water resource district easily.

IMPLEMENTATION

For implementing the anticipated objectives, Figure 3 shows the system framework of WRIIMS.

Figure-3: System Framework of WRIIMS



Sources: Authors Compilation

This study constructed three main servers, including:

- **Data Receiving Server**: Monitoring data would be imported from monitoring stations to WRIIMS. Moreover, this server would connect to numerous water resource management systems that are located in external government agencies.
- **Database Server**: The data collection server would sort out the collected data into a database server. Based on the data, analysts could analyze water quality. For a number of specified proposes, some government agencies could also obtain data via hydrological web services. This server also store the electronic maps for representing spatial information.
- **Web Server**: Reservoir managers could access various web services through this server.

Moreover, for successful data transmissions among various monitoring stations and servers, this study adopted several web services based on international standards that are announced by the open geospatial consortium (OGC).

These services include:

- **Sensor Observation Service** (SOS): This service enables WRIIMS to manage sensors and retrieve sensor data.
- **Sensor Alert Service** (SAS): An event notification system provides an push-based access from monitoring sensors.
- **Web Map Service** (WMS): A HTTP interface is for exchanging map images among various geospatial databases.
- **Web Feature Service** (WFS): This service enables WRIIMS to complete various operations on geographic features using HTTP as the distributed computing platforms.
- **Water Markup Language** (WaterML): This programming language is an information exchange schema regarding water data services within the hydrologic information system.
- **Web Processing Service** (WPS): This service provides rules for standardizing how inputs and outputs for geospatial processing services.
- **Keyhole Markup Language** (KML): KML is one international standard language for expressing geographic annotation and visualization on existing or future web-based online and mobile maps and earth browsers.

Finally, reservoir managers could perform various through their web browsers

RESULTS

In this section, this study illustrates six results, when reservoir managers applied WRIIMS to investigate the water quality on sites.

- **Automatic Alerts**: Figure 4 shows that reservoir managers configure the alert values for various monitoring stations. When monitoring stations determined any deviant condition, WRIIMS would alert reservoir managers. For example, Figure 5 shows that two monitoring stations were deviant.

Figure-4: Configuring the Alert Values

Figure-5: Deviant Monitoring Stations

Sources: Authors Compilation

- **Water Level Monitoring:** Figure-6 shows that analysts selected a period for obtaining historical monthly changes of water level.

Figure-6: Historical Monthly Changes of Water Level

Sources: Authors Compilation

- **Water Quality Monitoring**: Figure 7 shows that analysts applied WRIIMS to obtain the analysis reports regarding pH, BOD and COD.

Figure-7: Analysis Reports

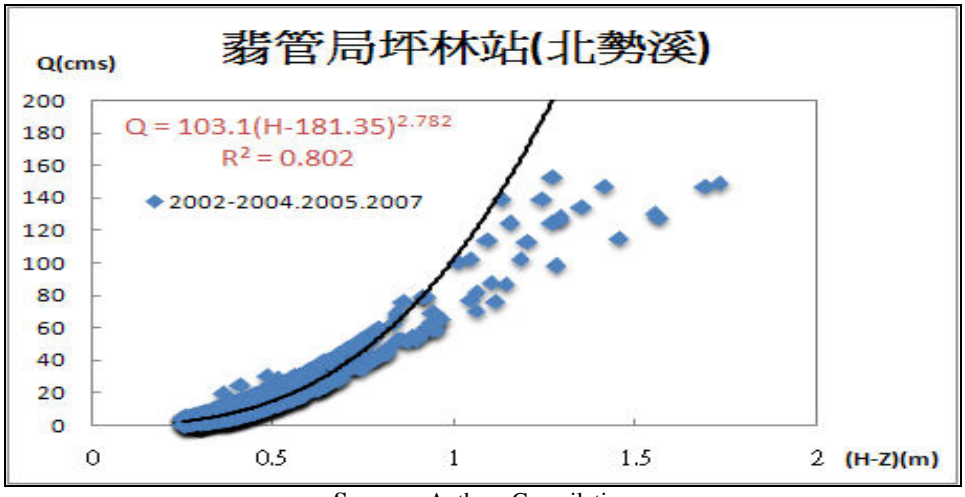
Sources: Authors Compilation

- **Water level-Water flow Curve**: Based on the relationship between the water level and water flow, analysts identified the curve (Figure 8) and the equation (Eq. 1) for various monitoring stations.

$$Q=a(H-Z)^b \text{ (Eq 1)}$$

where Q is the water flow of rivers (cms); H is the water level of observatories (m); Z is the water level when the water flow is zero (m); a and b are coefficients.

Figure-8: Water level-Water flow Curve in Pinlin Monitoring Station



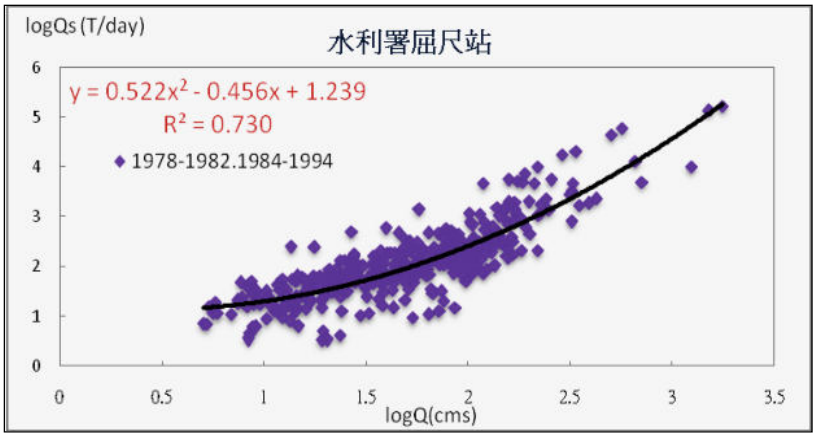
Sources: Authors Compilation

Sediment evaluation: Based on the relationship between the daily water flow and daily sediment, WRIIMS assisted analysts to determine the regression equation, Eq. 2, for various monitoring stations, as Figure 9 shown.

$$y=ax^2+bx+c \qquad \text{(Eq 2)}$$

where y is the log value of sediment (T/day); x is the log value of water flow (cms); a , b and c are coefficients.

Figure-9: The regression in Quchi Monitoring Station



Sources: Authors Compilation

Mobile decision management platform: the information service from inside and outside have been integrated into the platform for assisting affair executive, which improve the information sharing, and the efficiency of system. In addition, the mobile system assisted the managers to manage their affairs more flexible, which increased the comprehensive benefit of this platform.

Figure-10: Mobile Decision Management Platform

Sources: Authors Compilation

DISCUSSIONS

Based on the testing results, reservoir managers were satisfied with WRIIMS. However, this study still recognized two problems that would be improved in future. These problems include:

- Despite WRIIMS could receive real-time data from various monitoring stations, such service is insufficient. The mobile devices suffer the lack of power supply when reservoir managers were on sites, because the delivered data were frequent. Therefore, integrating data compression techniques with WRIIMS would be considerable.

- So far, two major operation systems for mobile devices are Apple iOS and Google Android. However, these systems are not compatible. Despite software, developers could construct iOS and Android-based WRIIMS, system maintenance would take time and cost. Such issue would be important accompanying with that M-WRIMMS grows up in future.

CONCLUSION

Many countries spend much cost on managing water resources, especially the civil water. This study shows a case study in Taiwan. For connecting the distributed monitoring stations and management sections, this study integrate mobile and geographic information techniques to construct WRIIMS. Reservoir managers benefit from this system, because they could obtain immediate monitoring data, perform online data analysis, and receive complete analytical reports. Reservoir managers could comprehend the statuses of managerial businesses. In sum, this study is helpful for the similar applications in managing water resources.

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A STUDY ON STRESS MARK AMONG EMPLOYEES OF SOFTWARE INDUSTRIES IN BANGALORE

Dr. P. Usha[4]

ABSTRACT

In this focused on present circumstances software industry has become one of the fastest growing industries in India. The reason for choosing particularly software industry and employees is that the level of stress these employees face is comparatively higher than other employees. Any kind of a job has targets and an employee becomes stressed when he or she is allotted with unfeasible targets and are unable to manage the given situation. Thus, the main aim of this article is to bring to lime light the level of stress with software employees in Bangalore and the total sample size for the study is 100 chosen by random sampling method in Bangalore city.

KEYWORDS

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

INTRODUCTION

Stress is one of the problems faced by human beings. It has both positive and negative impact on individual. The positive stress called eustress is required to certain level to help an individual to perform their work without which the individual will not work properly. The negative stress called distress has negative impact on the individual, which restricts them in performing their work. The ancient philosophical and religious texts provide information about stress, which has two approaches: the first approach begins with the nature of human existence and moves systematically to its dysfunctioning (i.e.) stress is generated under certain circumstances, the second approach identifies the problem and the principles of dealing with it are woven around the problem and its resolution. Experience of occupational stress is inevitably involved in the execution of any type of work. Stress has an adaptive value. It motivates the individual to attend to the task and get rid of the tension or demand the unattended task produced. The Indian Software industry has grown at a compounded annual growth rate (CAGR) of 28 % during the last 5 years. The key segments that have contributed significantly to the industry's exports include – software services - BPO sector is playing vital role in the growth of our country's economy. Due to liberalization of Indian economic policy, the growth of software industry is in commendable position. Due to cost advantage, availability of skilled manpower, quality services are the main reasons for the growth of IT industry in India.

STATEMENT OF PROBLEM

Computers have become an epitome of modern life, being used in every aspect of life. This has also ushered in a new genre of occupation-related health problem among software professionals. The reason for choosing particularly software employees is that the level of stress these employees face is comparatively higher than other employees. Any kind of a job has targets and an employee becomes stressed when he or she is allotted with unachievable targets and are unable to manage the given situation. The stress among employees of major software industries, Infosys, Tata Consultancy Services, and Cognizant Software companies in Bangalore. Hence, a study on job stress is needed to understand the level of job stress among the employees. This study has not been explored so far software companies in Bangalore.

REVIEW OF LITERATURE

Saurabh Shrivastava and Prateek Bobhate (2010), in their study, Computer related health problems among software professionals in Mumbai: A cross-sectional study, investigated that Ocular discomfort, musculo-skeletal disorders and psychosocial problems form key category of health problems found among constant computer users. This study has also brought into focus factors contributing to the occurrence of these problems. Thus, the problem requires a multidisciplinary action and hence there is an immediate need for the concerned authorities to collaborate and enforce suitable preventive measures.

Jakkula Rao and Chandraiah (2011), in their article, Occupational stress, mental health and coping among information technology professionals, found that job satisfaction and mental health are correlated but not significant. However, job satisfaction was positively and significantly correlated with coping behavior. The mental health is negatively and significantly correlated with occupational stress. It can be explained that as job satisfaction and mental health increases coping behavior increases. In addition, as stress increases mental health decreases.

[4]Assistant Professor, Annamacharya Institute of Technologies and Sciences, Andhra Pradesh, India, ushaphd.svu@gmail.com

Kesavachandran et al (2012), In their study, Working conditions and health among employees at information technology - enabled services: A review of current evidence identified that musculo-skeletal disorders, ocular disorders and psycho-social problems were some of the key health problems observed among software professionals. There is a need for implementation of the programs that include the concepts of ergonomics, health education, training of personnel to prevent and overcome the morbidity, as well as psychosocial problems among workers in software industry.

Thorsteinsson, E., Brown, R. & Richards, C. (2014), this study examined associations between work-stress, perceived organizational support, supervisor support, staff health. A heterogeneous sample of 201 office staff recruited via email and snowball sampling completed a short anonymous online survey asking about their recent experiences of the above factors. High work-stress was associated with worse staff health and work outcomes, and these associations were mediated by high-perceived stress. Less workplace support was associated with adverse work outcomes and high depression levels. Neither perceived organizational support nor supervisor support was shown to moderate between high work-stress to the staff health and work outcome associations. Work-stress likely contributed to feelings of high-perceived stress in some workers, which then contributed to poor health and higher turnover intentions. However, workplace support did not appear to buffer against the potential to experience ill health or adverse work outcomes. This study examines gaps in the work-stress literature, particularly in relation to adverse work outcomes and the possible impact of organizational support in reducing these and staff health problems.

Daniel C. Ganster, (2015), Research examining the relationship between work stress and well-being has flourished over the past 20 years. At the same time, research on physiological stress processes has also advanced significantly. One of the major advances in this literature has been the emergence of the Allostatic Load model as a central organizing theory for understanding the physiology of stress. In this article, the Allostatic Load model is used as an organizing framework for reviewing the vast literature that has considered health outcomes that are associated with exposure to psychosocial stressors at work. This review spans multiple disciplines and includes a critical discussion of management and applied psychology research, epidemiological studies, and recent developments in biology, neuroendocrinology, and physiology that provide insight into how workplace experiences affect well-being. The authors critically review the literature within an Allostatic Load framework, with a focus on primary (e.g., stress hormones, anxiety and tension) and secondary (e.g., resting blood pressure, cholesterol, body mass index) mediators, as well as tertiary disease end points (e.g., cardiovascular disease, depression, mortality). Recommendations are provided for how future research can offer deeper insight into primary Allostatic Load processes that explain the effects of workplace experiences on mental and physical well-being.

OBJECTIVES OF STUDY

- To study on job stress among employees of software industries in Bangalore.
- To examine the relaxation techniques practiced in the organization.

METHODOLOGY OF RESEARCH

Primary data was collected through well-structured questionnaire and interview method from the software professionals in Chennai. Secondary data was collected from internal records of the company such as library records, trade journals and various manuals of the software company and from various training programs previously conducted. Secondary data provides a better view of the problem study, many magazines, tools and other references were also mean important in this study. The sample size is 100 selected randomly.

DATA ANAYSIS AND DISCUSSIONS

Table-1: Percentage Analysis of Demographic Factors

S. No.	Parameters		Number of Respondents	Percentage to Total
1	Age of the Respondents	21-25 years	23	23
		26-30 years	15	15
		31-40 years	15	15
		41-50 years	24	24
		above 50 years	23	23
2	Marital Status	Married	60	60
		Unmarried	40	40
3	Designation	Analyzer	13	13
		Delivery Manager	11	11
		Project Manager	24	24
		Software Developer	16	16

		Support Engineer Tester Team Leader	18 10 8	18 10 8
4	Nature of Job	Permanent Temporary	84 16	84 16
5	Educational Qualification	Others PG UG	31 39 30	31 39 30
6	Income (Rupees)	25001-35000 35001-45000 45001-55000 above 55000 below 25000	26 23 23 20 8	26 23 23 20 8
7	Experience (years)	11-15 years 16-20 years 6-10 years above 20 years less than 5 years	19 20 14 23 24	19 20 14 23 24

Sources: Authors Compilation

Inferences: From the table-1, it is inferred that 24% of employees come under age group of 41-50 years, 23% of Employees come under age group of 21-25 years and above 50 years, 15% of Employees come under the age group of 26-30 years and 31-40years. 60% of Employees are married and 40% are unmarried. 24% of Employees are project manager, 18% of Employees are support engineer, 16% of Employees are software developer, 13% of Employees are analyzer, 11% of Employees are delivery manager, 10% of Employees are tester and 8% of Employees are team leader. 84% of Employees are permanent employees and 16% are temporary employees. 39% of Employees have completed PG, 31% have completed other degree and 30% of Employees have completed UG. 26% of Employees draw salary between Rs. 25001-35000, 23% draw salary between Rs. 35001-45000 and Rs. 45001-55000, 20% draw salary above Rs. 55000 and 8% draw salary below Rs. 25000. 24% of Employees have less than 5 years of experience, 23% have above 20 years, 20% have 16-20 years, 19% have 11-15 years and 14% have experience between 6-10 years.

Table-2: Weighted Average for Relaxation Techniques Practices

S. No.	Description	Always	Often	Sometimes	Rarely	Never	Total	Score	Rank
1	Yoga	20	15	25	10	30	100	2.85	7
2	Meditation	25	20	27	13	15	100	3.27	4
3	Home-Remedy	22	17	19	24	18	100	3.01	5
4	Walking	30	25	15	19	11	100	3.44	1
5	Listening to music	28	22	16	24	10	100	3.34	3
6	Sleeping	35	15	18	21	11	100	3.42	2
7	others	10	36	15	22	17	100	3.00	6

Inferences: From the above table-2, the highest relaxation technique is walking and least. Stress relaxation technique is yoga, which is practiced in the organization.

FINDINGS

- It has been found that 24 percentage of the respondents come under the age group of 41-50 years and 15 percentage come under 26-30 years and 31-40 years.
- From table 1, it has been found that 60 percentage of respondents are married and 40 percentage are unmarried.
- It has been found that 24 percentage of respondents are project manager and 8 percentage of respondents are team leader.
- The table highlights that 84 percentage of respondents are permanent employees and 16 percentage are temporary employees.
- The table 1 shows that 39 percentage of respondents have completed PG, 30 percentage of respondents have completed UG.

- From table 1, it has been found that 26 percentage of respondents draw salary between Rs.25001-35000 whereas 8 percentage draw salary below Rs.25000.
- It has been found that 24 percentage of respondents have less than 5 years of experience whereas 14 percentage have experience between 6-10 years.

SUGGESTIONS

- Work should be properly delegated to the employees to avoid overload of work, which could cause stress.
- Good relationship should be maintained within the employees to make the working Environment healthy.
- Proper grievance handling system should be practiced to help the employees to overcome their problems.
- Employees should be motivated by giving rewards for their excellent performances.
- Time management techniques should be taught to employees so that they complete their task within the scheduled time.
- Stress relaxation programmmes like yoga, meditation and exercises should be given to the employees.

CONCLUSION

Stress is a slow and insidious malady, which is an unavoidable one and a common problem in the workplace. The level of stress and its amount of consequences vary within and between organizations based on the nature and type of work practices. Organization must begin to manage people at work differently, treating them with respect and valuing their contribution. Recognition, participation and continuous training of employees are required to retain the skilled employees. It is the responsibility of the organization to see that its employees undergo stress relaxation practices to overcome stress, which maintains the sound health of the employees.

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Pezzottaite Journals,
24, Saraswati Lane, Bohri, Near Modern Dewan Beverages,
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(Mobile): +91-09419216270 – 71
editorinchief@pezzottaitejournals.net,contactus@pezzottaitejournals.net

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ANALYSIS OF ISSUES FACED BY ORGANIZATIONS ACROSS IT SECTOR IN MAINTAINING ENGAGEMENT LEVELS OF MULTIGENERATIONAL WORKFORCE

Archana Patil[5] Dr. Suruchi Pandey[6]

ABSTRACT

In today's highly competitive environment, exchange of ideas, thoughts, discussion on some important topics becomes more relevant and productive when it happens between people of different gender, age, culture and this is one of the reasons why organization is treating workforce diversity as a tool, which can give them competitive advantage over their competitors.

HR and talent management professionals are trying to develop and leverage a diverse and inclusive workforce. According to us, promoting diversity in any organization is not only the right thing to adapt, but also it is a competitive advantage as well to bridge a gap between the workplace and the marketplace. Diversity and inclusion are being considered as major components of Business strategy.

Technological advancements in IT sector affects leadership goals, employee satisfaction, and enhances quality of work. The first part of our report discusses the implications of multigenerational differences within the workforce. The second part defines the component of today's multigenerational workforce, pinpoints demographic shifts and explains the characteristic and traits inherent to each group. The third part addresses generalizations, Human resource challenges faced by IT industry, such as staffing, attrition and employee retention. Our report concludes with the discussion of the probability of organizing efforts and ways to improve cross-generational employee engagement and motivation.

The purpose of this study is to share with MCCIA, our insights and expertise about multigenerational issue within IT sector throughout India. This analysis identifies specific trends that will assist IT employers in engaging and motivating current employees and the future workforce.

KEYWORDS

Workplace, Employee Engagement, Multigenerational Workforce, Engagement Drivers, Generation X, Baby Boomers, Generation Y etc.

INTRODUCTION

Defining Engagement

Today companies and firms believe that engagement is a major source of gaining a competitive edge. Employee engagement does not hold any universal definition. Kahn (1990:694) defines employee engagement as "the harnessing of organization members' selves to their work roles; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances". The cognitive effect comprise of the employees' beliefs about the organization, beliefs about the leaders and working conditions of the organization. The emotional aspect deals with how the employees feel about each of the above-mentioned factors. In addition, their positive or negative attitudes towards the leaders and the organization are important factors. The physical aspect of employee engagement concerns the physical energies displayed by the employees to fulfill their roles. Thus, according to Kahn (1990), engagement is about being physically and psychologically present while performing an organizational task.

The Generations

Generation is defined as a cohort of individuals sharing the same events through music, news, educational background and styles of parenting during a certain time (Murphy, 2007). Thus, generation develops a collective outlook through the experiences formed during the formative years. According to a report by Gallup, Gen Y (Millennials), have overtaken the Baby Boomers at the workplace. The shift is increasing as the older generation is approaching retirement and more Millennials are joining the workforce. Due to the presence of multiple generations at workplace, which comes with different values and priorities, there is a potential of a real problem being created for the organization. According to latest study, there is an HR strategy to manage the aging workforce (Kirton, 2014). Organizations find themselves at a competitive disadvantage, engulfed in conflict due to lack of an effective strategy to address intergenerational challenges. They miss valuable opportunities in the process.

[5]Student (Human Resources), Symbiosis International University, Maharashtra, India, archana.patil2016@sims.edu
[6]Associate Professor (Human Resources), Symbiosis International University, Maharashtra, India, suruchi.p@sims.edu

What is the Multigenerational Workplace?

Today's IT organizations are becoming more aware of the significant impact of having five distinct generations in the workplace. A significant amount of literature exists on how to recognize the five separate generations, as well as how to attract and retain Generation X and Generation Y employees. However, research that addresses engaging and leading employees who comprise the multigenerational workplace appears to be emerging at a slower pace. Our study shows that a multigenerational workplace can be one of the ways for greater collaboration, unique exchange of ideas, and more productive working relationship, when managed appropriately.

The term multigenerational is typically used to describe the five predominant generations in today's workforce – the Baby Boomers, Generation X, Generation Y and Generation Z.

We have identified generation-specific differences, as well as similarities, and studied leadership techniques that benefit employees and leaders of all generations. Multigenerational conflict, an undercurrent in many IT organizations today, is preventable. HR Capital strategy strengthens intergenerational relationships, which ultimately improves the quality of the work environment.

We feel maintaining workforce diversity at work place has become one of the most important challenges which HR department of every organisation is facing in India today. By workforce diversity in organization, we mean group of people belonging to different culture, race, gender, languages and personality.

Importance of Multigenerational Workforce in Organization

Workforce Diversity in terms of multiple generations influences the work culture of an organization in many ways. It changes the mindset of the employees and makes them work in a friendly atmosphere, which is free of conflicts and complaints.

In handling the global talent acquisition war, having a multigenerational workforce plays a major role. Diversity brings both opportunities and challenges. Diversity drives innovation and creativity in any organization. Diverse team makes it possible to enhance flexibility and rapid response to change. Workforce from various generations gives a way to the new talent and ideas. It will help organization to bring in ideas of expertise from different industries together. It also helps in integration of employees from different city or country, which ultimately helps in bringing fresh prospective in doing any work.

How to Improve Workforce Diversity?

In the predominantly young workforce of India, it becomes important for any organization to assure that there should be no discrimination during hiring by training HR accordingly. This can be done by proper planning of recruitment and selection.

A manager who wants to efficiently manage the diverse workforce should be able to convince all employees about why diversity is important and how it will help their organization to grow in long run. He should be able to plan orientation and induction in such a way that all the workforce from diverse culture, gender and different generations feel comfortable to accommodate in new environment.

The higher management are usually responsible for motivating employees to work effectively and motivation need defers from person to person so they should be properly trained on how they should motivate employees from varying background. To avoid any conflicts arising management should make assure that ideas of all the segments should be taken into account before taking any decision.

Challenges in Managing Multigenerational Workforce

The Indian culture is one of the oldest civilizations with a wide range of people diverse in thoughts and beliefs. To convince the higher management about the importance of workforce diversity becomes a major challenge, as most of the organizations still do not want to change their existing work environment.

Although it is said that diversity will bring in more creativity and innovation but a large number of different minds may also lead to conflict and chaos in organization. To bring people with such differences in terms of age, culture, caste, gender, language together as it has been found that even if they are working in the same organization employees interact more with other employees who are similar to them.

Recruiting and retaining a workforce increasingly made up many generational groups is a challenge that can be tackled with a deeper understanding of each of the commonly identified generational groups. Effective managers must understand the times and

generational characteristics of these employees and they must assure that employees understand and respect one another's differences.

They must foster open discussion of how generational differences influence attitudes toward work and organizations. They must provide opportunities for multi-generation employees to contribute their best concurrent with meeting organizational goals. Employees must be offered a conditional security based upon value-added results and collaboration. Managers must use leadership practices that encourage the hearts of dispirited employees.

Drivers of Engagement across Generations

Today, diversification is treated as one of the key factor for sustaining competitive advantage. The success of organisations relies on various factors including the ability of its multi-generational workforce to collaborate within the interactive information society. Through our secondary research, it was found that there were two key issues in IT companies:

- There was a need for generational awareness in IT sector.
- The organization was facing challenges in managing multigenerational workforce.

Hence, our study addresses how this awareness presents benefits to various IT companies, such as, increased productivity, improved succession planning policies and strategies to recruit and retain a diverse workforce. The problem is directed at how diversity management influences Baby Boomers, Generation X and Generation Y in terms of their work performance and co-worker relationships.

REVIEW OF LITERATURE

Niemczyk and Ulrich, in the year 2009, conducted a study, which found the preferences of the millennial generation. Their research involving examining the work environment preferences of the Millennial Generation determined that this generation had a complex combination of relationship issues, personal growth ideas, and preferred organizational structures regarding their ideal workplace. These findings help determine that each generation had its own unique attitudes, work ethics, and preferred ways of managing and being managed.

Hayes, in the year 2010, conducted a research on "The Implications of Multigenerational Differences within the Workforce" According to him, these differences may impact the way people act in teams, and often miscommunication can lead to team members working concurrently but not collaboratively. Organizational success is dependent upon understanding the perspectives and desires of each generation and being respectful of their differences. All organizations are influenced by the values and preferences of their employees, and management needs to understand and adjust to these generational differences in order to avoid misunderstandings and miscommunications when considering employee productivity, performance, and retention.

Meriac, Woeher, and Banister, in the year 2011, conducted one of the first empirical studies to examine generational differences in the work ethic construct. They studied data from 1,860 participants collected over a 12-year period. Seven dimensions of 'work ethic' are ranked on a 5-point Likert-type scale: self-reliance; morality/ethics; leisure; hard work; centrality of work; wasted time; delay of gratification. Results show that Baby Boomers ranked significantly higher than Generation X and Millennials in all work ethic dimensions except leisure. Millennials ranked significantly higher than Generation X on three dimensions: morality/ethics, hard work, and delay of gratification. The pattern of results suggests that Generation Xers manifest the lowest level of work ethic of the three cohorts included in the study. However, in identifying the limitations of their study the authors conclude that interpretation errors (on the part of the respondents), measurement errors, and career stage could have an impact on the analysis. The conclusion of the study confirms that cohorts do, in fact, differ on their level of work.

RESEARCH METHODOLOGY

Topic selected for the study is **"Analysis of issues faced by organizations across IT sector in maintaining engagement levels of a multigenerational workforce"**. Today's managers face an unprecedented set of challenges. As organizations prepare for the coming generational shift, they need to take full advantage of the knowledge of their experienced workers, while at the same time, rethinking old paradigms about what work is and how it is done. Organizations that embrace generational differences in values, ways of getting things done, and ways of communicating will thrive.

Size of Sample and duration of survey: For the study, a sample size of 50 was taken. The study was conducted for duration of 4 weeks.

OBJECTIVES OF STUDY

- To analyses the issue of engagement amongst the workforce in IT sector.
- To identify the challenges being faced by the organization in managing the engagement levels of the workforce.

HYPOTHESIS OF STUDY

Based on the results of the pilot study, following hypothesis were formulated:

- **H_0:** Engagement issues vary from generation to generation.
  H_1: The workforce faces the same engagement issues irrespective of the generational difference.
- **H_0:** A generalized approach can be followed to engage a diverse workforce.
  H_1: No one-size fits all approach can be followed to engage a diverse workforce.

Methodology Used

Both primary and secondary data have been used in this study. A pilot study was conducted in the form of an online survey. Methodology used is survey method questionnaire.

Collection of Data

It includes information about employees gathered from 8 IT organizations via online survey and written questionnaires on the following topics: employees' perceptions of their work, organization/department as a whole, work group, supervisor/team leader, work style and outlook on life. In total, 50 employees participated. The data examines a range of experiences at the workplace.

DATA ANALYSIS AND INTERPRETATION

Part A

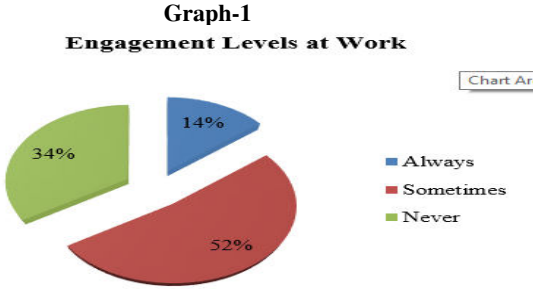
Table-1: Demographic Profile of Respondents

S. No.	Demographic Profile	Number (n=50)	Percentage (%)	S. No.	Demographic Profile	Number (n=50)	Percentage (%)
1.	Age (in Years)			2.	Gender		
a.	< 24	0	0	a.	Male	27	54
b.	24-30	25	50	b.	Female	23	46
c.	31-46	18	36				
d.	47-65	7	14				

Sources: Authors Compilation

PART B: Specific Information

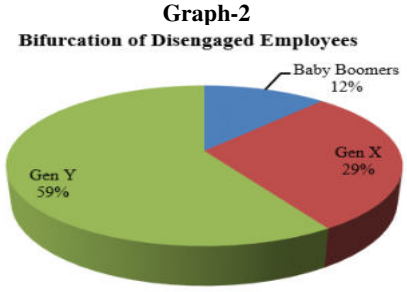
Graph-1



Sources: Authors Compilation

Analysis of engagement levels of the workforce: 52% of the workforce felt partially engaged.

Graph-2

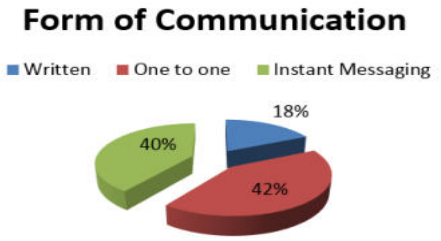


Sources: Authors Compilation

Analysis of the completely disengaged workforce: Gen Y constitutes the highest percentage i.e. 59% of the completely disengaged workforce.

Volume 5, Number 1, January – March' 2016
ISSN (Print): 2319-9016, (Online): 2319-9024
SJIF (2012): 3.201, SJIF (2013): 5.058, SJIF (2014): 5.891, SJIF (2015): 6.717

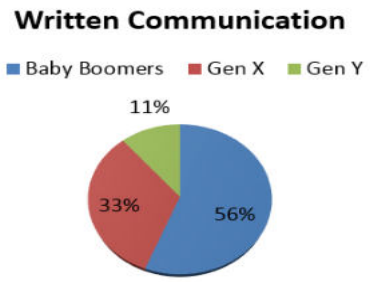
Graph-3



Sources: Authors Compilation

Preferred communication at work: One to one communication was most preferred form of communication closely followed by instant messaging.

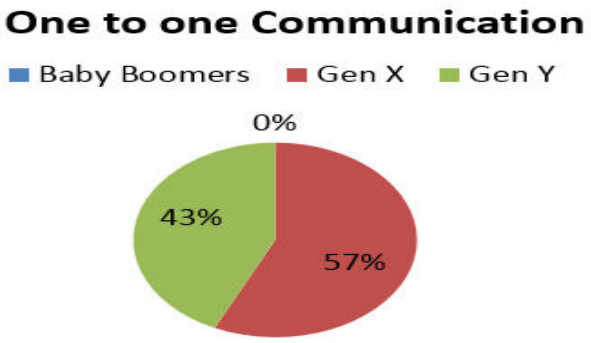
Graph-4



Sources: Authors Compilation

Baby Boomers completely endorse communication in written form.

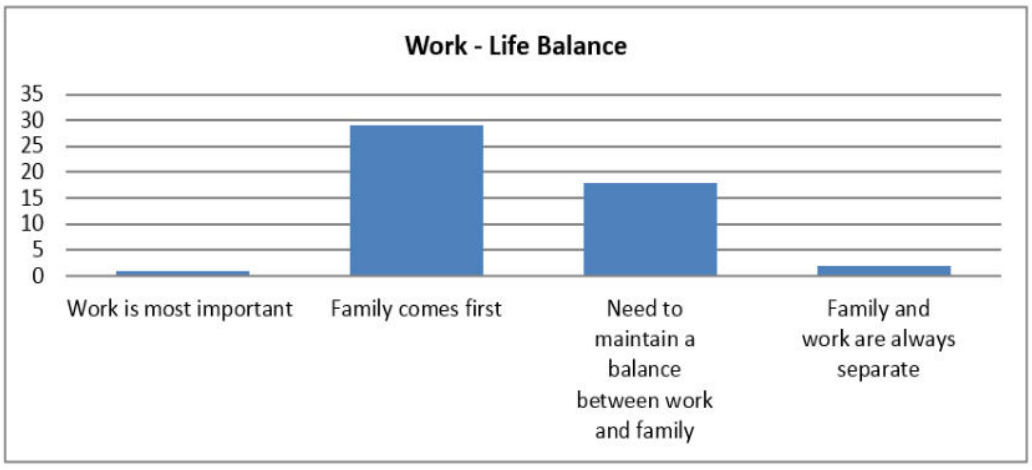
Graph-5



Sources: Authors Compilation

Gen X prefers one to one (personal) Communication.

Graph-6

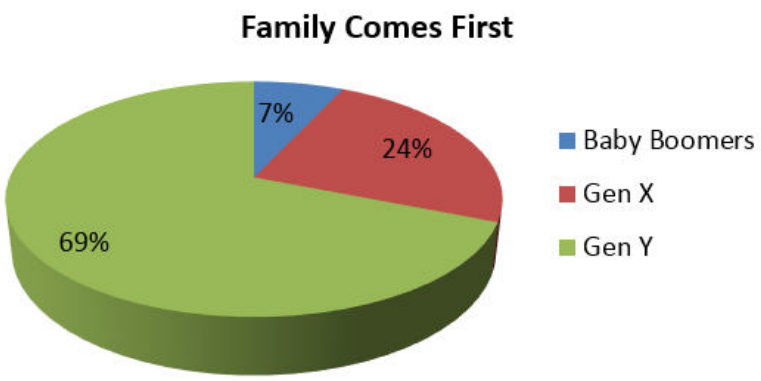


Sources: Authors Compilation

Analysis of the views of the workforce on maintaining work life balance: 29 out of the 50 respondents placed family first followed by 18 respondents maintaining a work life balance.

Volume 5, Number 1, January – March' 2016
ISSN (Print): 2319-9016, (Online): 2319-9024
SJIF (2012): 3.201, SJIF (2013): 5.058, SJIF (2014): 5.891, SJIF (2015): 6.717

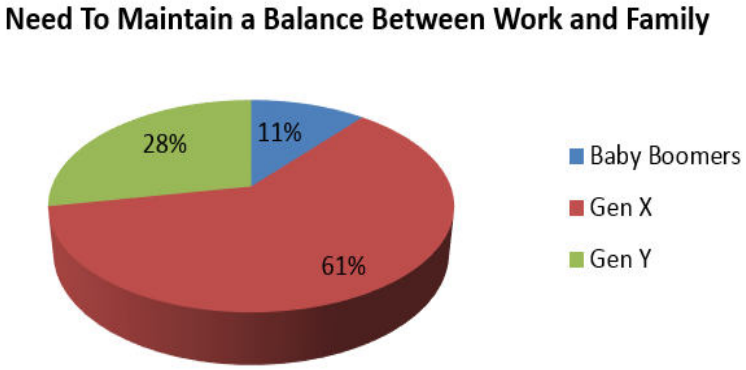
Graph-7



Sources: Authors Compilation

Analysis of the respondents who prefer family to work: A major 69% of the respondents who prefer family to work are Gen Y.

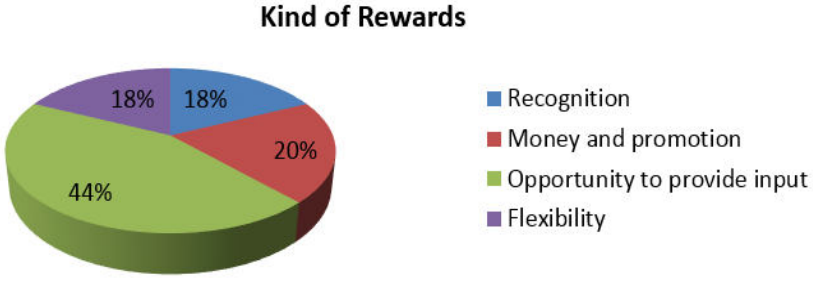
Graph-8



Sources: Authors Compilation

Analysis of respondents who prefer to maintain a balance between work and life: Gen X leads with 61% in maintain a perfect work life balance.

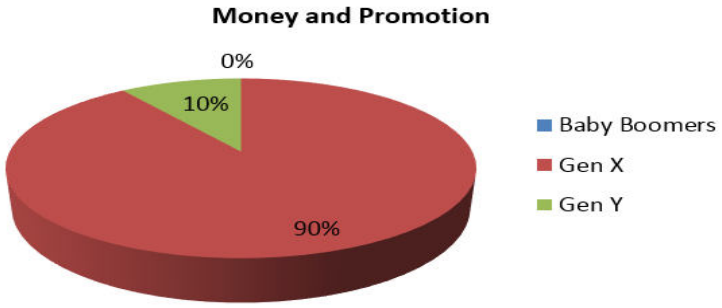
Graph-9



Sources: Authors Compilation

Analysis of types of rewards and recognition: The opportunity to provide input in the decision-making process was the major type of rewards that the workforce prefers.

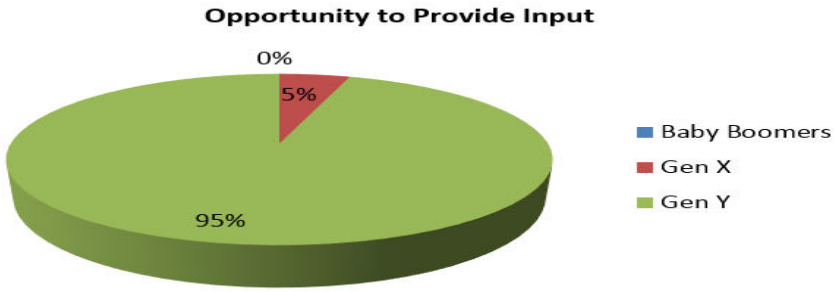
Graph-10



Sources: Authors Compilation

Analysis of the workforce who prefer monetary and advancement rewards: Gen X believes in the idea of monetary rewards and promotions as a form of rewards.

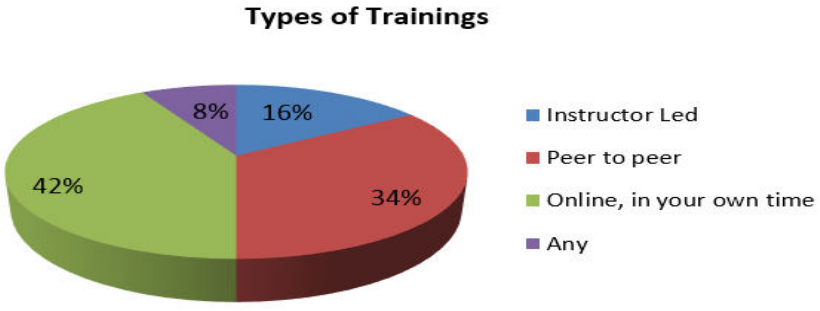
Graph-11



Sources: Authors Compilation

Analysis of the workforce who prefer a role in the decision making process: Gen Y majorly believes in being a part of the decision making process as a form of rewards.

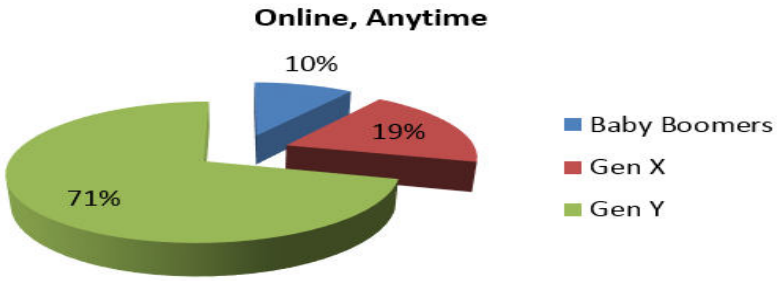
Graph-12



Sources: Authors Compilation

Analysis of different types Trainings: Online form of training is the most preferred followed by peer to peer and instructor led training sessions.

Graph-13



Sources: Authors Compilation

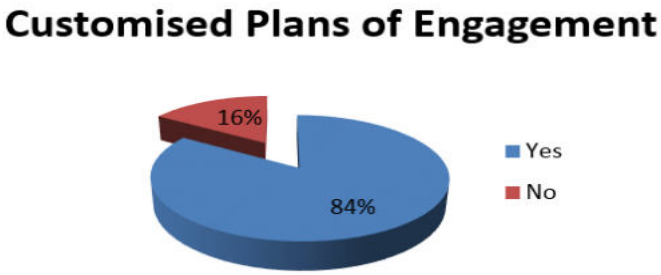
Analysis of the workforce, which prefer online form of training: Gen Y is found out to be the major endorser of online training, which can be taken anytime anywhere.

Graph-14

Sources: Authors Compilation

Analysis of the workforce who prefer peer-to-peer training: Gen X completely prefers attending peer-to-peer sessions as a form of training routine.

Graph-15



Sources: Authors Compilation

Analysis: 84% of the respondents think that it is necessary to have customized plans of engagement rather than following a strict common plan.

FINDINGS

Every coin has two sides; similarly, multi-generational workforce has both advantages and disadvantages for a firm. However, one thing, which is not to be forgotten, is that no company is this world of globalization would survive without diverse workforce. To avoid discrimination in any organization, it is very important to have a proper mechanism to manage Multi-generational. If not properly managed, it will results in challenges and difficulties for the organization and company will not be able to avoid workforce conflicts.

Major Findings from this Review Paper Includes:

- Traditionalists and Baby boomers reported higher levels of engagement than the younger counterparts did. Pitt, Catsouphes, Matz & Costa (2009) in their study stated that Baby boomers report better physical and mental health's are necessary factors for engagement. Hence, it is inferred that health plays a vital role in employee engagement.

- Employees that work in multigenerational team showed cultural support of flexibility at workplace. In addition, it was found that they have higher engagement levels.

- Organizations might plan to consider specific engagement drivers for their employees' in a specific generational cohort and other other age group. "One Size does not fit all" when it comes to process that most of the organizations could take about employee engagement.

- One major factor associated with higher engagement levels among Generation Y employees is the access to the flexibility to fulfill family and work responsibilities.

- Among Generation Y employees, satisfaction associated with training and development is a factor that results in high engagement level.

- Data collected during this project was split into three categories based upon the respondent's age. These age categories correspond to the respective ages of each generation.

Table-2

Generations	Current Age	Years Born
Baby Boomers	47-65	1946-1964
Gen X	31-46	1965-1980
Millennial (Gen Y)	24-30	1981-1990

Sources: Authors Compilation

Differing Learning Styles

While older generations were typically sent to formal training classes outside of the workplace, younger workers increasingly, expect that learning will take place within it. With four generations in the workplace, different training approaches and venues are needed to address the different learning styles of the cohorts.

Predominant Learning Styles of Each Generation

Table-3

Generations	Learning Styles
Baby Boomers	Desire for independence, and drive for success. Expert or instructor led; goal-oriented; competitive; "lead me to the information"; tech-latecomers.
Gen Xers	Individualists and also collaborative; peer-to-peer; "connect me to tech-adept.
Gen Y or Millennials	Need to see context and value; search and explore with each other, online, in their time, in their place; "connect me to everything"; tech-savvy.

Sources: Adapted from Bersin & Associates, "A New Organizational Learning Model: Learning On-Demand," (October 2007) http://joshbersin.com/2007/10/01/a-new-organizational-learning-model-learning-on-demand (accessed April 25, 2010); and others.

Accuracy of Age Group Generalizations

There are exceptions to generalizations about any group. There also exists overlapping characteristics within each of the four generations, particularly for employees born in cusp years, who may have experiences from, or exposure to, events from two distinct eras.

Understanding the shared life experiences of a generation enables IT employers to personalize leadership styles that benefit the entire workplace. While many employees within a group may not have identical characteristics, similar values are generation-specific based on events that shape the development of employees and underlie each generation's work ethic.

For developing leadership strategy and decision-making, the process of identifying characteristics unique to certain generations of workers enables healthcare leaders to make informed choices that affect individual employees and the entire organization.

Table-4: Summary of Factors Related to the Levels of Engagement by Age / Generational Group

	Gen Y	Gen X	Baby Boomers
Physical Health	✓		✓
Mental Health		✓	✓
Self-Evaluation	✓	✓	✓
Status as a Supervisor		✓	✓
Number of Work Hours			
Satisfaction With Training and Development		✓	
Access to Flexibility Needed	✓		
Supervisor Support			
Work Overload	✓		✓
Job Security		✓	✓

Sources: Authors Compilation

Generational Reward Preferences

Table-5

Generations	Learning Styles
Baby Boomers	Personal Attention, Promotion, and Recognition
Gen Xers	Free Time, Upgraded Resources, Opportunities for Development
	Certifications to Add to their Resumes
Gen Y or Millennials	Awards, Certificates, Monetary Rewards

Sources: Adapted from AARP, Leading a Multigenerational Workforce; Mixing and Managing Four Generations of Employees, Greg Hammill, FDUMagazine Online, http://www.fdu.edu/newpubs/magainze/05ws/generations.htm, accessed 7/2/2010, and Chief Information Officers Council, Net Generation: Preparing for Change in the Federal Information Technology Workforce (Washington D.C., 2010)

CONCLUSION

Understanding working style, unique perspectives and goals of Traditionalists, Baby boomers, Gen X and Gen Y will definitely lead to effective functioning of the organization. The study on managing across generations (Gaines & Wilson, 2009) states that to manage and engage the multigenerational workforce, one should be aware of the generational issues, avoid age stereotypes. One should learn to manage the unique strengths and need of each generation and should try to build a strong multigenerational workforce by catering to the needs of each group's need.

The review adds value to the present state of knowledge by the evaluation of various papers and literatures on engagement levels of multigenerational workforce. As a result, it addresses concerns about unmet research and about the disagreement on the definition of engagement and various ways to address the issues surrounding it.

"For employee engagement, one size doesn't fit all"

SCOPE OF FURTHER RESEARCH

There is a need for further research to study differences in individual behaviour. In addition, there is a scope to find if variables like personality would have an impact on levels of engagement. In addition, according to secondary research, huge part of this research has been done in the United States; hence, further research must explore various other countries where there is less knowledge about levels of engagement.

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INDIAN BPM COMPANIES STRATEGIC ONSLAUGHT TO REIGN THEIR SUSTENANCE

Dr. R. Vijaya Baskaran[7]

ABSTRACT

This paper tries to explore the ongoing strategic underpinnings attempted by Indian BPM companies to ascertain their continued edge in Global outsourcing since the beginning. The nearly two decades of service offerings to global majors by Indian business process outsourcing companies helped them to learn and master the art of service offerings to the global clientele as well as simultaneously move up in the value chain. The disruptive pace and the phase in which technology is affecting the nature of business services continue to be sought from Indian market is compelling Indian vendors to reinvent the structure of business processes and to offer the most critical even certain times core processes advertantly in a plausible manner to attract the new client besides retaining the existing clients. Will this be a temporary patch up solution or really making a deep difference from the earlier stages? This analysis is taken from top 15 BPM companies of Indian base who control close to half of the revenue generation and longstanding in the market. The assessment is made from grouping of strategic capability factors as the emerging strategic focus. More and more organizations now see the BPO services model as a way to both improve operational performance and create competitive advantage through processing excellence. Second Generation BPO, which focused on delivering bottom- line efficiencies, is becoming an essential and stable component of efficiently operating global corporations. The leaders in BPO services will continue to improve and refine the basic BPO model to deliver greater value to the bottom line.

KEYWORDS

BPM, Platform, Analytical, Outcome Based Pricing, Hub and Spoke etc.

INTRODUCTION

Close to two decades of Global outsourcing deals, Indian BPO majors are seen to establish seemingly irrefutable dominance not merely based on the earlier cost and labour arbitrage models but into progressively innovative models rebuilding on their competitiveness resulting in value based offering services and solutions to their clients literally moving ahead of the BPO value chain.

Though it started as a non-core, non-critical processes to be delivered by the outsourcing companies in India and as the global business complexities grew multifaceted larger Global clients are increasingly started to look for a holistic, outcome based sourcing strategies scouting for vendors to provide complete end-to-end solutions which made Indian BPO majors to resort to a better nimble approach with more dynamism as a compelling factor compared to their beginning days.

At the early stages, few prominent challenges faced were:

- A poor business environment not able to facilitate the IT as well as BPO growth in India
- Higher tax burden and inadequate government support
- Indian accent issues what is known as MTI (mother tongue influence) affecting the voice-based support services to the native English speaking audience.

What started in India as a fundamentally time sharing activity during 1960s emerged as data processing in 1970s and 1980s then grew into a shared services business in 1990s.Then after the launch of internet era which facilitated enormously the nature outsourcing activities of multinationals sourcing across the globe taking advantage of the time zone differences, cost and expertise in a massive manner. Offshoring and offsite works dominated the scenario in the early 2000s immediately after the Y2K issue.

BPO was also defined as a delegation of an IT-intensive business processes to a chosen external provider who owns, administers and manages it, according to a defined set of metrics" (Gartner 2004, quoted in Rouse and Corbitt, 2004).Indian BPO Industry which clocked a modest revenue of Rs.7200 crores (approx. US$ 1.6billion)in 2000-2001roseup to an estimated revenue of US$23.3 billion (Rs 1,42,048 crores) and a CAGR(2009-14) of 11.21% and especially in the financial year 2013-14 it registered a growth rate of 16.6% year-on-year and going as strong as ever as the world's biggest business process outsourcing (BPO) preferred country, accounting for nearly 38% of the US$53-billion overall global outsourcing market.

[7] Professor & Head, School of Management, Kristu Jayanti College (Autonomous), Karnataka, India, rvbaskaran@kristujayanti.com

GENERATIONS OF BPO

This paper unambiguously attempts to explore how Indian companies are working back to back to keep up their dominance they carved out professionally in the global outsourcing markets right from the early dominant periods and suitably they are equipping themselves to continue to get high margin, attract high value outsourcing contracts reposing and reassuring more trust and transparency factors for worldwide clients. Indian BPO industry had been riding on a high at growth rate of 40 per cent since the early 2000s and lowered down to15-18 per cent in the last 4-5 years. Reeling under the faltering growth, steadily increasing BPO employees' attrition rates at the entry level of 45-55% which is quiet strangulating in this sector and negotiating as well as renegotiating that too certain times during the mid-contract in client pestering pressure on always reduced costing methods ended up in reduced earnings missing the quarterly targets issuing quarterly warnings.

The BPO services market has a 15-year track record of evolution. The simple shared services model gave way to a sourcing decision to buy externally. The outsourcer's value proposition was providing the same services, but at a lower cost. Inevitably, the competitive environment drove the leading vendors to innovate and continuously improve their service offerings. The value proposition has also developed to match the accelerating demands of the buy side, which is under increasing price and globalization pressures.

The evolution of business process outsourcing during the last two decades can be characterized into major three phases or generations:

- 1st Generation BPO: Lift and Shift (call centre, few back office processes),
- 2nd Generation BPO: Offshoring (non-critical, non-core processes),
- 3rd Generation BPO: Value added offerings (non-critical, core processes),
- 4th Generation BPO: Changed into BPM model more on partnerships (some critical processes too).

In general offshore BPO has been identified as offering "tremendous opportunities to drive business value" (Lacity, Willcocks and Rottman, 2008). However, scarcity of related academic research in this area make decision-makers to proceed on faith, or rely on veracity of information from outsourcing vendors and consultants (who may not be disinterested parties) which insurmountably can lead to significant risk because reversing a bad strategic choice may involve major switching costs and will be even more become slower than the path into the initial outsourcing decisions (Rouse and Corbitt, 2007, Levina and Su, 2008)

METHODOLOGY

There are around 840 BPOs of Indian origin operating in India from the NASSCOM list was identified and out of these 44 BPOs are having a cumulative turnover of 57 % of the total turnover in financial year 2013-14. The main reason being even after the infamous global financial meltdown in 2008 Indian Outsourcing companies were performing at good rates. Data is collected from all the 44 BPO companies in terms of strategic outlook factors, net income and net revenue are compiled

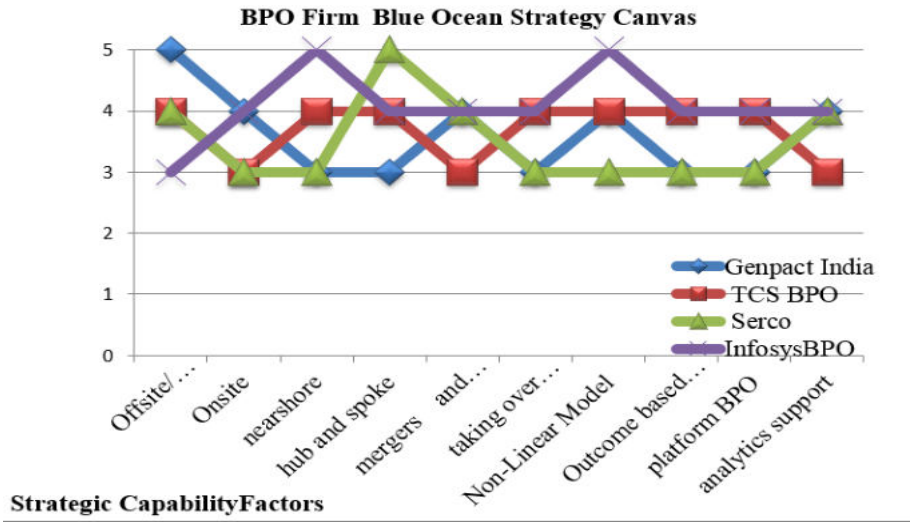
BLUE OCEAN AND RED OCEAN STRATEGY ANALYSIS

Blue Ocean Strategy was written in 2005 by W. Chan Kim and Renée Mauborgne, based on the principle that strategic management could extend its scope beyond competition (see Annexure I). The central thesis is how to generate new value, and this is accomplished through one (or more) of four perspectives: eliminating, reducing, raising or creating. **Red Ocean companies** try to outperform their rivals to grab a greater share of existing demand. As the market space gets crowded, prospects for profits and growth reduce. Products become commodities and cut throat competition turns the ocean bloody red. **Blue Ocean companies**, in contrast, access untapped market space and create demand, and so they have the opportunity for highly profitable growth. In Blue Oceans, competition is irrelevant. What consistently separates winners from losers in creating Blue Oceans is their approach to strategy. Creators of blue oceans do not use the competition as their benchmark, but follow a different strategic logic that we call *value innovation.* Instead of focusing on beating the competition, make them irrelevant by simultaneously creating a leap in value for buyers and your company, thereby opening up new and uncontested market space.

Canvas I

Genpact India was chosen since this the top BPO in the 15 companies list and being in the top position for more than 12 years as a pure play company .Blue ocean strategies are the emerging strategies like (i) Non Linear models, (ii) Outcome based pricing (iii) platform BPO and (iv) Analytics support. In the Figure-1 Compared to Genpact, Infosys BPO is clearly ahead in pursuing Non-linear model and Serco is up to Hub and spoke model and Genpact as a traditional BPO is still covering its conventional BPO strategies only that is relying more on Offsite/Offshoring and Onsite works to manage its revenue and operations.

Figure-1: Canvas I

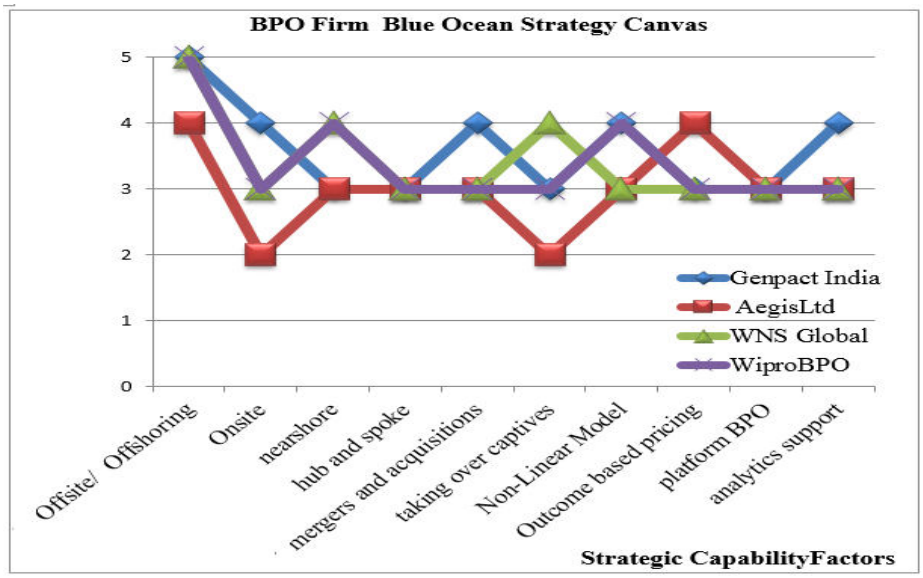


Sources: Authors Compilation

Canvas II

In the Figure-2 Compared to Genpact the other three companies Wipro, WNS Global and Aegis are fighting in the same conventional areas like Offsite / Offshoring and the earlier conventional outsourcing methods and laying less stress on the newer emerging trends. The Blue Ocean on the last four factors at the end is left as low profile by all these companies.

Figure-II: Canvas II



Sources: Authors Compilation

Canvas III

In the Figure-3 Compared to Genpact the other three companies Aditya Birla Minacs, EXL and First source are fighting in the same conventional areas like Offsite / Offshoring and the earlier conventional outsourcing methods and laying less stress on the newer emerging trends. In the Blue Ocean arena Aditya Birla Minacs and First Source has been attempting on non-linear growth models to better their productivity and performance.

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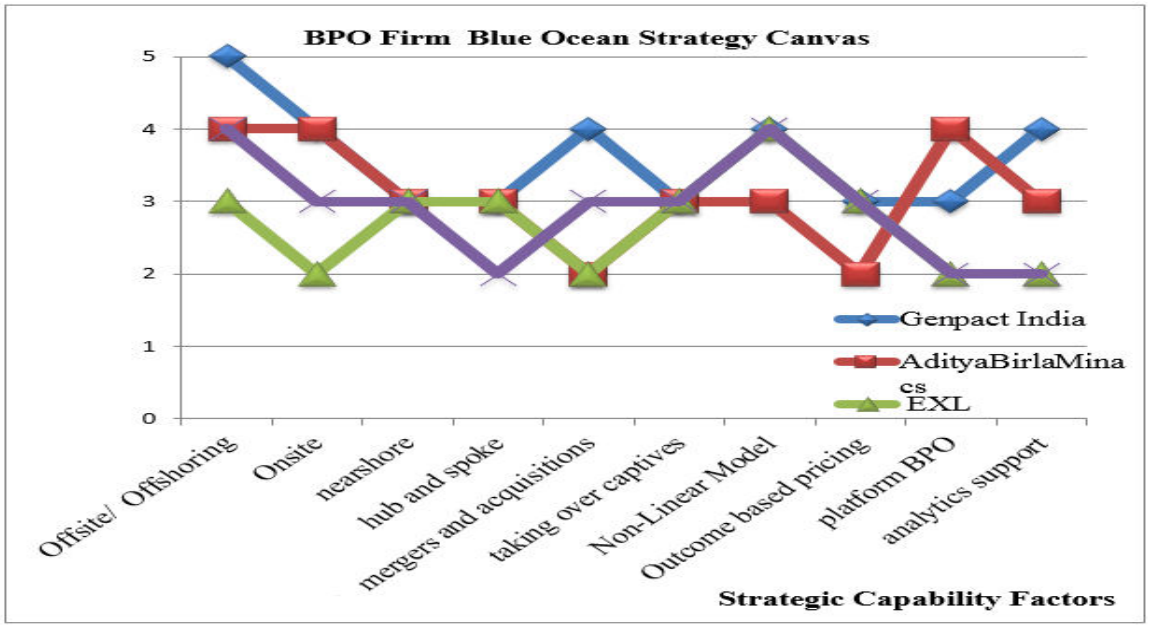
Figure-III: Canvas III

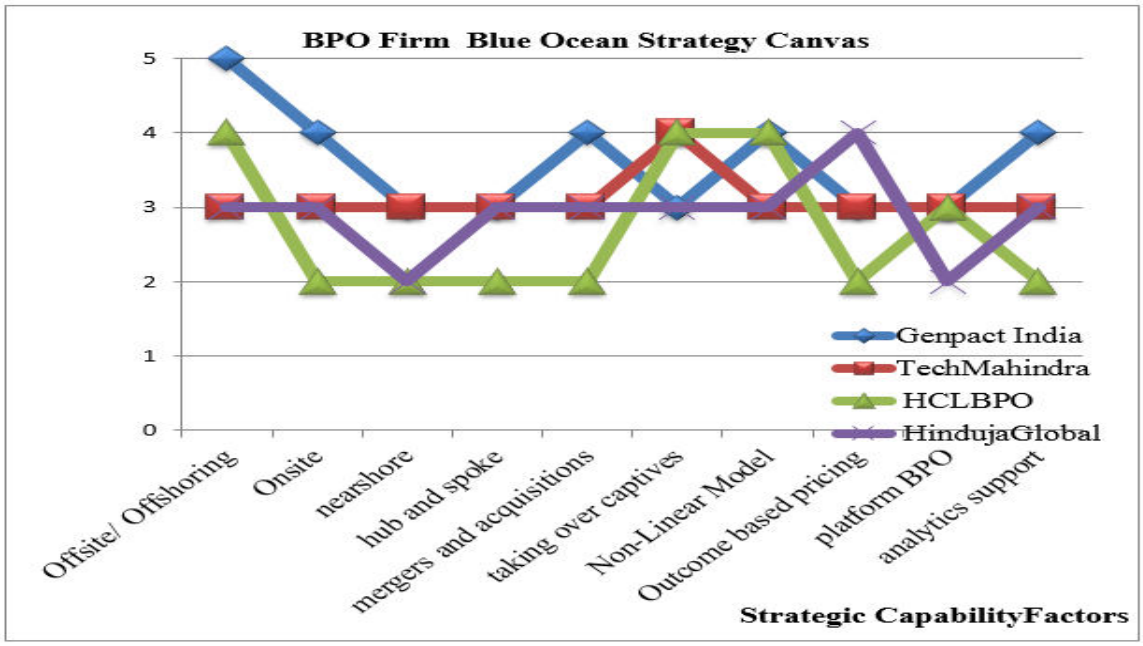


Sources: Authors Compilation

Canvas IV

In the Figure-4 Compared to Genpact the other three companies HCL BPO, Hinduja Global and Techmahindra are fighting in the same conventional areas like Offsite / Offshoring and the earlier conventional outsourcing methods and laying less stress on the newer emerging trends. Besides the three BPO Companies HCL is falling well below in the emerging area like platform BPO in which Hinduja global is also low performer. These Blue ocean segments have to concentrate in the near future.

Figure-IV: Canvas IV

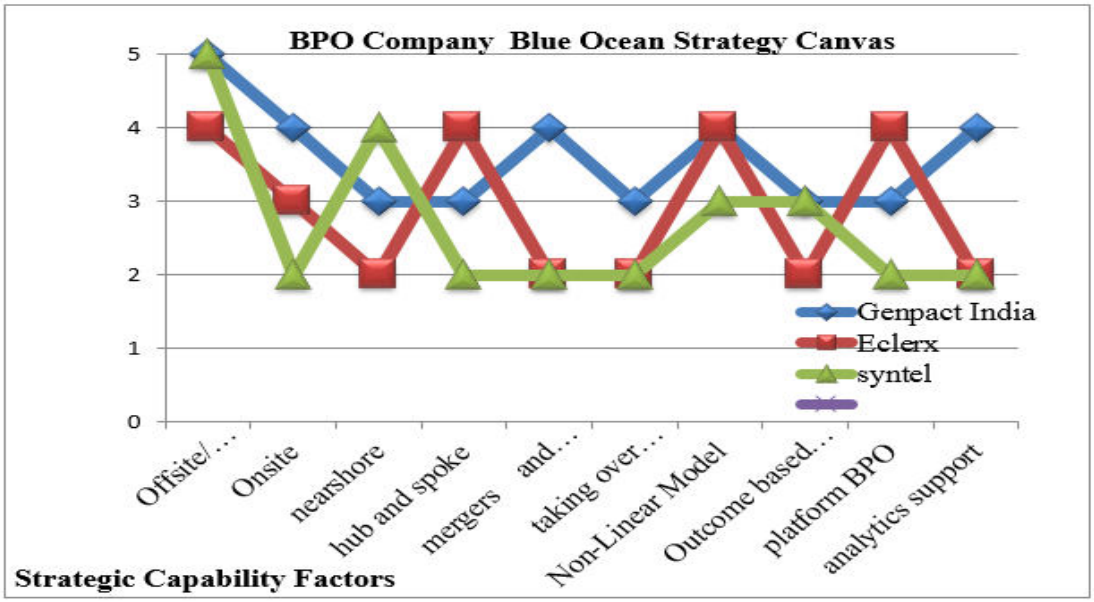


Sources: Authors Compilation

Canvas V

In the Figure-5 compared to Genpact the other two companies EClerx and Syntel who are having less than 10% of the total revenue when compared to the market leader Genpact have to largely concentrate on these Blue ocean segments in the near future.

Figure-V: Canvas V



Sources: Authors Compilation

Non -Linear Growth Performance Analysis

Non-linear growth models are fastly emerging as default standards of Indian BPO companies and as well as Global BPO market place where quantity is replacing quality. The earlier billing per seat or number of human equivalent is silently replaced with less headcount increased with more productivity at faster process turnaround levels. Indian BPO companies are employing approximately 3.5 million direct labour and close to 10 million indirect labour.

In 2013-14 the overall export revenue is Rs. 114810 crores. When following non-linear growth model to double this revenue in the next 3 years Indian BPO companies should add only 30% more workforce. So less than 4 million direct labour the revenue should be doubled. Table-1 shows how the six year revenue and head count is computed to arrive non-linear practices. Doing the same for all 15 companies the t-test is done and the results are displayed in Table-1.

Table-1: Model Computation for Non-Linear Growth

					% Revenue	% Head Count	
GenpactIndia	2008-09	3086	394.52	36200			Non-Linear
GenpactIndia	2009-10	4592	495.94	40800	48.8	12.71	4
GenpactIndia	2010-11	5680	641.46	46700	23.69	14.46	2
GenpactIndia	2011-12	7490.06	862.48	55400	31.87	18.63	2
GenpactIndia	2012-13	9290.24	916.74	59200	24.03	6.86	4
GenpactIndia	2013-14	11726	1263.46	66800	26.22	12.84	2

Sources: Authors Compilation

H_0: There is no significant difference between percentage increase in headcount and percentage increase in revenue.
H_1: There is significant difference between percentage increase in headcount and percentage increase in revenue.

Table-2: t-Test - Two-Sample Assuming Unequal Variances

Company	P value	Significant	Hypothesis
GenpactIndia	0.017***	YES	H_0 Rejected
TCSBPO	0.036***	YES	H_0 Rejected
SercoGlobal	0.42	**NO**	H_0 Accepted
AegisLtd	0.02***	YES	H_0 Rejected
WiproBPO	0.012***	YES	H_0 Rejected
InfosysBPO	0.011***	YES	H_0 Rejected
Firstsource	0.54	**NO**	H_0 Accepted
WNS Global	0.03***	YES	H_0 Rejected
AdityaBirlaMinacs	0.21	**NO**	H_0 Accepted
EXL	0.019***	YES	H_0 Rejected
HindujaGlobal	0.031***	YES	H_0 Rejected
HCLBPO	0.1	**NO**	H_0 Accepted
TechMahindra	0.121	**NO**	H_0 Accepted
Eclerx	0.016***	YES	H_0 Rejected
Syntel	0.029***	YES	H_0 Rejected

Sources: Authors Compilation

Out of the 15 Indian top BPO companies, 5 companies (shaded in Table-2) are not following Non-linear growth models. Except Tech Mahindra, Serco, First source, HCLBPO, Aditya Birla Minacs all 10 BPO companies taken for study is into practicing Non-linear growth models.

CONCLUSIONS

Of the US $146 billion, IT Industry the Business Process Outsourcing Industry is worth around US $24 billion. According to research firm IDC, the explosive growth in cloud and number of Internet-connected devices is expected to propel the IoT (internet of things) market globally to $3.04 trillion by 2020.

Indian BPO segment is aiming to exploit these disruptive technologies like IoT, mobility, cloud, 3D printing and automated cars that essentially comprise of more machine-to-machine interactions underpinning the dire need of stronger back end support system may bring in the next phase of growth for India's BPO sector.

Nasscom has formed a council to help the country's BPO / BPM industry to deliver $50 billion in revenues by 2020. India-based outsourcers are investing in more transformative capabilities in areas such as analytics, social media, and mobility and enhancing strategic local capabilities and resources.

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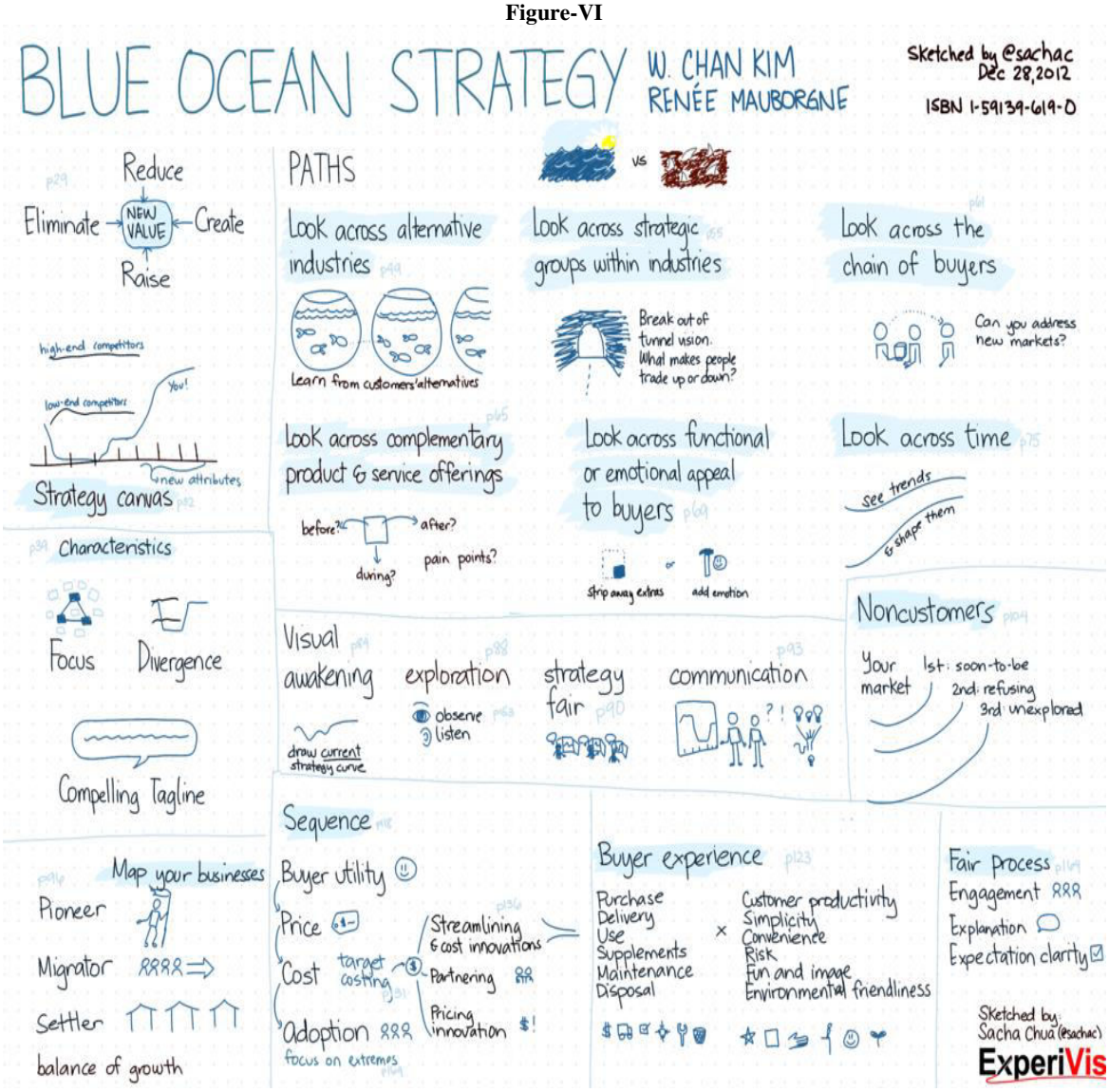
ANNEXURE

Figure-VI



Sources: Authors Compilation

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CSR: STRATEGIC IMPLEMENTATION IN KONKAN, PUNE AND AHMEDNAGAR REGION OF MAHARASHTRA

Dr. Asha Nagendra[8] Ankita Sinha[9] Saurabh Darekar[10] Sudarshan Chavan[11]

ABSTRACT

In today's competitive business environment, Corporate Social Responsibility (CSR) plays a vital role. The concept behind CSR is not to gain competitive advantage but it has become hygienic factor, something that is likely to expect from organizations. However, point of importance is how to deal with the stakeholders' consideration when planning CSR policies. The purpose of our study was to conduct an analysis on "CSR: Strategic Implementation in Konkan, Pune & Ahmednagar region of Maharashtra" and to study the factors which affect the selection of CSR activity and how they relate it with the brand image. The sample size selected was 15 respondents (companies) functioning in Mumbai, Thane and Pune region of Maharashtra.

The study provides an overview of organization's CSR practices. Brand Image of the company can be divided into two parts, Customer Perception & Employee Value Proposition. Customer Perception is external to the company & Employee Value Proposition is internal to the company. Results from this learning shows that brand image is affected positively by CSR & there is a relation between Socio economic conditions of the Konkan, Pune and Ahmednagar region of Maharashtra state and the CSR policies that companies adopt.

KEYWORDS

CSR, Brand Image, Customer Perception, EVP, CSR Practices etc.

INTRODUCTION

Corporate social responsibility (CSR, also called corporate conscience, corporate social conscience or sustainable responsible business / Responsible Business) is a form of corporate self-regulation incorporated into a business model. Today, all organizations join in social & environmental distresses or worries into their corporate processes and communications with their stakeholders. CSR is generally assumed as being the path through which an organization achieves a balance of economic, environmental and social requirements while at the same time accommodating the outlooks of stakeholders.

REVIEW OF LITERATURE

Srivastava (2012), conducted a study on "CSR: A case study of TATA Group" which goes around developing an understanding of CSR, digging into its idea & conclusion out to its scope taking case study of TATA group under Mr. Ratan Tata who has showcased the sense of accountability towards upliftment of common people & safeguard of environment & enhancement of the country. They recommended the execution of public-private partnership (PPP) for effective execution of CSR with government cooperation.

Sen & Bhattacharya (2001) carried out a study on "Corporate Social Responsibility and its effects on Brand Trust". CSR is an influential means for front-runners in creating strategy. However, not all firms might attain the similar affirmative result. It is because the implementation (leadership), sustenance (employee) and misuse (cause-related mark-com and branding) of CSR activities are not similar in every company. However, they concluded that effects of CSR on consumer behavior and brand attitudes have been rigid.

OBJECTIVES OF STUDY

The study focuses on two main objectives:

- To find the relation between Socio economic conditions of the Konkan, Pune and Ahmednagar region of Maharashtra state and the CSR policies of the companies operating there.
- To find out whether the CSR activities done by the company play an important role in creating their Brand Image.

[8]Professor, Symbiosis Institute of Management Studies, Maharashtra, India, ashanagendra9@gmail.com
[9]Student (MBA), Symbiosis International University, Maharashtra, India, ankita.sinha2016@sims.edu
[10]Student (MBA), Symbiosis International University, Maharashtra, India, saurabh.darekar2016@sims.edu
[11]Student (MBA), Symbiosis International University, Maharashtra, India, sudarshan.chavan2016@sims.edu

RESEARCH METHODOLOGY

The topic chosen for the study was **'CSR: Strategic Implementation in Konkan, Pune and Ahmednagar region of MAHARASHTRA'**. In today's era where every individual is becoming more and more aware about the environmental and societal impact of their activities, companies have adopted CSR as a way to benefit the society while benefiting them. Branding plays a very important role and companies have to do continuous evaluation of their brand perception by general public and customers. Companies who take active participation in CSR and endorse their CSR programs properly are perceived more positively than others who don't have evident programs, other all parameters being same. The sample includes 15 respondents from Mumbai, Pune and Thane region of Maharashtra. A questionnaire of 22 questions was made and administered. Based on the results of the pilot study the following hypothesis was formulated:

Hypothesis 1

H_0: There is no relation between Socio economic conditions of the Konkan, Pune and Ahmednagar region of Maharashtra state and the CSR policies that companies adopt.
H_1: There is a relation between Socio economic conditions of the Konkan, Pune and Ahmednagar region of Maharashtra state and the CSR policies that companies adopt.

Hypothesis 2

H_0: Companies that take an active role in promoting their corporate social responsibility programs are not viewed more favorably than those that do not have highly visible programs.
H_1: Companies that take an active role in promoting their corporate social responsibility programs are viewed more favorably than those that do not have highly visible programs.

Primary Data: The data has been collected using primary sources i.e. questionnaire.
Secondary Data were gathered from the sources like journal, books and internet to analyze the work done by other researchers prior to the present study.

RESULTS AND DISCUSSIONS

Table-1: Effect of CSR in creating EVP (Employee Value Proposition)

S. No.	Effect of CSR in Creating EVP	N=15	Percentage (%)
1	1 (Very Low)	0	0
2	2 (Low)	0	0
3	3 (Medium)	0	0
4	4 (High)	9	60
5	5 (Very High)	6	40

Sources: Authors Compilation

Discussions: From the data in Table 1, it is seen that 60% of the respondents feel that CSR activities conducted by them help substantially in creating the EVP while 40% feels it is very much necessary in creating EVP.

Table-2: Areas in Which your Organization Carries Out CSR activities in Konkan, Pune & Ahmednagar region of Maharashtra

S. No.	Most Critical Socio-Economic Issue in Konkan, Pune & Ahmednagar Region of Maharashtra	Number of Company Thinks About Socio-Economic Issue [A]	Percentage (%) [B=(A/15)*100]	Number of Cos. Actually Carrying Out the Activity [C]	Percentage (%) [D=(C/A)*100]
1	Education	14	93.33	14	100
2	Eco Village	12	80	11	91.67
3	Healthcare	13	86.67	11	84.62
4	Environment	11	73.33	9	81.82
5	Water Shortage/Drought Problem	0	0	1	6.67
6	Women Empowerment	6	40	3	50
7	Others	0	0	3	20

Sources: Authors Compilation

Discussion: From the data in Table-2, it is seen that almost all companies work in the field of Education, Eco village i.e. rural development in Konkan, Pune & Ahmednagar region of Maharashtra. The above results fulfil the first objective of the study, which states, "There is a relation between Socio economic conditions of Konkan, Pune and Ahmednagar region of Maharashtra state and the CSR policies that companies adopt".

Table-3: Rating the Brand Image of their Company in Relation to CSR

S. No.	Effect of CSR in creating EVP	N=15	Percentage (%)
1	1 (Very Low)	0	0
2	2 (Low)	0	0
3	3 (Medium)	6	40
4	4 (High)	7	46.70
5	5 (Very High)	2	13.30

Sources: Authors Compilation

Discussions: From the data in Table 3, it is seen that majority (46.70%) of the respondents feel that there's high level of Brand Image of their company because of their CSR activities while few (40%) feel that there's a medium level of Brand Image of their company because of their CSR activities.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.471	1.185		.398	.698
	Customer_Perception	.513	.204	.565	2.520	.027
	EVP	.272	.266	.230	1.025	.326

Note: Dependent Variable: Brand_Image
Sources: Authors Compilation

In order to test the hypothesis, statistical tools such as **Linear Regression Equation** was used and the equation came out to be:

Brand Image = 0.471+0.531 (Customer Perception) + 0.272 (Employee Value Proposition)

The above results fulfil the second objective of the study, which states, "CSR activities done by the company play an important role in creating their Brand Image."

Table-4: Effectiveness of Communication in CSR Activity

S. No.	Effectiveness of Communication in CSR Activity	N=15	Percentage (%)
1	Better Employee Engagement	12	80
2	Support from Stakeholders	9	60
3	Better Reputation in Market	14	93.33333
4	Transparency in Surroundings	4	26.666667

Sources: Authors Compilation

Discussion: From the data in Table 4, it is seen that 14 respondents out of 15 say that they earn a better reputation in the market by performing CSR activities, while 12 respondents thinks that there is a better employee engagement within the organization.

Flagship Events: From data received from respondents, we have identified following major flagship events of various companies.

Cognizant Education & Livelihood: Providing technical training and making the youth of rural people employable. They also teach vocational skills to people with disabilities to give them confidence to live life with pride. Other way of helping is funding the vocational training which currently going on at some other place.

Outreach: It is conducted at all locations of Cognizant. Employees teach students of municipal schools in various cities and prepare them for competitive exams like scholarship exams. They also conduct competitions among those schools to build confidence among students. These activities are employee driven and hey actively participate in such activities during their weekends.

Cipla Healthcare: 'The Cipla Palliative Care and Training Centre' in Pune continues to provide holistic care to terminally ill cancer patients and their families free of charge. They give them medicines free of charge and provide them with residential treatment in order for total care. It also includes moral support for patients and their family.

Education: Major activities include arranging training and awareness programs for adolescents. It also includes setting-up or developing infrastructure for schools like potable drinking water, sanitation facilities, benches, books and other stationeries. A practical approach of teaching is followed in order for them to understand real world examples that they correlate their curriculum with.

Environment: The basic aim of this initiative is promoting environmental sustainability in backward parts of country where people have very little understanding of their responsibility towards environment. Besides these, it also aims at promoting conservation of natural resources like water, coal, trees. Other secondary functions include promotion of Renewable Energy Resources like solar energy and wind energy.

Reliance Industries Limited 'Education for all': Started in 2010 it is a joint task of Mumbai Indian cricket team and Reliance industries. It aims to uplift an under privileged child through equal education opportunities. It is aimed at schools in Gujarat & Maharashtra especially in the rural parts of these places.

Project Jagruti: A project to encourage & bring dyslexic students from the less privileged segment into the main stream.

Health: The Dhirubhai Ambani Hospital at Lodhivali (near Karjat), Maharashtra, engaged extensively to develop the quality of life in neighboring communities. During FY 2013-14, thirteen medical camps were conducted. They are also targeting mortality of mothers and providing services to people suffering from TB.

Thyssenkrupp Education: Primary motive of Thyssenkrupp is promoting education & employment enhancing vocation skills particularly for children, women, elderly, & the differently able in rural areas of Aurangabad & Southern Pune. It will also include their livelihood up gradation.

Healthcare: Promotion of preventive action for health is done at rural places to prevent people from falling ill. Good sanitation habits are inculcated. Safe drinking water, disaster relief activities in rural areas of Aurangabad & Southern Pune region is made available. They also have various programs for Eradicating hunger, poverty and malnutrition.

Environment: They are also very particular about conserving environment by ensuring environmental sustainability, ecological balance, animal welfare, agroforestry. They also have huge projects regarding renewable energy projects.

Thermax Education: 'Thermax has been supporting the work of Akanksha Foundation, working to improve the lives of underprivileged children. It supports two of Akanksha's learning centres in Pune, After-school learning centers & Teach for India. A collaborative work happens where staff from teach for India teaches and logistical and financial support is provided by Thermax.

Watershed Management: Thermax, in association with CII and Gaurav Pratisthan (popularly known as Pani Panchayat) launched a project for watershed management in Pondhe village, 70 km from Pune. It includes educating people of the importance of rainwater harvesting. Professional knowledge is given to them along with guidance from mentors from this field. It has helped them tackle problem of water shortage.

Deepak Fertilizers and Petrochemicals Corporation Limited Project with Ishanya Foundation: Ishanya Foundation works near Pune district and in villages of Taloja near Panvel in Raigad District on the issue of Livelihood skills, Women Empowerment, Health & Education. They also provide need based health initiatives with a special focus on the eyes, especially Avoidable Blindness and Diabetes.

Health: The foundation has set up an OPD with few doctors for villages like Taloja & high schools for eye care. They also cooperate with Jehangir hospital for required facilities. They carry health check-up camps regularly. They conduct a training session for women to teach them tailoring.

Social upliftment: An exhibition is carried out for items produced by them. They organize cultural events for people with physical disabilities. Under this program, they also funded a session for teaching hospitality management to youths. They carried out English speaking activities for which almost 70 students have applied.

CONCLUSION & RECOMMENDATIONS

Corporate sustainability is a developing process & not an end. The Companies bill is an appreciable as well as appropriate step taken by the Government. However, 'spending' part in the CSR is undecided and is left for the organizations to decide. Globally, the conception of CSR has been acknowledged as a portion for achievement & existence of business along with fulfilling social objectives. However, the task for the organizations is to define some sturdy CSR strategy policies that would endeavour high performance in ethical, environmental & social areas & must fulfil all the stakeholders' goals.

The results of hypothesis testing regarding the relation between Socio economic conditions of the Konkan, Pune and Ahmednagar region of Maharashtra state and the CSR policies that companies adopt suggests that socio economic conditions are taken into consideration by the companies while formulating the CSR policies.

The results of hypothesis testing regarding companies that take an active role in promoting their corporate social responsibility programs suggest that the companies who have visible CSR programs have a better brand image.

Rating the Brand Image of their company in relation to CSR Impactful CSR activities help build a bridge of mutual trust between society and companies. This point is supported by the fact that majority of companies feel that better engagement with society and good reputation are the benefits that they get out of CSR.

Critical socio-economic issue in Konkan, Pune & Ahmednagar region of Maharashtra Though there is good match between the major issues that companies feel are prevalent in Konkan, Pune & Ahmednagar region and the field of activity in which they are conducting their CSR activities but there are few areas like water shortage and women empowerment where companies need to put in more efforts to bridge the gap.

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CURRENT TRENDS IN HR TECHNOLOGY AND ROLE OF ICT IN HRM PRACTICES

Dr. S. Sundararajan[12]

ABSTRACT

Information technology is expected to drive Human Resource (HR)'s transition from a focus on Human Resource Management (HRM) to Strategic Human Resource Management (SHRM). The usage of HRIS and role of HR technology are in improving the professional standard of the employees irrespective of the size of the industrial sector. The role played by HR Technology helps to better perform the various sub functions of HRM. It is an attempt to explain how HR professionals and managers are using HR Technology in different functions of the organization, which see the effects of HRIS on strategic HR tasks and job roles.

INTRODUCTION

The role of technology with in human resource management has altered considerably over the last decade. Never before has human resources been as empowered by technology, nor has there been such an unequivocal consensus about where it is headed. The use of technology in HR started as a practice in transforming obsolete processes but has grown into a tool for organizations to market their HR brand. Through the automation of processes, HR technology has advanced to create an environment in which HR professionals view their roles not as mere administrators, but as strategic enablers for key organizational decisions. New tools have advanced the most basic HR function such as recruiting, communications, engagement, recognition, and retention through the creation of highly efficient systems.

Human Resource Information System (HRIS)

Two decades ago, HRIS is defined as a system used to acquire, store, manipulate analyses, retrieve and distribute pertinent information about an organization's human resources. Later in 2003, HRIS will be implemented at three different levels: the publishing of information, the automation of transactions and a change in the way human resource management is conducted in the organization by transforming HR into a strategic partner with the line business. While there were both correct in their vision of what HR systems will be or can do in the future, they stopped short of estimating how quickly this will be achieved, and how much it will evolve. Having quickly delivered o its initial purpose, i.e. to create a well-oiled machinery on which the vehicle of basic Human resource management can run, HR technology has moved ahead by leaps and bounds into areas of development that no one imagined it would go. Earlier, perhaps around the time they were first introduced, HR systems were built as back office support software that would store employee data; manage payroll, leaves, attendance, and other such commonplace tasks. Used primarily by HR managers, these systems were the most basic in their functionality and served those well.

HR Technology

While such automation continues to exist, think e-HRM (electronic Human Resource Management or HRIS (human Resource Information systems) the demands from technology by the field of HR has changed drastically. Human Resource technology is increasingly being repurposed to place the focus on its contribution to business processes and success. This advancement of HR technology has occurred parallel to the changing needs of organizational HR. whether as the cause of it, or a consequence is worthy of debate. However, together, over the past decade, human resources, human resource technology has gotten a lot more sophisticated in how they measure and justify what they do, commanding respect from within, and outside the organization. This increased responsibility for HR technology has spawned a Software industry today resulting in an explosion of startups and new ideas, spurring a never seen before interest from private equity and venture capital firms and millions of dollars of merger and acquisition deals in this space. As money comes to HR technology, so do new ideas and smart people. The result: we are seeing one of the most innovative times ever in the HR technology market.

Redefining the Role of HR

Among many ways in which human resources have evolved recently, its recognition of Human Capital and Talent are most significant. For many years, people were seen by organizations as yet another cost center. Because financial sheets do not reflect an organization's human capital, it was not acknowledged for the longest time as the strategic asset that it is. That changed with new-era companies like Google, Apple, Microsoft and others that bought into focus highly successful products and services that were embodiments of their talents pools. Human resources went from looking for employees to fill open position to the science of using strategic human resource planning to improve business value and to make it possible for companies and organizations to

[12]Professor, School of Management, Kristu Jayanti College (Autonomous), Karnataka, India, rajanphd2009@yahoo.com

reach their goals. This shift towards attracting, managing, measuring, and retaining talent is discernable. While there are those who believe that these are just new phases for old work, the reality is that this is a new way of looking at what HR is and redefining what it does.

Recruiting in the new millennium has taken the concept of talent management even further, Businesses are now facing talent in the form of hands-on, aware generation that demands nothing less than the best work spaces, modern hiring systems, better engagement at all levels, easier, request communication rolling feedback, learning and development opportunities, and a lot more. With a changing workforce, the perception of HR too has undergone a massive change-from being a support function, to being an advisory one, from a focus on what an employer demands to configuring what employees need. Employee-based workplace ranking speak a lot for how human resources is now perceived by organisations worldwide. In an attempt to find their spot among the rankings if best companies to work for, organizations are going the extra mile to create workplaces that are a reflection of their best policies. In turn, they are rewarded with a workforce that feels a sense of pride, attracts better talent, and overall creates a great brand that also resonates with customers.

No longer is HR the ancillary role that exists only to employ people and manage grievances, but one whose practices affect the bottom line of an organisation. Some of new focus areas for HR now include Talent sourcing, acquisition and retention, employee systems of engagement, performance & productivity analytics, Learning Management, training administration, Succession Planning and many more. This mew focus has led the way for HR technologies that play well into how to manage people and their talents-to engage, grow, retain, and develop. Some examples of this technology includes social recruiting online skills assessments, bring your own device, e-learning systems predictive analytics, etc. The HR technology industry is innovating, rapidly to keep up with the changing demands of Human capital management. This paper focuses on the disruptions and trends in this multi-billion dollar business predicted to set the tone for organizational human resource management in the coming months.

TRENDS IN HR TECHNOLOGY

Recruiting Technologies for Millennials

Given the sheer size of the global recruitment market, the paper-resume-screening-interviewing-selection method has never been the most optimum in matching talent to the right job. Online recruiting and applicant tracking systems brought some efficiency, and streamlined the process. However, its only social recruiting that has trustily provided global businesses with the solution for building an effective workforce. While linked-in was the first to demonstrate how well social media tools can play into corporate recruitment, others followed suit soon enough to contribute to the current IT industry market for corporate recruiting software. The millennial generation's quick adoption of technology has contributed greatly to the entire recruitment process going digital. Candidates now look for and apply to jobs online, take remote assessments, interview through video, text and audio tools, and continue to grow the market for social referral recruiting.

For employers on the other hand, social recruiting has created an opportunity to build customized talent networks to improve employment branding, create job visibility, source through highly targeted groups, and monitor interest in the brand and more. The non-barriers of geography in the online space have also opened up opportunities for talent matching to a much larger field.

The other thing that recruitment technology is bringing about a change in is the candidate experience in recruitment. Employers are increasingly becoming aware of the fact that the job application process has a major impact on their employment brand, as well as future employee engagement and retention levels.

In the bid to create favorable candidate experiences, employers are looking beyond the regular resume screening, to technologies such as gamification. With gaming, mechanics to create simulated environment employers are able to not only test employees' hands-on skills, rather than bookish knowledge, but they are also creating a positive brand memory and recall.

Marriott International Inc. was among the first companies to use gamification to create a unique recruitment campaign. In an online social media hosted game entitled My Marriott Hotel, the hotel chain invited potential candidates their skills in the role of a hotel kitchen manager in a very closely real-life resembling environment. The successful campaign not only drove up the brand recall but also attracted large numbers of Marriott's target audience of millennials between the age of 18 and 27 to apply. Riding on the wave of companies purchasing corporate recruitment software, new tools in the space continue to be developed. From end-to-end recruitments, there is an abundance of technology at display in the recruitment space. Some other trends contributing to recruitment technology, explained later in the paper are Video Interviews, Online Assessments Mobile recruiting and Web proctored Tests. In The Talent Board's Candidates Experience Awards of the 45000 survey respondents, of those who had a positive experience, 61% said they would actively encourage colleagues to apply to the organization, 27% of those who had a negative experience would actively discourage colleagues from applying. In addition, 50% of positive share their positive experiences 32% of negatives broadcast their bad news. This is not even the worst. A bad experience during the interview or assessment stage many stop a good candidates from applying or from accepting a job offer.

The Science of Assessments

Not only research, but also the case study of companies such as Google has repeatedly indicated that data driven assessments lead to a better quality of hire than various other pre-hire screening methods. Yet less than half of all global organizations include any form of assessments as part of their recruitment strategy. The use of assessments beyond recruitment, such as in measuring engagement, conducting training, assessing effectiveness of development program, etc., is generating a ton of interest from organizations that are able to see the immense value of the data this can generate. The growing interest has led to a sharp increase in the size of the assessments market, and in conjunction, the breadth of assessment technologies on offer. Since the time testing went online, assessments have become even more sophisticated in terms of content, administration, results, benchmarking and more from basic multiple-choice questions format, to simulated environments, and performance based testing that lets candidates, demonstrated what they can do with what they know. From knowledge-by-rote-learning to hands-on skills evaluation, this has created a highly favorable situation for employers to hire the right candidate.

Aquent, a leading employment agency headquartered in Boston, was looking for a way to evaluate IT professionals on coding kills, in order to create a roster of job-ready candidates worthy of recommendation to their prestigious clients. Using an advanced front-end-coding simulator, Aquent mandated all candidates to solve coding challenges in real-time, instead of taking a regular multiple-choice question exam. This enabled Aquent to hard-verify every claim made by the candidates, rather than go by claims made on a resume.

Domination of Mobile

Mobile is continuing to drive the consumerization of HR technology. Millennial workers are often described as digital natives. As employers look for ways to comply with employees needs to use technology the way they are used to it, policies such as BYOD (bring your own device) are offering solutions to integrate these needs with the necessary corporate tolls for professional success. BYOD also called bring your own technology (BYOT), bring your own phones (BYOP),bring your own PC (BYOPC)-refers to the policy of permitting employees to bring personally owned mobile devices (laptops, tablets, and smart phones) to their workplace, and to use those devices to access privileged company information and applications.

From answering work emails to using HRIS, the worker of this generation continues to seek flexibility and convenience in all things work related and so HR will have to continue to offer specially built mobile applications for things rather than mobile version of what already exists. This offers organizations the obvious benefit of reduced costs (no need for the new fleet of black berries, or the associated Mobile Device Management costs) but also the opportunity to see more favorably. Research has concluded that the adoption of new technological tools affects employees' productivity, their chances of seeking a new job, and affects a potential candidate's desirability to apply to the business. For HR, the mobile revolution has translated into the redeployment of several functions to mobile. Job applications, candidate communication, feedback systems, learning and training programs, administrative tasks and a lot more now integrate better with mobile, giving employees the capability to manage just one device, and to employers' the ability to expand access quickly. For Example, for a multi-national company with offices around the globe, a learning program for managers made available on the mobile, can generate for greater enrollment from employees across their locations, at a fraction of the cost, than a traditional office-based program ever could.

What a Recruitment cycle on Mobile may look like?

- HR posts a job on a social network,
- Candidate applies to the job through their mobile,
- Business emails candidates about short listing,
- Candidate takes initial skills assessment,
- Emails resume,
- Employer schedules video interview,
- Candidate is offered a job over email.

Performance Management, e-Learning and MOOCs

Thanks to the flexibility in the hands of employees to seek and apply to a new job now organizations have had to step up the performance management and learning management systems that existed for decades. Annual evaluations and appraisal programs no longer cut it with the workforces today who expect a lot more than a steady paycheck. Employees expect their organizations to provide opportunities for learning, mentoring, recognition, development, a 360^{o} review, continuous feedback and a lot more.

Famed management consultant W. Edwards Deming listed annual performance reviews as one of the seven deadly diseases, with the insight that it nourishes short-term performance, annihilates long-term planning, builds fear, demolish teamwork, nourishes

rivalry and polices. New performance management tools allow for regular assessments, transparency in goal setting, and an overall conversation about performance rather than a sero-sum dispute about appraisals and compensation.

A shockingly small number of companies admit to having a performance process that drives any level of value. As an increasing number of factors make it to the millennial employees' list of what constitutes a good work place, employers have turned to technology to focus on providing internal talent mobility, career growth and learning opportunities. Online assessments, feedback portals, e-learning, MOOCs, are a few of the technologies that have facilitated the creation of talent strategies that help HR to review employee performance, provide rolling feedback and access to new roles offer custom learning programs and more. In conventional classroom learning, the delivery of content has been limited to a formal system that followed a time-based model of delivery. Technology has allowed content to be brought to the users' doorstep, or in this case, on their computer and mobile screens. Rather than enrolling for tedious daylong sessions to learn a new skill, employees now log on to YouTube or internal resource libraries that let them take courses as per their convenience. Stimulated training techniques where video, audio or gaming mechanics are used, are known to inspire higher engagement with lesions and boost information durability.

Another trend making giant strides in the realm of corporate learning and education is massive open online courses, MOOCs, which combine the set of subject-specific knowledge with assessments, evaluation, certification, and come with the access, flexibility and cost-effectiveness required of a modern learning platform today. Employees stand to gain by making an informed choice, upgrading their knowledge and skills and become more relevant to their business. Employers benefit from having a skilled workforce and are seen as a company that cares about employee development.

Transcending Descriptive Analytics

With all the new ways in which assessment science, e-learning and performance management are creating data subsets for businesses, there is a pile of human resource data that businesses are sitting on but are not sure of what to do with. When harnessed to big data, these talent analytics are revolutionizing how businesses hire, fire, promote, retain and a lot more under its human resource functions. While raw data by itself does not ass any value, powerful insights can be derived from unprocessed data sets and these insights is what is determining this data's worth to human resources. While so far organizations have concerned themselves only with data that is descriptive-that which falls within the realm of reporting analytics, predictive analytics is quickly transforming the value of this data into data into something far more relevant and even critical. Descriptive data is that which summarizes what has already occurred. Think: number of job applicants to specific jobs, percentage of hires that stayed beyond the first six months etc. Through the utility of statistical tools, predictive analytics uses large data to recommend courses of action by showing the likely outcome of each decision.

How does Big Data and Talent Analytics apply to Human Resources?

- Sourcing Candidates: Predictive analytics will be able to tell you advance where to place your online recruitment marketing for optimal performance and cost.

- In Hiring: By identifying, qualifying and predicting the future performance of a candidate before making hiring decisions. For example, If you have to choose between two candidates, who in every way so far proved to be equally qualified, talent analytics might help predict which one is more likely to succeed, or how long will it take for this person to succeed.

- Learning and Development: What are the development gaps, how can we close them**?** What will be the learning needs for teams of the future**?**

- Succession Planning: Who are the people that need to be groomed for leadership position**?** What gaps can be predicted for coming years to identify leaders more quickly**?**

Unification or Integration with other Systems

Another dramatic transformation in the way HR functions has been in the way it collaborates and incorporates from other professions. Where it once worked as a mostly independent unit, collaborating with other teams only to understand their workforce requirements, there is now an increased emphasis on collaboration to incorporate a balanced perspective on what works, and what does not in changing human behavior. While human resource professionals bring with them their psychological and social instincts, teams such as marketing, sales, and others can provide answers to everything else that drives human behavior, such as incentives motivation etc. Innovations and new ideas in HR technology are at a peak, with new companies launching into the space each with its solution to a specific HR task.

However, the winning businesses of the future in HR tech will be the ones that think past the individual human resource function to integrate systems as all-inclusive platforms, for both, the organization and the employee. Also as big data and predictive analytics abounds, the value of people-data to non-HR teams will become more evident and with the enlargement of the pool of people who will demand their share of this data, integration of HR technology with other business enterprise solutions will be a deal-breaker. This is one reason for the rising adoption of the SaaS (software-as a-service) model in HR tech, which makes it easy to upgrade, or transition systems internally, or even outside the organization. As the workplace undergoes radical changes itself in the way employees interact and communicate, companies will look more and more for vendors that offer a complete user experience-design interface and modern functionality, rather than the features alone.

CONCLUSION

Big data, assessments, mobile, video, e-learning and more, HR technology has some interesting times ahead and will continue to see exciting and unique developments. However, the biggest driver of HR technology remains the need to prove ROI against basic human resource practices of attracting, retaining, and engaging talent. Information will continue to be the most valuable asset to a business and thus the interest in analytics to gain crucial business insight will grow even if in new forms, and definitely in more secure ways.

Human resource personnel will continue to learn in the face of the quagmire of big data, redefining their roles to better grasp analytics and minimize understanding errors. After all mistakes in critical people, matters can hurt a business. In addition, even while predictive analytics becomes more accurate in its futuristic prophecies, it is no guarantee of actual outcomes. An assumption based on the wrong interpretation of data can lead to the erroneous distribution of resources, without any improvement for the future. However, that should not let an organization from exploring newer processes. Studies have proved that organizations have adopted technology for their HR processes consistently outperform those that do not have. Even as technology continues to get more sophisticated, the focus on an easy-to-use, integrated, interface will grow. As HR continues to evolve to meet the changing pressures on the businesses of today, so will HR technology alter to provide solutions to not only make these changes simpler and more manageable, but also provide the impetus for the next cycle of change.

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Editor-In-Chief
Pezzottaite Journals,
24, Saraswati Lane, Bohri, Near Modern Dewan Beverages,
Jammu Tawi – 180002, Jammu and Kashmir, India.
(Mobile): +91-09419216270 – 71
editorinchief@pezzottaitejournals.net,contactus@pezzottaitejournals.net

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ELECTRONIC CUSTOMER RELATIONSHIP MANAGEMENT (E-CRM)

Dr. U. Kanaka Rao[13] Danda Udaya Shekhar[14]

ABSTRACT

In this paper, an attempt is made to understand the role of e-CRM in building the customer relations better. CRM is a term that gained widespread recognition in the late 1990s. Market analysts say that billions of dollars will be spent on CRM solutions software and services designed to help businesses more effectively manage customer relationships through all types of direct and indirect channels.

Customer relationship management (CRM) can be the single strongest weapon to the manager to ensure that customers become remain loyal. Since the beginning of the new millennium, traditional marketing practices have not been effective in yielding good returns. The phenomenon of building a relationship with customers via the internet is known, as electronic CRM (e-CRM) the objective of the CRM and e-CRM are the same the difference is the medium used for providing services to the customer. E-CRM focuses on electronic channels mainly on the internet and on technologies that enable automated and electronic management of customer relations.

PRELUDE

Peter Drucker said, "The purpose of a business is to create customers and it is the importance of keeping those customers and of growing the depth of their relationship with business. After all, as research by Frederick Reichhold and Earl Sasser of the Harvard Business School shows, most customers are only profitable in the second year that they do business with you. That's right, initially, new customers cost money to spent on learning what they want and teaching them how best to do business with company.

Robert Thompson is founder and president of Front Line Solutions, Inc., an independent CRM consulting and research firm specializing in the emerging field of partner relationship management (PRM). Through his groundbreaking research in PRM requirements and best practices, he has earned a reputation as the industry's leading PRM consultant. In January 2000, Mr, Thompson founded CRM Guru.com (http:www.crmguru.com), which has become the largest and fastest growing CRM portal, with more than 100,000 members worldwide. CRM Guru.com unites a worldwide community of business managers who want to learn about CRM and exchange ideas and perspectives with others.

A panel of CRM experts-the "gurus" working with CRM Guru.com defined the Customer Relationship Management (CRM) is a business strategy to select and manage customers to optimize long-term value. CRM requires a customer-centric business philosophy and culture to support effective marketing, sales, and service processes, CRM applications can enable an effective Customer Relationship Management, if an enterprise has the right leadership strategy, and culture.

Few Definitions of CRM

'Way to identify, acquires and retain customers, is a business greatest asset' - **Siebel**

'A comprehensive business model for increasing revenues and profits by focusing on customers' - **Martin Walsh**

'An information industry term for methodologies, software, and usually Internet capabilities that help an enterprise manage customer relationships in an organized way' - **Marios Alexandrou**

There is gradual shift in marketing practices from basic marketing to reactive marketing and then to relationship marketing. In day of now, selling services was comparatively easy. Many companies took their customers for granted and could practice Leaky Bucket approach of marketing in expanding economics and rapidly growing markets. Owing to changing demographics, fierce competition and over-capacity in many industries, most companies are up against the problem of customer churn, that is, customer defection. It has become imperative for every company to fight for its share in the flat or faded market. They also realized that customer is the king or queen and retaining an existing customer is less expensive than creating a new customer for their products and services.

[13]Associate Professor, Department of Business Management, Swarna Bharathi Institute of Science & Technology, Telangana, India, dr.ukrao2015@gmail.com
[14]Assistant Professor, Department of Business Management, Madawalabu University, Ethiopia, dandauday@12348@gmail.com

Customer Relationship Management brings together all techniques and tools that are used to enter into relation with customers and prospects, in order to retain them and offer them a product or a service that is most suitable for their needs. In concrete terms, CRM is managed through software in which companies provide the following customer's information: last name, first name, telephone number, address, places where the client prefers to purchase, means of payment. This information helps the company to better focus the client and to send him offers, to provide products and services that meet his needs, by reducing costs.

Internally, the company has at its disposition a tool that sets out all the contacts. The use of this contact database can be wide. To be in contact with the customer or prospect, a range of techniques may be employed:

- **Telephone** is convenient to get into the significant part with the person and directly get his attention, with an exchange. This tool enables the company to make up their mind and act accordingly to the customer's needs and requirements. Having that said, sometimes it can be difficult to break the telephone switchboard and office assistant barriers to contact the right person.

- **Email** is a double-edged tool. First, company must ensure that it will have a valid mailing address that deals with the right person. Then, the email must be neither too short nor too long, and manage to get the attention of its recipient. Finally, this is a tool that does not reply the response whether immediate or not. That said, without going into endless descriptions, an email could contain a link, a video introducing the company, the product or the service better than by phone.

- **Direct contact**, as well as phone, has the benefit of having the person standing in front of customer and getting directly his attention, adjusting the speech in line with what the customer or prospect says. In the case of an appointment, the advantage for the contact of the company is that the client or the prospect is inclined to receive him and thus supply and demand can be meet.

INTEGRATED CUSTOMER RELATIONSHIP MANAGEMENT (ICRM)

Integrated Customer Relationship Management (ICRM) is the latest marketing strategy that meets the challenges raised by daily marketing, consulting services. It provides a theoretical framework for defining and constructing Customer Relationship Management (CRM) under market competitions. The ultimate goal of ICRM practice is to help companies in achieving sustainable competitive advantage through a strong customer relationship.

ICRM is solution to overcome the limitations of current CRM practices. It provides guidelines for standard process for effective CRM. It is because a company cans achieve sustainable competitive advantage in the end by building strong customer relationships. Thus, building strong CRM is the primary goal of a company is marketing practices. By putting customer needs at the center of marketing practices and defining customer relationship based on customer's basic needs, ICRM integrates all marketing functions in the process of building strong customer relationship.

- Firstly, ICRM defines customer relationship as intangible connections between a customer and company. It then constructs customer relationship from their basic needs. Thus, in ICRM practice, needs constructs value and the value determines customer relationship, which is the fundamental force behind a customer's loyalty behaviors. Secondly, as ICRM defines customer relationship under market competitions, it manages competitive customer relationship. Thirdly, it integrates all marketing functions and develops strategies to manage customer relationship through the "Zoom In" and "Zoom Out" integrated analytical processes.
- **The "Zoom In" process**: ICRM analyzes the competitive customer relationship in the marketplace and maps it into the company's database.
- **The "Zoom Out" process**: In this process, ICRM analyzes the data in the company's database and based on it develops CRM strategies under market competitions.
- ICRM is all about integration and through this integrated process; it overcomes the limitations of current CRM practice.

ELECTRONIC-CRM

The phenomenon of building a relationship with customers via the internet is known, as electronic CRM (e-CRM) the objective of the CRM and e-CRM are the same the difference is the medium used for providing services to the customer. E-CRM focuses on electronic channels mainly on the internet and on technologies that enable automated and electronic management of customer relations. E-CRM is a multi-faced strategy that helps companies to understand, anticipate and manage customer needs. A major thrust of it involves segmenting customers and offering appropriate and differentiated services for each of these levels. It mainly uses the electronic media to integrate and simplify customer-related business processes, drastically reducing costs of customer-facing operations while achieving CRM's primary goal to enhance the customer experience.

CRM is the seamless co-ordination between sales, customer service, marketing field support and other customer-touching functions. It integrates people, processes and technology to maximize relationship with all customers and partners, e-customers, distributional channel members, internal customers and suppliers. CRM results in a number of benefits to an organization like increased margins improved customer satisfaction ratings and decreased administrative costs.

DIFFERENCES BETWEEN CRM AND E-CRM

Meaning*:* CRM is a comprehensive approach for creating, maintaining and expanding customer relationship. E-CRM is the online CRM process. E-CRM that is the online CRM is an additional means of communications and level of interaction with the customers is different due to the difference in the technology and its architecture, which allows for the case of self-service to the customer.

Coverage: In CRM, the wide area coverage is not possible but in case of e-CRM, wide area coverage is possible.

Time Consumption: In CRM, it takes more time to get response from the customers. In e-CRM, the response time is reduced.

Response: In CRM, the response from the customers is a quick one, in e-CRM; a response may or may not happen due to poor response from online customers.

Cost: In CRM, the business organization has to spend more money to collect the data but the response is good so the cost is normal. In e-CRM, the business organization has to spend more amount to collect the data and feedback from online customers. However, the response is not as good as compared to CRM.

Security: In CRM, the data is secure and no additional costs are incurred to secure the data. In e-CRM, the data may be made secure by using some techniques like firewalls, digital signature and so on but the amount spend on securing the data for the above techniques is also high.

Effectiveness: CRM is more effective than e-CRM due to the limited and secure response of the latter. Due to the wide coverage area, but optional response from e-CRM, it is not an as effective as compared to CRM in the initial stage.

Innovation: Innovation is optional in CRM. However, due to its development, innovative techniques are adopted in e-CRM.

Attraction: In CRM, direct contact is possible. Even though it may or may not be an attractive option. Due to its development, e-CRM is attractive because of audio-visual features, animations etc.

Clarification of Doubts: The doubts can be clarified in CRM due to the availability of a direct channel of communication. In e-CRM, customer doubts are clarified indirectly. At times more hours to clear it.

Informative: CRM is highly informative. E-CRM is not highly informative.

Accessibility: In CRM, it is easy to access the data. In e-CRM, it is difficult to access the data because computer knowledge and technical skills are a prerequisite to access the data by a customer.

IMPLEMENTATION OF E-CRM

E-CRM implementation is more than system automation, implementing e-CRM necessitated much more than merely automating the related function and addressing the infrastructure requirements for its implementation on the web. It requires a fundamental change in the culture, philosophy, attitude and operation of an organization and hence, there is a need to initiate change management process to move from a product-centric focus to a customer-centric one. With this view, the implementation strategy should look at:

- Gathering, strong, sharing, retrieving, and tracking customer database repository, analyzing this information and deciding upon the relevant course of actions.
- Seamless integration of all customer communication channels with the customer database to respond in customers preferred channel.
- Automating and streamlining on–line customer service through installing the necessary software and hardware.

STEPS IN IMPLEMENTATION OF E-CRM

- Getting a firsthand feedback from customers, preferably through an un-biased third party would be vastly useful in identifying problem areas in the customer relationship management cycle, a key input for any e-CRM implementation exercise.
- Successful e-CRM implementation warrants the need for a well-planned infrastructure in place that allows capturing, storage and analysis of customer data.
- An organization must select the e-CRM software based upon the incremental ROI that it will bring to the organization. Sans this exercise, benefits of e-CRM implementation could take anywhere between three to six months and the business returns could start flowing on over another six to twelve months more.
- There is an increasing need in the country for institutions offering high-class e-CRM training programs to organizations, as this could save enormous cost and time of these organizations.
- Organizations need to select the e-CRM vendors cautiously and must prefer those that offer sufficient training, incentives, etc. to their employees and representatives.

DIFFERENT LEVELS OF E-CRM

In defining the scope of e-CRM, three different levels can be distinguished:

- **Foundational Services:** This includes the minimum necessary services such as website effectiveness and responsiveness as well as order fulfillment.

- **Customer centered Services:** These services include order tracking, product configuration and customization as well as security and trust.

- **Value added Services:** These are extra services such as online auctions and online training and education.

ELECTRONIC CRM APPLICATIONS

E-CRM applications are varied and many in industry segments: a) Banking & Finance, b) Hospitality, c) Telecom, d) Transport, and e) Government Organizations. Every industry segment finds CRM's utility virtually irreplaceable if they have a large customer base, several customer touch points and scope for multiple customer interactions such as financial services.

General Applications of e-CRM

- **Customer Segmentation:** Typically, mountains of customer data are available from the data warehouse. By applying mining tools, clusters of similar records can be made. From this, one can arrive at a list of customers who are more likely to respond to new product launches, new promotions, discount on specific products etc. This will help in finding a highly targeted market.

- **Prediction:** Data mining tools can build a classification system based on past data taking a number of parameters into consideration. Depending on this system, a new customer's behaviour can be predicted with reasonable accuracy. The same principle applies to a new product launch. Before the product is launched, its sales can be predicted. This can help in deciding the advertisement and pricing strategy.

- **Customer Loyalty Analysis:** To develop effective customer retention programs, it is vital to analyze the reasons for customer attrition for this Data Mining and OLAP tools can help in understanding customer attrition with respects to various factors influencing a customer and, at times, one can drill down to even individual transactions, which might have resulted in the customer switching over to competitors.

- **Cross Selling:** Based on the previous purchases made, data mining tools can provide a wealth of knowledge about the association between tow products. This can be used in building a strategy for promotion or to sell more products to the customers at the time of contact.

- **Customer Lifetime Value (CLTV):** Customers who are not very profitable today may have the potential of being profitable in future. Hence, it is essential to identify customers with high lifetime value. The, tools are designed to provide methods to calculate CLTV in different business environments.

- **Product Pricing:** Using data warehouse and data mining tools, sophisticated price models can be developed, which can establish price sales relationships for different products and the relationship between changes in prices and sales.

- **Campaign Effectiveness Analysis:** Once a campaign is launched, its effectiveness can be studied across different media. To the CRM managers, e-CRM offers the opportunity to personalize interactions and drive real time decision-making. At a tactical level, e-CRM allows the marketing department to make an honest evolution of campaign and initiative performance. Strategically, it helps to identify where performance drives and market opportunities lie. E-CRM can provide a 360 degree view of the customer and E-CRM allows the enterprise to focus on retention strategies and fine tune the brand in accordance with the changing customer needs and performances.

E-CRM IN INDIA

India is emerging as the hot spot for the e-CRM services. Industry experts has estimated the domestic e-CRM market size at close to $50 million. Growing at an average annual rate of around 30 percent to 35 percent, this market is expected to be worth around $300 million over the next three years. It is believed that in the end, India definitely has the potential to capture almost a fifth or more of the global e-CRM market. Examples of companies that have already made use of the opportunity:

- Korean consumer electronics subsidiary in India has about 25 percent of its dealer sales online (via an ICICI payment gateway), and purchase orders are fed into the ERP systems for production planning.
- Essar steel auctioned a part of its steel output in July-August 2000 and realized Rs.400 more per ton than it realize normally would.
- Banking majors like Citibank, HDFC, ICICI and IDBI have already initiated the implementation of CRM solutions to bridge the gaps in relationship management. Thus, there are very good prospects for e-CRM in India.

CONCLUSION

Customer Relationship Management brings together all techniques and tools that are used to enter into relation with customers and prospects, in order to retain them and offer them a product or a service that is most suitable for their needs. The phenomenon of building a relationship with customers via the internet is known, as electronic CRM (e-CRM) the objective of the CRM and e-CRM are the same the difference is the medium used for providing services to the customer. E-CRM focuses on electronic channels mainly on the internet and on technologies that enable automated and electronic management of customer relations. E-CRM is a multi-faced strategy that helps companies to understand, anticipate and manage customer needs.

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GREEN MARKETING RESEARCH: A REVIEW OF LITERATURE

Dr. Vedava P.[15]

ABSTRACT

When a growing segment of consumers started either rewarding or intending to reward firms that address environmental concerns in their business and marketing practices and punishing firms that appear to ignore the environmental imperatives, businesses started to manufacture environmentally friendly or in other words green products and to create green product policies in line with the societal and social marketing process.

The challenges for social/societal marketers are multidimensional and complex. It is important to have a general acquaintance with the various issues before initiating any measure to deal with these challenges. It is here the review of multiple literatures related to green marketing can greatly facilitate the examination of various issues such as what needs to be greened (products, systems or processes), why consumers purchase/do not purchase green products and how firms should think about information disclosure strategies on environmental claims. Accordingly, here, based upon the concept of green marketing, an attempt has been made to review multiple literatures related to green marketing research. The review unfolded some of the multidimensional and complex issues related to green marketing. Accordingly, Green marketing subsumes greening products as well as greening firms.

The essence of environmental marketing is the strategic product and customer decisions in which environmental issues are emphasized and environmental strengths are used as a competitive advantage. Firms may choose to green their systems, policies and products due to economic and noneconomic pressures either from their nonmarket environment (regulators, citizen groups and other stakeholders or from their consumers, business collaborates (the market environment). As the literature pointed out, the impact of market and nonmarket environments is mutual. Thus, firms need to adopt a coordinated approach to their market and nonmarket strategies.

Further, Green marketing is an emerging segment of the social performance literature. As such, the analysis of the impact of this new market on the consumers and the environment has been insufficient so far indicating a need for further research that can afford the examination of several other unexplored areas.

KEYWORDS

Green Marketing, Market Environment, Non-Market Environment, Strategic Product, Social/Societal Marketer, Theory of Motivation, Collective Action Dilemmas, Institutional Theory, Stakeholder Theory, Corporate Social Performance Perspective etc.

INTRODUCTION

Consumers now have become more sensible to environmental issues and have a high level of involvement regarding environmental issues because of growing environmental consciousness. Many Authors believe that they have worries about the future of the world and as results of this mostly prefer environment friendly products. Accordingly, companies have started to form their marketing strategies, named as green marketing, to appeal increasing awareness of this environment-friendliness. The natural and physical environment, traditionally viewed as an external influence on the process and content of managerial decision making, is now considered as central to corporate strategy (Drumwright 1994; Hart 1995; Shrivastava 1994). Businesses that are environmental stewards stand a chance of gaining many satisfied and loyal customers.

Unlike traditional marketers, social and societal marketers need to determine the needs of target markets and to deliver the desired satisfactions in a way that enhances the consumer's and *the society's well-being*. By doing so, social and societal marketers seek to persuade consumers to change their lifestyles. "However", according to Prakash (2002), "these behavioral modifications may not directly/sufficiently benefit consumers or the benefits may also be nonexcludable" (p.291). Further, social marketing literature suggests that consumers' incentives may be eroded if they believe that their actions *alone* may not enhance the community's welfare (Weiner and Doescher, 1991). Thus, the challenges for social/societal marketers are multidimensional and complex. It is important to have a general acquaintance with the various issues before initiating any measure to deal with these challenges. It is here the review of multiple literatures related to green marketing can greatly facilitate the examination of various issues such as what needs to be greened (products, systems or processes), why consumers purchase/do not purchase green products and how firms should think about information disclosure strategies on environmental claims. Accordingly, here, based upon the concept of green marketing, an attempt has been made to review multiple literatures related to green marketing research.

[15]Assistant Professor, Department of Commerce, Mangalore University, Karnataka, India, vedavap@yahoo.co.in

GREEN MARKETING

The growing environmental consciousness within the business and consumer communities caused the emergence of a new market, which is the green market. In its first workshop on "Ecological Marketing" held by The American Marketing Association (AMA) in 1975 ecological marketing was defined as: "the study of the positive and negative aspects of marketing activities on pollution, energy depletion and no energy resource depletion." [Henion and Kinnear 1976b, 1 quoted in Polonsky, 1994, p.2].This early definition has three key components:

- It is a subset of the overall marketing activity;
- It examines both the positive and negative activities; and
- A narrow range of environmental issues is examined.

While this definition is a useful starting point, to be comprehensive green marketing needs to be more broadly defined (Polonsky, 1994). According to Polonsky (1994), the following definition is much broader than those of other researchers are and it encompasses all major components of other definitions.

> "Green or Environmental Marketing consists of all activities designed to generate and facilitate any exchanges intended to satisfy human needs or wants, such that the satisfaction of these needs and wants occurs, with minimal detrimental impact on the natural environment." (Polonsky 1994, 2 quoted in Polonsky, 1994, p.2).

This definition ensures that the interests of the organisation and all its consumers are protected, as voluntary exchange will not take place unless both the buyer and seller mutually benefit. The above definition also includes the protection of the natural environment, by attempting to minimize the detrimental impact this exchange has on the environment (Polonsky, 1994). Thus, green marketing is the process for formulating and implementing environmentally beneficial marketing activities designed to generate and facilitate voluntary exchanges that satisfy a firm's economic and social performance objectives and is grounded in business principles with an entrepreneurial orientation and social performance principles with an environmental orientation.

LITERATURE REVIEW

Marketing literature on greening products/firms develops on both the societal and social marketing research (Prakash, 2002). Firms may choose to green their systems, policies and products due to economic and noneconomic pressures either from their nonmarket environment (regulators, citizen groups and other stakeholders or from their consumers, business collaborates (the market environment) (Prakash, 2002). As Baron (1995) has argued, the impact of market and nonmarket environments is mutual. Thus, firms need to adopt a coordinated approach to their market and nonmarket strategies. For example, in adopting green marketing policies, firms may face many challenges such as a contradiction between consumers' attitudes (opinion) of willingness to pay premiums for green products and actual behaviour, and their unwillingness to pay premiums for green products may be partly due to their skepticism of environmental claims.

Some scholars claim that consumers are willing to pay premiums for green products because consumers often priorities green attributes over traditional product attributes such as price and quality: 50% of Americans claim to look for environmental labels and to switch brands based on environment-friendliness (Phillips, 1999). However, the caveat is that such claims and attitudes may not always translate into *actual behaviors* (McGuire, 1985). One reason could be the social pressures to be 'green' (Ritchie and McDougall, 1985). Consequently, notwithstanding the claims about the concern for the natural environment, *mass* consumer markets for green products in *most* categories have yet to develop (Prakash, 2002).

Unlike traditional marketers, social and societal marketers need to determine the needs of target markets and to deliver the desired satisfactions in a way that enhances the consumer's and *the society's well-being*. By doing so, social and societal marketers seek to persuade consumers to change their lifestyles. "However", according to Prakash (2002), "these behavioral modifications may not directly/sufficiently benefit consumers or the benefits may also be nonexcludable" (p.291). Marketing literature also examines the relative salience of consumers' attributes and structural parameters (market environment, social norms and institutions) in inducing consumers to support green products (Prakash, 2002).

Clear, comprehensible and credible information provision about greenness is a key component of green marketing. Further, firms willing to provide clear, comprehensive and credible information must ensure that consumers have low-cost access to it. Although consumers may not have access to such information or understand its implications (Menell, 1995), the media and the various external stakeholders often widely disseminate information and interpret its implications, thereby putting pressure on firms to reduce pollution and to adopt green policies. Firms could seek to increase the credibility of disclosed information through internal, second-party or third party audits. Firms can also form strategic alliances, including product endorsements and corporate sponsorships from environmental groups that provide credibility to their environmental claims (Mendleson and Polonsky, 1995). Governmental policies and stakeholder initiatives can be important in reducing consumers' search, information or transaction

costs. Regulators and/or stakeholders can publish it, disseminate it to the media by press releases and post it on the Internet. In this context, government-sponsored, third-party eco-labelling programs can serve as useful vehicles for green marketing. However, the usefulness of eco-labels versus other information disclosure strategies is questioned. Menell (1995) argues that if governmental regulations can force firms to internalize most environmental externalities, then the price mechanism is a more institutionally sound mechanism for information provision than eco-labelling on three grounds: comprehensibility (consumers can understand price information more easily), universality (enables consumers to compare across a broad range of alternatives) and prioritization (better enables consumers to prioritize environmental attributes over other attributes). The role of information on greenness in consumer decision making assumes that consumers purchase products primarily based on products' (product level) attributes. However, development of information on firm-level attributes (greenness of processes and systems) can also show significant association with promotional strategies. Perhaps consumers want green products from green firms. From a managerial perspective, if brand attributes are more salient, firms should invest in greening products, but if corporate images are more important, focusing on firm-level processes/ systems is desirable (Prakash, 2000).

Firms may maintain their competitive position through environmental marketing. In some instances, competitive pressure has caused an entire industry to modify and thus reduce its detrimental environmental behaviour (Polonsky, 1994). Scholars believe that green firms can adopt a strategic approach to pre-empt command-and-control regulations that often hurt their profits (Fri, 1992), and to enable them shape future regulations, thereby reaping first-mover advantages (Porter and van der Linde, 1995). According to Polonsky (1994), firms may use green marketing in an attempt to deal with cost or profit related issues and firms that can reduce harmful wastes may incur substantial cost savings because disposing of environmentally harmful by-products, such as polychlorinated biphenyl (PCB) contaminated oil are becoming increasingly expensive and in some cases difficult.

According to Prakash (2002), firms can 'green' themselves in three ways. The first greening strategy pertains to value-addition processes (firm level). A steel firm may install a state-of-the-art furnace (new technology), thereby using less energy to produce steel. The second greening strategy pertains to management systems (firm level). Firms could adopt management systems that create conditions for reducing the environmental impact of value-addition processes. As pointed out by Prakash (2002), "[a] good example is the Responsible Care program of the chemical industry, which establishes systems to promote environmental, health and safety objectives" (p.286). In addition, the third greening strategy, building on Charter (1992), pertains to products involving extending the life of a product through repair, recondition, reusable design; rejuvenating product attributes through remanufacture and recycle.

Menon and Menon (1997) argued that the following influence environmental marketing activity positively or negatively: positive influences include regulatory and other political intensity and consistency; customer environmental sensitivity, expectations and power base of the firm's customers and their propensity to use their power; competitive intensity, attractiveness of environmental market opportunity; heterogeneity, professionalism, and cosmopolitan outlook of the top management ; the influence of a group of people within organisations – who initially resisted any environmental responsive influences on their decision making, but were later converted to become champions of the environmental cause – on other persons or building coalitions of support within an organization. The following have mixed influence: formalization that is programmatic and rule-based approaches to improving a firm's orientation to an issue; specialization, or departmentalization that is the number of departments into which organizational activities are segregated and compartmentalized. In addition, the negative influences are centralization, that is, the concentration of input and decision making in the relevant activities of market planning; the top management's industry and organizational tenure.

A key challenge for marketers is to understand Herzberg's (1966) theory of work motivation that focused on two work-related factors: those that motivated employees (motivators) and those that prevented dissatisfaction among them (hygiene). According to Prakash (2002), "[I]f managers believe that consumers view greenness as a motivating variable, they should invest in conveying information through advertising, direct mailing, brand labels, in-store displays and pamphlets"(p.295). "However, if consumers do not care much about who is greener, but they do penalize firms that violate environmental laws or emit high levels of toxins, greenness is a hygiene variable ..."(p.288).

Political economists focus on collective action dilemmas inherent in green marketing at the consumer and producer levels. Firms can deal with the collective action dilemmas (market-related problems) and gain first-mover advantages by seeking formal regulations (initiatives in the nonmarket environment) that impose similar costs on their competitors. Instead of individual-level sacrifices or direct costs (paying a premium for green products or altering life styles to lessen the burden on the environment), from which consumers can opt out, some social marketers favour collective sacrifices or indirect costs, from which individuals cannot opt out (Weiner, 1993).

The literatures on institutional theory, stakeholder theory and the corporate social performance perspective view green marketing as a subset of corporate policies designed to gain external legitimacy. According to Prakash (2002), "[t]hese have developed in response to the expectations of a broad spectrum of stakeholders, both internal and external" (p.295). The social performance literature generally recognizes three alternate perspectives or viewpoints guiding corporate social involvement: social obligation,

social responsiveness, and social responsibility (cf. Sethi 1979; Wartick and Cochran 1985; Wood 1991 cited in Menon and Menon, 1997). Menon and Menon (1997) suggest that firms could adopt enviroprenuerial marketing strategies: the processes for emphasizing the need for an entrepreneurial approach in melding ecological concerns and marketing strategy objectives. Creation of revenue by providing exchanges that satisfy firm's economic and social objectives is the main goal of the enviroprenuerial marketing. Derksen and Gartrell (1993) argue that social context show significant association with recycling behaviour: people having access to recycling programs exhibit higher levels of recycling than those not having such access. If public policies reflect (at least, partially) people's preferences, then citizens have some degree of influence over policies such as recycling programs. Thus, structures (public policies) are not entirely exogenous to consumers/citizens (Prakash, 2002). However, the public policy literature suggests, individuals signal their preferences for a policy through 'exit, voice, and loyalty' (Hirschman, 1970).

CONCLUSION

The challenges for social/societal marketers are multidimensional and complex. It is important to have a general acquaintance with the various issues before initiating any measure to deal with these challenges. It is here the review of multiple literatures related to green marketing can greatly facilitate the examination of various issues such as what needs to be greened (products, systems or processes), why consumers purchase/do not purchase green products and how firms should think about information disclosure strategies on environmental claims. Here, based upon the concept of green marketing, an attempt to review multiple literatures related to green marketing unfolded some of the multidimensional and complex issues related to green marketing. Accordingly, Green marketing subsumes greening products as well as greening firms. The essence of environmental marketing is the strategic product and customer decisions in which environmental issues are emphasized and environmental strengths are used as a competitive advantage. Firms may choose to green their systems, policies and products due to economic and noneconomic pressures either from their nonmarket environment (regulators, citizen groups and other stakeholders or from their consumers, business collaborates (the market environment). As the literature pointed out, the impact of market and nonmarket environments is mutual. Thus, firms need to adopt a coordinated approach to their market and nonmarket strategies. Further, green marketing is an emerging segment of the social performance literature. As such, the analysis of the impact of this new market on the consumers and the environment has been insufficient so far indicating a need for further research that can afford the examination of several other unexplored areas.

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SECURE DATA PRIVACY THROUGH LINEAR PROGRAMMING IN CLOUD COMPUTING

P. Shabana[16]

ABSTRACT

Cloud Computing has great potential of providing robust computational power to the society at reduced cost. It enables customers with limited computational resources to outsource their large computation workloads to the cloud, and economically enjoy the massive computational power, bandwidth, storage, and even appropriate software that can be shared in a pay-per-use manner. Despite the tremendous benefits, security is the primary obstacle that prevents the wide adoption of this promising computing model, especially for customers when their confidential data are consumed and produced during the computation. Treating the cloud as an intrinsically insecure computing platform from the viewpoint of the cloud customers, we must design mechanisms that not only protect sensitive information by enabling computations with encrypted data, but also protect customers from malicious behaviors by enabling the validation of the computation result. Such a mechanism of general secure computation outsourcing was recently shown to be feasible in theory, but to design mechanisms that are practically efficient remains a very challenging problem.

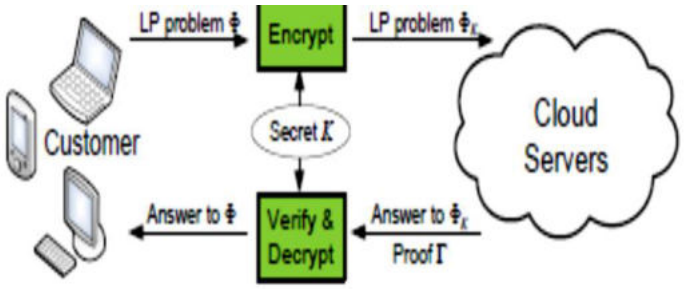
Focusing on engineering computing and optimization tasks, this paper investigates secure outsourcing of widely applicable linear programming (LP) computations. In order to achieve practical efficiency, our mechanism design explicitly decomposes the LP computation outsourcing into public LP solvers running on the cloud and private LP parameters owned by the customer.

INTRODUCTION

Cloud Computing provides convenient on-demand network access to a shared pool of configurable computing resources that can be rapidly deployed with great efficiency and minimal management overhead [1]. One fundamental advantage of the cloud paradigm is computation outsourcing, where their resource-constraint devices no longer limit the computational power of cloud customers. By outsourcing the workloads into the cloud, customers could enjoy the literally unlimited computing resources in a pay-per-use manner without committing any large capital outlays in the purchase of both hardware and software and/or the operational overhead therein. Despite the tremendous benefits, outsourcing computation to the commercial public cloud is also depriving customers' direct control over the systems that consume and produce their data during the computation, which inevitably brings in new security concerns and challenges towards this promising computing model [2]. On the one hand, the outsourced computation workloads often contain sensitive information, such as the business financial records, proprietary research data, or personally identifiable health information etc. To combat against unauthorized information leakage, sensitive data have to be encrypted before outsourcing [2] to provide end-to-end data confidentiality assurance in the cloud and beyond. However, ordinary data encryption techniques in essence prevent cloud from performing any meaningful operation of the underlying plaintext data [3], making the computation over encrypted data a very hard problem. On the other hand, the operational details inside the cloud are not transparent enough to customers [4]. As a result, there do exist various motivations for cloud server to behave unfaithfully and to return incorrect results, i.e., they may behave beyond the classical semi honest model. For example, for the computations that require a large amount of computing resources, there are huge financial incentives for the cloud to be "lazy" if the customers cannot tell the correctness of the output. Besides, possible software bugs, hardware failures, or even outsider attacks might also affect the quality of the computed results. Thus, we argue that the cloud is intrinsically not secure from the viewpoint of customers. Without providing a mechanism for secure computation outsourcing, i.e., to protect the sensitive input and output information of the workloads and to validate the integrity of the computation result, it would be hard to expect cloud customers to turn over control of their workloads from local machines to cloud solely based on its economic savings and resource flexibility. This overhead in general solutions motivates us to seek efficient solutions at higher abstraction levels than the circuit representations for specific computation outsourcing problems. Although some elegant designs on secure outsourcing of scientific computations, sequence comparisons, and matrix multiplication etc. have been proposed in the literature, it is still hardly possible to apply them directly in a practically efficient manner, especially for large problems. In those approaches, either heavy cloud-side cryptographic computations [7], [8], or multi-round interactive protocol executions [5], or huge communication complexities [10], are involved (detailed discussions in Section VI). In short, practically efficient mechanisms with immediate practices for secure computation outsourcing in cloud are still missing. Focusing on engineering computing and optimization tasks, in this paper, we study practically efficient mechanisms for secure outsourcing of linear programming (LP) computations. Linear programming is an algorithmic and computational tool, which captures the first order effects of various system parameters that should be optimized, and is essential to engineering optimization.

[16] Assistant Professor, Department of CSE, Srinivasa Ramanujan Institute of Technology, Andhra Pradesh, India, shabana.cse@srit.ac.in

Figure-1: Architecture of Secure Outsourcing Linear Programming Problems in Cloud Computing



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Specifically, we first formulate private data owned by the customer for LP problem as a set of matrices and vectors. This higher-level representation allows us to apply a set of efficient privacy-preserving problem transformation techniques, including matrix multiplication and affine mapping, to transform the original LP problem into some arbitrary one while protecting the sensitive input/output information. One crucial benefit of this higher-level problem transformation method is that existing algorithms and tools for LP solvers can be directly reused by the cloud server.

- For the first time, we formalize the problem of securely outsourcing LP computations, and provide such a secure and practical mechanism design which fulfills input/output privacy, cheating resilience, and efficiency.
- Our mechanism brings cloud customer great computation savings from secure LP outsourcing as it only incurs O (n ρ) for some $2 < \rho \leq 3$ local compute.
- The computations done by the cloud server shares the same time complexity of currently practical algorithms for solving the linear programming problems, which ensures that the use of cloud is economically viable.
- The experiment evaluation further demonstrates the immediate practicality: our mechanism can always help customers achieve more than 30× savings when the sizes of the original LP problems are not too small, while introducing no substantial overhead on the cloud.

PROBLEM STATEMENT

A. System and Threat Model

We consider a computation outsourcing architecture involving two different entities, as illustrated in Fig. 1: the cloud customer, who has large amount of computationally expensive LP problems to be outsourced to the cloud; the cloud server (CS), which has significant computation resources and provides utility computing services, such as hosting the public LP solvers in a pay-per-use manner. The customer has a large-scale linear programming problem Φ (to be formally defined later) to be solved. ΦK to CS. CS then uses its public LP solver to get the answer of ΦK and provides a correctness proof Γ, but it is supposed to learn nothing or little of the sensitive information contained in the original problem description Φ. After receiving the solution of encrypted problem ΦK, the customer should be able to first verify the answer via the appended proof Γ. If it is correct, he then uses the secret K to map the output into the desired answer for the original problem Φ. The security threats faced by the computation model primarily come from the malicious behavior of CS. We assume that the CS may behave beyond "honest-but-curious", i.e. the semi honest model that was assumed by many previous researches (e.g., [14], [15]), either because it intends to do so or because it is compromised.

B. Design Goals

To enable secure and practical outsourcing of LP under the aforementioned model, our mechanism design should achieve the following security and performance guarantees.

- **Correctness**: Any cloud server that faithfully follows the mechanism must produce an output that can be decrypted and verified successfully by the customer.
- **Soundness:** No cloud server can generate an incorrect output that can be decrypted and verified successfully by the customer with non-negligible probability.
- **Input / Output Privacy**: No sensitive information from the customer's private data can be derived by the cloud server during performing the LP computation.

- **Efficiency**: The local computations done by customer should be substantially less than solving the original LP on his own. The computation burden on the cloud server should be within the comparable time complexity of existing practical algorithms solving LP problems.

C. Background on Linear Programming

An optimization problem is usually formulated as a mathematical programming problem that seeks the values for a set of decision variables to minimize (or maximize) an objective function representing the cost subject to a set of constraints.

THE PROPOSED SCHEMES

This section presents our LP outsourcing scheme, which provides a complete outsourcing solution for – not only the privacy protection of problem input/output, but also its efficient result checking. We start from an overview of secure LP outsourcing design framework and discuss a few basic techniques and their demerits, which leads to a stronger problem transformation design utilizing affine mapping. We then discuss effective result verification by leveraging the duality property of LP. Finally, we give the full scheme description.

A. Mechanism Design Framework

We propose to apply problem transformation for mechanism design. The general framework is adopted from a generic approach [9], while our instantiation is completely different and novel. In this framework, the process on cloud server can be represented by algorithm ProofGen and the process on customer can be organized into three algorithms (KeyGen, ProbEnc, and ResultDec). These four algorithms are summarized below and will be instantiated later.

- KeyGen (1 k) → {K}. This is a randomized key generation algorithm, which takes a system security parameter k, and returns a secret key K that is used later by customer to encrypt the target LP problem.

- ProbEnc (K, Φ) → {ΦK}. This algorithm encrypts the input tuple Φ into ΦK with the secret key K. According to problem transformation, the encrypted input ΦK has the same form as Φ, and thus defines the problem to be solved in the cloud.

- ProofGen (ΦK) → {(y, Γ)}. This algorithm augments a generic solver that solves the problem ΦK to produce both the output y and a proof Γ. The output y later decrypts to x, and Γ is used later by the customer to verify the correctness of y or x.

- ResultDec (K, Φ, y, Γ) → {x, ⊥}. This algorithm may choose to verify either y or x via the proof Γ. In any case, a correct output x is produced by decrypting y using the secret K. The algorithm outputs ⊥ when the validation fails, indicating the cloud server was not performing the computation faithfully. Note that our proposed mechanism provides us one-timepad types of flexibility. Namely, we shall never use the same secret key K to two different problems. Thus, when analyzing the security strength of the mechanism, we focus on the cipher text only attack. We do not consider known plaintext attack in this paper but do allow adversaries to do offline guessing or inferring via various problem-dependent information including sizes and signs of the solution, which are not necessary to be confidential.

B. Basic Techniques

Before presenting the details of our proposed mechanism, we study in this subsection a few basic techniques and show that the input encryption based on these techniques along may result in an unsatisfactory mechanism. However, the analysis will give insights on how a stronger mechanism should be designed. Note that to simplify the presentation, we assume that the cloud server honestly performs the computation, and defer the discussion on soundness to a later section.

1) Hiding Equality Constraints (A, b): First, a randomly generated $m \times m$ non-singular matrix Q can be part of the secret key K. The customer can apply the matrix to Eq. (2) for the following constraints transformation,

$$Ax = b \Rightarrow A'x = b'$$

Where $A' = QA$ and $b' = Qb$. Since we have assumed that A has full row rank, A' must have full row rank. Without knowing Q, it is not possible for one to determine the exact elements of A.

2) Hiding Inequality Constraints (B): The customer cannot transform the inequality constraints in the similar way as used for the equality constraints. This is because for an arbitrary invertible matrix Q, $Bx \geq 0$ is not equivalent to $QBx \geq 0$ in general. To

hide B, we can leverage the fact that a feasible solution to Eq. (2) must satisfy the equality constraints. To be more specific, the feasible regions defined by the following two groups of constraints are the same.

(Ax = b Bx ≥ 0⇒ (Ax = b (B − λA)x = B′x ≥ 0

Where λ is a randomly generated n×m matrix in K satisfying that |B′| = |B − λA| 6= 0 and λb = 0. Since the conditionλb = 0 is largely underdetermined, it leaves great flexibility to choose λ in order to satisfy the above conditions.

Summarization of basic techniques Overall, the basic techniques would choose a secret key K and encrypt the input tuple _ into _K = (A′, B′, b′, c), which gives reasonable strength of problem input hiding. In addition, these techniques are clearly correct in the sense that solving K would give the same optimal solution as solving. However, it also implies that although input privacy is achieved, there is no output privacy.

C. Enhanced Techniques via Affine Mapping

To enhance the security strength of LP outsourcing, we must be able to change the feasible region of original LP and at the same time hide output vector x during the problem input encryption. We propose to encrypt the feasible region of by applying an affine mapping on the decision variables x. into y = M−1(x + r). Since this mapping is an one-to-one mapping, the LP problem _ in Eq. (2) can be expressed as the following LP problem of the decision variables y. minimize cTMy − cT r subject to AMy = b + Ar BMy ≥ Br. Using the basic techniques, this LP problem can be further transformed to minimize cTMy subject to QAMy = Q (b + Ar), BMy − QAMy ≥ Br –Q (b + Ar).

D. Result Verification

Until now, we have been assuming the server is honestly performing the computation, while being interested learning information of original LP problem. However, such semi honest model is not strong enough to capture the adversary behaviors in the real world. In many cases, especially when the computation on the cloud requires a huge amount of computing resources, there exists strong financial incentives for the cloud server to be "lazy". They might either be not willing to commit service-level-agreed computing resources to save cost, or even be malicious just to sabotage any following up computation at the customers. Since the cloud server promises to solve the LP problem K = (A′, B′, b′, c′), we propose to solve the result verification problem by designing a method to verify the correctness of the solution y of K.

1) The Normal Case: We first assume that the cloud server returns an optimal solution y. In order to verify y without actually solving the LP problems, we design our method by seeking a set of necessary and sufficient conditions that the optimal solution must satisfy. We derive these conditions from the well-studied duality theory of the LP problems [13]. For the primal LP problem K defined as Eq. (5), its dual problem is defined as, maximize b′T s subject to A′T s+B′T t = c′, t ≥ 0, (6) where s and t are the m×1 and n×1 vectors of dual decision variables respectively. The strong duality of the LP problems states that if a primal feasible solution y and a dual feasible solution (s, t) lead to the same primal and dual objective value, then both y and (s, t) are the optimal solutions of the primal and the dual problems respectively [13]. Therefore, we should ask the cloud server to provide the dual optimal solution as part of the proof. Then, the correctness of y can be verified based on the following conditions, c′T y = b′T s,A′y = b′,B′y ≥ 0,A′T s + B′T t = c′, t ≥ 0. (7) Here, c′T y = b′T s tests the equivalence of primal and dual objective value for strong duality. All the remaining conditions ensure that both y and (s, t) are feasible solutions of the primal and dual problems, respectively. Note that due to the possible truncation errors in the computation, the equality test A′y = b′ can be achieved in practice by checking whether ‖A′y − b′‖ is small enough.

2) The infeasible Case*:* We then assume that the cloud server claims K to be infeasible. In this case, we leverage the methods to find a feasible solution of a LP problem, usually known as the phase I methods [16]. These methods construct auxiliary LP problems to determine if the original LP problems are feasible or not.

SECURITY ANALYSIS

A. Analysis on Correctness and Soundness Guarantee We give the analysis on correctness and soundness guarantee via the following two theorems.

Theorem*: Our scheme is a correct verifiable linear programming outsourcing scheme.*

Proof: The proof consists of two steps. First, we show that for any problem and its encrypted version K, solution y computed by honest cloud server will always be verified.

RELATED WORK

A. Work on Secure Computation Outsourcing

General secure computation outsourcing that fulfills all aforementioned requirements, such as input / output privacy and correctness / soundness guarantee has been shown feasible in theory by Gennaro et al. [9]. However, it is currently not practical due to its huge computation complexity. Instead of outsourcing general functions, in the security community, Atallah et al. explore a list of work [5], [7], [8], [10] for securely outsourcing specific applications.

Considering the case of the result verification, the communication overhead must be further doubled, due to the introducing of additional pre-computed "random noise" matrices. In short, these solutions, although elegant, are still not efficient enough for immediate practical uses, which we aim to address for the secure LP outsourcing in this paper.

B. Work on Secure Multiparty Computation

Another large existing list of work that relates to (but is also significantly different from) ours is Secure Multi-party Computation (SMC), first introduced by Yao [11] and later extended by Goldreich et al. [24] and many others.

CONCLUDING REMARKS

In this paper, for the first time, we formalize the problem of securely outsourcing LP computations in cloud computing, and provide such a practical mechanism design, which fulfills input / output privacy, cheating resilience, and efficiency. By explicitly decomposing LP computation outsourcing into public LP solvers and private data, our mechanism design is able to explore appropriate security / efficiency tradeoffs via higher level LP computation than the general circuit representation.

We develop problem transformation techniques that enable customers to secretly transform the original LP into some arbitrary one while protecting sensitive input / output information. We also investigate duality theorem and derive a set of necessary and sufficient condition for result verification. Such a cheating resilience design can be bundled in the overall mechanism with close-to-zero additional overhead.

Both security analysis and experiment results demonstrates the immediate practicality of the proposed mechanism. We plan to investigate some interesting future work as follows: 1) devise robust algorithms to achieve numerical stability; 2) explore the sparsity structure of problem for further efficiency improvement; 3) establish formal security framework; 4) extend our result to non-linear programming computation outsourcing in cloud.

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EMPLOYEE PERCEPTION OF WORK-LIFE POLICIES IN THE BPO INDUSTRY

K. Elayaraja[17] Dr. V. Dhamodharan[18]

ABSTRACT

Employee retention is vital to the long-term health and success of any business organization, especially in case of BPOs where the organizations spend so much in the recruitment and their initial and ongoing training of the employees. This paper attempts to study the impact of work-life policies on employee retention in BPOs and to suggest recommendations on how to alleviate the work-life disconnect and promote work-life balance.

INTRODUCTION

India is considered as hub for outsourcing and we can find as many BPOs on the Indian soil as compared to any other nation. Today Indian BPO and ITES sector is witnessing attrition on a large-scale and retention has become a difficult task. We can also term it as a talent crunch in the industry. The BPO industry is feeling the heat and challenge to retain the talent in the organizations. The most critical and delicate situation is to withhold the best talent in the organization. Many reputed employers in the industry have undergone this crunch of talent retention. The sector is contributing a lot to Indian economy and creating employment opportunity especially to the youth, and the perception of youth towards the sector is found to be positive. However, the BPO/ITES sector is always placed on top whenever "attrition" is mentioned.

Work-life balance is the stability characterized by the balancing of an individual's life complexity and dynamism with environmental and personal resources such as family, community, employer, profession, geography, information, economics, personality, or values (Crooker et al, 2002).Work-life balance has become a subject of concern in view of the contemporary technological, demographic, market, and organizational changes associated with it. Increasing demand for work-life balance have forced BPO companies to take some of the initiatives such as alternative work arrangements, flexible working hours, leave policies and benefits in lieu of family care responsibilities and employee assistance programmes. Such policies are known as 'work-life benefits and practices' (WLBPs).

INDUSTRY OVERVIEW

Business process outsourcing (BPO) is a subset of outsourcing that involves the contracting of the operations and responsibilities of specific business functions (or processes) to a third-party service provider. Often the business processes are information technology-based, and are referred to as ITES-BPO, where ITES stands for Information Technology Enabled Service. Indian BPO companies offer varied services, such as, customer support, technical support, telemarketing, insurance processing, data processing, forms processing, bookkeeping and internet / online / web research. The IT-BPO sector in India aggregated revenue of US$ 100 billion in FY 2012, where export and domestic revenue stood at US$ 69.1 billion and US $31.7 billion respectively.

Though 2013 has left the US$ 108 billion IT and ITES sector of India standing at the crossroads, Software Services Industry Body NASSCOM is positive about the growth of India's IT sector. According to NASSCOM, "'newer geographies' are set to double their contribution to India to 20% by 2020". As per the estimation of NASSCOM purely domestic and export services of the Indian IT sector is expected to generate US$ 225 billion by 2020.

WHY DO ITES EMPLOYEES QUIT?

In the ITES industry, work can often be monotonous and opportunities for career growth are minimal. Therefore, when opportunities beckon, employees leave the organization for greener pastures. However, there are some common reasons that especially cause people to leave. Surveys have listed the following as few major reasons for attrition:

- Night shifts and rotational shifts,
- For higher education,
- Inability to handle various types of stress,
- Monotonous work,
- Company policies are not conducive,

[17]Research Scholar, Bharathiyar University, Tamil Nadu, India, elayarajak@yahoo.com
[18] Assistant Professor and Head, Department of Business Administration, Government Arts College, Tamil Nadu, India, veedhamu@gmail.com

- Lack of career growth,
- Problems with those in senior positions or peer managers,
- For higher salary and better designation,
- No time for personal life,
- Misguidance by the company,
- Grievances,
- Dissatisfied by appraisal system,
- Dissatisfied by internal job posting (IJP), etc.

These are some of the reasons that employees highlighted when exit interviews were conducted by the ITES organizations. Hence, we can infer that it is not only the money and career factors that propel the employees to quit jobs in ITES organizations, but rather intention to leave is influenced by mental, physical and emotional factors. Many students right out of college get attracted to the ITES industry as they want to explore the corporate world and make some money, they also get attracted to hikes and better offers from other companies and then they change companies because there would be a hike in the salary by the next hiring company. However, these days, many ITES organizations have made efforts to curb attrition and have been coming up with several innovative strategies to keep the employees in the organization. Employee retention is obviously one of the toughest tasks in the ITES industry

With its 24/7 operations BPO companies has higher turnover rates compared to most other industries. The turnover intent among BPO employees is associated with age, career commitment, and burnout, satisfaction with pay, boss, promotions, job responsibilities, firm management and promotions. BPO companies should ensure effective rewards management, helping employees find the right fit and rethinking job design, as well as provide fun atmosphere and Employee Wellbeing Programs. Moreover, as BPO employees belong to fairly young age group, a supportive workplace and fun work environment is imperative to address the work-related stressors.

LITERATURE REVIEW

Work/life policies refer to flexible work scheduling (e.g. part-time work, job-sharing, variable starting and quitting times), family leave policies allowing periods away from work for employees to take care of family matters, and childcare assistance (Burke & Cooper, 2002). McCrory (1999) indicates that the majority of high technology workers value work/life initiatives as very meaningful. Loyal, high technology employees (those who cannot envision changing jobs in the near future) are more concerned with leave (vacation, holidays etc.), flexible work schedules, family friendliness and a proximity to their home, than job seeking employees who are actively looking for a new position (Dubie, 2000).

Studies suggest that employee morale, satisfaction, and performance are improved among employees who have received work/life programs such as onsite child care, time for elder care, opportunity to study, opportunities for telecommuting as these reduce the level and intensity of stress that employees experience (Bruck, et al., 2002; Harmon, 2001; Garvey, 2001; Gibson et al., 2006). Consequently, organizations are paying more attention to work and personal/family life-friendly programs, and are developing other benefits and activities that may help alleviate workplace stress and conflict between work-life.

Thompson (2002) classified these work-life initiatives into five categories:

- Time-based strategies like flexi-time, telecommuting and job sharing;
- Information-based strategies like relocation assistance, elder care resources, company work/life balance intranet;
- Money-based strategies like leave with pay, scholarships for dependents;
- Direct services like onsite childcare, concierge services and takeout dinners; and
- Culture-change strategies like training or focus on employees' performance not office face time.

Agarwal and Ferratt (1999) argued that it is a sensible business practice to accommodate those employees who may not join the workforce for a typical 9-to-5 workday because of other constraints in their personal life. Work life policies correspond to work conditions provided. The organisation should take into account the needs of the information technology workforce and try to minimize the consequences of conflict between the work and family issues (Honeycutt & Rosen, 1997).

The mere existence of these work/life policies demonstrates progress, but does not show that installing such a set of policies necessarily constitutes a their work/life programmes with management support will more likely be rewarded with employees that show more commitment to company success, greater loyalty, and a stronger intention to stay with their companies (Merrick, 1998).

The popular press has hailed work/life policies as methods for amending the conflict between working and raising families. Friedan (1989) and Leinfuss (1998) recognize work and family policies as positive for employers as a means of attracting and retaining a dedicated workforce. Paré and colleagues (2001:5) define these work conditions provided by organisations to take into account the needs of the information technology workforce and to minimize the consequences of conflict between the work and family issues.

OBJECTIVES OF STUDY

The primary objectives of the study are:

- To study the impact of work-life policies on employee retention in the BPO industry
- To suggest a new retention strategy suitable for future use by human resource practitioners as a guide in determining what work-life policies a BPO organization should adopt to retain their employees.

RESEARCH METHODOLOGY

Sample Design
This study was carried out on a sample of 100 BPO professionals across 5 BPO companies in Chennai city.

Data Collection
Both primary and secondary data have been used to draw appropriate conclusions. The primary data was collected by using questionnaire method. The secondary data was mainly drawn from available literature pertaining to the field of knowledge.

DATA ANALYSIS AND INTERPRETATION

Table-1: Respondent Profile

Factor and Classification	Number of Respondents	Percentage
Age		
Below 25 years	17	17
26-30 years	38	38
31-35 years	29	29
36-40 years	10	10
More than 41 years	6	6
Gender		
Male	63	63
Female	37	37
Education		
Diploma	13	13
Graduate	59	59
Post-graduate	23	23
Others	5	5
Tenure with the Organization		
Less than 2 years	13	13
2years to 5 years	53	53
5 years to 10 years	22	22
More than 10 years	12	12
Monthly Salary Range		
Below Rs. 10000	6	6
Rs. 10001 to Rs.25000	23	23
Rs.25001 to Rs.50000	30	30
More than Rs.50000	41	41
Marital Status		
Married	55	55
Unmarried	45	45

Sources: Authors Compilation

Table-2: Employee Perception of Work-Life Policies

Question	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Mean
My work schedule does not conflict with my personal life.	8	14	26	32	20	3.42
I do not have too much workload.	11	18	9	43	19	3.41
Once I notify my supervisor, I am sometimes allowed to work from home.	6	14	5	38	37	3.86
My job does not affect my role as a spouse and/or parent.	30	28	23	8	11	2.42
I have the time and energy to fulfil my responsibilities outside of work.	22	33	18	15	12	2.62
My working life balances well with my family life.	29	26	11	17	17	2.67
My organisation offers flexibility as to when to start and end the day's work	43	19	8	19	11	2.36
My organisation allows working for longer days per week to get a day off.	31	27	8	26	8	2.53
My company offers better work-life balance than other organisation.	6	20	16	33	25	3.51
I can easily take time off for emergencies, such as accidents or illness involving loved ones.	15	21	33	18	13	2.93

Sources: Authors Compilation

Null Hypothesis (H0) – There is no significant relationship between the age of employees and work-life policies.
Alternative Hypothesis (H1) – There is a significant relationship between the age of employees and work-life policies.

Table-3: Chi-Square Test between Age and Work-Life Policies

Response	Below 25 years	26-30 years	31-35 years	36-40 years	More than 41 years	Total
Strongly Agree	17	19	12	5	1	54
Agree	0	9	9	4	2	24
Neither Agree nor Disagree	0	4	2	1	0	7
Disagree	0	5	4	0	1	10
Strongly Disagree	0	1	2	0	2	5
Total	**17**	**38**	**29**	**10**	**6**	**100**

O	E	O-E	$(O-E)^2$	$(O-E)^2/2$
17	9.18	7.82	61.1524	30.5762
0	4.08	-4.08	16.6464	8.3232
0	1.19	-1.19	1.4161	0.70805
0	1.7	-1.7	2.89	1.445
0	0.85	-0.85	0.7225	0.36125
19	20.52	-1.52	2.3104	1.1552
9	9.12	-0.12	0.0144	0.0072
4	2.66	1.34	1.7956	0.8978
5	3.8	1.2	1.44	0.72
1	1.9	-0.9	0.81	0.405
12	15.66	-3.66	13.3956	6.6978
9	6.96	2.04	4.1616	2.0808
2	2.03	-0.03	0.0009	0.00045
4	2.9	1.1	1.21	0.605
2	1.45	0.55	0.3025	0.15125
5	5.4	-0.4	0.16	0.08
4	2.4	1.6	2.56	1.28
1	0.7	0.3	0.09	0.045
0	1	-1	1	0.5

0	0.5	-0.5	0.25	0.125
1	3.24	-2.24	5.0176	2.5088
2	1.44	0.56	0.3136	0.1568
0	0.42	-0.42	0.1764	0.0882
1	0.6	0.4	0.16	0.08
2	0.3	1.7	2.89	1.445
Total				**60.443**

Sources: Authors Compilation

Degree of freedom – (r-1) (c-1) = 16
Chi-Square = 60.443
Tabulated Chi-Square for 16 degrees of freedom at 5% level of significance is 26.296
Since calculated value > tabulated value, **the null hypothesis (H0) is rejected**.

Inference: There is a significant relation between the age group of employees and work-life policies.

Null Hypothesis (H0) – There is no significant relationship between the tenure of employees and work-life policies.
Alternative Hypothesis (H1) – There is a significant relationship between the tenure of employees and work-life policies.

Table-4: Chi-Square Test between Tenure and Work-Life Policies

Response	Less than 2 years	2years to 5 years	5 years to 10 years	More than 10 years	Total
Strongly Agree	6	23	13	8	50
Agree	3	11	6	4	24
Neither Agree nor Disagree	0	3	1	0	4
Disagree	3	8	2	0	13
Strongly Disagree	1	8	0	0	9
Total	**13**	**53**	**22**	**12**	**100**

O	E	O-E	$(O-E)^2$	$(O-E)^2/2$
6	6.5	-0.5	0.25	0.125
3	3.12	-0.12	0.0144	0.0072
0	0.52	-0.52	0.2704	0.1352
3	1.69	1.31	1.7161	0.85805
1	1.17	-0.17	0.0289	0.01445
23	26.5	-3.5	12.25	6.125
11	12.72	-1.72	2.9584	1.4792
3	2.12	0.88	0.7744	0.3872
8	6.89	1.11	1.2321	0.61605
8	4.77	3.23	10.4329	5.21645
13	11	2	4	2
6	5.28	0.72	0.5184	0.2592
1	0.88	0.12	0.0144	0.0072
2	2.86	-0.86	0.7396	0.3698
0	1.98	-1.98	3.9204	1.9602
8	6	2	4	2
4	2.88	1.12	1.2544	0.6272
0	0.48	-0.48	0.2304	0.1152
0	1.56	-1.56	2.4336	1.2168
0	1.08	-1.08	1.1664	0.5832
Total				24.1026

Sources: Authors Compilation

Degree of freedom – (r-1) (c-1) = 12
Chi-Square = 24.1026

Tabulated Chi-Square for 12 degrees of freedom at 5% level of significance is 21.026
Since calculated value > tabulated value, **the null hypothesis (H0) is rejected**.
Inference: There is a significant relation between the tenure of employees and work-life policies.

MAJOR FINDINGS

From Table 1, we can infer that majority (38%) of respondents were in the 26-30 years age group followed by 29% in the 31-35 years age group. Majority of respondents were male, only 37% were female. Majority (59%) of respondents were graduates, 23% were post-graduates. 53% of respondents had been with their current organization for 2-5 years, while 22% had been with the organization for 5-10 years. Only 12% of respondents had been in the current organization for more than 10 years. Majority of respondents (41%) earned more than Rs. 50,000, while 30% earned between Rs.25001 and Rs.50000. Majority (55%) or respondents were married while 45% were unmarried.

From Table 2, it can be inferred that the ability to work from home after informing the supervisor, better work-life balance than other companies, conflicting work schedules, workload, taking time off for emergencies are some work-life policies with which employees are satisfied in their current organizations. Flexibility to start and end the day's work has the least mean, followed by working for longer days per week to get a day off, and balancing work life with family life.

From Table 3, it can be inferred that there is significant relationship between age of employees and work-life policies.

From Table 4, it can be inferred that there is significant relationship between tenure in organization and work-life policies.

RECOMMENDATIONS

Results revealed that, despite the relatively high compensation package, the different benefits they enjoy, and the various programs the companies offer, the integration of work-life balance in the respective BPO organizations is essential. The organizations should examine existing work-life policies, programs vis-à-vis workload, and general working conditions.

Guidelines established at the governmental, industry and sector levels, as well as the ability of individuals to capitalize on existing work-life balance programs have to be connected. BPO workers have to be knowledgeable about, and appreciative of, policies provided at the organization level, and should continue to protect their welfare. At the same time, there may be evidence that organizational climate and environment often curtail policy developments on the governmental level by being generally unsupportive of employees beyond their legally established rights. Consequently, accomplishing work-life balance is a complex issue that requires the interaction and cooperation of social actors at national, governmental, organizational, as well as the individual-worker level.

Achieving a work-life balance benefits both employers and employees. While the employers get the benefit of productive and active employees, the employees feel secure and loyal. It also improves confidence, concentration, self-esteem, and loyalty among the employees. The concept of work-life balance is still fresh in Indian BPOs and Indian companies, in general. Indian IT companies are probably the first ones to provide a fun-work environment. Some companies are now investing in recreational facilities at the worksite.

BPO companies can enhance their work-life policies to include the following:

- Discourage employees from working late.
- Take a regular employee satisfaction survey that can determine employee expectations and identify the pitfalls in the work pattern.
- Provide vacations and encourage employees to take breaks.
- Provide opportunities like work from home, flexi times.
- Conduct stress management workshops.
- Take employees out for official lunches once every three months.
- Provide counseling on the job.
- Develop an Internal Ergonomic Program.
- Employee Assistance Programs can contribute to awareness on how to cope with stress.
- Consider yoga as a possible solution for stress management.
- Introduce job rotation whereby an employee will spend half the day over the phone and the other half in administrative tasks to break the monotony of the job.

CONCLUSION

In the BPO sector, there are usually excessive targets to achieve, and employees have to interact with various types of callers. At the same time, quality of the service needs to be maintained. All this may lead to burnout and stress in the employees. BPO companies are trying to bring in work life balance of the employees by taking care of the factors like working from home, flexible workhours and job rotation, in order to retain talent, enhance quality of work and to keep the employees happy.

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IDENTITY VERIFICATION MODEL IN CLOUD COMPUTING OVER SECURITY ISSUES

Rajesh Kumar Kashyap[19] Dr. Sarika Sharma[20] Dr. Ramchandra G. Pawar[21]

ABSTRACT

Cloud computing enables consumers to access resources online through the internet, from anywhere at any time without worrying about technical/physical management and maintenance issues of the original resources. Cloud computing acts as a means to maintain a flexible and scalable IT infrastructure that enables business agility for practicing managers who are trying to exploit the benefits of cloud computing for the efficient use of IT resources. Even though there are impending benefits arising out of cloud computing, there are a lot of risks and security concerns, which are associated with it. This research paper is an attempt to analyses the several critical security challenges in the Cloud Computing. In order to handle such concerns, we proposed effective methods dealing with these challenges. It removes several issues inherent with conventional authentication approaches, such as social security numbers, and provides functional security.

KEYWORDS

Cloud Computing, Cloud Security Issues, Authentication etc.

INTRODUCTION

Cloud computing is a new computing paradigm that is built on virtualization, parallel and distributed computing, utility computing, and service-oriented architecture. Cloud Computing is a generic term for anything that involves delivering hosted services and computing resources over the Internet. According to NIST [9] (National Institute of Standards and Technology, US), Cloud Computing provides a convenient, on-demand network access to a shared pool of computing resources. Here, resources refer to computing applications, software services, platforms, network resources, virtual servers and computing infrastructures. Cloud computing simply means Internet computing, generally the internet is seen as collection of clouds; thus the word cloud computing can be defined as utilizing the internet to provide technology enabled services to the people and organizations.

Cloud computing enables consumers to access resources online through the internet, from anywhere at any time without worrying about technical/physical management and maintenance issues of the original resources. Besides, Resources of cloud computing are dynamic and scalable. Cloud computing is independent computing it is very different from grid and utility computing. Google Apps is the paramount example of Cloud computing, it enables to access services via the browser and deployed on millions of machines over the Internet. Resources are accessible from the cloud at any time and from any place across the globe using the internet. Cloud computing is cheaper than other computing models; zero maintenance cost is involved since the service provider is responsible for the availability of services and clients are free from maintenance and management problems of the resource machines. Due to this feature, cloud computing is also known as utility computing, or IT on demand. Scalability is key attribute of cloud computing and is achieved through server virtualization. This fresh, web-based generation of computing uses remote servers placed in extremely safe and secure data centers for storage of data and management, so organizations do not need to pay for and look after their internal IT solutions. After creation of a cloud, Deployment of cloud computing differs with reference to the requirements and for the purpose it will be used in the last several years, cloud computing has emerged as one of the most influential paradigms in the IT industry, and has attracted extensive attention from both academia and industry.

Although the great benefits brought by cloud computing paradigm are exciting for IT companies, academic researchers, and potential cloud users, security problems in cloud computing become serious obstacles which, without being appropriately addressed, will prevent cloud computing extensive applications and usage in the future. One of the prominent security concerns is data security and privacy in cloud computing due to its Internet based data storage and management. In cloud computing, users have to give up their data to the cloud service provider for storage and business operations, while the cloud service provider is usually a commercial enterprise, which cannot be totally trusted. Data represents an extremely important asset for any organization, and enterprise users will face serious consequences if its confidential data is disclosed to their business competitors or the public. Thus, cloud users in the first place want to make sure that their data are kept confidential to outsiders, including the cloud provider and their potential competitors. This is the first data security requirement.

[19]Research Scholar, MATS University, Chhattisgarh, India, rajdlw@gmail.com
[20]Director (MCA), Jayawant Shikshan Prasarak Mandal's ENIAC Institute of Computer Application, Maharashtra, India, sarika4@gmail.com
[21]Professor & Head, Research Center, Padmashree Dr. D. Y. Patil Institute of Master of Computer Applications, Maharashtra, India, rgpawar@rediffmail.com

Although the use of cloud computing has increased rapidly, cloud computing security is suffering from severe data security threats from user point of view in the cloud computing environment. Security is biggest hurdle in wide acceptance of cloud computing. Users of cloud services are in fear of data theft and privacy. Customers do not want to lose their private information because of malicious insiders in the cloud. Furthermore, data intrusion leads to many problems for the users of cloud computing. We analyse the several critical security challenges in the Cloud Computing. In order to handle such concerns, we proposed effective methods dealing with these challenges.

USER VERIFICATION THROUGH E-MAIL

Email-based user verification is an emerging alternative to public-key infrastructure (PKI). It removes several issues inherent with conventional authentication approaches, such as social security numbers, and provides functional security. User verification through email is a latest approach to identify user. Whenever a valid user login through several system, system must ask for a unique code, which will be known only by valid user. This unique valid code should be send to user's register email address. User has to login through registered email address. Whenever location or personal computer will change, it IP address will also change. Thus, in this case the proposed email based user verification will efficiently handle this situation.

It also fulfills the security issue coming from various hackers. Whenever hackers known ID and password for login into application for any user. In this case, hackers will not able to login due to unique security code ask by the system. Hackers will not be able to verify its identity due to escape in email verification steps.

In prior time, most of the organizations have developed and deployed identification–authentication application based on PKI. These methods allow securing users from faulty impersonations and identity thefts [1].Though, the genuine user identification process in the web has not changed over the last twenty years. However, the entire process is based on password identification and cookies [2].

The survey from Google on email account security have shown that there is an propagation in Google account blockings as an outcome of account hijacking and several thefts [3]. They have presented mostly used authentication method represents the text-based password approach where each user enters their login names and passwords. Although it was famous, textual passwords suffer from various drawbacks. Though easy and simple textual passwords are easy to remember and maintain, they are more chances for the vulnerable to attacks. While complex and arbitrary passwords are difficult to remember and maintain and thus it was not easy for hackers to hack the users account for these complex password [4].

They various aspect of security that advances the textual authentication is the graphical authentication, which is easier to remember. As per authentication, itis complex to formulate and orchestrate attacks for graphical authentication considering that the password space of graphical authentication extends more than that of textual passwords and makes them harder to crack and brute force attack resistant. Although, graphical authentication suffers from the so called shoulder-surfing which represents a hazard of intruder scrutinizing passwords by recording user sessions or directly supervising the users [5].

There is other work which deals with multilevel authentication is explained in [6] where the authors demonstrates a 3-level authentication based on textual, image based and one-time password fashion. Although this kind of scheme does not contain image encryption and their safe storage for ignoring direct compromise of the data used for authentication and reorganization. Other work contain the meaning of a strict authentication system by giving a multi-level authentication approach that produces a password in multi-level instances for accessing and using cloud services inside of which, an e-mail cloud service can reside as well [7].

In present time, the essential use of EBIA is in the application that it allows users to regain lost or missed Web passwords. Several online services, it allows users register an email address at the time of account creation; in the case if a user forgets his or her password, at the same time system gives a facility in which it automatically generates a new password and sends it to the user's registered email address with the given website. Other EBIA systems provides a password resets by sending users an HTML link; when users click on the link, their Web browser opens to a page that lets them create a new password.

In the same way, several Web sites now demands people registering with their web sites to use their email address as their user name. The given approach removes a common but essential issue for Web sites: namespace collisions. In the case when users can choose their own user names, two or more users can pick the same one. However, due to email, addresses are essentially unique and it is easy to verify ownership of an email address (by sending an HTML link that requires a response), using email addresses as user names avoids the possibility of conflict.

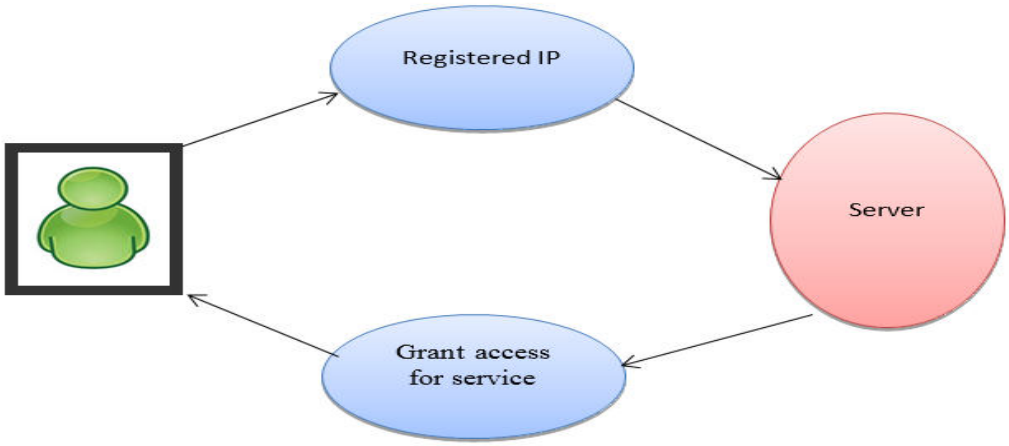
At first glance, EBIA might seem unsecure and, therefore, unwise. After all, the vast majority of Internet email travels without cryptographic protection: Someone or something could read or modify email without detection while the message is in transit. Indeed, several commercial systems do just that—Yahoo, for example, inserts advertisements into email messages and, perhaps

more significantly, will alter email that appears to resemble JavaScript. What's more, key employees at many businesses and Internet service providers (ISPs) can browse or perform keyword searches on users' mailboxes. Given this lack of security, relying on email to prove identity or facilitate financial transactions seems unwise.

Indeed, many security professionals have criticized EBIA systems, complaining about the practice of emailing unencrypted passwords, their reliance on email addresses as identifiers, and on flawed implementations that can send "password resets" to any email address, rather than only to the address on file. Microsoft's .NET Passport service, for example, once let any individual who knew how to exploit such a security flaw in its password reset system seize any Passport account—although the flaw was corrected after it was publicly disclosed [8].

We are providing email based user verification approach. In this approach, we have categorized the concept in three ways. In first section, user login from its trusted IP address, which is registered on cloud. In this section, user needs not to verify its identity on internet. In such condition, user is able to login without any verification process. The given condition demonstrated below:

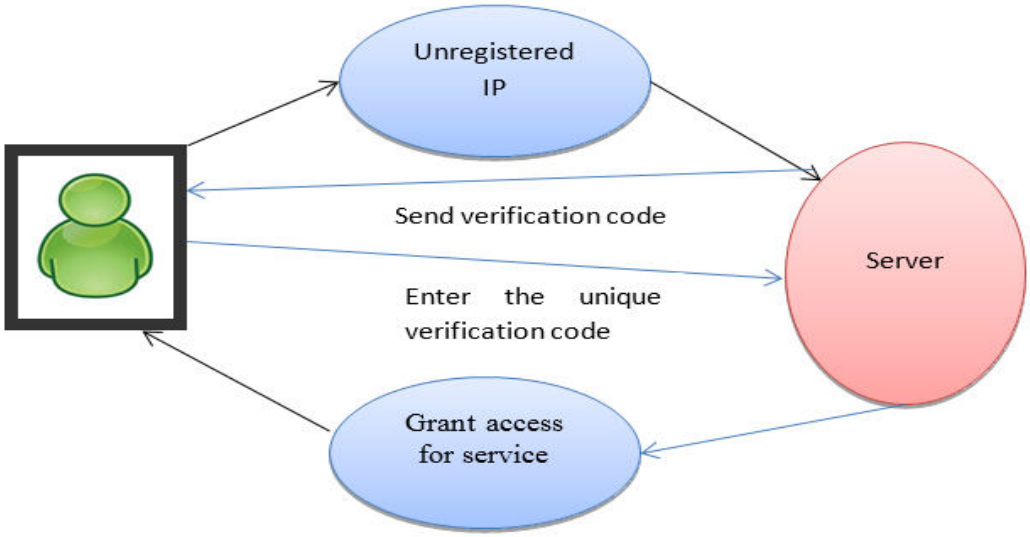
Figure-1: User Login through Registered IP



Sources: Authors Compilation

In the second condition, user wants to login from different place. In such condition, a verification mail should be send to user's account. User opens the mail and gets the unique verification code. This unique verification code helps the user to login successfully. It is due to change in IP address of user's system. The given approach can be demonstrates below:

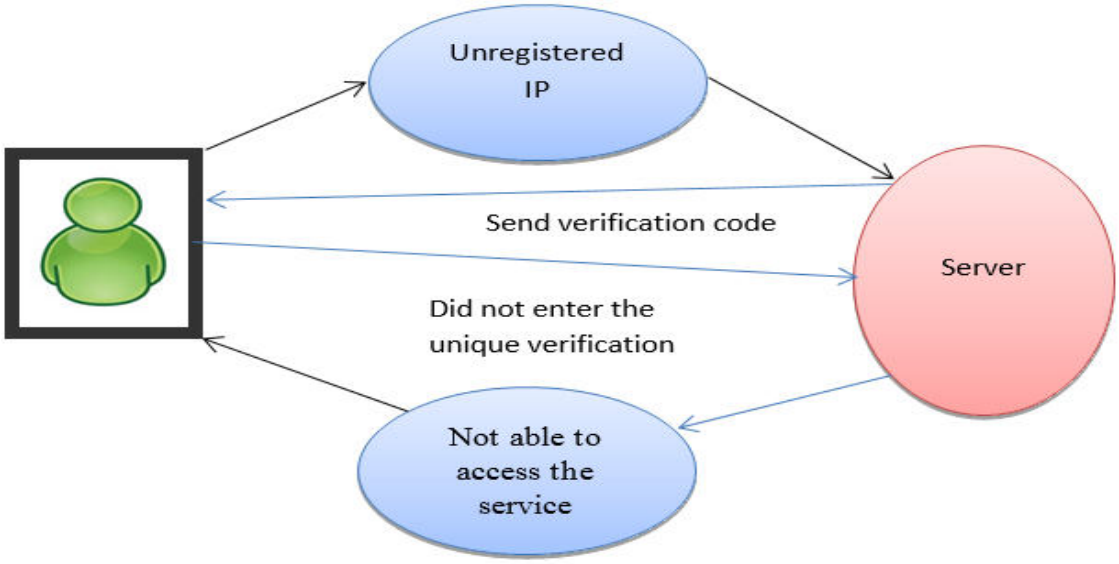
Figure-2: User Login through Unregistered IP



Sources: Authors Compilation

In third condition, hackers wants to login from a valid user's account. In such condition, hackers will not be able to login due to escape the verification steps. Because hackers have not access to open the user's mail and get the unique verification code.

Figure-3: Hackers Login through Unregistered IP



Sources: Authors Compilation

In this section, we have developed an algorithm, which verifies the user through e-mail. Every time a user login with new place with new IP address, user gets an e-mail verification code to login. Until user click on verification link, he/she is not able authorized to login into cloud application (i.e. his own account, he will not login until verification process completed). Here, we are going to provide an algorithm to verify a user through an e-mail. The algorithm is given below in various steps:

1. Create an account. Enter name and e-mail address.
2. Validate the input
   2.1 Name text field should not be empty
   2.2 Name text field should not be t
   2.3 E-mail text field should not be
   2.4 E-mail address should be valid.
3. Create a database for user registration establish a connection and select the registrations database.
4. Insert Account
   Enter the submitted account information to database and create an activation hash.
   4.1 Create a random 32-character hash and assign it to a local variable.

Send verification code

$$Loc\_var = md5\ (rand\ (0, 1000));$$

   MD5 function converts it into a 32-character string of text. The given character string use in our activation email. This is much secure and difficult to crack.
   4.2 Creating a Random Password
   Create random password using md5. It will create a random password, which cannot be read by an "evil" person.
5. Send the verification Email
   5.2 Send email to user
   5.3 Provide email a subject
   5.4 Provide the unique code to activate the account
6. Account Activation
   6.1 Connect to database server with username and password
   $connect("localhost","username","password")\ or\ die(db\_error());$
   6.2 Select registration database

$select\_database\ ("registrations")\ or\ die(db\_error());$

$if((get\ ['email']) \&\& !empty(get['email'])\ AND\ (get\ ['hash']) \&\& !empty(get\ ['hash']))$

{

```
// verify data
}
else
{
// Invalid approach
}
Set email variable;
Set hash variable;
}
If(matched)
        msg( "your account has been activated, now you can login")
        else
        msg("Invalid approach, Please use the link in your mail to verify your account)
```

7. Login

```
If(match > 0)
login complete
else

login failed
```

CONCLUSION

Thus if we are able to develop an inclusive model using this algorithm and suggested features then this will become an exclusive identity verification model in cloud computing. This model is not only beneficial for IT Industries only but this will be most beneficial for Small and Medium enterprises in other industries also those who are apprehensive about exploiting die to the cost of ownership as well the growing scale of vulnerabilities and the risks involved in using them. This paper is not an attempt to find the pitfalls in the models being in existence but an attempt to explore additional opportunities, which if taken care would increase the usage of cloud among the stakeholders.

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ANALYSIS OF GREEN HR PRACTICES IN IT, ITES AND BFSI SECTOR IN INDIA

Ruchismita Parida[22] Lavika Saxena[23] Pallavi Sharma[24] Dr. Suruchi Pandey[25]

ABSTRACT

The issues of climate change and global warming have received attention worldwide and the need for sustainable development has been reinforced by all major countries. The carbon footprint of each individual has increased at an alarming rate and hence taking steps to increase the carbon handprint is the need of the hour. To help in the sustainable development goal of the countries, corporates have taken many proactive steps and have shown their support. The report titled 'Analysis of Green HR Practices in IT, ITES and BFSI sector in India' gauges into the efforts made by corporates and their HR department to reduce their carbon footprint. The main objective of the study was to know about the Environmental Management System in the organizations and assess the employee awareness about the same. The study was done on sample of 300 employees and 15 HR managers from IT, ITES and BSFI sector. The method adopted for data collection involved physical interaction as well as E-questionnaires. The employee awareness about the Environmental Management System in their respective companies was highest in the IT sector and least in the BFSI sector. Across these three sectors, majority of the employees gain awareness about the Green HR practices from the notification by the HR. The biggest driver to implement Green HR practices is the environmental consideration followed by economic consideration.

KEYWORDS

Carbon Emissions, Sustainable Practices, Carbon Footprint, Carbon Handprint etc.

INTRODUCTION

Green human resources refer to using every employee interface to promote sustainable practices and increase employee awareness and commitments on the issue of environment sustainability. Green HR is a strategy used primarily for reducing the carbon footprint of each employee. It also helps in talent retention, as in today's world, a large part of the workforce is concerned about the environment and are more committed and satisfied with the organizations that endorse and follow green practices. The Green Human Resource management must reflect and cater to sustainable development and to the needs of the people without compromising on the availability of resources for the future generation to meet their needs.

OBJECTIVES

- To study employee awareness about various Green HR initiatives and policies incorporated by firms in IT, ITES and BFSI sector in India.
- To identify the drivers of Green HR practices in IT, ITES and BFSI sector.

REVIEW OF LITERATURE

Mitra Pradip (May 2005) in their research study titled *"Sustainability Reporting Practices in India"* did a research on reporting sustainability practices adopted by organizations in India. The focus of his study was on the state of reporting in the field of sustainability in India. They found out that around 78% of GRI sustainability reports from India contain complete information, which is related to such practices in their organizations. They concluded that recuperating sustainability reporting would not only exhibit good governance but also be showcased as an environmental responsible organization.

Gill Mandip (2012) conducted a research study titled "*Green HRM: People Management Commitment to Environmental Sustainability"* in January 2012. The focus of the study was to design a process model under Green HRM for processes including recruitment, performance management and appraisal, training and development, compensation and exit. The other objective was to assess the nature and scope of the sustainable initiatives undertaken by ITC Limited. The research suggested effective green HR initiatives and practices for processes from recruitment to exit.

[22]Student (Human Resources), Symbiosis International University, Maharashtra, India, ruchismita.parida2016@sims.edu
[23]Student (Human Resources), Symbiosis International University, Maharashtra, India, lavika.saxena2016@sims.edu
[24]Student (Human Resources), Symbiosis International University, Maharashtra, India, pallavi.na2016@sims.edu
[25]Associate Professor (Human Resources), Symbiosis International University, Maharashtra, India, suruchi.p@sims.edu

METHODOLOGY USED

To conduct a research on "Analysis of Green HR Practices in IT, ITES and BFSI sector in India" we have selected 300 employees and 15 HR mangers working in major IT, ITES and BFSI firms across India. Based on the result of the pilot study 2 hypothesis were formulated:

- H_0: Companies do not have active Environmental Management initiatives.
  H_1: Companies have active Environmental Management initiatives.

- H_0: There is no employee awareness regarding the implementation of Green HR practices.
  H_1: There is high level of employee awareness regarding the implementation of Green HR practices.

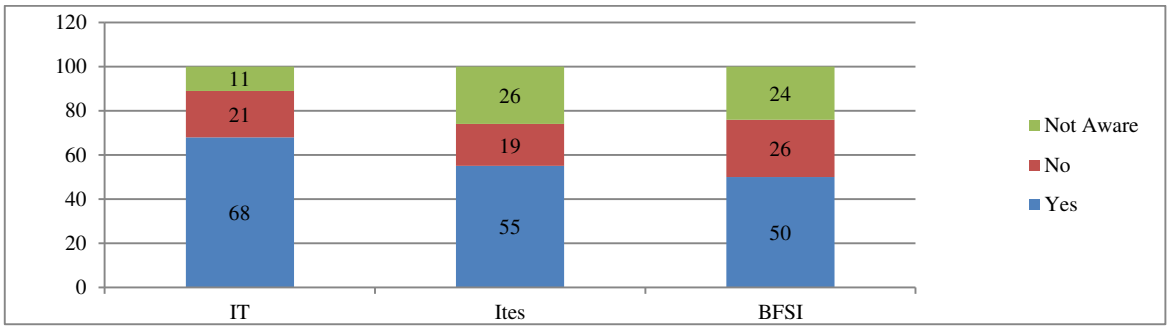
Responses were collected by mailing the questionnaires to 100 employees each of IT, ITES and BFSI sector and 5 HR managers each from these sectors.

RESULTS

Part A: For Employees

A1) Awareness of Environmental Management System

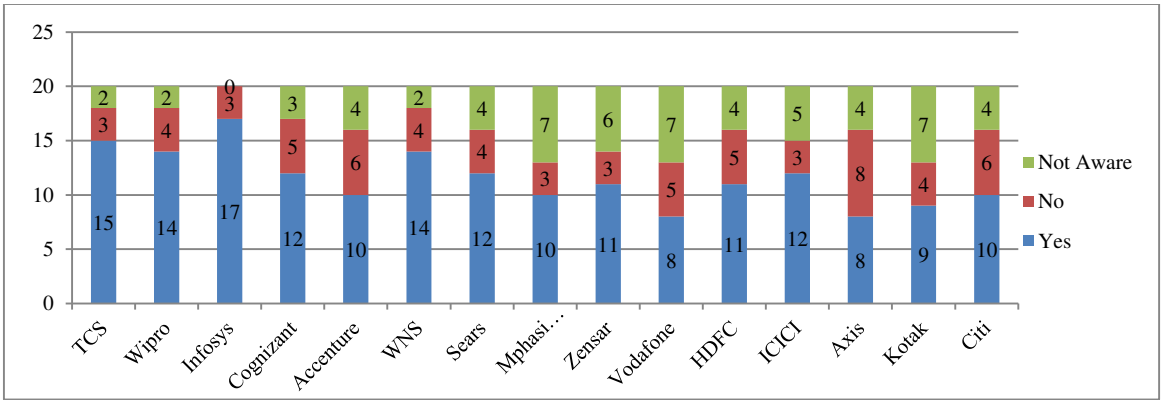
Figure-A1.1: Employee Awareness of EMS across IT, ITES and BFSI Sector



Sources: Authors Compilation

Discussion: From the above graph we can conclude that, the employee awareness level of the Environmental Management System in their respective companies was highest in the IT sector and least in the BFSI sector. In the IT sector, 68% of the respondents were aware about EMS in their companies whereas, in the BFSI sector, 50% of the respondents were aware of the same.The deduction from the above negates the second hypothesis that employees are not aware of the Green HR practices in their organizations and hence we accept the alternate hypothesis for IT and ITES sector.

Figure-A1.2: Company wise Employee Awareness of EMS

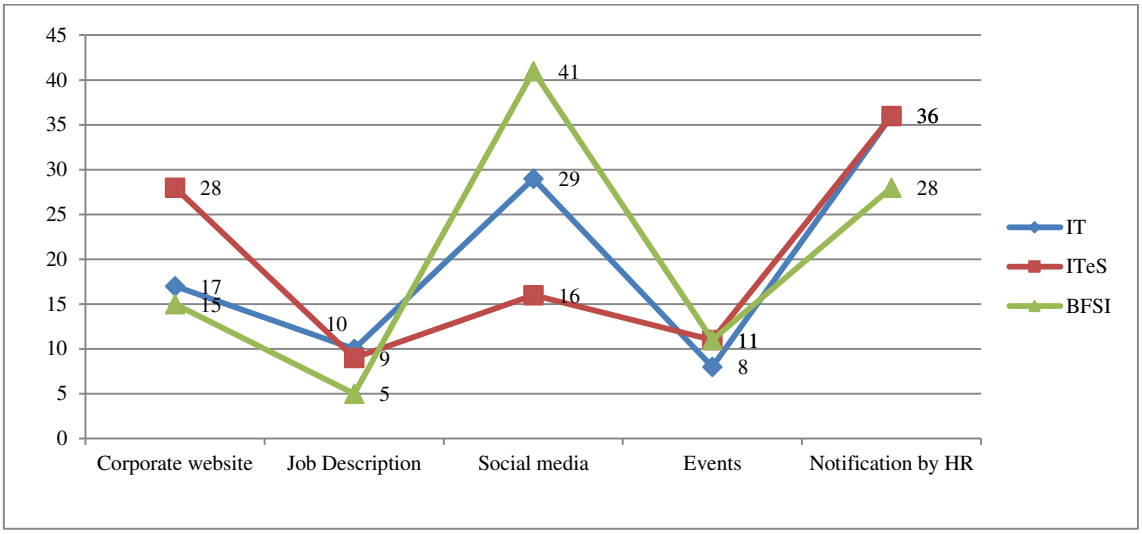


Sources: Authors Compilation

Discussion: From the above graph we can conclude that Infosys had the maximum number of respondents who were aware of the presence of EMS in their company i.e. 17 followed by TCS i.e. 15. In addition, Infosys was the only company, which had no respondent who was unaware about the existence of such a system in the company. The employee awareness level was the least in the Vodafone shared services and Axis bank, both companies having 12 respondents each who either said that the company had no EMS system or were unaware of its presence.

A2) Source of Knowledge of Green HR practices

Figure-A2: Source of Knowledge of Green HR practices across IT, ITES, BFSI Sector

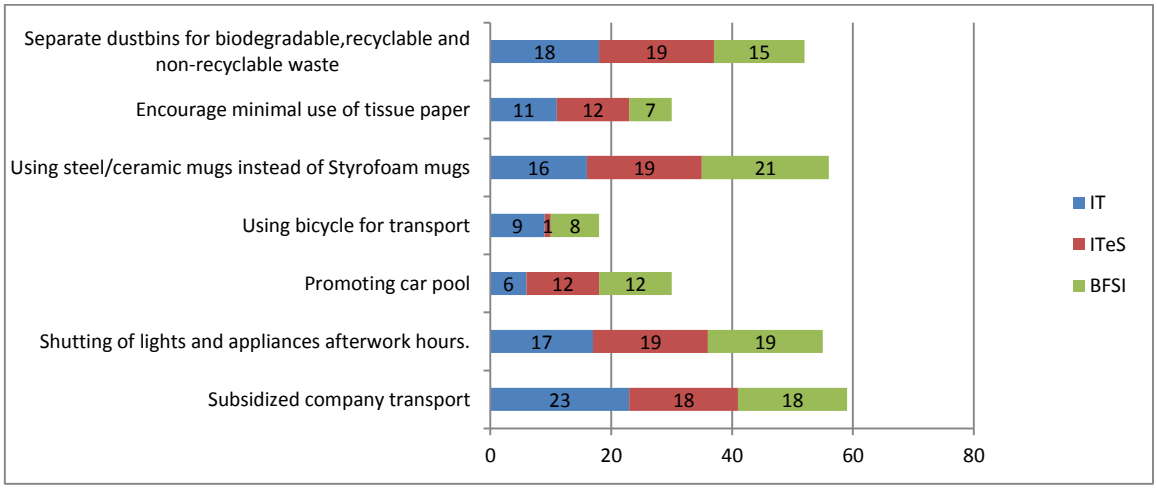


Sources: Authors Compilation

Discussion: From the above graph, we see that across all the three sectors, majority of the employees gain awareness about the Green HR practices from the notification by HR followed by social media and corporate website. For the IT sector and ITES sector, major source of knowledge for the respondents was Notification by HR whereas for the BFSI sector it was Social Media. For IT sector, the source of knowledge imparting least awareness about green HR practices was events whereas for the ITES and BFSI sector the source imparting least awareness was Job Description.

A3) Green Practices Encouraged in the Organisation

Figure-A3: Green Practices Encouraged in Companies across IT, ITES and BFSI Sector



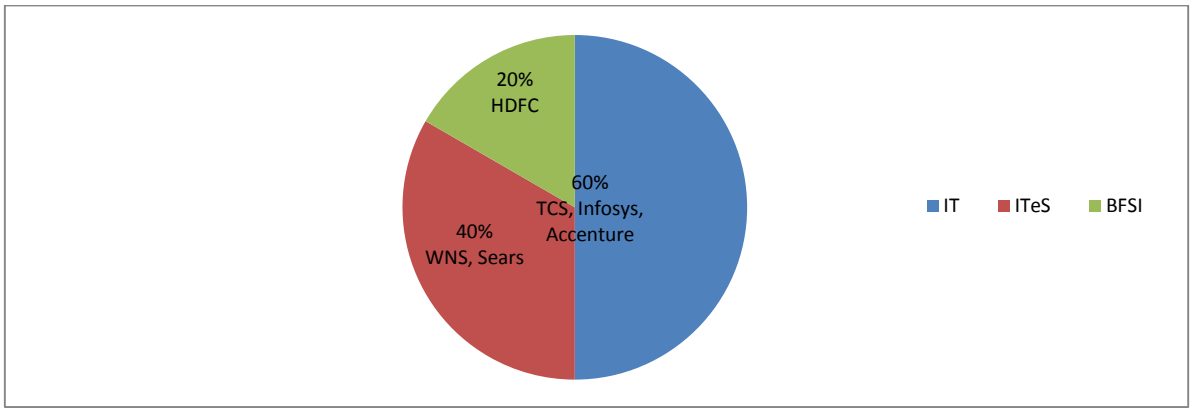
Sources: Authors Compilation

Discussion: From the above graph, we can conclude that across all the three sectors, subsidized company transport is a practice, which was, encouraged the maximum while using bicycle for transport was encouraged the least. In the ITES sector, using ceramic mugs, shutting of lights and appliances after work and using separate dustbins for biodegradable, recyclable and non-recyclable are the practices encouraged the most. In BFSI Sector using ceramic mugs was encouraged the most.

Part B: HR managers

B1) Informing new Recruits about Green HR Practices

Figure-B1: Companies Informing New Recruits about Green HR practices across IT, ITES and BFSI sector

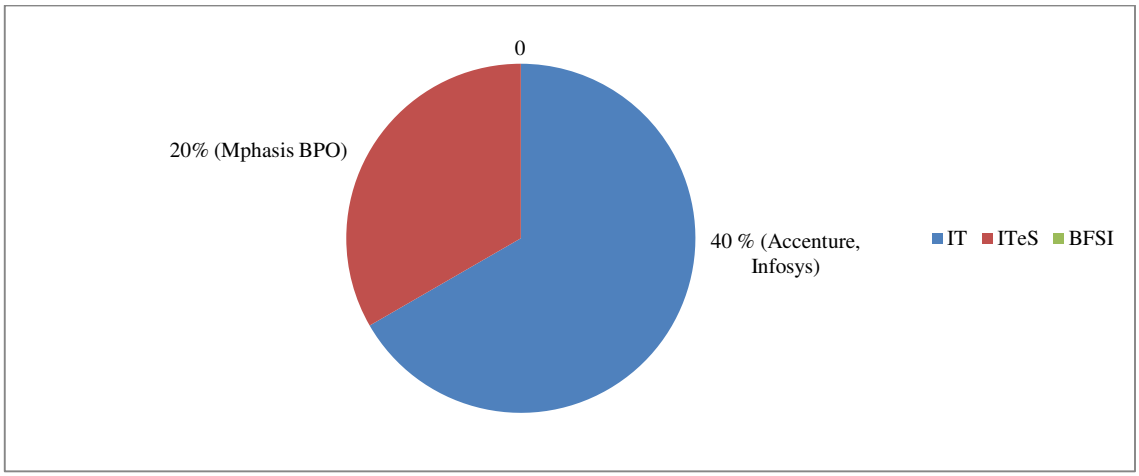


Sources: Authors Compilation

Discussion: From the above graph, we can conclude that majority of the IT sector informs their new recruits about green HR practices followed by ITES and BFSI sector. The companies that inform the new recruits about Green HR practices are TCS, Accenture, Infosys, WNS, Sears and HDFC.

B2) Tracking Number of Pages Printed Per Employee

Figure-B2: Companies Tracking Number of Pages Printed per Employee across IT, ITeS and BFSI Sector

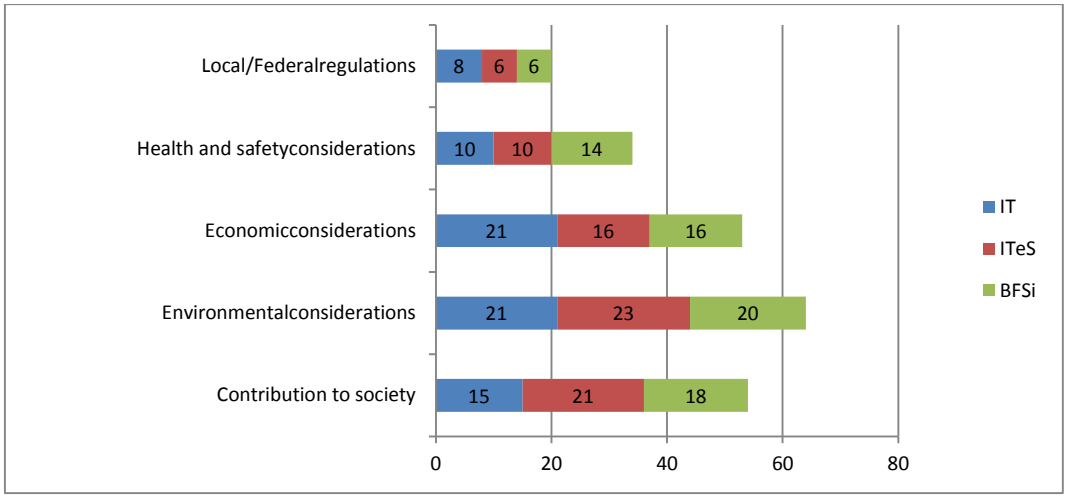


Sources: Authors Compilation

Discussion: In the IT sector, 40% of the respondents said they track the number of pages printed per employee and keep a check on it. These companies include Accenture and Infosys. In the ITES sector, 20% of the respondents said they track the number of pages printed per employee. These respondents were from MphasisBPO. In the BFSI sector, none of the companies keeps a track of the number of pages printed per employee. In the IT sector, the respondents who did not track the number of pages printed per employee were form Cognizant, Wipro and TCS. While in ITES sector, these respondents were form Sears, WNS, Zensar and Vodafone shared services.

B3) Drivers of Green HR practices

Figure-B3: Drivers of Green HR Practices across IT, ITeS and BFSI sector



Sources: Authors Compilation

Discussion: From the above graph we can conclude that across all the three sectors, environmental considerations was recorded to be the biggest driver for implementation of green HR practices and local and federal conditions was recorded to be the least significant driver. In the IT sector, most of the companies said that economic considerations and environmental considerations were the biggest drivers for implementing green HR practices in their respective organizations. In the ITES sector, most of the companies said that environmental considerations and contribution to society were the biggest drivers. In the BFSI sector, most of the companies said that environmental considerations was the biggest driver for implementing green HR practices in their respective organizations. The deduction from the above negates the first hypothesis that companies do not have active Environmental Management initiatives and hence we accept the alternate hypothesis for IT, ITES and BFSI sector.

CONCLUSION

We conducted a research to study the implementation of Green HR practices implemented by IT, ITES and BFSI firms in India. There are various sustainable practices encouraged by organisations like subsidized company transport, separate dustbins for different kinds of wastes, minimal use of paper, using bicycles for transport etc. However, there were formal Environment Management Systems available in many firms in IT and ITES sectors, yet ITES lacked in their efforts to spread awareness about it to its employees. The BFSI sector still needs to boost up with implementing and spreading awareness about such systems to its employees. We found out that the employee awareness about Green HR practices was maximum in the IT sector, followed by ITES and the least in BFSI sector.

Our second objective was to assess the drivers that affect adoption and implementation of Green HR practices. As per the HR managers, top three drivers of implementing and maintaining green practices are Economic considerations, Environmental consideration and Contribution to society. So thereby, we accept our alternate hypothesis that, Companies have active Environmental Management initiatives. We also accept our second alternate hypothesis for the IT and ITES sector that there is high level of employee awareness regarding the implementation of Green HR practices.

RECOMMENDATIONS

As per our findings from the research, the following recommendations can be made for proposing green HR initiatives in the company. The company should comply with ISO 14001, which is a series of Environmental Management Systems (EMS) standards to assist organizations in their responsibilities towards environment. Moreover, the companies should promote initiatives like waste reduction, recycling and conservation of paper, use of two-sided printing and green office supplies, car-pooling and use of public transport. Moreover, effective green HR initiatives can be integrated with the HR Processes within the organization. For recruitment, branding the green HR practices and policies of the organization on its website can be done. In case of performance management system, companywide environmental performance standards can be set along with specific criteria for green goals for each job for performance evaluation. In addition, orientation programs should be held for the newly hired employees to orient them with the environmental concerns and initiatives of the company.

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Editor-In-Chief
Pezzottaite Journals,
24, Saraswati Lane, Bohri,
Near Modern Dewan Beverages,
Jammu Tawi – 180002,
Jammu and Kashmir, India.
(Mobile): +91-09419216270 – 71
editorinchief@pezzottaitejournals.net
contactus@pezzottaitejournals.net

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ISSUES AND CHALLENGES IN DATA MINING

Dr. D. NM. Raju[26] D. Srividya[27]

ABSTRACT

Mining of data is a familiar technique for extracting information from a large amount of data logically and ethically. However, sometimes it may reveal personal information about individuals' privacy. The extraction of such information is highly useful to people, business organizations, industry and so on. Such extraction of information is generally from mass, incomplete, noisy and random data. Privacy preserving data mining has become a buzzword in the recent scenario.

In these days of technology explosion, data storage, data processing, privacy preservation has become a major challenge in data mining. Data mining draws its works from various fields or areas like data base-technology, machine learning, statistics, pattern recognition, information retrieval, data visualization and so on.

Hope and believe that the research in data mining will continue and reach new heights in the coming years. This paper throws light on various important aspects of data mining including major issues and challenges in data mining.

KEYWORDS

Data Mining, Privacy Preserving, Issues & Challenges etc.

INTRODUCTION

Data mining helps to extract hidden preventive information or knowledge from large databases. It is an innovative technology, which assists companies to concentrate more on important information, which is stored in data-warehouses. Data mining tools help the business houses to predict future trends and to make knowledge driven decisions. Data mining tools and techniques answers business questions in less span of time and solves business problems effectively in no time unlike traditional way, which was more time consuming.

Most companies collect and refine large quantities of data. Data mining techniques can be implemented on the existing software and hardware platforms to enhance the value of existing information resources. It can be integrated with new products and systems due to on-line facility. When implemented on high performance client/ server, the tools of data mining can produce answers to questions by analyzing the databases. It can answer to questions such as, which clients can respond to the promotional mailing and why?

EVOLUTION

Data mining has become an active and important area of research since the early 1990s.Data mining has evolved from relational data and includes time and space constraints. The development in positional technology and locational-based services have led to the growth of Spatial-Temporal Data Bases that require advanced data mining capabilities.

DEFINITION AND MEANING

Data Mining*:* A process used by companies to turn raw data into useful information. By using Software to look for patterns in large batches of data, businesses can learn more about their customers and develop more effective marketing strategies as well as increase sales and decrease costs.

Meaning: Data Mining uses artificial Intelligence techniques, neural networks, and advanced statistical tools such as cluster analysis to reveal trends, patterns, and relationships, which might otherwise have remained undetected. It attempts to discover hidden rules underlying the data. It is also called as data surfing. Its parameters include: a) Association, b) Classification, c) Clustering, and d) Forecasting etc.

It is used in many research areas including mathematics, cybernetics, genetics, and marketing.

[26]Director & H.O.D, Nimra College of Engineering and Technology, Andhra Pradesh, India, srinilayam55@gmail.com
[27]Senior Software Engineer, Electronic Free Images Limited, Karnataka, India, srividya.dantuluri@gmail.com

CHARACTERISTICS OF DATA MINING

- Large Quantities of Data: The Volume of Data is so great it has to be analyzed by automatic techniques. Ex: Satellite information, Credit Card Transactions etc.
- Noisy and incomplete data. Imprecise data is the characteristic of all Data Collection.
- Complex Data Structure: Convectional Statistical Analysis is not possible.
- Heterogeneous Data Stored in legacy systems.

OBJECTIVES OF DATA MINING

- To find the unseen pattern in large volume of Historical Data that helps to manage an Organization.
- Sequence or Path Analysis.
- Classification, Clustering, Forecasting etc.
- **Prediction:** It involves using some variables or fields in the Database to predict unknown or Future values of other variables of interest.

IMPORTANCE OF DATA MINING & DATA

The process of Data Mining begins with business houses. The process of Data Mining includes competitive data, Social Media conversations, Industry Survey Data and Blogs. Data Mining is misunderstood by many. Many think that it is process of extracting Data or Data Processing. However, in practice, it is Computer assisted process of digging through and analyzing enormous sets of data and then extracting its meaning. The extracted Data will help Business to make knowledge driven decisions. Data Mining Tools help the Business to answers questions which or otherwise time consuming.

Data Mining involves the following Elements:

- Extraction, Transformation, and loading of Data to a Warehouse system.
- Storage and Management of Data in a Database Systems.
- Access to Data for Business Analyst's and IT professionals.
- Analysis of Data by Software.
- Presentation of Data in a useful Format such as, Tables or Graphs.

Organizations can make better and more useful business decisions in the areas of Marketing, Advertising introducing of New Products and services with Data Mining.

ETHICS OF DATA MINING

Data Mining has serious ethical implications when data used relates to people. The users and the practitioners of Data Mining Tools and Techniques must be aware of ethical issues concerned. Data Mining may also be used to know the people getting the loans and to whom special offers are being made. Discriminations relating to race, sex, religion and so on are not only unethical but also illegal. Using sexual and racial information for Health Care is not unethical. Whenever information is collected from, individuals they must be informed clearly the purpose for which such information is used. Sometimes surprising things may arise from Data Mining.

Insurance Companies may discriminate people to meet the goals in Business. They may draw Conclusions like young pay more on insurance relating to automobile finance. When presented with Data it is necessary to find out who is authorized to use, the purpose for which it is collected and what type of conclusions are legitimate to draw from it. In addition to community standards for the use of Data, logical and scientific Standards must be followed when drawing conclusions from it.

RELATED WORKS

Data Mining is the process of extracting and valuable patterns from raw collection. It can also disclose sensitive information about individuals. Data Mining draws work from areas including Data Base Technology, pattern recognition, information retrieval, and data visualization. It involves the use of Data analysis tools to discover previously unknown and valid patterns and relationships in large data sets. These tools can include statistical models, mathematical algorithms, machine learning methods etc.

Privacy preserving in Data Mining has become an important area of research. Data Mining can be performed on collected Data represented in quantitative or multimedia forms.

***Other Related Works in Data Mining**:*

- Scaling of Dynamic time warping for Data Mining applications.
- Yale: Rapid proto-typing for complex Data Mining tasks.
- Educational Data Mining – A survey from 1995 to 2015.
- The problem of concept drift: Definition and related work.
- Privacy - Preserving Data Mining.
- Scalable, Distributed Data Mining – An agent Architecture.
- Towards parameter – Free Data Mining.
- Security and Privacy implications of Data Mining.

ADVANTAGES AND DISADVANTAGES OF DATA MINING

Data Mining is an important aspect of Knowledge Discovery process. It facilitates analysis of large volumes of Data to get the hidden and useful knowledge. It is applied not only in business concerns but also in other areas such as weather Forecast, Medicine, Transportation, healthcare, Insurance, Government etc. Data Mining has lot of advantages when used in a specific industry. It has also certain disadvantages. Ex: Privacy, Security and Misuse of Information.

Advantages of Data Mining

- **Marketing:** It provides the Direct Marketers information relating to the trends about the purchasing behavior of their customers. Thus, the marketers can focus their attention on their customer with more precision. Ex: Software Company may provide information about the new software to the existing as well as the prospective consumers.

- **Banking and Crediting**: it helps Financial Institutions in credit reporting and loan information. Ex: it helps Credit Card issuers in detecting Fraudulent Credit Card Transactions.

- **Law Enforcement:** It helps law-enforcing agency in identifying criminal suspects based on the type of crime, habit and other behavioral patterns.

- **Researchers**: it helps researchers in accelerating the process of analyzing Data and save time so that they can concentrate more on other projects.
- It helps in the process of Decision Making.

Disadvantages of Data Mining

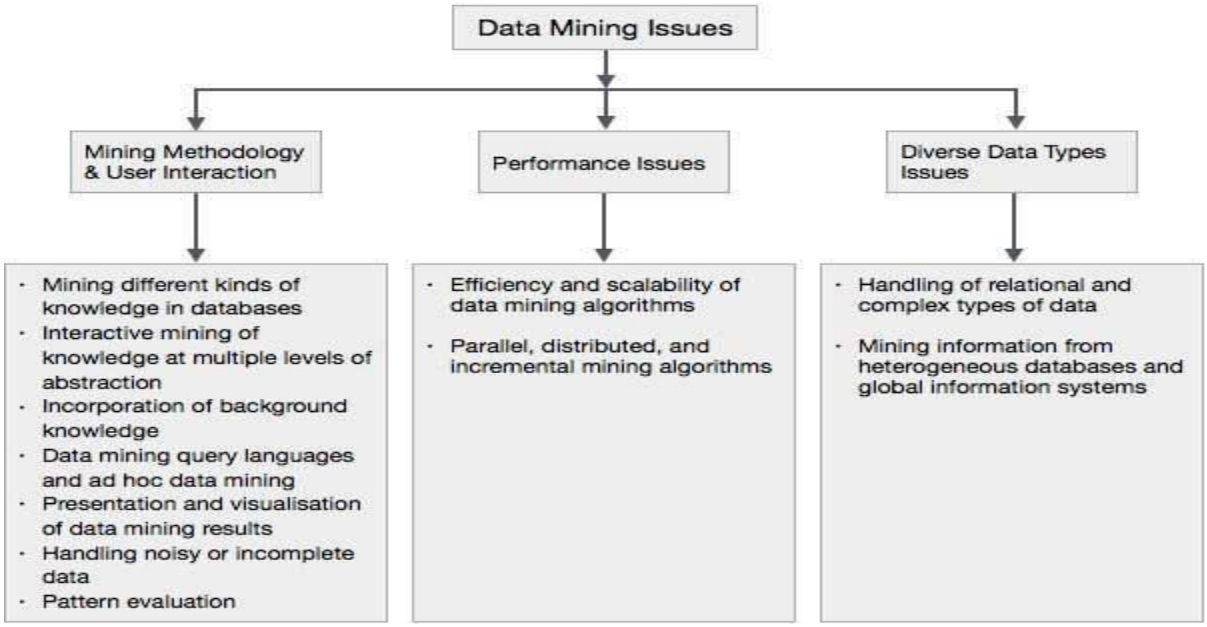
- **Privacy Issues:** It has become a major concern in the country. The concerns about privacy have been on raise off-late due to the use of internet. It is because of this some do not shop on internet. There is every possibility that others may find access to their personal information who may cause personal harm by using in unethical way.

- **Security Issues:** Companies may have lot of information about various types of people but they do not have sufficient systems to protect the information.

- **Mis-use of Information**: Trends obtained through Data mining meant for marketing purpose or for ethical purposes may be mis-used.

MAJOR ISSUES AND CHALLENGES IN DATA MINING

Figure-1



Sources: Authors Compilation

Data mining is complex as the algorithms used can get complex data, which is not available at a particular place. It is to be integrated from different heterogeneous data sources. The process of integration may also create certain problems or issues.

CHALLENGES IN DATA MINING

The various challenges in the area of data mining including processing and extracting valuable and knowledgeable data collected from various sources can be studied as pre-processing, post-processing, data mining tasks and algorithms. There are also other important challenges Dirty Data; Explaining Data Mining to Others; Difficulty in Accessing Data and so on. Some of the challenges are discussed below:

***Data Cleaning and Pre-processing*:** It is essential to ensure data quality and to improve the efficiency and ease of the mining process. It is because data collected from various sources may be noisy, incomplete, inconsistent etc., which may not be suitable for mining directly.

Data pre-processing includes data cleaning to remove noisy data and outliers, data reduction to reduce the dimensionality and complexity of data and to convert the data into suitable forms for effective mining and so on.

Technological advances made it possible to collect and store huge amounts of data in various forms like text, video, graphics etc;

Unfortunately, these data may come across the problems of missing values and noises and may even be incomplete and inconsistent. Thus, ensuring data quality and to improve the efficiency of knowledge discovery is a big challenge.

***Post-Processing*:** It is refining and evaluating the knowledge derived from mining procedures. It includes simplification of extracted knowledge or documenting it. Other challenges of post-processing may be:

- How to evaluate the discovered patterns,
- How to present the mining results to understand easily,
- How to convert discovered patterns to knowledge.

Tasks and Algorithms: These are the suitable steps for knowledge discovery. Data mining involves a wide range of tasks and algorithms. Ex: clustering and trends to understand non-trivial changes. Different data mining tasks may use the same database in different ways.

Other challenges of tasks and algorithms may be:

How to achieve the effective data mining of different kinds of knowledge based on different data mining algorithms. Thus, data mining across multiple information sources is a challenging task.

***Dirty Data*:** It is a major challenge in data mining since long. Many data miners provide inputs to business users to overcome the problem. Data miners use descriptive statistics and visualization assist business users in understanding their data and to identify the problem areas.

***Explaining Data Mining to Others*:** Data miners are dis-heartened with the executors because they do not appreciate the solutions provided, as they do not possess sufficient knowledge and the conceptual base about data mining.

> Data miners do not mind to approach the middle level Managers/executives who can spare time to understand the solutions. Some other data miners even approach the lower level in the organization and to convince the key users to identify the problem and work with them in finding a solution.

Difficulty in Accessing Data: Accessing data, which is typical, poses a major challenge. It is so in case of data, which is scattered throughout the organization. Data miners have realized that the difficulty in accessing data is only due to lack of their proper planning or strategy for data. Ex: how it can be obtained, what data is needed, how quality can be maintained etc.

Data miners suggest that business problems can be solved when they work together with business users.

Other Challenges in Data Mining are:

- Scalability,
- Data quality,
- Dimensionality,
- Privacy preservation,
- Streaming data,
- Complex and heterogeneous data.

LIMITATIONS OF DATA MINING

- Data is primarily personnel related but not technology related.
- Data can identify connections between behaviors or variables but does not identify relationships.

CONCLUSION

Data mining is meant to extract hidden knowledge from large amount of data. It is a process of extracting knowledge and valuable patterns from new collection of data. It is used to un-cover patterns in the data but it is carried out only on samples of data. Data mining process becomes ineffective if the samples do not make good representation of large volumes of data.

In addition to this, due to Globalization cutthroat competition has become a big challenge for all organizations and industries in data mining issues. To conclude, there no organization or industry which is free from business rivalry. Thus, this paper throws light on various important aspects of data mining such as various problems, issues, and challenges in the area of data mining and creates scope for further research.

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A STUDY ON IMPACT OF HR PRACTICES ON EMPLOYEE ATTITUDINAL IN ITES SECTOR

Dr. Manju Shree[28] Yimer A.[29]

ABSTRACT

In the last two decades, the Indian IT/ITES industry has contributed significantly to Indian economic growth in terms of GDP, foreign exchange earnings and employment generation. However, equally significant though not as tangible, has been the ripple effect it has created on the general economic environment in the national and international economic space. The industry has been the trigger for many "firsts" and has contributed not only to unleashing the hitherto untapped entrepreneurial potential of the middle class Indian but to also taking Indian excellence to the global market.

The fast growing IT/ITES industry has been struggling with several issues concerning availability and quality of talent. The industry has responded to this issue by evolving sustainable and innovative solutions. The industry is also making efforts to ensure that employees are provided a stimulating and healthy working environment for improving their level of satisfaction and productivity.

The impact of Human Resource (HR) practices on the organization and its effectiveness is an important topic both from an academic and practitioner perspective as it addresses the "value- added" by human resources and the HR function. Much of the work on the impact of HR practices on the organization has been conducted at the macro level, studying the relationship between HR practices and firm performance. In summary, this study suggests that core HR practices are the factors in influencing the employee's attitude, and that a more comprehensive approach to studying the impact of HR practices in order to enhance understanding of the true impact of HR practices on employee's attitudinal for optimum performance.

INDIAN IT / ITES INDUSTRY

The Indian IT / ITES industry has been one of the great success stories of modern India. The overwhelming majority of companies in this sector were started by entrepreneurs with modest backgrounds and very limited access to capital. In many ways, this industry has helped create the brand of "New India" and served as an inspiration for everyone else. The IT/ITES industry has significantly contributed through socially relevant products/services and community initiatives in human resource development, education, employability, health, encouraging women empowerment.

According to Barney (1991:99), the framework of resource based view of sustaining competitive advantage "suggest that firms obtain sustainable competitive advantages by implementing strategies that exploit their internal strengths, through responding to environmental opportunities, while neutralizing external threats and avoiding internal weakness." For competitive advantage to be gained, resource available to competing firms must be variable among competitors, and these resources are not easily obtainable. Taken from economics and strategic management, within the context of SHRM, the resources based views brings together strategy, HR practices, and the firm's human capital (Wright & McMahan, 1992).

REVIEW OF LITERATURE

Schuler and Jackson (1997a; 1997b) integrated strategies with the employee behaviors required to achieve the strategies. They integrated both business strategies and employee behaviors to the specific HR practices that would develop the requisite competencies and skills necessary to accomplish the strategic business objectives. They prescribe a menu of HR practices from which to choose in determining which practices to link to competitive strategies in order to gain a competitive advantage. In his study on the impact of strategic HR practices, Huselid et al., (1997) found that strategic HR practices were associated with firm performance.

In the SHRM empirical studies, the measurement of HR practices has ranged from simply acknowledging that the practice is in place, to report how many employees participate in the programs (Arthur, 1994; Delaney & Huselid, 1996; Delery & Doty, 1996; Huselid, 1995; Jackson, Schuler, & Rivero, 1989; Snell & Dean, 1992).

Huselid and Colleagues (1997) attempted to assess the quality of the programs by asking HR managers for their input. The investment in the human capital of the organization suggests that the employees in the organization are the intended target and

[28]Associate Professor (Management), College of Business & Economics, Wollo University, Ethiopia, manjushreesha@gmail.com
[29]Head of Department (Management), College of Business & Economics, Wollo University, Ethiopia, manjushreesha@gmail.com

recipients of such investments. What has not been studied in the macro approach to studying HR practices is the perspective from the employees who are the intended targets and recipients of the HR practices.

Huselid and Becker (1996) suggest that there is a difference between an espoused policy and the actual practice that employees experience, and Becker and Gerhart (1996) argue that there is a difference between what the researchers says that firms should do and what firms actually do. It is, therefore, important to acknowledge that there is a difference between what is intended to be implemented and what actually takes place. Employee perceptions of practices may be different from what the organization intends (Whitener, 2001). Employee's perceptions of HR practices may also be significantly different from that of senior management and the HR professionals in the organization. Therefore, in order to fully understand the impact of HR practices can have on both employee outcomes and organizational performance, it is important to study the employee constituency, as they are the targeted recipients of the HR activities.

Becker and Gerhart (2006) refer to the HR system as the "Invisible asset that creates value when it is so embedded in the operational systems of an organization that it enhances the firm's capabilities" and that it is difficult to imitate because the precise mechanisms by which HR systems generate values are difficult to grasp. This investment in the human capital of the organization suggests that the employees in the organization are the intended targets and recipients of such investments.

OBJECTIVES OF STUDY

- To find out the association between HR practices and employee attitude.
- To study the influence of HR practices on the demographic variables such as Gender, Job experience on Attitudinal of employees.

SCOPE OF STUDY

The study is intended to study the impact of HR practices on employee attitudinal in ITES companies. The dependent variable studied are attitudinal independent variables are HR practices such as training and developmental opportunities, pay for performance, and decision-making. The study is confined to the ITES companies situated in Coimbatore city.

HYPOTHESIS

- There is no association between HR practices and employee attitude.
- Demographic variables Gender, Job experience, HR practices, do not determine attitudinal of employee.

RESEARCH METHODOLOGY

The present study is a descriptive survey. The terms and concepts have been operationally defined, further the hypotheses for empirical validation are stated, and the process of sample selection, statistical methods for data analysis and tools used for measurements to obtain data are included.

Reliability and Validity: After adaptation of the original HR practices scale by investigator, a pilot study was carried out on a random sample of 50 employees. The reliability of the scale was assessed and the reliability coefficient of the HR practices scale was found to be 0.91 (91%).

Population and sample of Study: The population for the study was ITES companies in Chennai having commenced operation at least since 2003 because the study focused on identifying the Convenience sampling is used in research owing to various reasons. Sackett and Larson (1998) argue that a convenience sample can be relevant for research to the extent that it possesses the essential person and setting characteristics that define membership in the intended target population.

Data Collection: A total of 90 employees from 9different ITES companies in Coimbatore city were approached for data collection.

DATA ANALYSIS AND RESULTS

The data collected have been analyzed using SPSS 20 statistical software and the results obtained thereby have been interpreted. These have been done on each independent and dependent variables.

H_1: There is an association between HR practices and employee attitude.

Table-1: Chi-square Analysis between HR practices and Employee Attitude

HR Practices vs Employee attitude	Chi-Square value	d.f.	Asymp. Sig (2-sided)
Training & Development Vs Employees attitude.	1.480E2a	9	.000
Pay for performance Vs Employees attitude.	1.678E2a	9	.000
Performance appraisal & Career advancement vs Employees attitude.	99.092a	12	.000

Sources: Authors Compilation

***Inference*:** From the above table, the p-value for Pearson's Chi-square is <.001. This infers that there is an association between HR practices and employee attitude.

Table-2: Frequency Distribution of Employees' Opinion about Reward for Performance

Discussion	Frequency	Percentage	Cumulative Percentage
Strongly Agree	1	1	1
Agree	51	57	58
Neutral	29	32	90
Disagree	8	9	99
Strongly Disagree	1	1	100
Total	90	100	

Sources: Authors Compilation

Inference: From the above table, it is inferred that majority (56.9%) of the respondents disagree with the statement they have received reward for their performance.

SUMMARY AND CONCLUSIONS

The impact of Human Resource (HR) practices on the organization and its effectiveness is an important topic both from an academic and practitioner perspective as it addresses the "value- added" by human resources and the HR function. It is inferred from the chi square analysis that there is an association between HR practices and employee attitude.

From the descriptive analysis, the researcher suggest that, the companies can provide training programs to improve managerial competencies , more time to be provided for employees returning from training to reflect and plan improvements. The companies may reward employees for their extra effort in work. Timely reward and appreciation are the ways to motivate the employees for better performance. Employees of ITES companies can have frequent discussions about their goals, objectives and performance with their managers for their career development. Companies can provide more help to the employees for their career development, information and resources available for them.

The Indian employee today is very savvy. Riding on the back of an employment boom, the employees have taken full advantage of the shift of power in the employer – employee equation. From plush offices equipped with world class facilities to HR practices that cater to every whim and fancy, today's employee is demanding it all and will make sure he gets it.

Having entered the workforce during a time of 'plenty', the young employee has aspirations and attitudes that differ considerably from those of his predecessor. High levels of remuneration, fast faced growth are some of the things taken for granted by employees these days. Rewards are extremely important and any company that under estimates their importance may choose to do so at the risk of facing a mass exodus.

HR practices, be it training, performance, promotion and career development the effort the organization put into creating an employee focused work environment makes them feel of the organizational support. This support makes them to be committed and this attitude relates to the behaviour and performance of the employees in the organization. This study has important implication for ITES companies about HR practices and performance. The HR practices do not determine the performance. The companies can improve the HR practices and find ways to improve the performance of the organization. The study shows that the HR practices has an association with perceived organization support and this has an impact on the affective commitment and organization citizenship behaviour of the employees of ITES companies.

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Editor-In-Chief
Pezzottaite Journals,
24, Saraswati Lane, Bohri, Near Modern Dewan Beverages,
Jammu Tawi – 180002, Jammu and Kashmir, India.
(Mobile): +91-09419216270 – 71
editorinchief@pezzottaitejournals.net,contactus@pezzottaitejournals.net

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AN APPROACH TO FIND THE SUBSTITUTE METHOD FOR TRANSPORTATION PROBLEM

Dr. Mayank Panwar[30] Deepak Sisodia[31]

ABSTRACT

The aim of this paper is to design the new substitute method to solve the transportation problem quickly. We introduced the new substitute method to solve the transportation problem and get the solution, which is similar to the optimum solution.

KEYWORDS

Optimality, Initial Feasible Solution, North–West Corner Method, Lowest Cost Entry Method, Vogel's Approximation Method etc.

INTRODUCTION

Transportation Problem is the one of the most significant and victorious applications of quantitative analysis for solving industry problems. Production problems have been in the physical distribution of goods, usually referred to as transportation problems.

Basically, the reason of T. P., is to minimize the cost of delivery goods from one place to another place so that the requirements of each advent place are met and every shipping location operates within its ability. However, quantitative investigation has been used for many problems other than the physical allocation of goods; illustration, it has been used to efficiently place employees at certain jobs within an organization. Transportation problem is an important class of linear programming problem, associated with routine performance in our realistic life and mostly deals with logistics. It is useful in solving issues on allocation and transportation of goods from one place to another place. The goods are transported from a set of source (e.g., plant) to a set of destinations (e.g., storage chamber) to meet the particular needs.

Hitchcock [8], The basic transportation problem is developed by **Hitchcock** in 1941 and **Koopmans [9]** further advanced it independently. The relationship between basic solutions in the transport problem and the tree structure of a graph introduced by **Koopmans [9]** The basic transportation problem developed by Hitchcock; however, it is solved for the business purpose 1951. To solve transportation problems **Dantzig [3]** choose the simplex method .The formulation of T. P. and the simplex method is applied to solve the problem by **Dantzig [3].** Since transportation problem is a special type of problem, which is an integral part of operation research, and this topic is in almost all the books of operation research and mathematical programming. An intuitive presentation was developed by **Charnes and Cooper [2], which** is on Dantzig's procedure. On the other hand, there are various results found from these **Grigoriadis and Walker [7], Ford and Fulkerson [4], Balinski and Gomory [1], Muller Merbach [10]. Gass [5]** presented briefly**, in (1990) the issue of transportation problem is elaborated in detail,** and there are different methodologies related to transportation problem, as there are different method for solving the transportation problem by which different solution obtained**.**

PROBLEM AND FORMULATION

In this section we introduce a general transportation problem which solved by the regular solution methods of transportation as Vogel's Approximation Method.

Example – Find the Initial Basic Feasible Solution by Vogel's and substitute Method

	D_1	D_2	D_3	D_4	Supply
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Demands	20	40	30	10	100

[30]Associate Professor, Teerthankar Mahavir University, Uttar Pradesh, India, anumayak@gmail.com
[31] Assistant Professor, Sardar Vallabhbhai Patel University of Agriculture & Technology, Uttar Pradesh, India, deepaksisodia02@gmail.com

Solution - By Vogel's Approximation Method

The Total Transportation Cost

	D_1	D_2	D_3	D_4	Supply
O_1	1(20)	2	1(10)	4	30
O_2	3	3(20)	2(20)	1(10)	50
O_3	4	2(20)	5	9	20
Demands	20	40	30	10	100

=1*20+1*10+3*20+2*20+1*10+2*20=Rs. 180

ALGORITHM FOR NEW SUBSTITUTE METHOD

Step 1 - Choose the least value from the demand and capacity of the transportation table.
Step 2 - Allocate the minimum value of demand/ capacity to the cell having lowest element.
Step 3 - Subtract the allocated value of demand/capacity from the adjacent demand/capacity value and table is adjusted.
Step 4 - The column or row having allocated cell adjacent to the allocated demand/capacity is cross-out from the transportation table and the demand/capacity is exhausted.
Step 5-Prepare the new transportation table.
Step 6- Similar process is repeated to get the total transportation cost which is minimized.

NOW THIS PROBLEM IS SOLVED BY SUBSTITUTE METHOD

Similar Problem Will Give the Optimum Solution

	D_1	D_2	D_3	D_4	Supply
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Demands	20	40	30	10	100

Step 1-Choose the minimum value from capacity and demand and allocate that value to cell having the least element i.e.

	D_1	D_2	D_3	D_4	Supply
O_1	1	2	1	4	30
O_2	3	3	2	1(10)	50-10=40
O_3	4	2	5	9	20
Demands	20	40	30	10	100

Step 2-Same process continues as column $D_4$is eliminated then the new problem is:

	D_1	D_2	D_3	Supply
O_1	1(20)	2	1	30-20=10
O_2	3	3	2	40
O_3	4	2	5	20
Demands	20	40	30	90

Step 3-Same process continues as column $D_1$is eliminated then the new problem is:

	D_2	D_3	Supply
O_1	2	1(10)	10
O_2	3	2	40
O_3	2	5	20
Demands	40	30-10=20	70

Step 4-Same process continues as column $O_1$is eliminated then the new problem is:

	D_2	D_3	Supply
O_2	3	2	40
O_3	2(20)	5	20
Demands	40-20=20	20	60

Step 5-Same process continues as column $O_3$is eliminated then the new problem is:

	D_2	D_3	Supply
O_2	3	2(20)	40-20=20
Demands	20	20	40

Step 6-Same process continue as column $D_3$is eliminated then the new problem is:

	D_2	Supply
O_2	3(20)	20
Demands	20	20

Now the total transportation cost:

=1(20)+1(10)+3(20)+2(20)+1(10)+2(20)
=Rs.180

This is similar to the optimum cost of the transportation problem after using the substitutive method.

CONCLUSION

The substitute Method is convenient in use and as it helps us to get the solution more nearer to the optimum solution. The requirement of optimization of the transportation cost, or the optimum solution for the problem is achieved by the substitute Method.

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Editor-In-Chief
Pezzottaite Journals,
24, Saraswati Lane, Bohri, Near Modern Dewan Beverages,
Jammu Tawi – 180002, Jammu and Kashmir, India.
(Mobile): +91-09419216270 – 71
editorinchief@pezzottaitejournals.net,contactus@pezzottaitejournals.net

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A NEW SPATIO-TEMPORAL DATA MINING: ISSUES, TASKS AND APPLICATIONS

Dr. D. NM. Raju[32] D. Srividya[33]

ABSTRACT

Spatial Data mining i.e., mining knowledge from large amounts of Spatial-data is a highly demand in field because huge amounts of Spatial data have been collected in various applications ranging from remote sensing to Geographical Information Systems (GIS), Computer Cartography, Environmental assessment and planning etc.; The collected data far exceeded humans ability to analyze. Research Studies on Data Mining have extended the scope of data mining from relational and transactional data basis to Spatial Data Mining.

The present paper deals with Spatio-Temporal Data Mining and its issues. This paper develops a spatial-temporal data mining method for uncertain water reservoir data. The goal of the data mining method is to learn from a history human reservoir operations in order to derive an automated controller for a reservoir system. Spatio-temporal data mining is a challenging task due to the following reasons: (1) spatio-temporal datasets are usually much larger than spatial data sets, (2) many common spatial techniques are unable to deal with objects that change location, size or shape, and (3) complex and often non-linear spatio-temporal relationships cannot be separated into pure spatial and pure temporal relationships.

Support Vector Machines (SVMs) have been extensively and successfully applied in feature selection for many real-time applications. In this paper, we use SVM feature selection to reduce redundant and non-discriminative features in order to improve the computational time of SVM-based data mining. We also propose combining Principal Component Analysis (PCA) with multi-class SVMs. We show that SVMs are invariant under PCA transformations and that PCA is a desirable dimension-reduction method for SVMs. We propose also an extension of the SVM Regression approach to be able to perform spatio-temporal data mining. As a case study, we apply our spatio-temporal data mining method to derive an automated controller for the North Platte River Reservoir system. This reservoir system has multiple reservoirs, whose spatial location and the variables in each reservoir have been incorporated in our reservoir operations model. Further, each reservoir stage or status changes over time by the opening and closing of a dam to control the water levels. We show that by inputting the selected features from a spatio-temporal dataset by the PCA has achieved excellent results and could speed up the evaluation of data mining by SVM by an order of 10 while maintaining comparable accuracy. The North Platte River Reservoir system case study shows that the SVM Regression approach combined with PCA is an efficient tool for spatio-temporal data mining.

KEYWORDS

Spatial Data Mining, Spatio-Temporal Data Mining, Data Mining, Support Vector Machines, Principal Component Analysis etc.

INTRODUCTION

With the introduction of various data monitoring and data generation technologies, there has been a tremendous burst of data collected or archived. Digitization methods such as sensors, barcodes, quick response (QR) codes have made huge amounts of operational data readily available and the sizes of these warehouses of data only seem to be increasing due to the availability of powerful and cost effective database systems. The continuous growth data requires effective data processing and transformation methods by which the information and knowledge can be retrieved or obtained. This called for data mining techniques by which the embedded information can be put to good use. A large number of data mining tools and techniques are currently available for identifying data characteristics, patterns and operational rules. The interest in data mining has inspired many new research fields that emphasize both the theoretical and the practical development of effective technological tools. However, actual implementations carried out on applications other than the mainstreams have been very limited. This limitation can be attributed to numerous factors such as data availability, size, effectiveness and the consequences of implementation. About the applications, there are two scenarios; either large dataset (greater than 100,000 records) or small dataset(less than 100,000 records).

Large data are those, which contain millions or billions of records. Existing research and statistical techniques have proved that working with larger data is relatively easy as there is large amount of information available for a thorough analysis. Moreover, calculating the determining values such as regression coefficients, mean, medians etc. make statistically more sense about the performance of the actual model. With the increase in the sample size, the probability of the errors also diminishes. In other words, it is easier to identify any faint pattern, which outlines the behavioral characteristics of the given data, in a large dataset. One of the primary data mining methods is the outlier detection paradigm. Likewise, clustering and pattern matching are yet other

[32]Director & H.O.D, Nimra College of Engineering and Technology, Andhra Pradesh, India, srinilayam55@gmail.com
[33]Senior Software Engineer, Electronic Free Images Limited, Karnataka, India, srividya.dantuluri@gmail.com

important techniques. Both of the above, work in identifying the above mentioned faint pattern, which is easy when the study data set is considerably large. Calculating the global optima gives a general idea about the decisions for the pattern or clustering to be followed for the successful development of the model. On the other hand, small data is much harder to work with because determining how the data break out into clusters and identifying a definite structure are not straightforward. In traditional applications of computer science such as remote sensing, railway reservations and banking, the amount and the complexity of the data gathered by current enterprises is inherently large and is constantly growing at an exponential rate. Consequently, extensive analysis of the data processes and transactions have been carried out through data mining. Over the years numerous data mining models such as artificial neural networks, genetic Algorithm, decision trees, association Rule induction, data visualization etc., have been proposed and applied for various practical applications.

Careful analysis of this large amount of data is first carried out to find the data-mining model that is best for the given problem. Extensive testing to check the consistency of the performance then follows it. Then result is an effective data-mining model that encompasses all the operational rules, working and even aid in predicting the future working of the system. For large data applications, a number of data mining models and methodologies have been tried, tested and successfully deployed for everyday operations. However, not all applications are data rich by default. In traditional applications, the data is archived solely for the purpose of data mining and analysis. Unfortunately, this assumption of availability of huge databases or warehouses containing data exactly in the desired fashion for analysis is not always true. Even if the repository has a decent amount of stored data, the final data that can be effectively used for the above-mentioned operation might be considerably less. Certain applications like flood forecasting, geriatrics, internal medicine, geological studies will have data that is collected over a relatively short period of time say ten years. In such instances, even small data must still be studied to develop operational rules. It has been seen by many researchers that system operations are not just restricted to the static behavior of data but rather is the interactive behavior of data spread over a wide time [20], [7] and [22]. Data processing and querying techniques are increasingly used in water resource management in the recent times. The amount of data available for any hydrological management task is generally extensive because hydrology is a data intensive field. The technological advancements specifically in data collection and the geographic information systems area has enabled users to capture various aspects of the water systems ranging from the widespread physical to the high precision chemical features. Accurate water quality assessment would help with better understanding for developing models or understanding patterns. Water resource management is expected to be completely automated in the near future, that is the decisions and operations will no longer be manually suggested by technicians and experts but instead through automated software systems with the aid of input models, required queries etc.

1.1 TEMPORAL DATA MINING

Many data mining techniques were originally targeted towards simple structured datasets such as relational databases or structured data warehouses. More importantly, these algorithms were used to classify data that occur in the same time period or in other words, those datasets that are not expected to change much over time. However, technological improvements and the internet have led to more sophisticated data collection methods thus resulting in more complex data systems such as multimedia, spatial and temporal databases, which are unstructured or semi-structured. In the field of engineering, sensor based monitoring applications such as tele-communication control or time-stamped system monitoring. In finance, applications such as analyzing the transaction logs to analyze product sales or inventory trends prove important for business planning [29].

In the field of healthcare, most patient data are temporal sequences. These patient data encompass the complex diagnostic systems such as ECG, EEG and patient chart details that record vitals or the effectiveness of the treatments. They usually arise with either sensor-based monitoring, such as telecommunications control or log-based systems monitoring. In finance, applications on the analysis of product sales or inventory consumptions are of great importance to business planning [5].

In healthcare, temporal sequences originate by complex data acquisition systems ECGs or even with simple ones like measuring the patient's temperature or treatment's effectiveness [10]. In the last years development of medical informatics, the amount of data has increased considerably and more than ever, the need to react in real-time to any change in the patient behavior is crucial. Therefore, there is an increased demand to carry out data mining for these complex temporal data. In addition to these datasets being voluminous, the traditional machine learning and data mining algorithms do not work well on time series data due to their high dimensionality, feature correlation, and large presence of noisy data. One major problem that arises during the mining process is treating data with temporal features or attributes.

1.1.1 Challenges in Temporal Data Mining

Temporal databases [3] usually do not accept the same types of updates and queries as traditional snapshot databases. Temporal databases contain explicit information about the start and end time of transaction. Hence, temporal data only allow updates as corrections or new versions rather than modifying the entire record. If it is required to modify the temporal data, then it is inserted into the database as a new record. Temporal queries may make use of complicated temporal selection criteria. However, when working with temporal data; the ideal requirements for employing the supervised classification methods are hardly met. In other

words, the data is hardly independent and identically distributed. Instead, there is frequent overlapping or limited amount of data that can be effectively used for training purposes etc. Some of the common problems when working with temporal data are as follows:

Heterogeneous Data Sources: Temporal data framework requires analyzing data instances there are recorded n units back in time. Based on the period of this unit (monthly, yearly, or every decade) the data collection method might have undergone significant changes in methodology and format during these periods. The sources for these databases might also have changed completely. Hence, the data fusion method has to put together information from these multiple sources into a single composite picture of the relevant processes.

Small Datasets: Most classifiers are based on properties such as Euclidian distance, Gaussian distribution, and regression equations, which are valid only when applied on large training data. Since for temporal data, the input data sets are combined from multiple sources and might be included over large periods, there is a possibility that much of the data collected from these sources are not needed for the given purpose of the study. For example, the rainfall data, which is used for a reservoir operation optimization, might have originally come from a groundwater study data. Hence, the number of groundwater data attributes that can be used for data mining the reservoir operation function may be limited. It is necessary to choose carefully an appropriate data-mining algorithm when working with N-dimensional transaction databases. Supervised learning methods that allow for event analysis in a multi-dimensional space are usually good choices.

1.2 SPATIAL AND SPATIO-TEMPORAL DATA MINING

1.2.1 Spatial Data Mining

As described earlier, spatial and time-varying information is inherently present in most geographical or hydrological applications. Therefore, it is useful to develop techniques that efficiently summarize and discover trends in spatial and spatio-temporal data and help in decision making. Temporal data mining carried out in Phase 1 focused on identifying the operational rules of a single reservoir under consideration. However, in real-time system, reservoirs are stand-alone systems. In location, dependent data applications such as those use that geographical or hydrological data, including the time varying data analysis with the spatial data analysis would help in developing real-time solutions.

1.2.2 Spatio-Temporal Data Mining

Spatial data records information regarding the location, shape and its effect on features (e.g. geographical features). When such a data is time variant, it is called spatiotemporal data. Spatio-temporal data mining is an upcoming research topic, which focuses on studying and implementing novel computational techniques for large-scale spatiotemporal data. Progress in hardware technologies such as portable display devices, wireless devices has enabled an increase in availability of location- based services. In addition, GPS data is becoming increasingly available and accurate. These developments pave way to a range of new spatio-temporal applications such as distributed systems, location based advertising, disease monitoring, real estate process etc. Having explored temporal data mining, the next step is to extend data mining techniques to spatiotemporal data. This is because in most cases, the spatial and temporal information is implicitly present in the databases; it might be either metric-based (e.g. size) or non-metric based (e.g. terrain, storm path) or both. It is therefore necessary to acknowledge it before carrying out data mining processes that target developing real time models. The spatial and temporal dependencies are inherently present in any spatio-temporal databases. Spatio-temporal data mining can thus be defined as identifying the interesting and non-trivial knowledge from large amounts of spatio-temporal data. Spatio-temporal data mining applications range from transportation, remote sensing, satellite telemetry, monitoring environmental resources and geographic information systems (GISs) (Roddicining) information from such datasets is an important problem. In most cases, these databases changes with time, it is therefore important to capture the evolutionary behavior of the spatial data points with respect to time as these give insights for predicting future occurrences of events such as hurricanes, drought and groundwater contamination.

1.2.3 Challenges in Spatio-Temporal Data Mining

In addition to the challenges mentioned for working with temporal data, spatio-temporal data presents the following challenges:

Size: Spatio-temporal objects are typically large and do not have well-defined shape or boundaries thus making them more complex to describe and record (Miller and Han). Recent technological advances in computational sciences have resulted in huge amounts of data. Therefore, the data mining approaches must scale well to large data sets.

Geometric Properties: The geometric properties associated such as shape and size of the objects are important when modeling real time operational systems like designing a water shed which requires information about the size of the area, the pressure and temperature conditions etc.

Data Aggregation: The geographical data collected might have different topological and geometric frameworks. In some cases, the data attributes about the geographical location might be unique. Generalization of such datasets would be counter-productive. Research techniques are also more focused on modeling spatial relationships among features in an attempt to better understand the underlying processes.

Class Aggregation: When working with large-scale framework of databases the samples collected might not contain the designated set of class labels. For example, in a remote sensing application, when the geographical location of the type of the region of the specified geographical location is being recorded, class labels are often used in thematic maps. This labeling in some cases might be erroneous. There might also be a difference in the class aggregation depending on the data source.

Skewed Data: In some cases, the spatio-temporal data may skew more towards one objective. For instance, the high-resolution satellite imagery usually has abundant spatial information but might not record the time aspect like image change according to the time of the day. In another case, sensors stationed for monitoring events give precise and detailed information with respect to time of events but offer little information about the spatial relationship of the distributed sensors.

High Correlation: Temporal data contain an intrinsic dependency between instances, and thus display a high correlation between the data values. If the reservoir operation is considered, the amount of rainfall that is received in a particular location in the current month affects the water levels in the nearby reservoir, which consequently affects the water available for the subsequent times. Identifying the temporal relationships from the Spatio-temporal data requires implicit modeling of the spatio-temporal constraints and auto correlation so that an inference can be made about important events such as the durability of the reservoir over time and its ability to withstand shocks.

Spatial Auto Correlation: The value of a variable at a location is related to the values of the same variable at the locations nearby in this situation. Geographical data has spatial dependency i.e. attributes of nearby location influence each other and tend to possess a great degree of similarity. For example, the type of land cover tends to be more similar at a distance of one meter than a few miles. Ignoring spatial autocorrelation might result in errors that increase multifold in a high dimensional data.

PROBLEM STATEMENT

Many researchers studied multi reservoir systems, but their models and rules were based on the assumption that the reservoir network or the state variables are a linear network operating on linear constraints and costs. In this paper, we propose a model for deriving the operational rules for composite reservoir operations using data mining that addresses the aforementioned challenges.

We propose a new spatio-temporal data mining method RF-SVR (Reduced Feature- Support Vector Regression) which combines Support Vector Regression Analysis with PCA (Principal Component Analysis) to effectively model the non-linear spatial relationship between the dependent variable (outcome) and a set of predictors in a spatial framework. We also apply the new spatio-temporal data mining method to the North Platte River reservoir system, which is a challenging application in our region. Water reservoir operators need to balance releasing water for current uses and storing water for future uses. They also need to avoid high water levels which might cause an overflow and flooding of the surrounding lands.

Skillful reservoir operators have an accumulated knowledge that is not easy to analyze using existing models. Our spatio-temporal data mining was able to learn from past reservoir operational data and derive an automated controller that can be cheap and as effective as human controllers can. The main research question for this work is how efficient data mining models can be designed and developed for the prediction of reservoir releases from both single reservoir and multi-reservoir context. The solution to this can be found out by answering the following sub questions.

- How to carry out data mining on high-dimensional multi-variate Spatio-Temporal Data framework?
- How can feature reduction be carried out to further enhance the model developed?
- What types of data mining algorithms can be used?
- How should the performance of each of the data models be evaluated?

CONCLUSIONS

The major goal of this paper was to device an effective spatio-temporal data-mining model in a data short multivariate environment and to check the applicability of both temporal data mining and spatio-temporal data mining algorithms for mining the operation rules for reservoir operation in case of both single reservoir and multi-reservoir systems. It was discovered that in terms of performance, the multi-layer preceptor classifier reported best results for temporal data. It was also found that number of instances and number of attributes of the data sets do not have strong influence on the performance of the data mining algorithms as high accuracy of prediction was observed in data-short environment as well with large data sets.

Employing Principal Component Analysis (PCA) for the spatio-temporal dataset resulted in a drastic- nearly 8 fold decrease in the input feature vector size based on the results, it can be concluded that the converting the data from a high dimensional to one with few attributes has indeed resulted in an effective model.

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Editor-In-Chief
Pezzottaite Journals,
24, Saraswati Lane, Bohri, Near Modern Dewan Beverages,
Jammu Tawi – 180002, Jammu and Kashmir, India.
(Mobile): +91-09419216270 – 71
editorinchief@pezzottaitejournals.net,contactus@pezzottaitejournals.net

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STUDY OF CREDIT CARD FRAUD DETECTION METHODS AND COMPONENTS OF RESEARCH ON CLASSIFICATION MODEL

Archana Shinde[34] Dr. H .T. Dinde[35]

ABSTRACT

Credit card is currently most popular source of payment for both online as well as normal purchase because of rapid improvement in electronic commerce technology. This results in increase in cases of credit card fraud. Due to significant growth in modern technology and global superhighways of communication, financial fraud is also increasing, resulting in the loss of billions of dollars worldwide every year. The preliminary fraudulent transaction detection measures comprise genuine transactions and simple pattern matching techniques, which are not often sufficient to detect those frauds accurately. Thus, implementation of efficient fraud detection systems has thus become essential for all credit card issuing banks to reduce their losses. The main objective of this research paper is to find a way to re-process the recognized transactions and identify the most feasible legitimate transactions from the stream of legitimate/fraudulent transactions. If this objective is achieved, the work of unnecessary investigations is reduced resulting to substantial savings for the Financial Institutions.

KEYWORDS

Machine Learning, Decision Trees, Classification Model, Neural Networks etc.

INTRODUCTION

Credit cards are one of the most popular methods of payment worldwide and particularly in, due to the existence of a widespread point of sale POS network. Millions of people around the world use credit cards to purchase goods and services by having access to credit for a period of several weeks. Any appropriate system could be abused and same fact is true for credit cards. For addressing these challenges, decision tree leaning methodology, one of the most commodities used applications of Artificial Intelligence (AI) for addressing the pattern recognition and classification problems was considered. The possibilities of enhancing the current operation by introducing a post processing system constitute the objective of this research paper.

Financial Institutions (FIS) suffer classy fraudulent activities and bear millions of dollars losses every year. Banks and credit card issuer's always try to search new techniques to prevent fraud. Some of the preventive measures on the cards are magnetic stripes, three-dimensional holograms, and card validation codes (CVC). These institutions are also looking at the replacement of credit cards with Smart Cd; however, based on estimates this replacement will be very expensive due to the widespread POS network and the huge number of credit cards. Financial Institutions also make extensive use of a variety of technologies, mainly Neural Networks (NNs), to track and identify suspicious transactions and mark them for further examination.

TECHNIQUES FOR CREDIT CARD FRAUD DETECTION SYSTEM

Many organizations and individuals prefer plastic card based payment systems. Therefore understandably industries with this step of growth are susceptible to attacks by fraudsters. Along with the rise of credit card use, FIS are employing various methodologies and strategies to detect and prevent fraud. The main technologies used, are as follows:

In Credit Card Fraud Detection there are many methods, here we present survey of some most powerful method. Credit Card Fraud Detection Methods:

Decision Tree

Decision trees are one of the most powerful and popular classification and prediction in current use in data mining and machine learning. Decision tree consists of nodes and arcs, which connect nodes. To make a decision one starts from root node and ask questions to determine which arc to follow until one reaches the leaf node and decision is made. Decision trees are statistical data mining technique that express independent attributes and a dependent attributes logically AND in a tree shaped structure. The attractiveness of decision trees is due to fact that in contrast to neural networks they represent rules. Rules can easily be expressed so that humans can understand them or directly use them in database access language such as SQL, so that records found in particular category can be reviewed. A decision tree is flowchart classifier like tree structure where each internal node represent test on attribute, each branch represent outcome on test, each leaf node indicate value of target attribute. The topmost node in tree

[34]Assistant Professor, Pratibha College of Commerce and Computer Studies, Maharashtra, India, shinde.archana2525@gmail.com
[35]Associate Professor, Karmaveer Bhaurao Patil College, Maharashtra, India, drhtdmaths@gmail.com

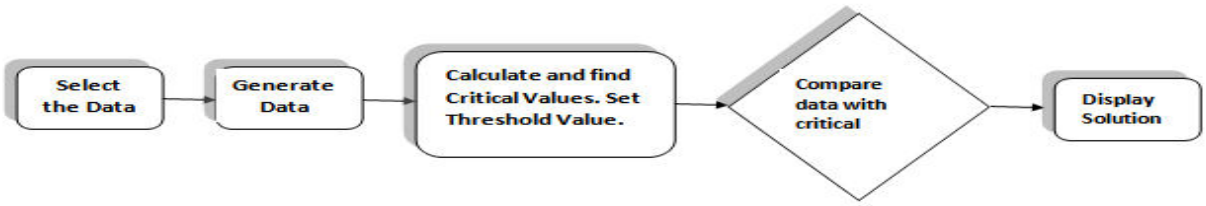
is the root node. Classification rules, extracted from decision trees, are IF-THEN expressions and all the tests have to succeed if each rule is to be generated [1]. Decision tree usually separates the complex problem into many simple ones and resolves the sub problems through repeatedly using [1], [2]. Decision trees are predictive decision support tools that create mapping from observations to possible consequences. There are number of popular classifiers construct decision trees to generate class models.

Decision tree methods are C5.0, C&RT and CHAID. The work demonstrates the advantages of applying the data mining techniques including decision trees and SVMs to the credit card fraud detection problem for reducing the bank's risk. The results show that the proposed classifiers of C&RT and other decision tree approaches outperform SVM approaches in solving the problem under investigation. Advantages of decision tree are: construction of decision tree classifier do not require parameter setting, easy to interpret for small size trees, more accuracy is achieved in comparison with other classification techniques for simple dataset, convertible to simple and understandable rules.

Genetic Algorithm

The Genetic algorithms are evolutionary algorithms having objective of obtaining better results to precisely eradicate the fraud, it has become very important to build protected and effective e-payment system to identify whether a transaction is fraudulent or not [3]. As the credit card transaction is progressing the fraud needs to be identified that is at real time and this process is enhanced by using genetic algorithm by reducing the false alerts. The fraud that is detected is based on the customer's behavior [4].

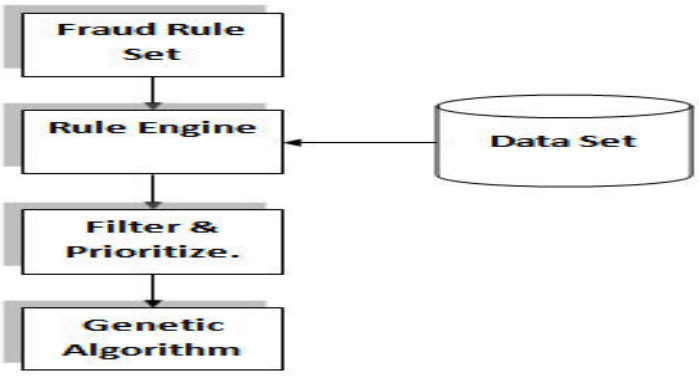
Figure-1



Sources: Authors Compilation

Genetic algorithm technique is iterative and the iterations are repetitive for a pre-specified number of times until best solution is found. It is a parametric process for obtaining better performance the main problem should be undertaken [4]. Parameters and settings should be listed in order to generate fraud transactions. Such parameters are necessary to calculate critical values, Credit Card usage frequency count, Credit Card usage location, Credit Card overdraft, current bank balance, average daily spending etc.

Figure-2: System Design



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The objective is to conquer better and optimal solutions. Application of this algorithm to bank credit card fraud detection system, the probability of fraud transactions are predicted soon after credit card transactions are terminated by the banks. Thus, a sequence of anti-fraud approaches can be accepted to avoid banks from great losses before hand and decrease risks.

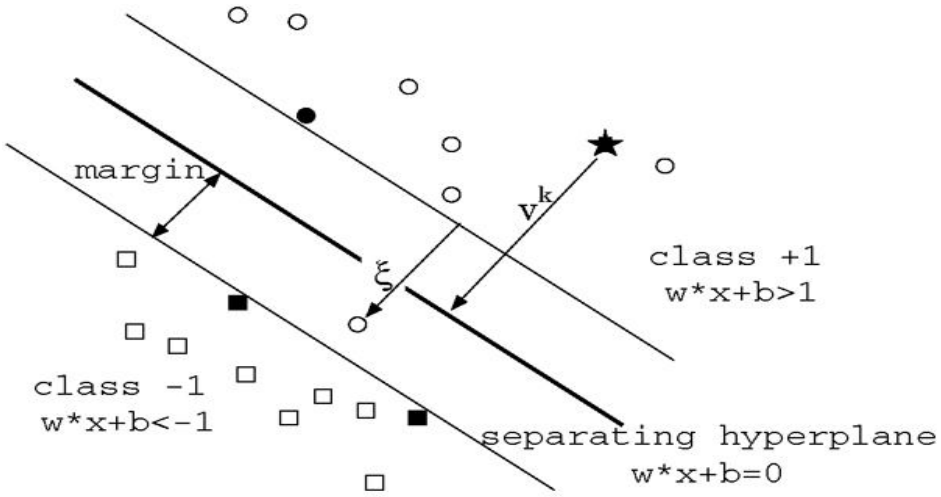
Neural Networks

Neural Networks (NNs) are a part of Artificial Intelligence (AI) aimed to address classification and pattern recognition problems. The term 'neural' is somewhat misleading. In reality there is no thinking in a neural network even if technology is inspired by the way neurons interact with each other in brain. Klimasauskas, Director of Financial Services at Neural Ware, a Pittsburgh-based neural network vendor, has commented on this fact: 'The important thing to realize is that neural networks, as a technology, have nothing to do with the brain. It is called neural because many of the techniques were first introduced by people who were studying the human brain but it is really a set of mathematical techniques for clustering information and finding curves for the data". In the past few years, NNs have established widespread consideration and study from the Financial Institutions. The purpose for this attention is the vigorous and developing nature of the fraud detection application. Comprehensively, neural networks have shown effective results in areas such as fraud detection by looking at massive quantities of data which have a number of independent variables. They are developed and trained to find patterns and correlation among the incoming transactions.Artificial neural network (ANN) can be used in the acknowledgement of characteristics timely and make predictions [5].

The Support Vector Machines

The Support Vector Machines (SVM) algorithm was first introduced by Cortes and Vapnik (1995). This algorithm finds a distinct kind of linear model, the maximum margin hyper plane, and it classifies all training instances correctly by separating them into correct classes through a hyper plane (a linear model). The maximum margin hyper plane is the one that gives the highest separation between the classes – it comes no closer to any of the classes than it has to. The instances that are closest to the maximum margin hyper plane – the ones with minimum distance to it – are called support vectors. There is always at least one support vector for each class, and often there are more (Witten and Frank 2005). The optimal hyper plane is found by maximizing the width of the margin. As shown in Figure below, the margin is the distance between the separating hyper plane and the closest positive class and negative class.

Figure-3: Separating two Classes using a Hyper Plane (Leopold and Kindermann 2006)



Sources: Authors Compilation

In situations that the classes are not perfectly separable, the SVM algorithm finds the hyper plane that maximizes the margin while minimizing the misclassified instances using a slack variable. As shown in Figure above, the slack variable, ξ, represents the distance of the misclassified instance from its margin hyper plane. The SVM algorithm minimizes the sum of distances of the slack variables from the margin hyper planes while maximizing the margin width. This is done by solving the following equation using Quadratic Programming:

Minimize:

$$\frac{1}{2} W^2 + C \sum_{i=1} \xi_i$$

Subject to:

$$y_i \ (w.x_i + b) \geq 1 - \xi_i, \forall x^i \xi_i \geq 0$$

Where *w* and *b* are parameters that are learned using the training data, ξ is the slack variable that represents the outliers, and *C* is a parameter that allows for selecting the complexity of the model. The larger the *C* value is the less training errors are accepted and the more complex the predictive model becomes. There are situations where a nonlinear region can separate the classes more effectively. Rather than fitting nonlinear curves to the data, SVM determines a dividing line by using a kernel function to map the data into a different space where a hyper plane can be used to do a linear separation. The concept of a kernel mapping function is very powerful because it allows SVM models to perform separations even with very complex boundaries. An infinite number of kernel mapping functions can be used, but the Radial Basis Function has been found to work well for a wide variety of applications including credit card fraud (Hanagandi, Dhar and Buescher 1996). The transformation to a high-dimensional space is done by replacing every dot product in the SVM algorithm with the Gaussian radial basis function kernel as follows:

$K(xi, xj) = exp(-y || x_i - x_j ||^2). y \geq 0$

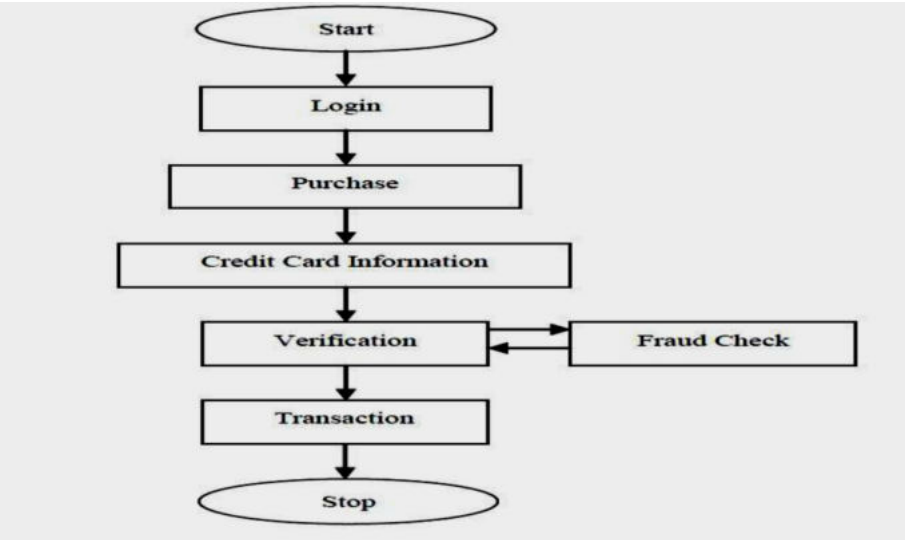
$K(xi, xj) = \varphi(x). \varphi(y)$

Where $K(xi, xj)$ is the kernel function and $\varphi(x)$ is the transformation function.

In this method, firstly, all the collected data is pre-processed before starting the modeling phase. As, the distribution of data with respect to the classes is highly imbalanced, so stratified sampling is used to under sample the normal records so that the models have chance to learn the characteristics of both the normal and the fraudulent record's profile [6]. To do this, the variables those are most effective in differentiating the legitimate and the fraudulent transactions. Then, these variables are used to form stratified samples of the legitimate records. Future, these stratified samples of the legitimate records are combined with the fraudulent ones to form three samples with different fraudulent to normal record ratios. The first sample set has a ratio of one fraudulent record to one normal record; the second one has a ratio of one fraudulent record to four normal ones; and the last one has the ratio of one fraudulent to nine normal ones [6].

Hidden Markov Model

Figure-4: Architecture of Credit Card Fraud Detection



Sources: Authors Compilation

All the information about credit card (Like Credit card number, credit card CVV number, credit card Expiry month and year, name on credit card etc.) is checked with credit card database. When user enters correct database then it will ask Personal Identity number (PIN).After matching of Personal Identity number (PIN) with database and account balance of user's credit card is more than the purchase amount, the fraud checking module will be activated. The verification of all data will be checked before the first page load of credit card fraud detection system. If user credit card has less than 10 transactions then it will directly ask to provide personal information to do the transaction. Once database of 10 transactions will be developed, then fraud detection system will start to work. By using this observation, determine Users spending profile. The purchase amount is checked with spending profile of user. By transition probabilistic calculation based on HMM, it determines whether the transaction is real or fraud. If transaction may be concluded as fraudulent transaction then user must enter security information. This information is related with credit card

(like account number, security question and answer which are provided at the time of registration) and if transaction is not fraudulent then it will direct to give permission for transaction. If the identified transaction is fraudulent then the security information form will rise. It has a set of question where the user has to answer them correctly to do the transaction [7]. These forms have information such as personal, professional, address; dates of birth, etc. are available in the database. User entered information is matched with database information, and then transaction will be done securely. And else user transaction will be terminated and transferred to on line shopping website. The flowchart of proposed module is shown in Figure above.

Artificial Immune Systems

Artificial Immune Systems (AIS) represent an important strategy inspired by biological systems and developed by Neal et al in 1998 [8]. The main developments within AIS have focused on three main immunological theories: clonal selection, immune networks and negative selection. The immune system can distinguish between self and non-self. In the concept of credit card fraud detection, self (S) represents all patterns in a finite space that is legitimate and non-self ($\hat{S}$) represents all patterns that are not in self [9][10]. The AIS consists of artificial lymphocytes (ALCs) that able to classify any pattern as self or non-self by detecting only non-self-patterns. AIS detection engines implements AIS based algorithms, which can classify input data as normal or fraudulent [11]. The networks produced by the artificial immune system are effective when used as a simple classification tool. They perform well on all of the data with which they have been tested so far. The ability to produce a network which not only models that data presented, but also generalises to cover a larger region of the input space seems to be valuable. The networks also lend themselves easily to some very effective visualization techniques which enhance their usability further.

STUDY OF CLASSIFICATION

Classification

Classification is conducted in a variety of human activity. Classification can be related to some extend with some decision or prediction that is made on the basis of currently accessible information. Then a classification technique is useful for repeatedly making such decisions in new situations. In a controlled interpretation, the task alarms the building of a technique that will be applied to a continuing sequence of cases, in which each new case must be assigned to one of a set of pre-defined classes on the basis of observed attributes or features. In this approach the aim is to establish a rule by which one can classify a new observation into one of the existing classes. Such problems are often referred to as classification problems. The construction of a classification procedure from a set of data for which the true classes are known has also been variously termed as pattern recognition, discrimination, or supervised learning (in order to distinguish it from unsupervised learning or clustering in which the classes are inferred from the data). A much more difficult problem is that of unsupervised learning or clustering, where solved cases are not known, so no classifications can be given, and the samples consist only of observations. In that circumstance the objective is to identify clusters of patterns that are similar, thus recognizing potential classes. This type of problem is far less designed and its potential for success is much more limited, because it involves much more estimating [12] [13].

Reasons for Classification

There are many reasons why one may wish to set up a classification procedure. Some of the examples for classification problems are: (1) mechanical procedures for sorting letters on the basis of machine-read postal codes, (2) assigning individuals to credit status on the basis of financial and other personal information, (3) the primary diagnosis of a patient's disease to select urgent treatment while waiting for definitive test results, and (4) credit card fraud detection [13]. Thus, most urgent problems arising in science, industry and commerce can be considered as classification or decision problems which often require complex and extensive data for evaluation.

The Classification Model

In statistics the classification problem is sometimes called the prediction problem, and in the field of machine learning it is called concept learning. The major objective of empirical learning is to extract a decision rule from the sample data where the results are known, such that the results can be useful to new data where the outcomes are not known. Set of examples are used by learning system known as training set in order to develop a decision making system called as classifier which finds generalized decision rules. The simplest way of signifying a classifier is to consider it as an algorithm, which produces a decision for every pattern of data that is presented to it. This system accepts a pattern of data as input, and produces a decision as output [12]. Every problem has a set of possible observations which are known as features or attributes. To train and assess a learning system, the available data should be divided into three parts: (1) the training set, (2) the testing set, and (3) the case set. Maximum amount of information from samples is extracted by training set. Accuracy of trained system is estimated by testing set and is a stage where the trained system is validated. The case set is used for evaluating and predicting accuracy of the classifier on upcoming cases. The analyst has a very important role in the design of any classifier. Al1 the observations are symbols that are being manipulated

by the computer. Therefore, while the computer can carry out different forms of analysis, much of the prospective for success depends on analyst who selects the real world data with the required accuracy [12].

Perspectives on Classification

The components of research on classification can be represented in three main and distinct categories: (1) statistical, (2) neural networks, and (3) machine learning (ML). Statistical methods are categorized parametric, whereas NN and ML methods are categorized as non-parametric. The objective of classification is to develop rules or procedures [14], to behave like human decision making system even if not able to exceed in performance but have the benefit of consistency ,to tackle a wide range of problems and given enough data could be generalized. For this purpose there are different algorithms that search a hypothesis space defined by some underlying representation (e.g., linear function, neural networks, logical descriptions, or decision trees). For each of these hypotheses representations, the corresponding learning algorithm takes advantage of a different underlying arrangement to establish the search through the hypothesis space.

Statistical Approaches

Statistical approaches are generally categorized by having a core probability model. This model provides the probability of an event or object to be in each class rather than exclusively to give the classification of the case. These methods try to deliver an approximation of the joint distribution of the features within each class which can thus provide a classification rule. It is usually assumed that statisticians will use these techniques. Therefore, some human intervention is assumed with regard to variable selection and transformation, and overall structuring of the problem.

Neural Networks

Neural networks consist of layers of interconnected nodes, each node producing a non-linear function of its input. Some nodes are also identified with the output of the network. The input to a node may come from other nodes or directly from the input data. The complete network, therefore, represents a very complex set of interdependencies, which may incorporate different degrees of nonlinearity, allowing very general functions to be modelled [14].

Machine Learning

Machine learning is rooted at generating classifying expressions adequately simple to be agreed by humans. Machine learning is basically a multi-disciplinary field. It induce results from artificial intelligence (AI), probability and statistics, computational complexity theory, control theory, information theory, philosophy, psychology, neurobiology, and other fields. Unlike statistical approaches, this operation is carried out without human interference. Machine Learning is a method of data analysis where the classifiers, obtained from a training set of pre-classified cases, are used to predict the classes of new cases [14].It is usually used to include automatic computing procedures, based on logical or binary operations that learn a task from a series of examples. Many large databases are adapted by this method in order to learn general regularities implicit in the data

Learning Decision Trees

Decision trees, a machine learning method are amongst the oldest and popular ways to represent the outcome of classification learning procedure. Decision trees are capable of representing most complex problems when sufficient data is provided, and they are one of the most powerful techniques for partitioning samples into a set of decision rules. It is a method for approximating discrete valued target functions, in which the learned function is represented by a decision tree [15]. For enhancing human readability learned trees can also be represented as sets of if-then. These learning methods are very popular and have been successfully useful for variety of tasks from learning to diagnose medical cases and to learning to assess credit risk.See5 is a decision tree learning software package which was designed and developed by Ross Quinlan, a scholar, pioneer, and researcher in the field of machine learning. It extracts informative patterns from the data. It examines the data to produce decision trees and/or rule sets that relate a case's class to the value of its features.

Boosting

Boosting is a technique used to improve the prediction accuracy of the classifiers and for generating and combining multiple classifiers, either decision trees or rule set the expense of increased classifier construction time [16]. In boosting, instead of one classifier, several classifiers are constructed and the combination of their outcomes will determine the final class being assigned to the case. The effectiveness of boosting is not deterministic and it is not known beforehand. Only after employing this technique on the data and comparing the results one can see whether the prediction accuracy has improved or not. The Boost option with 10 trials is selected and the program ran for the same learning set. As the first step, a single decision tree or rule set is constructed as before from the training data. Generally this classifier makes mistakes on some cases in the dataset. This process lasts for a

determined number of iterations. When the second classifier is constructed, the algorithm pays more responsiveness to the misclassified cases to try to get them right. The second classifier will also make errors on some cases, and these become the focus of attention during the construction of the third classifier. This differentiates second classifier from the first one. On an average different Machine Learning sources and trials over several datasets, large and small, have shown that 10-classifier boosting is the most appropriate choice. The Boost option with x trials allows See5 to construct up to x classifiers in this manner (suggested default is 10) [16]. Software can state that when no enhancement can be made on accuracy level on observing the fact that although the number of trails for the boost option was set to be 10, the algorithm terminated after 7 trials. Constructing multiple classifiers requires extra computational time and resources but the effort worth cost. Boosting trials greater than 10 are also examined in the experiments performed generally it never exceeds 10 trails before the algorithm terminated.

Cross-Validation

The basic idea of the cross-validation technique is to try to estimate how well the current system will predict the unobserved data. It gives more reliable estimates in predicting accuracy. Instead of using one sample to build a tree and another sample to test the tree, the algorithm will form several pseudo-independent samples from the original samples and use these samples to form a more accurate estimate of the error. For this determination, the program splits the data into a number of folds (splits) equal to a chosen number. Experience on a large number of datasets has shown that the number of folds & equal to 10 has achieved good results [18]. For this reason, in many learning algorithms the number of folds is chosen at 10 as the default option. Each case is used just once as a test set and contains almost the same number of examples and the same class distribution. For each fold in turn, a classifier is constructed from the examples in all other folds and then its accuracy is tested on the examples in the holdout fold. The error rate of a classifier produced from al1 the samples is predicted as the ratio of the total number of errors on the hold-out cases to the total number of cases of loan applicants. Different random partition of training cases is used every time cross validation is run.

CONCLUSION

There are numerous techniques of identifying a credit card fraud. In this paper, a comparative study of some of the fraud detection methods based on credit card. Any of these or combination of algorithms are practically used for bank credit card fraud detection system, the probability of fraud transactions can be known before hand after completion of credit card transactions carried by the banks. Thus, a sequence of anti-fraud approaches can be accepted to avoid banks from great losses before hand and decrease risks. This paper gives contribution towards the effective ways of credit card fraud detection. All these techniques of credit card fraud detection discussed in this paper, have its own strengths as well as weaknesses. Thus, this survey enables us to create a hybrid approach for developing some effective algorithms, which can perform well with minimum costs and higher accuracy. This paper shows components of research on classification model namely statistics, neural network and machine learning. Increasing number of majority instances in the training data will produce classifiers with improved performance; these classifiers classify a large number of fraudulent cases as legitimate leading to very high False Negative rate. The other important factor which may have a serious impact on the performance of the classifiers is the limitations of the data sets.

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RECENT TRENDS AND CHALLENGES IN RETAILING AND ITS ROLE IN E-COMMERCE

V. Siva Rama Krishna[36] Manmohan Tiwari[37]

ABSTRACT

The retail industry over the past decade has been seen as the harbinger and an indicator of economic growth and spending power globally. Some of the recent trends seen in the industry and that have lots to offer to businesses and customers. Based on the lifestyle of the market segment, have a clear understanding of the various channels customers would be comfortable in using. The recent trends in the in-store operations front have been aimed on optimizing the utilization of space and enhancing the overall productivity of the management processes and resources. As retailers realize that it is economical to retain an existing customer than to acquire a new one, there has been tremendous focus in this area. Retail analytics is an emerging area, which aims at analyzing every aspect of Retail activity right from sales performance, to marketing effectiveness to customer preferences, to loyalty and shift. The emergence of Radio Frequency Identification (RFID) has important implications for businesses, consumers, as well as policymakers. CPFR is a methodology in which partners in value chain coordinate plans in order to reduce the variance between supply and demand and share the benefits of a more efficient and effective supply chain. EDI traditionally has been used by large organizations that can afford to spend huge amount of money on converters as well as maintaining private point-to-point networks for security and reliability reasons.

KEYWORDS

Trends of Retailing, Integrated Multi Channel Retailing, Customer Relationship Management (CRM) Retail Analytics, Radio Frequency Identification (RFID), Collaborative Planning, Forecasting and Replenishment (CPFR), EDI etc.

INTRODUCTION

The retail industry over the past decade has been seen as the harbinger and an indicator of economic growth and spending power globally. It has transformed itself into global phenomena and has been a scene of constant change and innovation. The emergence of internet as a tool for communication and the learning's from Dot Com failure has made the industry more cautious in its spending. Therefore the focus over the last decade has been on increased productivity, cost cutting at the same time having more enhanced focus on customer satisfaction and retention. The latest trends reflect the spending power, lifestyles, tastes, time available, geographies; loyalties etc. apart from these, there have been many initiatives to improve the productivity and efficiency of the supply chain, better vendor management and efficient global operations. The following are some of the recent trends seen in the industry and that have lots to offer to businesses and customers.

Integrated Multi Channel Retailing (IMCR)

Integrated Multi Channel Retailing (IMCR) refers to the seamless integration of the various sales and service channels provided by the retailer to the customer. An item ordered through one channel can be received through another channel and returned through a third channel. Many leading retailers have addressed the basic aspects of operating in a multi-channel environment. However, few, if any, have truly exploited the potential of integrated multi-channel retailing to measurably increase customer loyalty and economic returns. Based on the lifestyle of the market segment, have a clear understanding of the various channels customers would be comfortable in using. Analyze the partnership, distribution and franchisee model in use and the likely changes due to new multi-channel requirements. Integrate the infrastructure covering the following areas, such as Product Catalog, Inventory and Merchandize, Pricing, Point – of – Sale (POS), Shipping, After Sale Services, Franchisee / Distributor Integration, and Promotions and Discounts. Some of the technology requirements for IMCR are:

- Online portal having catalogs and shopping on the Internet.
- Integration with mobile phones and hand held devices.
- Secure online payment payments and gateway integration.
- Supplier B2B messaging hubs and extranets.
- Integrated inventory management and product search facilities.
- Usage of messaging standards and protocols like X12, EANCOM, EDIFACT and XML and POS standards like ARTS.

[36] Assistant Professor, Department of MBA, Swarna Bharathi Institute of Science & Technology, Telangana, India, raamandeep@hotmail.com
[37] Assistant Professor, Department of MBA, Swarna Bharathi Institute of Science & Technology, Telangana, India, manus.tiwari@gmail.com

In Store Operations

In-Store Operations solutions enable true multi-channel retailing by delivering a consistent shopping experience across all retail channels - in the stores, through Web site, catalog or call center. The key business functions include point of sale, store labor management, customer order management, and store inventory management. The recent trends in the in-store operations front have been aimed on optimizing the utilization of space and enhancing the overall productivity of the management processes and resources.

Customer Relationship Management (CRM) Initiatives

As retailers realize that it is economical to retain an existing customer than to acquire a new one, there has been tremendous focus in this area. Customer Relationship Management (CRM) and service has seen a total transition from call center and helpdesk based services to more comprehensive and innovative customer loyalty programs and personalized service management. Based on its functionality, a typical CRM system is subdivided into three basic sub sections:

- **Marketing:** Marketing primarily deals with providing functionalities of Long term planning and Short-term execution of marketing related Activities within an organization. For long-term marketing plans, Quantitative as well as Qualitative measures (targets) can be set for a defined period and for different product groups, which are then monitored, based on the actual performance throughout the defined period. Short Term execution includes running Marketing campaigns via different communication channels targeting a pre-defined group of potential buyers with a specific message referring to a product or a group of products

- **Sales**: The sales functionalities of the CRM - Customer relationship management software are focused on helping the Sales team to execute and manage the presales process better and in an organized manner. Sales team is responsible for regularly capturing key customer interactions, any leads or opportunities they are working on etc., in CRM system.

- **Service:** Service related functionalities are focused on:
    - Effectively managing the customer service (Planned or Unplanned),
    - Avoid "leakage" of Warranty based services,
    - Avoid "Penalties" arising due to Non conformity of SLA (Service Level Agreements),
    - Provide first and Second Level support to Customers.

Vendor Managed Inventory

Vendor Managed Inventory (VMI) is a means of optimizing Supply Chain performance in which the supplier is responsible for maintaining the supplier's inventory levels at customer (distributor or retailer) site. The supplier has access to the supplier's inventory data and is responsible for generating purchase orders based on the movement of goods and reaching of the re-order level. The Benefits of VMI are numerous for both Supplier & Retailer.

- **Retailer is Benefits**: The goal is to have an improvement in Fill Rates from the supplier and to the end customer. Decrease in stock outs and a decrease in inventory levels. Planning and ordering cost will decrease due to the responsibility being shifted to the Supplier. The overall service level is improved by having the right product at the right time. The supplier is more focused than ever in providing great service

- **Supplier is Benefits**: Visibility to the Retailers Point of Sale data makes forecasting easier. Promotions can be more easily incorporated into the inventory plan. Reduction in Retailer ordering errors (which in the past would probably lead to a return). Visibility to Stock Levels helps to identify priorities (replenishing for stock or a stock out?). Before VMI, a supplier has no visibility to the quantity and the products that are ordered. With VMI, the supplier can see the potential need for an item before the item is ordered.

Retail Analytics

Retail analytics is an emerging area, which aims at analyzing every aspect of Retail activity right from sales performance, to marketing effectiveness to customer preferences, to loyalty and shift.

- **Marketing Perspective Analytics** covers Customer segmentation and targeting, Campaign management and Customer / Channel Affinity.

- **Sales Perspective Analytics** covers Customer Profitability Analysis, Cross Selling and Up selling, Market Basket Analysis, Product Affinity.

- **Inventory and Merchandise** point of view Predict accurately what products should be sold together, Analyze product performance across a category, Shelf Life analytics, Understand how pricing impacts sales volumes, Identify which products produce the largest returns and Which products (by category, feature set, model) generate the most revenue, and profit?

- **Customer Service Perspective**, the analytics covers Customer Satisfaction Analysis and Customer Loyalty Analysis.

Radio Frequency Identification (RFID)

The emergence of Radio Frequency Identification (RFID) has important implications for businesses, consumers, as well as policymakers. Companies are turning to RFID to track products, manage warehouse inventory and to stock retail shelves. Consumers are using RFID tags when they travel on highways, purchase gas and groceries, and protect their pets. RFID also has significant potential as a public safety and anti-counterfeiting tool. As the cost of RFID chips declines, new applications of this exciting technology would emerge. The area of RFID application in commercial space overlaps with that of barcode hence the comparison between the two. In addition, RFID tags hold much more data than barcode labels. The tag can be programmed to hold information such as an item's serial number, colour, size, manufacture date and current price, as well as a list of all distribution points the item touched before arriving at a store. Although retail giants like Wal-Mart, Metro, Tesco and CPG majors like Unilever, P&G and Gillette are in the news and currently drive the mass implementation in concentrating on the supply chain, RFID has been successfully implemented in a variety of other areas like automotive manufacturing, pharmaceutical, livestock, government and military operations.

Collaborative Planning, Forecasting and Replenishment (CPFR)

CPFR is a methodology in which partners in value chain coordinate plans in order to reduce the variance between supply and demand and share the benefits of a more efficient and effective supply chain. It operates as a set of business processes in which trading partners agree to mutual business and measures, develop joint sales and operational plans, and electronically collaborate to generate and update sales forecasts and replenishment plans. the benefits of implementing CPFR in retailers perspective are Enhanced sales opportunities and recovery of lost sales, Commitment from supplier for maintained service levels, Investment in the right inventory, Long-term price rationalization due to mutual cost cutting and Ability to monitor product in supply chain.

EDI over the Internet (EDIINT)

EDI traditionally has been used by large organizations that can afford to spend huge amount of money on converters as well as maintaining private point-to-point networks for security and reliability reasons. This was an unthinkable proposition for the small and medium sized enterprises.

The advent of Internet has brightened the possibility of doing online transactions by these small and medium enterprises, but with the compromise on security. Ensuring the flow of EDI data transfer over the Internet in a secure manner is the objective of EDIINT. EDIINT solution helps to level the playing field for SMEs by providing a solution that allows these companies to do business with larger organizations and, at the same time, enjoy the cost savings, speed and other benefits of e-Commerce.

EDI over the Internet (EDIINT) is a working group of the Internet Engineering Task Force (IETF) that is chartered with creating specifications for transporting EDI or XML documents over the Internet in a secure (digitally signed and encrypted), highly reliable manner. Applicability Statement 1 (AS1) and Applicability Statement 2 (AS2) are the current specifications developed by EDIINT for transporting data between organizations via the Internet.

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Pezzottaite Journals,
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Jammu Tawi – 180002,
Jammu and Kashmir, India.
(Mobile): +91-09419216270 – 71

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OPTIMIZATION OF DATA STORAGE AND QOS IN DATA REPLICATION USING THE PRIORITY DATASETS

Dr. K. Fayaz[38] C. Vijay Kumar[39]

ABSTRACT

In recent times the modern technological developments of applications. The internet will play a significant role. The Internet provides to us content in the forms of videos, emails and information served up in web pages. With Cloud Computing, the next generation of Internet will allow us to "buy" IT services from a web portal, drastic expanding the types of merchandise available beyond those on e-commerce sites such as e-Bay, Snapdeal and Flipkart. We would be able to rent from a virtual storefront the necessities to build a virtual data center such as CPU, memory, storage, and add on top of that the middleware: web application servers, databases, enterprise server bus, etc. as the platform to support the applications.

Data replication comprises a standard fault tolerance approach for systems especially large-scale ones that store and provide data over wide geographical and administrative areas. The major topics that the task of data replication covers include the replica creation, placement, relocation and retirement, replica consistency and replica access. In this paper we examine how this combination affects the replication lifecycle in cloud computing and to introduce a set of interoperable novel file replication algorithms that take into account the infrastructural constraints as well as the priority of the data.

KEYWORDS

Data Replication, Grid Computing, Virtual Datacenter, Priority Data Replication etc.

INTRODUCTION

The fundamental challenges of data-intensive computing are managing and processing exponentially growing data volumes, significantly reducing associated data analysis cycles to support practical, timely applications, and developing new algorithms, which can scale to search and process massive amounts of data. In recent years, the "Grid" comprises an infrastructure including systems and applications that integrates and manages resources and services distributed across multiple control domains. Within the Grid, a data set can be distributed at many different storage nodes, thus making possible the redirection of requests for that data set to the most 'appropriate' storage node.

Several important decisions need to be taken, including the number of replicas to be created and the location of these new replicas in order to meet a 'goal'. In real world applications, this 'goal' is translated into the QoS requested whereas minimal infrastructure cost is targeted from the Service Provider's side. Based on the replication scheme followed, a replica persists until a user decision for deletion or lifetime expiration or replicas are automatically created and deleted based on system or user-related parameters including current workload and network bandwidth, cost, with the latter, however incurring additional costs and network overhead.

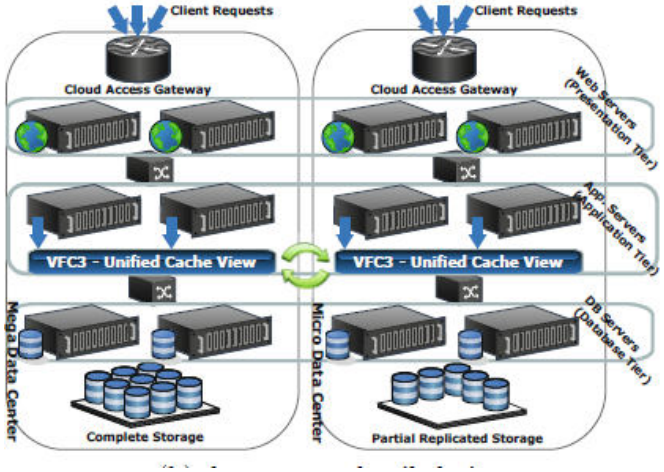
RELATED WORK

To increase resource utilization in the presence of smaller customers, providers employ multi-tenancy, in which multiple users or applications are collocated on a single server while enabling effective resource sharing. Sharing of resources at different levels of abstraction and distinct isolation levels results in various multi-tenancy models; the shared machine, shared process, and shared table models are well known. This resource sharing improves providers' profits. Ideally, each tenant on a multi-tenant server is both unaware and unaffected by other tenants operating on the machine, and is afforded the same high performance it would receive on a dedicated server.

Database replication techniques have been used to improve, performance, and scalability in different environments. Aspects related to multi-tenant database and elasticity to guarantee QoS have received little attention. These issues are important in cloud environments; the providers need to add replicas according to the workload to avoid SLA violation. Furthermore, they need to remove replicas when the workload decreases and to consolidate tenants.

[38] Faculty (System), Department of Computer Science & Technology, S. K. University, Andhra Pradesh, India, fayazk16@gmail.com
[39] Research Scholar, Department of Computer Science & Technology, S. K. University, Andhra Pradesh, India, rasool.phd@gmail.com

Figure-1: Replication Storage in Datacenter



Sources: Authors Compilation

To overcome these limitations, this paper presents Replication, an approach to database replication in the cloud with quality of service, elasticity, and support to multi-tenancy. In Replication, elasticity adjusts the system's capacity at runtime by adding and removing replicas without service interruption in order to handle the workload variation. To the best of our knowledge, we explore the problem of how to work the replication in multi-tenant database environments. We considered replications are a block-based storage system comprising n storage nodes with total data storage capacity of n_c bytes, where c is the capacity of each storage node. Every user data block is of size s bytes, and is replicated r times. These r replicas are stored in the system such that no two replicas of a data block are in the same node in which the r replicas of each data block are stored depends on the placement scheme used we impose no restriction on the set of placement schemes that can be used.

Replications (Stored data) are comprised of one or more disks, a memory, processor, network interface, and power supply. The components are less reliable than the disks, and the failure of any of these components leads to a node failure. The disks inside a node are assumed to be protected by a checkpoint scheme which also corrects unrecoverable or latent sector errors by using either scrubbing or intra-disk redundancy Disk failures are assumed to cause a node failure only if the checkpoint system is unable to recover from these failures. The systems use STRT (Self Tracking Recovery Technology) for disks, the disks can be aggressively replaced to ensure that disk failures are not the main cause of node failures. In our proposed work, the node failures are assumed to be caused primarily by the failure of components other than disks, such as memory, processor, network interface, and power supply.

Our proposed scheme introduces an integrated solution offering dynamic data replication that takes into account numerous data-related and QoS-related factors and constraints, such as requests locality, cost and network bandwidth. A set of interoperable algorithms, which make up an integrated replica management approach is presented. In dynamic replication, solution focuses on determining the number and the location of the replicas to be created or deleted aiming at workload balancing, QoS satisfaction and network bandwidth usage improvement. We assume read-only data, and thus rendering replica consistency becomes an irrelevant issue. The algorithms have been implemented for a system with a centralized architecture, which distinguishes between a large number of storage nodes and a replica management node that maintains the replica directory and manages the access to the replicas and lifecycle.

Priority of a data set is a term directly connected to profit the maximization of profit by satisfying the QoS requirements of as many customers as possible and resulting in fewer deficits due to violation of the guarantees. The data set is the one for which it is imperative to maintain the guarantees to the QoS requirements either because it produces more profit or because it yields the greater deficit in case of violation. In turn, these are affected by the amount of requests for the data set the ''value'' of the customer who requests it and the temporal characteristics of the requests such as the more recent a request for a data set is, the more it is weighted in the importance calculation.

Algorithm for assigning the Priority data in Data Replication

1. Sort the Storage files in descending or ascending order of sizes.
2. For every data set i, calculate the number of replicas to be created using the formula: $n(i) = \lfloor s(i)/size(i) \rfloor$.

3. Due to the rounding, a part of s(i) has been left unused.
5. Assign the data priority based on the usage of the users.
6. Left Space (i) = s(i) − n(i) * size(i).
7. Calculate the total unutilized space: LeftSpace = Σki =0 leftSpace(i).
8. Choose the first data set in the list of descending order of sizes that size(i) ≤ LeftSpace and allocate space for it: s′(i) = s(i) + size(i).
9. Else Choose the first data set in the list of descending order of sizes that size(j) ≤ LeftSpace and allocate space for it: s′(j) = s(j) + size(j).
10. Calculate the left unutilized space: LeftSpace′ = LeftSpace −size(i).
11. Go to step 5.

After the number of new replicas to be created has been calculated, the replica management service will have to decide where to place them. This problem has to be solved separately for each data set. Consequently, the replica placement problem can be parallelized largely. This parallelization allows us to utilize a computational Grid to speed up the process. When in the process of selecting the 'best' storage nodes that will host the new replicas, one of the most important criteria should be network availability. A storage node will be favored if there is a high bandwidth link from which frequent requests for the data set are sent. For each data set request is recorded, followed by its date and origin. Consequently, a distance metric can be defined which takes into account factors such as administrative barriers, network topology, bandwidth, etc. User's access latency and availability comprise two important QoS parameters related to data, the expected or regular workload of the storage nodes can also be taken into account when calculating this metric.

Suppose that we have selected an n-combination Cn ∈ CS2 n and we have placed the new replicas there. Therefore, the set of storage nodes that now contain a replica is S1∪Cn. If a request for that data set was made, the ''nearest'' storage node would be selected to serve the request. Note that there is not necessarily a unique ''nearest'' node, but this is of no great importance, as selecting between equally good options can be done randomly. Based on the historic data on data set requests that set R contains, we could argue that the ''cost'' that request i ∈ R entails is equal to the distance metric between i and the ''nearest'' storage node, assuming that the storage cost across storage nodes is the same as cs = cs,j, j ∈ S1 ∪ Cn

Filtering the Priority Data in Replication

The basic idea of the greedy approach is to select one node at a time. In the first iteration, we choose the storage node that minimizes the cost under the assumption that all the requests are served by that node. In the second iteration, we choose the storage node that minimizes the cost supposing that each request is served by the nearest node according to the distance matrix i.e. for each request we choose the nearest between the node selected in the first iteration and the priority node of the second iteration. We follow this procedure until we have chosen n nodes.

Table-1: Priority the Data Replications

Data Size (MB)	PDR-1	PDR-2	PDR-3	PDR-4	PDR-5	PDR-6
10	6.5	3.5	5.2	2.3	6.7	4
20	3.6	8.3	8.9	1.1	0.8	3.8
30	9.3	8.1	3.6	4.4	4	3.3
40	7.2	5.6	9.3	6.2	7.2	6.2
50	7.1	9.7	7.2	8.5	0.2	9
60	8.1	8.8	7.1	1	0.7	5.9
70	5.6	4.3	7.7	9.5	3.2	2.6
80	9.7	3.9	4.9	8	2.2	1
90	8.8	7.5	4.5	4.4	8.1	2.3
100	4.3	2.6	7.2	6.7	2.3	9.9

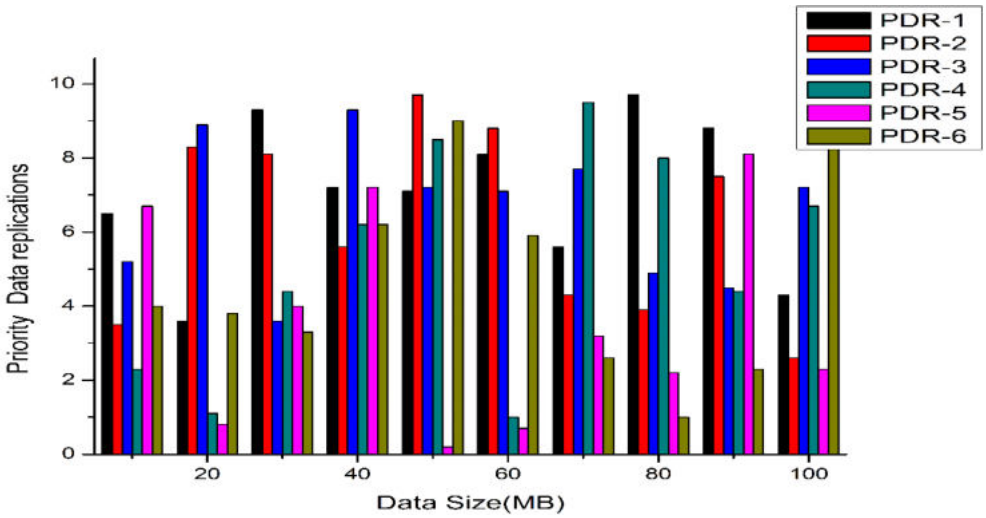
Sources: Authors Compilation

Table-2: Energy Consumption in Servers

Data Size	PDR-1	PDR-2	PDR-3	PDR-4	PDR-5
10	12	9	9	9	9
20	17	14	16	14	16
30	26	22	23	21	23
40	36	31	29	30	29
50	44	39	42	39	42

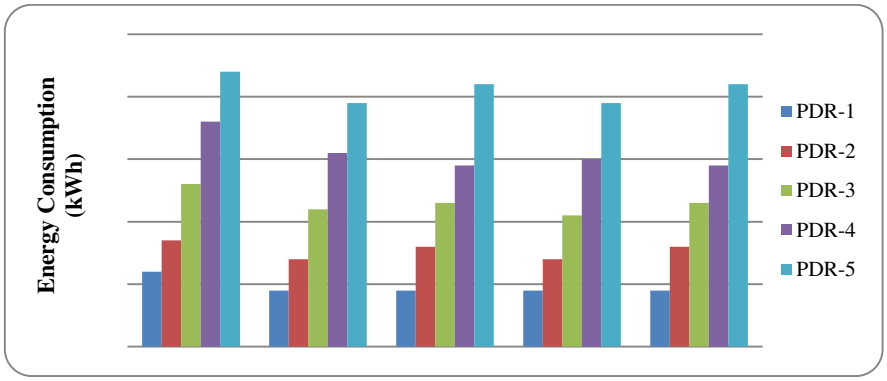
Sources: Authors Compilation

Figure-2: Priority the Data Replications



Sources: Authors Compilation

Figure-3: Energy Consumption in Servers



Sources: Authors Compilation

CONCLUSION

This paper presented Priority data in replication and filtering the data replication algorithms, which offer an integrated solution for dynamic replication in a Grid environment. The system that we propose is scalable and the algorithms can be easily implemented on a Grid environment to provide fast execution and serve the dynamicity. Most of functionalities, including determining the number of replicas required based on data demand, content significance and requested QoS, the location of the new replicas within the Grid environment based on network bandwidth and the overhead that the replication process introduces as well as the replica relocation and retirement. Our Priority data in replication can handle the dynamicity of the Grid environment by expanding or reducing the set of data replicas based on the number and the geography of the data requests.

One of our future works will be to enrich the set of QoS for dynamic replication, including both service provider and client-related requirements with business driven constraints and reducing the user waiting time, speeding up data access, and further increasing data availability. In addition, the replication strategy will be deployed and tested on a real cloud-computing platform. It is also planned to make data replication strategy as a part of cloud computing services to satisfy the special demands of cloud computing.

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MEASUREMENT OF CONSUMER BEHAVIOUR THROUGH QUANTITATIVE METRICS

Srinivasa A. T.[40]

ABSTRACT

Stores image and customers loyalty are the twin variables, which are related to each other. Customer loyalty appears to be one of the most discussed and contentions marketing concept in recent years (Larn et al. 2004). Stores image is regarded as a key element in the consumer choice of shopping which includes internal and external qualities in addition to physical qualities of the store. Research in this area reveals that store image was the significant predictor of store loyalty (Hartman and Spizo 2005). The main purpose of this paper is to explore and examine factors leading to consumer behaviour. A proper understanding of consumer behaviour in this globalized competitive scenario strengthens the manufacturer's commitment to produce right qualitative, priced and most liked products. Retailing is a process of selling goods and services to the needy consumers and hence it is necessary to study and gather such information, which helps to understand consumer and his behaviour. Marketers are in a state of affix to design suitable strategies, they are multiplying their efforts to retail the customer base, and some manufacturers are declaring reward programs to convince and reinforce their loyal customers.

KEYWORDS

Loyalty, Customer Satisfaction, Retention, Image, Location etc.

INTRODUCTION

Understanding customer behaviour in a cross-cultural environment is an essential part of marketing activities in a world that is becoming more consumer centric (Aftab Atam, 2009). Indian retail industry is the fifth largest in the world. Retailing is going a sea of changes in India. It is one of pillars of Indian economy (Smitha Sikri et al., 2012). Retailing in India is projected to touch 1000+ billions by the end of 2020 with a 10% growth annually. Like in most of other countries, Indian retail industry is slowly getting organized and corporatized and giant scale stores are established across the Indian landscape despite some setbacks in North India wherein some organized retail stores were forced to close down. Markets are becoming increasingly globalized, the need arise for understanding consumers in different cultures is a priority in marketing activities. The study intends to explore the understanding consumer behaviour in Bengaluru. Much attention has to be focused on converting satisfied customers to loyal customers since loyal customers are better than many times the satisfied customers are.

Urban Consumer

The demographic profile of urban consumer is most important to consider before designing consumer behaviour understanding strategies. Lower family size, higher education level, internet savvy, innovative western style of living, willing to accept innovative products along with ready to spend personal earnings, strong brand based, supports joint decision, brand switcher, higher awareness, health conscious, global in outlook are some of the demographic features of urban consumer in Bengaluru.

Bengaluru is noted IT hub has of India, a trade center and all weather friendly city. Innumerable IT, manufacturing, service industries are established just some 6-7 years back. The urban Bengaluru consumer taste is ever changing. The correct may not be possible and a strong need based competitive strategy if designed and used the valuable information may be derived.

Table-1: Understanding Satisfied and Loyal Customers

Factors	Satisfied Customers	Loyal Customer
Pricing	Can be negotiated	Negotiation costs
Payment	Pay at their discretion	Pay on time
Turnover	15% of higher of satisfied customers	only 25%
Difficult times	Leave the old firm	Stay with old firm
Perception	Perceive in general	Perceive as a partner
Competitive Data	Seek Competitive data	Share Competitive Data
Contract	Need a contract to keep satisfied customers in place	Lifetime contract

Sources: Aftab Alam et. al., (2009)

[40] Faculty, Department of Statistics, BLDEA - Basaveshwara Arts & Commerce College, Karnataka, India, srinivasaat1974@gmail.com

OBJECTIVES OF STUDY

- To over the influencing factors of location and consumer behaviour.
- To understand relationship between behaviour and stores image.
- To study consumer behaviour and loyalty

HYPOTHESES

The research was conducted with the following predetermined hypotheses:

- Consumers feel that location will not influence the customer behaviour.
- Customer's loyalty is not a key factor in deciding the purchases of branded goods.
- Image of the stores do not influence customer behaviour.

RESEARCH METHODOLOGY

A well-drafted questionnaire in English was administered and under no circumstances, prompting was done in order to extract information. Random sampling technique was used to identify the respondents. 200 sample were studied for the present study. The survey was conducted in the month of January 15th to 31st January 2016. Chi-square and ANNOVA quantitative metrics were used to present the data and hypotheses were tested. Before the distribution of questionnaire, it was pretested to ensure validity of data and the final questionnaire was prepared in the light of experience derived through pretesting.

REVIEW OF LITERATURE

Researchers like Anold and Tigert 1982, Walters 1991, Burnard and Housher 1992, investigated the importance of retailer prices and promotions on shopping behaviour.

Shivakumar (1990) in his study entitled relationship between marketing stimuli and consumer response shows that the consumer behaviour connected with the purchase of refrigerator reveals that irrespective of income level and possession of the consumers, the refrigerators have been bought mainly to preserve food.

Strebel, J.K. O'Donnell, and Myers, J.G. (2004). In their study entitled exploring the connection between frustration and consumer choice behaviour in a dynamic decision environment, proposes that he probability of making a decision is significantly lower when consumers are frustrated with the path of technologies charge.

Brown (1989) in his model of retail competition and shopping behaviour, specify store patronage as a function of the distance from the store to the shopper's home.

SURVEY FINDINGS

Table-1 reveals data about influence of location on consumer behaviour. Three categories of income grade people were selected and their bipolar opinions were expressed and shown in the table. There are 97 respondents or 48.5% out of 200 said to a good extend location influences consumer behaviour and 80 respondents viewed that (40%) location influences consumers behaviour on an average. 23 respondents or 11.5% expressed that location somewhat influences the behaviour. The chi-square table reveals that he F calculated being 12.7212 more than the TV 9.488 @ 5% level of significance with d. f. = 4 fails to accept the null hypotheses and accepts the alternative.

Table-2 highlights the relationship between consumer behaviour and stores image. The store influencing factors varies from image influencing behaviour to image is sentimental and influences the purchase. Out of 200 respondents 100 strongly agreed that the stated parameters in the table influences the consumer's behaviour. 70 respondents or 35% agreed over the variables influencing consumer behaviour and out of 30 remaining 12 stood as neutral, 10 disagree and 8 strongly disagree. The ANOVA table clearly reveals that it fails to accept the null hypotheses and accepts the alternative (two tailed).

Table-3 shows clearly the exact relationship between consumer behaviour and loyalty. Out of 200 respondents, 90 or 45% strongly agreed over the variables influencing loyalty. Further, the table reveals that 79 respondents or 39.5% agreed over the factors stated in the table and as many as 31 respondents or 15.5% stood as either neutral, disagree and strongly disagree. The ANOVA clearly fails to accept the null hypotheses and accept the alternative.

CONCLUSION

The study started with the research concept of knowing relationship between consumer behaviour and loyalty and image. The study after processing of data into tables reveals that there exist a high relationship between location, image and loyalty and customer behaviour. Further all the variables influences location, image, loyalty. Understanding these factors may be very difficult. Research has done in the past reveals a high-level linkage of the issues under study. A substantial portion of the customers purchase products from different organized sources just because of quality, branding and better friendly attitude of salesman. The newly emerged malls in Bengaluru already created a hype among the affordable to buy their requirement.

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APPENDIX

Table-2: Influence of location on Customers Behaviour

Income Grade	Good extent	Average	Somewhat	Total
Lower income	15	15	10	40
Middle Level income	45	30	8	83
Higher income	37	35	5	77
Total	97	80	23	200

Sources: Primary Data

Hypotheses

Ho: Consumers feel that location will not influence the customer behaviour	Reject
H_1: Consumers are not under the impression that location will not influence customer behaviour	Accept

Chi-square Analysis

Consumer value 12.7212, d.f. = (r-1)(c-1)=(3-1)(3-1) = 4, Sig. Level @ 5%, TV = 9.488.

The calculated value being 12.7212 is greater than the TV = 9.488 @ 5% of significance with d.f. = 4 fails to accept the null hypotheses and hence the alternative is accepted.

Table-3: Consumer Behaviour and Stores Image

Factors Influencing Stores Image & Behaviour	SA	A	N	DA	SDA	T
Image influences behaviour	22	18	3	2	2	47
Influences the customer to buy goods	26	15	3	1	1	46
Repeat visit and repeat buy is made	18	10	4	2	3	37
If image is bad, customers may switch over to others	19	16	1	1	1	38
Image is sentimental and influences the purchase	15	11	1	4	1	32
Total	100	70	12	10	8	200

Sources: Primary Data

Hypotheses

H_0:	Image of store do not influence consumer behaviour	Reject
H_1:	Image of the stores influence the consumer behaviour	Accept

ANOVA Table

Source of Variation	**ss**	**d.f.**	**ms**	**f-ratio**	**5% F Limit (from F-table)**
Between the Squares	1890.4	(5-1) = 4	1890.4/4 =476.6	476.6/6.87= =69.3740	F (4,20) =2.87
Sum of Squares	137.4	(25-5) = 20	137.4/20 =6.87		
Total	2027.8	(25-1) = 24			

Sources: Authors Compilation

Analysis of ANOVA

The above ANOVA reveals that the F calculated value being 69.3740 greater than the TV = 2.87 @ 5% level of significance with V1 = 4 and V2 = 20 fails to accept the null hypotheses and hence the alternative is accepted.

Table-4: Consumer Behaviour and Loyalty

Factors Influencing Loyalty	**VA**	**A**	**N**	**VDA**	**SDA**	**T**
Customer loyalty leads to customer retention	20	18	2	2	2	44
A high customer loyalty stops switch over	16	16	1	3	1	37
Customer loyalty leads to repeat purchase	15	14	3	3	1	36
Customer loyalty brings long term success	19	13	1	2	3	38
A high level customer loyalty leads to lifetime patronage	20	18	1	4	2	45
Total	90	79	08	14	09	200

Sources: Questionnaire
Note: VA - Very much agree, A - Agree, N - Neutral, VDA - Very Much Disagree, SDA - Strongly Disagree

Hypotheses

H_0:	Customer loyalty is not a key factor in deciding branded goods	Reject
H_1:	Customer loyalty is a key factor in deciding branded goods	Accept

ANOVA Table

Source of Variation	ss	d.f.	ms	f-ratio	5% F Limit (From F-table)
Between sample	1581.4	(5-1) = 4	1581.4/4 =395.35	395.38/3.35 =118.0149	F (4, 20) =2.87
Sum of squares	67.0	(25-5) = 20	67/20 =3.35		
Total	1648.4	(25-1) = 24			

Sources: Authors Compilation

Analysis of ANOVA

The above ANOVA reveals that the F calculated value being 118.0149 greater than the TV = 2.87 @ 5% level of significance with V1 = 4, and V2 = 20 fails to accept the null hypotheses and hence accepts the alternative.

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Pezzottaite Journals,
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Jammu Tawi – 180002,
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(Mobile): +91-09419216270 – 71

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IS ATTRITION IN INFORMATION TECHNOLOGY INDUSTRY DUE TO FAST GROWING NATURE OF THE INDUSTRY?

Sastry Akella S. S. K.[41] Dr. Venkateswara Rao Korasiga[42]

ABSTRACT

One of the prime challenge for Indian IT (Information Technology) industry is attrition of employees. IT industry is growing and consequently the need for skilled human resource is increasing day by day. It is assumed that attrition is due to the growth of the industry and companies have to live with this challenge. Based on earlier studies, both internal and external factors are causing attrition. The external factors are common to all companies and internal factors are specific to each company. If external factors have more influence, the attrition is expected to be correlated across industry. If internal factors have greater influence then the company can control attrition. This paper studies the correlation of attrition across the industry and with the growth of the company.

This study is based on the secondary data published by the companies. The revenue, profit (Profit before Tax) and attrition data is collected for ten companies from their annual reports. The data is presented as line graphs to identify the correlation. Simple correlation coefficient is calculated to confirm the graphical findings.

The observation that IT industry is growing on regular basis is confirmed. However, attrition is not correlated with the industry growth. Attrition is not correlated among companies. The attrition of the company is also not correlated with its revenue growth. It is observed that attrition is neither related to the growth of the industry nor controlled in the industry. Attrition is fluctuating randomly. However, Some of the research papers say that intention to stay is a better indicator of attrition rather than actual attrition. The Human Resource policies are aimed at controlling attrition. A more detailed study of the effectiveness of employee performance management systems is warranted to understand the phenomena of attrition.

KEYWORDS

Attrition, IT Industry, Revenue, Profit, HR Policies etc.

INTRODUCTION

IT (Information Technology) industry is growing at a very fast rate across the globe more so in India, especially due to exponentially increased exports of Information Technology Enable Service (ITES) / IT services. The industry requires highly skilled and motivated human resource. Hence, there is a need to induct and retain skilled resource. One of the main challenges of IT industry is attrition of human resource. Attrition is believed to be IT Industry phenomena. It will be interesting to study the relation of attrition across the industry. Does the attrition rates correlate with industry growth? Another important question will be whether the company can control the attrition by effective Human Resource (HR) policy initiatives. Here is an attempt to study whether attrition has any relation to growth of the industry/company in India.

REVIEW OF LITERATURE

Attrition means employees leaving current company permanently to join another company (A Pandu, Nov 2012). Attrition is measured as percentage of employees leaving a company in a given financial year. The reasons for leaving a company have been studied by researchers repeatedly.

The Importance of Controlling Attrition*:* Indian economy is growing fast and IT industry is one of the major contributors to the growth. However, high attrition rates in India make it less likely to retain its dominant position in global outsourcing market. High attrition rates ranked as an important concern for 73 percent firms experienced in outsourcing industry. Attrition results in costs to the corporates for the recruitment/replacement of workers and retraining them (Tustin Nupur, 2010). Adaption of IT by different industry groups including the government sector has enlarged the domestic component of IT labour market (Basant Rakesh, 2004). Expectation of employees will continue to rise as the company grows, and the leaders of the company must keep pace or the willingness to follow will be lost (Sherman J Andrew, 2002). Employee retention is important in realizing full return on investment. Human capital theory includes the length of service in an organization as proxy for job relevant knowledge or ability (Ramlall Sunil, 2004).

[41]Research Scholar, JNIAS-JNTU Hyderabad; Visiting Faculty, IBS Hyderabad; Dy. General Manager (Retd.), CMC Limited, Telangana, India, ssksastry@gmail.com
[42]Associate Professor, IBS Hyderabad (ICFAI Foundation for Higher Education), Telangana, India, venkatkorasiga7@gmail.com

***The Factors Causing Attrition*:** There are various studies conducted repeatedly to identify the factors that have major impact on decision of the employees to leave an organization. It is stated that employees leave the company mostly for better compensation packages. Employees expect fair compensation package, commensurate with their skills. Employees expect compensation as per perceived industry standards (Dr. Gupta Sangeeta, 2011; A Pandu, 2012; S. Poornima, 2013; Priya, 2011; Taylor Philip, 2008; William A Brown, 2003; US Job Retention Poll December 2006). Employees look for career advancement. Lack of potential for growth is also a catalyst for employee attrition (Dr. Gupta Sangeeta, 2011; A Pandu, 2012; Priya, 2011; Ramlal Sunil, 2004; Tustin Nupur, 2010; William A Brown, 2003). Overseas assignments are also a major attraction for employees to change organizations (Budhawar S Pawan, 2009). Sense of achievement, Employee job satisfaction and attachment towards company will increase employee intention to stay with the company (William A Brown, 2003; A Pandu, 2012). Recognition and Reward are main reasons for increase in intention to stay. Monthly, Weekly rewards and recognition as well as Half Yearly incentives have encouraged employees to stay with the company. However, dissatisfaction with pay will override intention to stay with the same company (Dr. Gupta Sangeeta, 2011; S. Poornima, 2013; William a Brown, 2003). The Reward Recognition strategies and Communication Effectiveness strategies are employed least in India even by MNC's (B. R. Ananthan, 2011). Training and employee development have an impact on employees decision to stay with the organization (B. R. Ananthan, 2011; Dr. Gupta Sangeeta, 2011; M. Srimannarayana, 2010). Some employees may be leaving current company due to personal reasons or concern for Job security (Priya 2011). Quality of supervision and Transparent appraisals have a bearing on employee intention to stay with the organization (Dr. Gupta Sangeeta, 2011; Priya, 2011). There is a need for some kind of independent employee representation in management decisions (Taylor Philip, 2008). Expectation of employees continue to rise as the company grows, and the leaders of the company must keep pace or the willingness to follow will be lost (Sherman J Andrew, 2002).

***Research Gap**:* The literature has established the need for controlling attrition. Further, the research has identified various factors responsible for employee attrition. These factors are external to the organizations as well as internal to the company. However, it is not evident whether, the attrition is influenced by the growth of the industry, if so whether the attrition has a relation among the companies. Secondly, whether any company is able to control attrition with its policies. Now, this paper is trying to study the relation of attrition with industry growth/company growth. *Let us list the factors responsible for attrition:*

Compensation, Career growth, Recognition and Reward, Training and development, Incentives, Job satisfaction, Attachment towards organization, Fair and transparent appraisal system, Job security.

All the above factors depend on the company culture and policies. Companies can try to influence these factors. However, the studies referred so far have not established whether any of the company has effectively controlled the attrition. Attrition may be due to personal reasons also, but we assumed that the effect of personal reasons is minimal and not considered for this discussion.

In addition, the IT industry is growing very fast and industry growth can influence attrition. The factors causing attrition due to globalization and faster growth of IT industry are listed below:

- Attraction towards big Multinational Companies,
- International travel opportunities,
- Higher compensation and rewards,
- Faster career growth.

We can safely conclude from the above discussion that attrition depends on two category of factors. One set of factors are external to the company and are directly related to the industry growth and opportunities in India and abroad. The other set of factors are internal to each company. Now the question that arises is which factors have greater influence on attrition.

In order to understand the influence of external factors, it is imperative to study whether individual company growth has a relation to the growth of the industry in terms of revenue/profitability. If individual growth is positively related to industry growth, then the question that arises is whether attrition of a company has a relation to the industry attrition. If we assume that the influence of the industry factors are uniform on all companies then internal factors may have greater influence on the attrition of the company. In the second case, the company can control attrition and attrition over a period will be under control.

OBJECTIVES AND HYPOTHESES

***Objectives of the Study*:** In order to explain above issues raised, it is proposed to study the attrition with following objectives.

- To compare the individual company growth with the Industry growth both in-terms of revenue and profit.
- To determine the relations between individual company's attrition and attrition of the industry.
- To determine the relation between the attrition of the company and the growth of the company both in-terms of revenue and profit.
- To verify whether an individual company has control on attrition.

Hypotheses: The following hypotheses are formulated to examine the above:

- Hypothesis 1: Company growth is directly related to industry growth in terms of both revenue and profits.
- Hypothesis 2: Attrition is a phenomenon of IT industry and attrition of the company is related to attrition of the industry.
- Hypothesis 3: Attrition is directly related to the growth of the company.
- Hypothesis 4: Company can control attrition.

To validate the above hypotheses, some key Indian company's data is collected and statistically analyzed.

RESEARCH METHODOLOGY

It is proposed to study some typical companies of Indian IT industry. The study is based on the annual reports of these companies. The revenue, profit and attrition published in annual financial reports are collected and statistically analyzed to understand the relation among them.

***Sampling Design*:** The companies selected belong to three categories of Indian IT industry. The Category I companies are level one companies whose revenues are above thousand crores per year. The Category II companies are companies whose revenues are 1000 crores and below. The Category III companies have operations in India but revenues are presented in millions of dollars. The annual reports are downloaded from their web sites from 2000 to 2013. The data of revenues, profit before tax and attrition is collected and tabulated. It is observed that attrition data is not presented in annual reports for some of the companies. In addition, even those companies, which have given attrition data, have not presented for all the years in their annual reports. The tabulated data is presented in Note 1. The companies selected for data collection have been listed below category wise:

- Category I: Infosys, Wipro, HCL technologies, TCS
- Category II: Infotech, Mindtree, Mphasis, 3iInfotech
- Category III: CSC , Genpact

***Processing Design*:** The approach adapted is to study the relation by calculating Karl Pearson's coefficient of correlation 'r' (simple correlation). A brief note on Karl Pearson's coefficient of correlation is given in Note 2. The value of r lies between + or – one. The value of +one indicates perfect correlation. The zero value indicates that there is no association between the variables. The values near one indicates high correlation. Positive values indicate positive correlation and negative values indicate inverse relation. Coefficient of correlation is measured between two variables. The variables are selected for about a decade.

The coefficient of correlation is calculated for the pairs of variables as given below:

- Revenue data year wise for pair of comparable companies (for Industry benchmark)
- Profit before tax year wise for pair of comparable companies (for Industry bench mark)
- Attrition year wise for pair of comparable companies (for Industry benchmark)
- Revenue and Profit before tax for each of the selected company(for internal benchmark over a period)
- Revenue and Attrition for each of the selected company(for internal benchmark over a period)

For industry, benchmark the following approach is taken. Infosys is considered as industry benchmark for Indian IT industry. Hence, it is proposed to see the correlation against Infosys for industry benchmark. All category I companies are measured against Infosys. Infotech of category II is bench marked against Infosys. Now category II companies are bench marked against Infotech. For category III, Genpact is bench marked with Infotech and CSC is bench marked with Genpact.

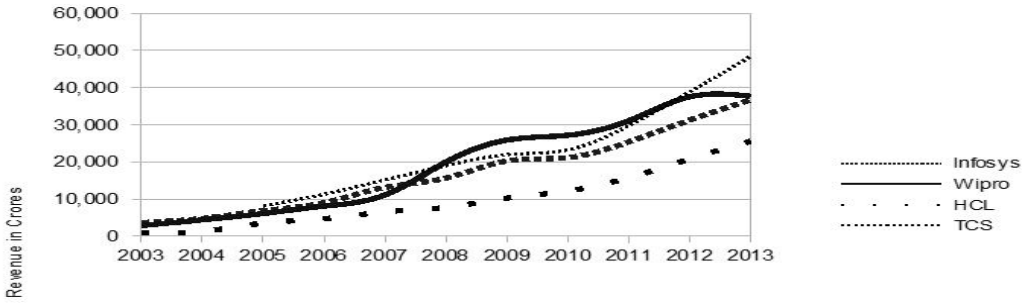
***Assumptions and Limitations*:** It is a difficult task to study all the Indian IT companies. Only representative sample of companies have been selected. In addition, industry average for variables have not been computed. Instead, it is attempted to identify a company, which is representing the industry for reference. It is assumed that Infosys represents industry standard for Indian IT companies. The profits data is collected considering profits before taxes. Different companies compute the profits before taxes differently. The profits before tax may or may not include duties, depreciation etc. based on their accounting policy. The nomenclature used by company is presented in notes 1.

The study is based on secondary data. No primary data is collected. In addition, the internal factors have not been studied. Only attrition relation with industry growth as well as company growth is studied based on secondary data.

ANALYSIS

The analysis is done in two ways. First, the line graphs are drawn to see the correlation graphically. The data is analyzed statistically. The category I and category II companies are considered for graphical presentation of revenue and profits data. The category III companies are not considered for graphical representation of revenue and profit.

Graph-1: Revenue Growth Category-I



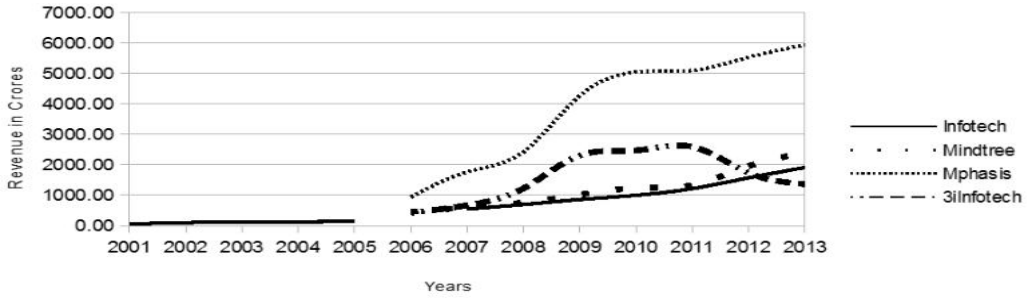
Sources: Authors Compilation

Revenue: The revenue of the company is the main indicator for growth of the industry. The revenue graph of category I companies is given below.

The graph clearly shows continuous growth for all the companies' year on year. The revenues of all the companies are growing together. Infosys is occupying middle space of the graph. TCS and Wipro have a little higher growth during certain years. HCL has shown smoother line indicating consistent and uniform growth relatively.

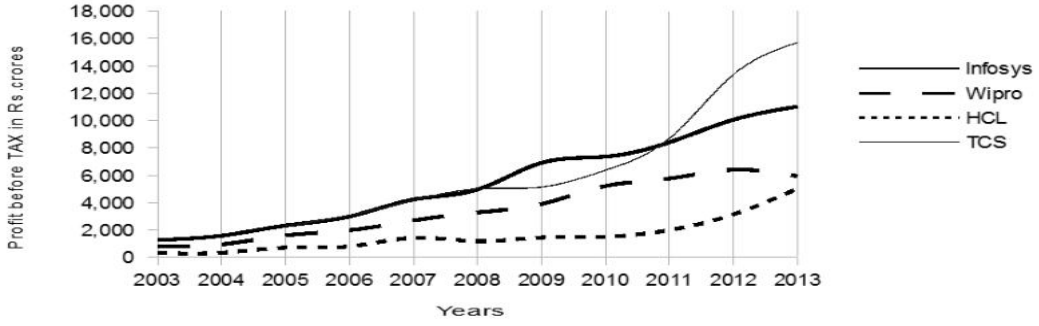
As per the graph, Infosys performance appears to be average of industry performance. Infosys is considered as face of modern Indian IT industry. The line graphs and popular belief that Infosys is the benchmark company have converged. Infosys is taken for benchmark.

Graph-2: Revenue Growth Category-II



Sources: Authors Compilation

Graph-3: Profit Before Tax Category-I



Sources: Authors Compilation

The revenue graph of category II companies is also showing growth year on year. Infotech has shown a steady growth. Mindtree has also shown a regular growth. 3iInfotech has spikes of growth and fall. Mphais has a very fast growth in couple of years in between.

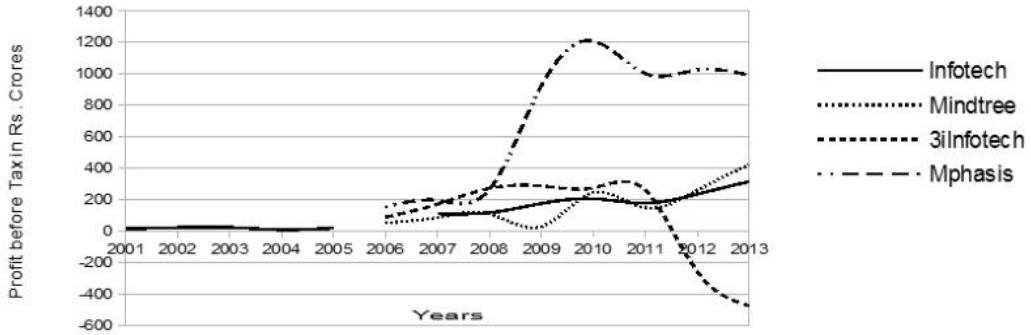
To summarize, IT industry in India is growing regularly and some companies have a very high growth in certain years. Infosys and Infotech have shown steadier growth compared with other companies. The graph of category I and II are shown separately for the simple reason that the value difference is high. Hence, the single graph will not present the clear picture.

Profit: Another indicator for growth is profit. Profit before taxes has been considered for discussion. The graphs for profit before taxes is shown below separately for category I and category II.

The profit before tax has shown regular growth for all the four giants of Indian IT industry today. Infosys and TCS have shown growth continuously with TCS showing very fast increase in last couple of years. HCL's increase in profits is low but maintained the level with increased growth in last couple of years. Wipro has a steady growth in profits but profits dipped in 2013. Over all Infosys has shown middle path and can be taken as reference for profit.

The profit graph for category II companies is given below:

Graph-4: Profit Before Tax Category-II

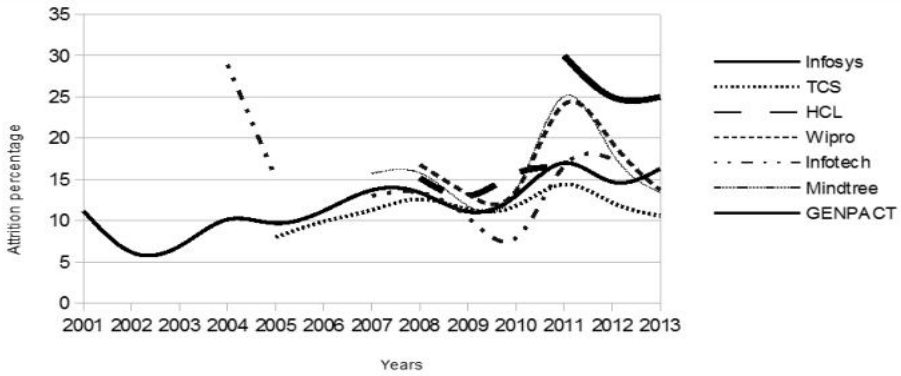


Sources: Authors Compilation

The profits for category II companies are also growing but not steadily. Of course, Infotech has shown steady growth. However, Infotech has not given data for 2006. The profits are fluctuating for Mindtree. The profits for 3iInfotech have fallen drastically in 2012 and 2013. Mphasis profits have shown very big spike in 2010. The profits have marginally fallen during the following years. We can summarize, that category I companies, which have revenue growth, are also showing regular growth in profits. However, the category II Company's i.e. tier two companies have revenue growth year on year basis but profits are fluctuating. We can observe that even in category II companies there is an increase in profit over a period.

Attrition: Attrition is discussed for all the three category companies together. The attrition graph for all category of companies is given below:

Graph-5: Attrition



Sources: Authors Compilation

The attrition data is available for only few years for most of the companies. Some companies have not shared the attrition data in their annual reports. Hence, Mphasis, 3iInfotech and CSC lines are totally missing in the graph. Even, Genpact has given for only couple of years. Unlike, revenue and profit graphs, the attrition graph is sinusoidal curve in nature. However, the pattern is not same for all the organizations. Mindtree and Wipro have similar pattern. Infotech has the same pattern if not in the same range. Infosys and TCS have no common pattern but for few years. The graph clearly shows that attrition is neither increasing nor decreasing continuously year on year. We cannot observe pattern of attrition for the industry based on this graph. In addition, there is no evidence that attrition is controlled by any of the company chosen for discussion. Only, Genpact shows control of attrition but has data for three years only. Infotech data shows there is a decrease in attrition 2005 but data is not available for 2006 and subsequently, it is again a sinusoidal curve. From the graph, the attrition has no correlation among IT companies of any category. In addition, none of the companies has shown consistent control on attrition.

The initial observation is that revenue, profits are growing across the industry, and most of the companies have similar growth pattern. However, attrition is not increasing or decreasing based on revenue/profit growth. In addition, none of the companies individually has shown either increase or decrease of attrition over a period.

Statistical Analysis: Let us examine correlation of individual organization with the industry. To understand the correlation, the variables namely revenue, profit and attrition are considered for calculation of Karl Pearson's coefficient of correlation (r Simple correlation). The correlation can be seen between two variables based on series of values. To understand the industry correlation, Infosys is taken as benchmark organization. Simple correlation (r) is calculated between Infosys and category I companies. In addition, Infosys is correlated with Infotech. Now Infotech is correlated with category II companies. Infotech is correlated with Genpact. Genpact in turn is correlated with CSC (Category III). Thus, an attempt is being made to understand the correlation across industry.

The r-values are presented in the table 1 below:

Table-1: Industry Correlation

Company 1	Company 2	r for Revenues	r for Profits	r for Attrition
Infosys	Wipro	0.9801357074	0.9803112031	0.6371689413
Infosys	HCL	0.9918035407	0.8956581766	−0.2347921835
Infosys	TCS	0.9913806252	0.9400072530	0.7241905523
Infosys	Infotech	0.9953095924	0.9800437942	−0.2179832827
Infotech	Mindtree	0.9953582257	0.7992638823	0.7710066306
Infotech	Mphasis	0.8748684433	0.7281991581	
Infotech	3iInfotech	0.1785240300	−0.8178477773	
Infotech	Genpact	0.9953645315	0.9470743141	−0.8116061781
CSC	Genpact	0.2633214023	−0.4274039054	
Infosys	Mindtree	0.9921163080	0.7992638820	0.9752671336

Sources: Authors Compilation

The above table clearly shows that the revenues of IT companies are positively and highly correlated among themselves. Only CSC and 3iInfotech revenues have a very low correlation coefficient and can be considered as not growing with the industry. The Infotech and Mphasis have also shown correlation of the order of eight. The correlation among profits before taxes is also very high among the companies. The category I companies are very near to perfect correlation factor of one. Infotech is correlated with Infosys very highly. There is fair correlation of profits among category II companies, the factor being above 0.7 and mostly around 0.8. Again CSC and Genpact profits are very poorly correlated ($r < 0.5$).

So statistically, the IT industry is growing and the growth among these companies is very highly correlated. Both category I and category II companies are growing together even though operating at different revenue levels. The profits are also growing and are highly correlated. The profits of category II companies are also reasonably correlated if not as much as revenue correlation. It is safe to assume that IT industry is growing and all the companies are growing similarly both in terms of revenue and profits, but for few exceptions.

If we look at the table-1, we cannot say the same about attrition. Among category I companies Infosys and TCS have correlation factor of 0.72. We can assume that Infosys and TCS have reasonable correlation. The correlation factor is much below for Wipro (0.63). HCL correlation factor with Infosys is (-0.23), negative and very near to no correlation. In category II companies, Infotech and Infosys correlation factor is negative and very low (-0.21). The data is not available for Mphasis and 3iInfotech. Mindtree is very much correlated with Infosys and correlated to some extend with Infotech. However, the data available is only for three

years. We cannot confirm statistical correlation with limited data. Thus, largely, there is no evidence that there is correlation of attrition factor among IT companies. It is safe to say that attrition is prevalent in IT companies. IT companies have concern for attrition, but not willing to share the data. Attrition is an industry phenomenon. However, attrition is not correlated across IT companies.

To examine further, the correlation factor for revenue and profit as well as correlation factor between revenue and attrition is calculated for each company over a period. The number of years for which data is available is mentioned in the tabulation below.

The r-values for each company is presented in the table 2 below:

Table-2: Company Correlation

Name of Company	r (Revenue vs. Profit)	Number of Years	r (Revenue vs. Attrition)	Number of Years
Infosys	0.9966641430	13	0.8301042710	13
Wipro	0.9862693600	13	0.1882161240	6
HCL	0.9621761000	14	−0.5073712910	5
Infotech	0.9812110940	12	0.3480055080	8
TCS	0.9855400130	9	0.4114197200	9
Mindtree	0.9512508170	9	−0.1912656210	8
Mphasis	0.9491710090	8		
3iInfotech	0.2491775640	8		
CSC	−0.0996459700	14		
Genpact	0.4114197200	9	−0.8638319925	4

Sources: Authors Compilation

Infosys and TCS present the data for attrition for all the years, only in their annual reports. Mindtree has presented data for all the years except for one year. Wipro, HCL, Genpact have given attrition data for less than half the years. Only Infotech has given data for 75 percent of years. Mphasis, 3iInfotech and CSC have not given attrition data at all. This clearly shows companies are not keen on presenting attrition data even though, attrition is mentioned by all the companies as a factor of concern.

The revenue and profit are highly correlated for Infosys, Wipro, HCL Infotech, TCS, Mindtree and Mphasis. In case of 3iInfotech, CSC and Genpact profits are not correlated with revenues. The profits are not increasing/ decreasing with revenues. In addition, in the earlier discussion only CSC revenues are not correlated with industry. Based on the above discussion, it can be stated that the profits are highly correlated with revenues.

Now, let us look at attrition. Only, in case of Infosys the revenue and attrition are highly correlated, the correlation factor being greater than 0.8. The revenue and attrition correlation factor is greater than 0.8 for GENPACT, but profit is not correlated to revenue (0.4). However, in all other cases the correlation factor is less than 0.5. Based on this, we can say attrition is not related to the growth of the company. Revenue and profits are correlated and growing over a period, but attrition not correlated with revenue growth. If we examine graph 5, the attrition is neither constant, nor consistently increasing or decreasing over a period. The attrition line graph for any company is sinusoidal, clearly showing, that there is no control on attrition for any company. Only in case of Infosys, attrition is correlated with revenue. The attrition is not related to revenues or profits of the any other company or the industry in general. Hence, it may be assumed that attrition is directly related to the internal factors of the company. Nevertheless, as per the graph, no company is able to control the attrition on regular basis.

RESULTS

Based on the above analysis let us examine the Hypothses. IT industry is growing year on year and companies are growing year on year along with the industry except for few companies. Both revenues and profits are growing together. For each of the company, revenue is growing year on year and profits are growing along with revenues. However, attrition is neither growing nor decreasing with the industry growth. There is no correlation of attrition among the companies. In addition, there is no correlation of attrition with revenue of any company over a period. Hence, the result of statistical analysis of hypotheses is given below:

Hypothesis 1: The Company growth is directly related to industry growth in terms of both revenue and profits.
Hypothesis 1: Is observed to be true by graphs as well as statistical correlation.
Hypothesis 2: Attrition is a phenomenon of IT industry and attrition is related to attrition of the industry.
Hypothesis 3: Attrition is directly related to growth of the company.
Both hypotheses 2 and 3 are not proved by graphical observation or statistical correlation.

Hypothesis 4: The company and can control attrition.
There is no statistical evidence that Hypothesis 4 is correct. We could not observe a pattern of attrition across industry or in a company over a period in the line graph. If we assume that companies are trying to control attrition then Hypothesis 4 is also not true.

CONCLUSION

The study is aimed at studying attrition in IT industry. Organization have a concern for attrition and their annual reports highlight the same. The companies are sharing revenue and profits in annual reports but not sharing attrition data. The IT industry is growing very fast and profits are growing with revenue. Most of the IT companies are growing together in terms of revenue and profit. However, attrition has no correlation among IT companies / industry. Attrition is neither increasing nor decreasing together across the industry. In addition, attrition of a company is not correlated to revenue / profit of the company. Attrition is neither increasing nor decreasing with revenues/profits. Hence, even though attrition is considered as an IT industry phenomena, attrition is not related to industry growth or company growth. In addition, there is no pattern in the attrition of any company over a period. If attrition is considered as dependent on internal factors, we have to conclude that organizations do not have effective processes to control attrition in any company over a period. It is essential to study the effectiveness of various measures taken by companies to improve employee retention. In addition, it may be desirable to study intention to stay rather than actual attrition.

NOTE-1

The Financial and Attrition Data for Indian IT Companies – Based on their Annual Reports

Table-3: Infosys

Year	Revenue (Rs. Crores)	PBIDT (Rs. Crores)	Attrition (Percentage)
2001	1959	808	11.2
2002	2603	1037	6.2
2003	3623	1272	6.9
2004	4761	1584	10.15
2005	6860	2325	9.7
2006	9028	2989	11
2007	13149	4225	13.7
2008	15648	4963	13.4
2009	20264	6906	11.1
2010	21140	7360	13
2011	25385	8414	17
2012	31254	10061	14.7
2013	36765	11015	16.3

Sources: Authors Compilation

Table-4: Wipro

Year	Revenue (Rs. Crores)	PBIT (Rs. Crores)	Attrition (Percentage)
2001	1769	605.7	N/A
2002	2145	994.5	N/A
2003	2845.6	810	N/A
2004	4358	954	N/A
2005	6075	1604	N/A
2006	8066	1985	N/A
2007	11095	2694	N/A
2008	19958	3283	16.8
2009	25862	3900	13.2
2010	27175	5213	13.6
2011	31803	5766	24.1
2012	37525	6401	19.5
2013	37688	5936	13.7

Note: N/A stands for Not Available
Sources: Authors Compilation

Table-5: TCS

Year	Revenue (Rs. Crores)	PBT (Rs. Crores)	Attrition (Percentage)
2005	8122	2308	8
2006	11282	3074	9.9
2007	15156	4170	11.3
2008	18976	5003	12.6
2009	21947	5139	11.4
2010	23222	6370	11.8
2011	29770	8700	14.4
2012	38858	13366	12.2
2013	48426	15703	10.6

Sources: Authors Compilation

Table-6: Mindtree

Year	Revenue (Rs. Crores)	Profit Before Tax	Attrition (Percentage)
2006	455.37	55.7	N/A
2007	597.71	89.56	15.7
2008	761.6	112.7	15.8
2009	1020.44	32.5	11.8
2010	1233.24	246.2	13.6
2011	1330.9	152.6	25.1
2012	1330.9	152.6	18.2
2013	2396.8	423.6	13.4

Sources: Authors Compilation

Table-7: HCL

Year	Revenue (Rs. Crores)	PBIDT (Rs. Crores)	Attrition (Percentage)
2000	451	210	N/A
2001	833	453	N/A
2002	856	417	N/A
2003	979	322	N/A
2004	1274	339	N/A
2005	3471	715	20.4
2006	4680	809	N/A
2007	6524	1428	N/A
2008	7755	1182	15.2
2009	10229	1454	13
2010	12136	1522	15.7
2011	15730	1996	16.5
2012	20831	3146	N/A
2013	25581	5025	N/A

Sources: Authors Compilation

Table-8: Infotech

Year	Revenue (Rs. Crores)	EBIDTA (Rs. Crores)	Attrition (Percentage)
2001	60.2	17.23	N/A
2002	100.47	25.63	N/A
2003	125.37	26.67	N/A
2004	125.8	12.21	28.91
2005	153.8	22.3	15.2
2006	N/A	N/A	N/A
2007	549	113	13.02
2008	696	121	13.43
2009	860	178	10.42
2010	999.4	208.3	7.9
2011	1217.56	180.35	16.62
2012	1570.66	236.48	17.5
2013	1911.17	316.63	N/A

Sources: Authors Compilation

Table-9: Mphasis

Year	Revenue (Rs. Crores)	PBIT	Attrition (Percentage)
2006	940	155	N/A
2007	1760	198	N/A
2008	2423	266	N/A
2009	4263	925	N/A
2010	5036	1209	N/A
2011	5097	1004	N/A
2012	5525	1027	N/A
2013	5936	995.1	N/A

Sources: Authors Compilation

Table-10: 3iInfotech

Year	Revenue (Rs. Crores)	PBIT (Rs. Crores)	Attrition (Percentage)
2006	424.05	92.02	N/A
2007	670.77	173.73	N/A
2008	1223.56	272.85	N/A
2009	2304.7	288.47	N/A
2010	2468.75	276.9	N/A
2011	2587.48	261.21	N/A
2012	1730.59	−253.96	N/A
2013	1364.28	−469.85	N/A

Sources: Authors Compilation

Table-11: CSCs

Year	Revenue ($. Million)	PBIT (($. Million)	Attrition (Percentage)
2000	9370	611	N/A
2001	10524	330	N/A
2002	11426	497	N/A
2003	11346	612	N/A
2004	14768	747	N/A
2005	14059	715	N/A
2006	14616	821	N/A
2007	14857	607	N/A
2008	16500	918	N/A
2009	16740	949	N/A
2010	16128	1038	N/A
2011	16042	968	N/A
2012	15877	−4347	N/A
2013	14993	480	N/A

Sources: Authors Compilation

Table-12: Genpact

Year	Revenue (($. Million)	Gross Profit (($. Million)	Attrition (Percentage)
2005	492	18.8	N/A
2006	613	481	N/A
2007	823	252	30
2008	1041	422	N/A
2009	1120	447	N/A
2010	1259	4470	N/A
2011	1600	595	30
2012	1902	744	25
2013	2132	812	25

Sources: Authors Compilation

Note: PBIDT, PBIT, PBT, EBIDTA: Profits before TAX with or Without Depreciation

NOTE 2

A brief note on Karl Pearson's coefficient of correlation (C.R. Kothari, 2004): Karl Pearson's coefficient of correlation is also known as simple correlation.

- It is denoted by 'r'.
- It is most widely used method of measuring degree of relationship between two variables.

The coefficient assumes the following:

- There is a linear relationship between two variables.
- That the two variables are casually related which means that one of the variables is independent and the other one is dependent.
- A large number of independent variables are operating in both variables so as to produce a normal distribution.

The calculation formula is:

$r = \Sigma(X_i - \overline{x})(Y_i - \overline{y}) / n.\ \sigma x.\sigma y$

X_i is ith variable of X variable
Y_i is ith variable of variable Y
$\overline{x}$ is mean of X
$\overline{y}$ is mean of Y
σx is Standard deviation of X
σy is standard deviation of Y

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A STUDY ABOUT SUSCEPTIBILITY AND PROTECTION IN REAL TIME SYSTEMS

Pradosh Chandra Patnaik[43] M. V. Ramana Murthy[44] Dr. S. B. Kishor[45]

ABSTRACT

In this paper, we explore the security challenges and issues of Real-Time Systems. We abstract the general workflow of Real-Time systems, identify the potential susceptibility, attack problems and issues, characteristics and a collection of challenges that need to be addressed; then we also suggest a context-aware security framework for general Real-Time Systems and advice some potential research areas and problems.

KEYWORDS

Real-Time System, Security, Actuation, Context-Aware etc.

INTRODUCTION

Real-Time System (RTS) [1] aims at examining and supervising the behaviour of physical processes, and actuating actions to transform its behaviour in order to make the physical environment work correctly and better. Commonly, a Real-Time system (RTS) consists of two major mechanisms, a physical process and a cyber system. Typically, the physical procedure is monitored or controlled by the cyber system, which is an associated system of several tiny devices with sensing, computing and communication capacity. The physical process involved may be a natural, a fabricated physical system (e.g. an operation room) or a more complex combination of the two. However, as the communication between the physical and real systems improves or grows more, the physical systems become increasingly more liable to the security susceptibility in the cyber system. For example, some hackers have busted into the air traffic control mission-shore up systems of the U.S. Federal Aviation Administration many times in recent years, according to the report sent to the FAA in 2009 may [2]. Now few hackers are also able to hack those medical devices fixed in human body, which have wireless interactions [3]. A CIA Report [4] reveals that hackers have infiltrated power systems in several regions outside the United States, and in any case, one case caused a power outage affecting multiple cities. In 2010, the attacker verified a software tool called CarShark [5] which could slay a car engine remotely, turn off the brakes so the car would not stop and make application give wrong readings by observing communications between the electronic control units (ECUs) and insert wrong packets of data to take out attacks. In this year, hackers have planned a virus, which can successfully attack Siemens plant-control system [6]. Actually, the safety susceptibility are being found in more and more Real-Time System s like smart transportation system, medical systems electronic power grid, and so on. Security of RTS has become a matter of concern of researchers. If we have a highly secured cyber physical system then we have to consider the possible susceptibility on the systems. Actually, security for cyber physical systems is a comparatively a new area and not much work has been done in this regard. Like any other new areas, most of the attempts seems to be focused on mapping clarification from existing domains such as sensor networks, which contribute to the networked operation, and low capability features with RTS [7]. However, these answers were frequently not designed for RTS. As an example, consider an example of gas leaking in a smart building, the Real-Time System of the gas department must assist with the one, which monitors the wounded person's health to accomplish the set free mission. In usual situation, these applications are not dependent. However, once there is urgency, all these applications need to communicate and share resources to fulfill the same goal. Conventional secure communication solutions are not developed for the interoperation among mixed applications. How to make sure that the system is still secure while interacting with another system is an issue of importance in cyber physical systems. There are also other new security issues for RTS that need to be addressed. In this paper, we first figure out and model the general flow of work of a RTS. Secondly, we identify the susceptibility, attacking models and challenger types; finally, we suggest a new security framework for RTS and talk about a set of challenges and research troubles that need to be resolute in the future.

GENERAL WORKFLOW OF RTS

A general workflow of RTS can be classified into four important steps:

Monitoring
Monitoring of physical processes and environment is an essential purpose of RTS. It is also used to give feedback on any past actions, which are taken by the RTS and make sure correct operations in the future. The physical process is to achieve the original physical goal of the RTS.

[43] Research Scholar, Department of Computer Science, Gondwana University, Maharashtra, India, pradoshpatnaik1974@gmail.com
[44]Professor, Department of Mathematics & Computer Science, Osmania University, Telangana, India, mv.rm50@gmail.com
[45] Assistant Professor, Department of Computer Science, Sardar Patel Mahavidyalaya, Maharashtra, India, s.b.kishor.spc@gmail.com

Networking
It deals with the data aggregation, dispersion. There can be more than one sensor in RTS. These sensors can produce data in concurrent, various sensors could generate much data, which is to be aggregated or diffused for analyzers to practice further. At the same time, different applications need to be communicated with networking communication.

Computing
It is for reasoning and analyzing the data composed during monitoring to verify whether the physical process assured certain pre-defined condition. If the conditions are not being fulfilled, the corrective actions are suggested to be executed in order to make sure meeting the conditions. For example, a datacenter RTS can have a replica to predict the temperature increase with respect to other scheduling algorithms, which can be used to find out future potential operations.

Actuation
Here, executions of the actions are determined during the computing phase. Actuation can actuate various forms of actions such as correcting the cyber performance of the RTS, changing the physical procedure. For example, the action can be the release of some type of medicine in a medical RTS. Fig 1 shows a common workflow of RTS. Let Y represent the data acquisition from sensors, Z represent the physical data aggregation in-network, U represent the valid computed result of the physical system states which could advise controller to select valid commands, V represent the control commands sent to the actuators.

RTS SECURITY OBJECTIVES AND THREATS

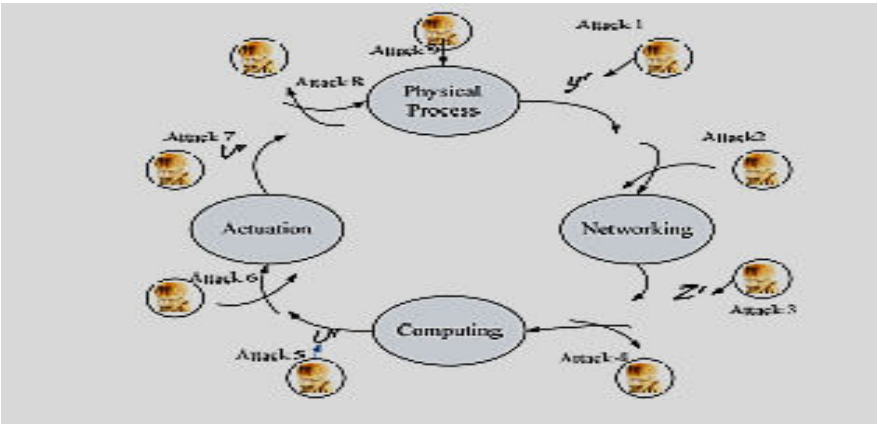
A. Security Objectives

Confidentiality
Confidentiality refers to the capability to prevent the revelation of information to illegal individuals or systems [8]. For example, a Healthcare RTS on the Internet needs the individual health records to be transmitted from the Individual Health Record system to the doctor or front medical devices. If an illegal party obtains the individual health care in any way, a breach of privacy has taken place. Confidentiality is essential for maintaining the users' isolation in Cyber Physical Systems [9]. Realizing Confidentiality in RTS must stop an enemy from intruding the state of the physical system by snooping on the communication channels between the sensors and the regulator, as well as between the regulator and the actuator.

Integrity
Integrity refers to data or resources cannot be modified without approval. Integrity is broken when a rival accidentally or with wontedly intends and modifies or deletes important data; and then the receivers get wrong data and believe it to be true. Integrity in RTS could be the ability to get the physical goals by detecting , preventing, avoiding, or blocking deception attacks on the information sent and received by the sensors and the actuators or controllers [10].

Authenticity
In computing and communication procedure or process, it is essential to make sure that the data, transactions, communications, transmission are genuine. It is also significant for authenticity to authenticate that both parties concerned are who they claim they are.[12] In RTS, the authenticity intends to realize authentication in all the related procedures like sensing, communications, actuations etc.

Figure-1



Sources: Authors Compilation

B. Major types of attacks to RTS

As above figure shows, we summarize the types of attacks to RTS as follows:

Compromised-Key
A key is a secret code/ information, which is important to read secure information. Once an attacker gets a key, then the key is considered a compromised key [14]. An attacker can gain access to secured information without the awareness of sender or receiver by using the compromised key. The attacker can decrypt or change data by the compromising key, and try to utilize the compromised key to compute additional keys, which could allow the attacker access to other secured communications or resources. Actually, it is possible for an attacker to obtain a key although the process maybe a difficult and resource concentrated. For example, the attacker could detain the sensors to execute reverse engineering job in order to figure out the keys inside, which could be represented in attack 9 shown in figure 3, or the attacker could pretend to be a valid sensor node to cheat to agree on keys with other sensors.

Eavesdropping
Eavesdropping refers to the attack that rival can intercept any information communicated by the system [13]. It is called passive attack that the attacker does not involve with the working of the system and simply finds its operation. RTS is particularly vulnerable to eavesdropping through traffic analysis such as intercepting the monitoring data transmitted in sensor networks collected through monitoring. Eavesdropping also violates user's privacy such as an individual patients health status data transferred in the system. In Figure, attack 4 can represent the eavesdropping attacks on data aggregation processes; attack 8 can represent the tapping on controller demands.

Man-in-the-Middle Attack
In man-in-the-middle attack [15], wrong messages are sent to the operator, and can take the form of a wrong negative or a wrong positive. This may cause the machinist to take an action, such as flipping a breaker, when it is not needed, or it may cause the operator to think everything is fine and not take an action when an action is needed. For example, in Figure 3, attack 7 shows that the rival sends V' to indicate a system change, however, V' is not the real actuate command. When the operator follows normal procedures and attempts to correct the problem, the operator's action could cause an undesirable event. There are numerable variations of the modification and replay of control data, which could affect the operations of the system. Attack 1, attack 3, attack 5 can also represent this kind of attacks.

Denial-of-Service Attack
Denial of Service (DoS) attack [16] is one of the network attacks that stop the legal traffics or requests for network resources from being responded or processed by the system. This type of attacks usually transmits a huge amount of data to the network to make demand handling the data so that normal services cannot be provided. The denial-of-service assault prevents normal work or use of the system. After gaining access to the network of cyber physical systems, the attacker can always do any of the following:

- Flood a controller or the entire sensor network with traffic until a shutdown occurs due to the overload.
- Send invalid data to controller or system networks, which causes abnormal termination or behaviour of the services.
- Block traffic, which results in a loss of access to network resources by authorized elements in the system.

For instance, in Figure 2, Attack 2 can represent that adversaries flood the entire sensor network with a large amount of jamming data to block the normal network traffic, attack 6 can represent that the adversaries send a huge amount of invalid data to actuators to cause abnormal termination of actuation process.

C. Characteristics of Adversaries

This section introduces several main types of potential opponents:

- Skilled hackers are complicated programmers with the skill to find exclusive susceptibility in existing software and to create working make use of codes;
- Discontented insiders with malicious intent may not need a great deal of knowledge about cyber intrusions because their knowledge of a target system often allows them to gain unrestricted access to cause injure to the system or to steal system data, who are considered a principal source of cybercrime and sabotage, the types of insiders may be employees, contractors, or business partners;
- Criminal groups, the main motivation of a criminal group launching an attack on a Real-Time System would be extortion. [4]
- Nation-states terrorist group, most terrorists seek higher-crash targets in 1 country such as aero systems or 735-power grid system, they could develop the capabilities to bring down those critical cyber-physical facilities. Besides, they

almost certainly try to achieve the goal by recruiting highly skilled coders, hiring control system engineers and bribing insiders. [17]

Depending on the types of rivals, the defenders of RTS can adopt the corresponding policies or strategies to respond to the attack. Besides, researchers can gain understanding of rivals characteristics and an ability to anticipate a rival in order to build hazard models.

CONTEXT - AWARE SECURITY FRAMEWORK

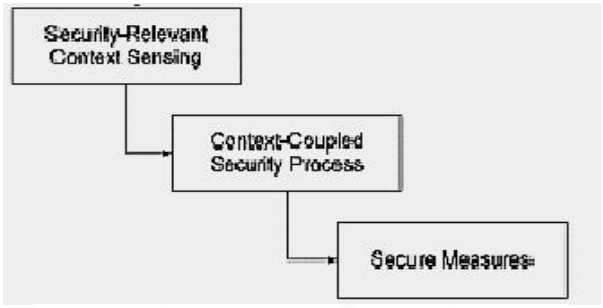
We propose a context-aware security framework for Real time Systems.

We make security-relevant context information incorporated into several security measurements such as verification, encryption, key agreement protocol, access control and so on. Therefore, security mechanism for Real-Time System can be vigorously adapting to the physical environment by the assistance of context coupling. We call this kind of security mechanism context-aware security framework.

Context is the set of environmental states and settings that either finds out an application's behavior or in which an application event happens [18]. The context can be from many context information providers and can be different forms from temperature to grade of pleasure. Commonly, the context can be categorized into four types: system context, user context, physical environment context and time context. In our framework, we mainly tackle security-relevant context which consists of the set of contextual attributes that can be used to characterize the situation of an entity, whose value affects the choice of the most appropriate controls or the configuration of those controls to protect information and information systems from unauthorized access, use, disclosure, disruption, modification or destruction in order to provide confidentiality, reliability and availability. When attacks are happening, the attack model and the adversary types can also be one of the contextual attributes. The values of security-relevant contextual attributes affect the choice of the most appropriate controls because they affect the likelihood of certain threats to confidentiality, integrity, and availability being realized. Therefore, based on their values, the most suitable controls and configuration of those controls can be employed to alleviate those threats. The context-aware security framework can be represented as following formula; the general workflow can be referenced in Figure below:

Let us consider one health care case, the operating doctor can be certified to access his patients' records when he is in hospital, while when the place sensing data shows he is outside, if the doctor still wants to access the records, the access control works joined with the changed context and deny this access.

Figure-2



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In the context-aware security framework for RTS, we separate it into three main aspects: sensing security, cyber security, control security, as show in Figure.

Sensing Security

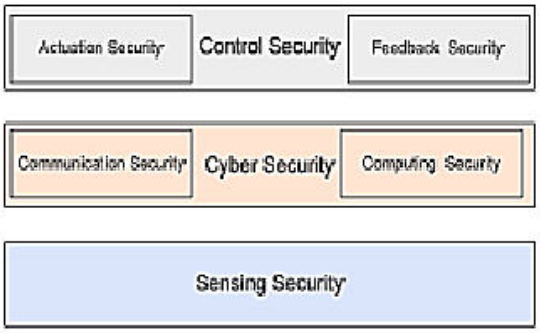
The security configuration, if depend on the context; we have to ensure that context information is trustworthy. Here we propose that in the lifecycle of the security-relevant context from context discovery, context acquisition to context convey, we adopt Trusted Platform Module to achieve the goal of secure sensing. A Trusted Platform Module (TPM) [19] is a relatively cheap hardware component used to facilitate building trusted software systems. Our proposed solution leverages the TPM functionality of attesting to the integrity of software running on a sensor to a remote verifier. A TPM can be used to enable trusted boot, where each piece of code loaded from boot-time is measured via cryptographic hash [20] before loading. All-important keys and data will be saved in the Basically the sensor node platform will consist of ARM11 chip, external memory Flash and SDRAM, Zigbee

as transmitter, temperature sensor and battery operated power supply. Therefore, beside all the data is authenticated from the sensors to the verifiers with secret keys, which are stored inside securely, potential loop holes are also blocked by embedding the memories, cryptographic eliminators and master key into the processor chip.

Cyber Security

It includes communication security and computing security. RTS is networked which not only allows them to form a network for data fusion, and delivery to back-end entities but also take coordinated response actions. We can design a context-incorporated communication protocols for securing both inter and intra RTS communication from both active (interferers) and passive (eavesdroppers) adversaries. It includes context aware key management scheme, context-aware mutual authentication scheme, and context-aware privacy protection scheme. Besides, once the data has been collected and processed, it may be need to be stored over time for future access; any tampering of the stored data can lead to errors or disruptions in future. In the future, context-aware encryption, digital signature, and access control solutions will be developed for securing data in RTS platforms against physical or cyber tampering and invalid access.

Figure-3



Main security aspects

Sources: Authors Compilation

Control Security

It can be divided into actuation security and feedback security. Actuation security aims to ensure that actuation can take place under the appropriate authorization. Dynamic condition of the authorizations will be designed, as RTS's needs change over time. Feedback security refers to ensuring that the control systems in a RTS that provide the essential feedback for effecting actuation are protected. The state-of-art security solutions mainly focus on data security only, but their effects on decision and control algorithms have to be studied for providing in-depth defense against various attacks on RTS.

Context-aware privacy protection and encryption scheme mainly prevents the users' privacy from eavesdropping or data stealing. In the coming future, we will continue developing the rest of security protocols and schemas in the proposed context aware security framework for RTS. Context aware mutual authentication protocol resolves man-in-the middle-attacks and other authenticity problems; Context aware access control solves the unauthorized access problems; context-aware keys management scheme can process keys management for various RTS related applications and situations; Context-aware intrusion detection mainly detect invalid intrusion and block DoS attacks. In addition, we will implement our security protocols and schemes for a prototype of RTS.

CONCLUSIONS

In this paper, we examine the security issues and challenges of Real-Time System s and suggest a security framework for RTS. We hope that these issues and challenges will bring enough motivation for further discussions and interests of research work on security aspects for RTS.

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E-COMMERCE AND E-BUSINESS: A COLLABORATION STUDY OF TOURISM INDUSTRY TO CREATE NEW NETWORK

Ranit Kishore[46] Dr. Sunit Kr. Kulshreshtha[47]

ABSTRACT

The role of networks has been recently associated with tourism planning. It may lead to a win-win situation for the promotion of a destination, since all parts involved cooperate to promote a uniform and complete tourist experience. Visitors, residents and business organizations who are associated directly or indirectly with a market destination need to develop dynamic relations through co-operation. The paper argues for the necessity of public and private collaboration, an issue that needs to be taken into consideration when networks are created for tourism marketing. National tourism organizations can have a significant role to play in these networks. To this end, the role of social media and information technology is of significance for destination marketing. Incorporation of information and communication technologies and the adoption of c-commerce in a marketing tourism destination strategy may strengthen networks and alliances between the public-private sectors for the implementation of a successful tourism development.

KEYWORDS

Networks, C-Commerce, Private-Public Sector Collaboration, Tourism, Communication, Social Media etc.

INTRODUCTION

The growth of international tourism is closely related to its ability to use computerized systems (Fuchs et al., 2010), as the use of information and communication technologies (ICTs) through the generation, gathering, processing, application, and communication of information, becomes very important to all travel and tourist stakeholders for day-to day operations of their business and can help them in creating strategic benefits (Buhalis, 1998). The latter are mainly caused because of flexible pricing and reduced communication and distribution costs, better specialized and differentiated services, close relationships with customers, smart enterprise networks, established entry barriers, and knowledge acquisition (Go, 1992; Buhalis, 1998; Fuchs et al., 2010).

Key stakeholders in the tourism industry can promote the destination's economic development by collaborating with the use of ICTs (Katsoni, 2011). Taking into consideration that destinations compete with each other in order to attract the potential visitors, -who have time and resource limitations-, destinations need to differentiate themselves to assert their unique and distinctive characteristics (Pritchard and Morgan, 2001; Kavaratzis and Ashworth, 2008; Kavoura, 2013; Kuscer, 2013).

Destination stakeholders include public sector and governments, residents, tourism industry sector, destination management organization and other groups-such as the most important categories, which may influence and determine the management and marketing; these groups develop dynamic relations with the aim to cooperate and collaborate rather than compete (Goeldner and Ritchie in Konečnik, 2004).

This paper argues for the necessity to shift emphasis on the role of networks' cooperation and collaboration through the incorporation and use of ICTs, for a better and holistic tourist strategy approach. We argue that alliances are necessary for the implementation of a successful tourism marketing strategy and we emphasize the importance of a public-private sector cooperation.

COOPERATION, COLLABORATION AND NETWORK CREATION FOR THE IMPLEMENTATION OF A SUCCESSFUL E-MARKETING STRATEGY

Tourism is a fast-evolving economic activity, which contributes immensely to employment, economic growth, sustainability and competitiveness and has therefore consequent social, cultural and environmental implications (Katsoni, 2013b). Tourism is part of a global cultural economy, a complex process that 'produces places as material natures, social relations and discursive conceptions' (Bærenholdt et al., 2004: 26). Tourism is also a typical crosscutting industry, as it caters for a variety of economic branches, such as accommodation, gastronomy, transport, and a wide range of cultural and recreational facilities. In order to create and implement a total strategic marketing plan and advertising of a respective area, a holistic identity of the area with specific dimensions and characteristics is necessary.

[46]Research Scholar, Monad University, Uttar Pradesh, India, ranitkishore@gmail.com
[47]Professor and Ex-Head, Shravan Nath Math Jawahar Lal Nehru P. G. College, Uttarakhand, India, ranitkishore@gmail.com

Rainisto (2003) argued for a number of critical success factors in destination marketing utilized for a successful destination development, such as the creation of a planning group, which may determine the value of the destination. Based on the destinations' resources, a unique selling proposition is created depending on selected attractions of the destination, promoting the physical and soft or immaterial attraction factors (Kotler et al. in Rainisto, 2003: 70). In that way, the sum of characteristics that differentiate one particular tourism destination from any other are important to be identified and communicated to target groups (Rainisto, 2003) and the creation of networks can facilitate such a promotion. Coordination of these activities is necessary to implement the marketing plan and the communication message of the tourism destination in order to safeguard commitment among key tourism stakeholders and avoid conflicting actions (Kavaratzis and Ashworth, 2008; Sartori, Mottironi and Antonioli, 2012).

Tourism destinations typically comprise numerous autonomous suppliers, often Small- Medium Tourist Enterprises (SMTEs). Cooperative programs go a long way in blending various stakeholders in the hospitality community into a unified marketing presence. They develop mutual respect and appreciation regarding the needs of each actor by maximizing membership participation and destination exposure. Different public agencies encourage the establishment of small medium enterprises in order to develop tourism activities in rural areas for example (Chatzigeorgiou, Christou, Kassianidis & Sigala, 2009: 147); museum groups and the management of museums (private or public) associated within a specific area may also initiate network co-operation based on their attractions and visitors' interests in order to fully employ destination marketing management (Vasiliadis and Fotiadis, 2008: 29).

Limited research has taken place to examine the role of networks for the promotion of a destination (Saraniemi, 2009; McGehee et al., 2010). Networks reinforce 'bonding' and 'bridging'; the former is associated with cooperation inside the enterprises of the community whereas the latter is associated with external cooperation, as is for example the coordination of activities between entrepreneurs in a region and the contribution of an external cooperation, such as an advisor from another country or a private sector stakeholder who has experience in tourism marketing and planning (Jones in Mc Gehee et al., 2010: 489). Networks create teams. Mickan and Rodger (2000) present characteristics of effective teams. The features of teams that create a network are associated with "complementary skills who are committed to a common purpose, performance goals and approach for which they hold themselves mutually accountable" (Katzen bach and Smith in Mickan and Rodger, 2000).

Cooperation and network formation between tourist operators, who are independent but at the same time, interdependent, may add value to the tourism destination product and could serve as a type of 'one-stop shop' for a tourist destination (Gartrell, 1991; Kotler, Palmer and Bejou, 1995; Mickan and Rodger, 2000; Bowen and Makens, 2003; Leiper, 2004). Networks can offer a workable structure for cooperation. Networks could be a strategic alliance improving the product/services offered by the tourism destination, improve overall performance and increase competitive position, as sometimes it is difficult for a single firm to cope with the risks, complexities and constant changes of its environment (Cravens et al., 1993; More and McGrath, 2003; Petrou et al., 2007).

A systems theory approach is associated with the elements of interdepedence and relationships, coordination of activities between and within teams and at the same time, distinctive roles for the implementation of the superordinate goal that is clearly defined and shared among the network team (Mickan and Rodger, 2000). Nonetheless, this is not always the case since personal expectations for example, or the way others perceive the roles of the members in the group may influence the way networks function and the results of the network (Mickan and Rodger, 2000; Ooi and Pedersen, 2010). Leadership is also significant for the network's successful implementation and in addition, the establishment of trust among members of the network or team, which in turn, influence team's processes and interaction such as coordination to perform different tasks; in that way, conflict is avoided (Mickan and Rodger, 2000). Nevertheless, at times, relationships may be loose among stakeholders or teams who form part of a network and may not be symbiotic who may not even want to co-operate (Ooi and Pedersen, 2010). Furthermore, social network theory argues that the attributes of individuals are less important than their relationships and ties with other actors within the network (Mickan and Rodger, 2000; Povilanskas and Armaitienė, 2010).

We could mention examples from different countries regarding existence and operation of networks. Joint initiatives of various communication federations and associations, independent companies and important personalities in Greece such as the Hellenic Advertisers' Association, the Association of Advertising and Communications' Companies, the Greek Association of Branded Product Manufacturers created advertising campaigns to promote Greece's tourism abroad in 2010; it is the first time in Greece that the private sector volunteered to support Greek culture and tourism and 24 radio and TV adverts were produced (On Board, 2013: 192).

Another typical example of network creation which promotes the unique characteristics of a tourism region, is TUI Viagens, Portugal; specifically, in regard to the island of Sao Miguel, Azores, local tours are advertised and synergies and networks are created such as Azorean circuits, whale watching, scuba diving, tracking tours, rent-a-car and English and German guides, offering a total experience to the tourist (http://www.tuiportugal.com).

Public and private cooperation is also an issue that needs to be accounted for in the creation of networks. Public authorities cannot only help in establishing networks between various tourist stakeholders, but they can also assist in developing and maintaining products on a long-term and sustainable basis. Networks can enhance the co-operation of all stakeholders in a tourism destination, as they can provide flexibile and valuable marketing information, they encourage innovation, resource development and access to knowledge, unite the existing fragmented nature of tourism supply and finally provide a total tourism product (Augustyn and Knowles, 2000; Inkpen and Tsang, 2005; Saxena, 2005; Novelli et al., 2006; Daskalopoulou and Petrou, 2009). National Tourist Organization s can be accounted as public for example. "The role of National Tourist Organization s…is increasingly supported by the involvement of the private sector towards a collaborative and entrepreneurial set of values" (Wight, 2013: 135). A typical example where public and private sectors can cooperate is the recent effort for promoting the tourist product in Greece. More specifically, Greek Law 4070/2012, refers to the creation of an organization which will promote Greece, -in paragraph 1 it is stated that an anonymous organization is created entitled "Marketing Greece Anonymous Organization of Promotion and Development of Tourism" and with the title "Marketing Greece A.E.". Its sole Proprietors are the Association of Greek Tourist Enterprises (SETE) and the Greek Public…where the Ministry of Development, Competitiveness, Shipping, Culture, Tourism, and SETE will be in charge to sign all-important decisions taken.

Greek Law 4070/2012, mentions in Article 5, that the aim of the abovementioned organization is the development and adoption of promotion and advertising programmes of Greek tourism, internationally and nationally. In addition, its aim is the research of international and domestic tourist market, for the creation, development and adoption of a branding system for Greek tourism at national, peripheral, regional level...as well as activities related to the support of tourism. SETE will participate with a 70% and the Greek Public will participate with 30% to the capital of the organization. It is the first time that public and private organization s cooperates in Greece in order to promote the Greek tourist product, allowing us to argue for the creation of synergies among the private and public sector.

Tourist boards and strategic authorities are important for the businesses involved as they encourage entrepreneurship on accommodation, food, services, attractions; they may provide a voice on industry issues and implement the marketing of the country (Wight, 2013). Their role can be significant because they may interact with interest groups and support the industry in tourism policy issues (Wight, 2013).

The abovementioned efforts of tourism networking in Greece that have been mentioned above have not been successfully implemented so far, since the characteristics of effective teams have not been developed. Greek Laws are continuously changing and there is tension between the different agents involved -tensions exist between the Ministry of Culture and the Greek National Tourism Organization which interchangeably change names, merge, then again change names in short periods; at the same time, there is conflict and mistrust among its members over who has the administrative power and should be responsible for management issues such as the management and organization of cultural activities in heritage sites (Kavoura, 2001; Kavoura, 2013). Contrary to what network theory dictates about collaboration and team working, cooperation among the public and private Greek sector does not seem to be implemented.

THE ROLE OF ICTs ON NETWORKS FOR THE IMPLEMENTATION OF A SUCCESSFUL E-MARKETING STRATEGY

Collaboration around ICTs may help the promotion of the tourism destination and enhance economic development. Principals for tourism development should incorporate ICTs into their strategic marketing policies, addressing issues that affect them such as collaboration, co-operation and competition.

The way tourism stakeholders choose to promote and disseminate information for a tourist destination varies tremendously, since sometimes the destination is presented by multiple websites through the actual tourist operators themselves, whereas centralized bodies such as tourist bureaus try to demonstrate the total tourist experience on that location, but they have the characteristic of being bureaucratic and mainly "hierarchical tourist boards" (Palmer and Mc Cole, 2000). In addition, tourist companies among three European countries were found to have differences towards the adoption of e-business technologies and applications (Vlachos, 2013) which may in fact influence the way information and communication technologies are implemented. The importance of demonstrating a comprehensive and unified tourist experience in a holistic profile of the tourist destination is not widely acknowledged by the tourist stakeholders. We argue that an understanding of the necessity of member participation and cooperation is vital to tourism marketing destination marketing.

According to Werthner and Klein (1999: 261), "most of the destination sites are purely informational servers, where booking is mostly not supported"; they further assert that this reflects a lack of agreement for a holistic business cooperative destination strategy, suggesting that a number of issues should be addressed, such as forming co-operative strategies and covering the entire product range, particularly regarding the airline sector.

The creation of collaborative commerce (c-commerce) refers to collaborative management of information flows between businesses through ICT use and enables the formation of partnerships in new expeditious ways, in order to keep up with or to

access unique or innovating resources, based on trust and business culture that values partnerships and ongoing dialogue between the public and private sectors can also be encouraged, for example, on the future need for training places (Ring and Van De Ven, 1992, Holsapple and Singh, 2000; Fairchild and Peterson, 2003; Levy et al., 2003; Turban et al., 2004). Trust, rather than competition with each other is the objective since networks deter competition (Inkpen and Tsang, 2005; Kavaratzis and Ashworth, 2008; McGehee et al., 2010: 486). The emphasis is on cooperation among businesses; rather than on spending energy, time and money to observe how to 'compete' other businesses, everyone works as part of a group with multiple benefits and results for all.

A network with great potential for tourism development, which has really revolutionized communication, interaction and business, in general, is the 'virtual' or 'social' network. 'Virtual' or 'social' networks can be defined as permeable structures without physical borders separating them from the environment, comprising a multiplicity of autonomous, interdependent, and self-organizing actors that rely on the internet infrastructure to integrate and exchange value (Poon, 1993; Pollock, 1998; Romano, Eliva and Passiante, 2001; Wang and Fesenmaier, 2004; Zhu et al, 2005; Katsoni, 2013a).

Online travel communities have no restrictions of distance and time and has become an effective customer relationship management (CRM) tool by enabling tourism stakeholders to manage and attract customer relationships through its integration with the new communication media, by providing in-depth, focused, and member-generated contents, engaging tourists through interactions with other members based on common attributes and interests, (by allowing them to maintain existing social ties and form new connections), and retaining them by facilitating relationship building with other members (Wellman et al., 1996; Wang and Fesenmaier, 2004; Zhu et al, 2005).

Blogs are virtual forms of networking among tourist as they act as media through which individuals and organization s present opinions and/or information about specific topics that are useful for the tourist destination, such as images, photographs, links to related sites, critique, variety of activities, reviews and opinions (Pühringer and Taylor, 2008). DMOs and other tourist stakeholders can benefit from the existence of blogs, as they can provide them with valuable information into the types of 'e-word of mouth' messages (Bickart and Schindler, 2002). Specifically, blogs can help them identify and monitor tourist trends in the destination, and they can provide them with specific performance reviews, product and event evaluations, and reviews of service standards. In addition, blogs can help a marketing competitor analysis by providing identification of product or infrastructure gaps (Pühringer and Taylor, 2008).

The tourism sector virtual organization is a network of independent tourism sector competitors linked by ICT to share skills, costs, assets and broaden access to markets. Palmer and McCole (2000) argue that the 'virtual organization ' structure or collaboration around ICT by SMTEs is a more effective way of promoting tourism destinations since it is flexible and responsive to business changes that occur in their operating environment. The use of ICT thus facilitates the rapid interchange of business information and reflects the actual product offer and activities that the tourist will experience associated with online brands. The online brands have the following characteristics; they have users, they promise a price benefit, they prove their value with experience, they continuously adjust, their globalization is easy; they have a relational and experiential character since each person develops a personal relation and has a unique experience with the brand (Kapferer, 2013).The perceived image of the tourism destination is created by the tourist's virtual experience of the content of tourism destination Websites. An analysis of the Destination Management Organization s' (DMOs') website emphasizes that there are two main functions: firstly, general publicity in terms of providing Web presence, information and interaction; and secondly, advertising, including publication of the tourism products or services without prices, provision of e-mail addresses and e-mail booking, online selling with credit card payment, capability for customers to acquire an account identity for direct purchases and other services, such as call for information, tourism guide services, etc. (Gretzel et al., 2006). Thus, a specific whole is created and advertised electronically. To make a step further, the promotion of such virtual experience via the website may include more than one participating businesses, which create a network that aims to promote a unique, and consistent identity destination message.

A typical example is Azores, Portugal. Businesses that operate in the tourism industry such as hotels, tourist guides, rent car companies, trips, local restaurants are in cooperation and initiate advertising and promotional campaigns in order to attract tourists; this takes place via the traditional print media, such as leaflets (see for example, Panazorica Tours, 2013) and via the internet where a website is provided where all the activities are consistently promoted in a uniform way http://www.panazorica.pt. Another example for Portugal is the network created by five star hotels. 'Stay close to Azores' is their slogan, their logo is an open ended circle connected with another open ended circle and hotels from Portugal and more specifically from Lisbon and the islands of Azores -Sao Miguel, Terceira and Faial- promote their businesses; a website is provided with all the necessary information regarding reservations made to the participating hotels in addition to a central email address (http://www.bensaudehotels.com; http://www.bensaude.pt). This information is also promoted in the print promotional material of the destination (see for example, The Azores Tourist Guide 2013). Lack of cooperation among the participating groups may result in the limited usage of communication and information technology (Borges-Tiago, Couto, dos Santos Natário and Braga, 2007) because tourists make purchase decisions based on the totality of the experience available at a destination (Williams and Palmer, 1999).

A tourist portal is defined as an information gateway to the Internet and is an example of collaboration between tourist stakeholders allowing the exchange of business intelligence and information relating to a specific tourist destination, and by providing a single point of content management for the available information. (Turban et al., 2004). Portals can also initiate customer relationship management (CRM), by allowing tourism stakeholders to push value-added products to targeted customer segments at the customer portal (Turban et al., 2004: 322). Web service technology with respect to information travel systems facilitates "interoperability among many heterogeneous systems such as flight reservations and hotel bookings" (Dogac et al., 2004: 21), as tourist sites' hyperlinks regarding car rentals, airlines, accommodation and the like, facilitate the concept of destinations' holistic view on behalf of the tourist (Palmer and McCole, 2000).

Cultural tourism presents an area's cultural heritage, ranging from environmental attractions to historical, artistic, archaeological and folkloric features, and is a good example of the way in which online technologies, such as the portals discussed above, have influenced the tourism industry. The MEDINA (Mediterranean by Internet access) project (2002 to 2007) was one of the first European established cultural web portals for fourteen Mediterranean countries, where access to the portal was achieved through mobile devices (e.g. personal digital assistants or smart phones) (Garzotto et al., 2004) and network creation can add to the whole process.

The evolution of Web 3.0 or Semantic Web as a "mesh of information linked up in such a way as to be easily processable by machines, on a global scale" (Siau and Tian, 2004), by using a 'common and minimal language to enable large quantities of existing data to be analyzed and processed' (Gutierrez et at, 2011: 250), suggest that tourism organization s experience continuous change and the uncertainty that has defined it (Mistilis and Buhalis, 2012). The existence of the Semantic Web, where meaning of content is recognized and understood by computers, enabling machine to machine interaction (Mistilis and Buhalis, 2012) and interoperability-centric capability, reinforces the role of networking, as it leads to an enhanced product creation, greater efficiency in matching tourism supply and demand, reduced dependency on third party intermediaries, facilitation in consumer choice and improvement in B2B networking (Mistilis and Buhalis, 2012 :53).

The incorporation of information and communication technologies to the marketing tourism strategy is significant for further strengthening networks and alliances for the implementation of successful tourism development.

IMPLICATIONS FOR MANAGEMENT: THE CONTRIBUTION OF NETWORKS FOR THE IMPLEMENTATION OF AN ADVERTISING COMMUNICATION PROGRAMME AND AN E-MARKETING TOURISM STRATEGY

This conceptual paper argued for the significant role of networks for a successful e-marketing communication and advertising strategy. Rather than basing their relations on competition, the actors involved in the promotion of the distinct characteristics of a destination, can offer and enhance the completely created system.

Networks may include public and private alignments. National Tourist Organizations may unite and bring the private entrepreneurial activities together, 'extinguishing' the disagreements that may exist. Industry contribution may add to the marketing and advertising campaigns (Wight, 2013: 135) especially in periods of economic crisis, as is nowadays where there is limited budget that a destination may have for its promotion.

Synergies and interdependence among those involved can reinforce relations and coordination of activities when all parts involved cooperate to promote a uniform and complete tourist experience.

To this end, the role of social media and information technology is of significance for destination marketing. Communication in marketing needs to be coordinated and networking among all important tourist stakeholders could facilitate the ultimate goal of providing a holistic and coherent message towards tourists.

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editorinchief@pezzottaitejournals.net
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Jammu Tawi – 180002,
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A STUDY ON EMPLOYEE ENGAGEMENT PRACTISES IN IT INDUSTRY IN CHENNAI, OMR TAMIL NADU

Sandhya Manjunathan[48] Dr. S. Vasantha[49]

ABSTRACT

Employee Engagement practices in IT industry has become one of the hottest issues when comparing with other industries work culture in today's trend. These articles enlighten "A study on Employee Engagement practices" dealt with the organizational job resource which has been provided to the employees so far there by analyzing their psychological intention and finding a way for their need fulfillment and how they are been made engaged with their colleagues and the relationship they hold with organization and their job. Employee Engagement is the important phenomenon in any kind of industry. Since Employee Engagement is a deeply concern with individual and organization, there is no right answer, only the right answer for each individuals with their own set of motivations keeps their level of engagement based on the organizational resource hence it has to be handled by the organization very carefully so that they plan how to engage their workforce, prioritize and workout as efficiently as possible. Descriptive research design was adopted in this study. Judgment sampling technique used to choose samples. A sample size of 60 was selected through systematic random sampling method. The survey is based entirely on primary data obtained through a structured questionnaire. The analysis was done with the help of statistical tools like chi-square, weighted average method and correlation. This study is a restricted only to the IT employees who are working in Chennai. Finally, the research hints by providing the suggestions to improve the present Employee Engagement practices of the employees in IT industry.

KEYWORDS

Employee Engagement, Concern, IT (Information Technology), EE Practices etc.

INTRODUCTION

The concept of employee engagement was first put forward by the psychologist Kahn in 1990. It underlined the need for a high emotional connect between employees and their organization which can motivate the employees to deliver their best. Employee engagement remains a major challenge for companies and organizations worldwide – and an often elusive outcome even for those organizations who are already committed to achieving a high level of employee engagement and who already have employee engagement programs in place. Employee engagement is a desired outcome that occurs when workers feel a heightened mental and emotional connection to their jobs, their manager, their coworkers, and/or their organization and its mission. As a result, they are more dedicated and more willing to apply voluntary, discretionary effort to their work beyond the norm to help their organization succeed. Three types of employee engagement are:

- **Engaged:** Employees work with passion and feel a profound connection to their company. They drive innovation and move the organization forward**.**
- **Actively Disengaged:** Employees are not just unhappy at work; they are busy acting out their unhappiness. Every day, these workers undermine what their engaged coworkers accomplish.
- **Actively Disengaged:** Employees are not just unhappy at work; they are busy acting out their unhappiness. Every day, these workers undermine what their engaged coworkers accomplish.

IT INDUSTRY CONTRIBUTION ON EMPLOYEE ENGAGEMENT PRACTISES

In 2012, **Tata Consultancy Services (TCS)** was ranked first 'The Best Companies to Work for' in India by Business Today. This noteworthy attributed to the company's tireless endeavor in implementing a variety of employee engagement programmes, which helped them attain the lowest attrition rate in the Indian IT sector. Some of the oldest employee engagement programmes at the company was Maitree (which means friendship), Proactive Employee Engagement Programme (PEEP), and PROPEL launched in early 2000s. Maitree had started to support the spouses of the TCS employees who often had to settle in other countries outside India in a very new environment and culture. On the other hand, PEEP focused on one-on-one interactions between junior and senior employees and PROPEL promoted the culture of Share-Care-Grow. However, with a total strength of 226,000 employees from 103 nationalities across the globe as of 2012, managing workforce diversity and integrating employees to the Tata culture

[48]Research Scholar (Management), Vels University, Tamil Nadu, India, sandykandy2007@gmail.com
[49]Professor, Vels School of Management Studies, Vels University, Tamil Nadu, India, vasantha@velsuniv.org

remained a great challenge for TCS. Amidst this scenario, it remained to be seen whether TCS would continue to retain its acclaim and score high as an employer despite overcoming the various HR challenges.

Wipro has continually sought to implement practices to enhance the engagement, capability and competitiveness of our talented, global workforce. These practices are aligned to different phases of hiring, assimilation, learning, growth and retention and shaped by the Spirit of Wipro values. Employees' feedback on the Spirit of Wipro values is a key component in our Employee Perception Survey as well as in our Wipro Leaders' Qualities 360-degree feedback process.

Over the years, focus on participative engagement has increased and programs have been more closely aligned to cater to our diverse and multi-generational workforce. Employee engagement programs are driven at multiple levels – organizational, unit/team and individual and includes retainers and contractors on projects. Besides our awareness campaigns like email announcements, kiosks and on-floor sessions, business and HR managers are key enablers to employee engagement. Defined metrics on connects like 'Wipro Meets', 'All Hands Meet', one-to-one and team meetings are embedded in the key performance areas of leaders and HR alike.

REVIEW OF LITERATURE

Sahu Gangadhar & Sahoo Chandan Kumar (February 2009) says that Employee Engagement (EE) is a pivotal mechanism for nurturing a high performance culture to drive the organization towards success. EE is about building a truly great relationship with the workforce. Employee is one of the key assets of an organization and today's employee in the organization is treated more than an employee. Therefore, EE is linked with the company's growth and development and contribute towards the core competencies of a successful organization. Any employee who is not engaged an employee is, the more is his commitment level towards making a plan more successful in a significant way so that each of the employee should think like the strategic business partner of the business process.

The key drivers of employee engagement and he has stated some models of employee engagement. R.N. Misra (September 2009) has described employee engagement in detail with the example of US based company. He starts with the introduction of employee engagement. He also describes Ingredients of Employee Engagement, then categories of employees such as engaged employees, not engaged employee and actively disengaged employees. He further explains about the drivers of Employee Engagement, types of Employee Engagement such as Emotional Engagement and Rational Engagement. He also discussed the reasons why an employee leaves an organization, why companies perform badly. In addition, he has given advantages of engaged employees.

N. Rajgopal & Abraham, Sunu Mary (August 2007) discuss about the 8 key drivers of Employee Engagement and some models of employee engagement. He has also stated the competitive advantage of Employee Engagement. Dutta, 2006 pointed that product and processes cannot help organization sustain loyal customers they also need highly motivated, dedicated and involved employees who are very passionate about their work and organization in short they need " Engaged Employees".

Mahendru and Sharma, (2006) emphasized that a successful organization is built with its employees contribution – a contribution that will not effective unless its employee are engaged in strategic decision-making and other initiatives. Sangeetha, (2006) stressed that a business success is directly linked to the commitment of the employee and stated that successful companies are those that recognize opportunities to foster employee engagement.

Mohanka, (2004) emphasized that forward thinking companies recognize that they must take a holistic view in managing and motivating their employee talent as an end-to-end process, from the initial recruitment, through initial recruitment, through performance review, developments, incentivisation, measurement, feedback.

Gallup, (2002) according to him there are three types of people engaged employees, not engaged employees, and actively disengaged employees. Engaged employees are builders who consistently strive to give excellence within their roles. Not engaged employees focus on the task spelled out to them rather than the goals of the organization. They do what they are told to do. Actively disengaged employees are dangerous individuals who not only do not perform but also demotivate the performer in the organization

NEED FOR STUDY

Many organization are successful at managing the materials and machinery of the organization, they fail short in managing human side of their business. This research is needed for IT employees who are looking for better initiative to balance their work and relationship with the organization. In this study, the different IT Company employees have been assesses the importance of employee engagement practices and its effectiveness. The study believes that people perform better when they are allowed and made engaged in their organization. This approach motivates people by satisfying not only their social & psychological aspects but also their economical needs.

There by to satisfy the new generation workforce, organizations need to concentrate on employee engagement practices in the organization. Further today's workforce is realizing the importance of work engagement and its relationship with organization and is trying to strike a balance between career & personal lives.

SCOPE OF STUDY

The study is limited to OMR area, Chennai, and aims at the limited segment of IT Employees to study their level of engagement in the organization.

OBJECTIVES OF STUDY

- To study the Employee Engagement practices in the Indian IT Sector.
- To study the perception of employees with respect to the Employee Engagement practices in the Indian IT Sector.
- To offer recommendations for improvement in the employee engagement practices in the Indian IT Sector.

LIMITATION AND CONSTRAINTS

- The sample populations considered were mainly employees residing in the OMR areas of Chennai. The other IT Concern employees were not included.
- However, the data collected and interpreted with utmost reliability and consistency but due to subjectivity and prejudice of a few respondents, certain limitation as if answers of the questionnaire depend upon the thought of the employee, which they may differ from the reliability.
- The survey conducted considering the time & space constraint: Chance of wrong answer cannot be ruled out; indirect measures relied upon the employee attitude etc.

RESEARCH METHODOLOGY

- **Research Design**: Descriptive research design was undertaken in this research.

- **Sampling Technique**: Judgment sapling technique was utilized from probability sampling method to select the sample from Chennai.

- **Method of Data Collection**: Survey method of primary data collection using combined interview and questionnaire adopted for collection of primary data through field survey in Chennai from various employees. Secondary data has collected from books, journal, newspaper and websites.

- **Statistical Tools**: This research was analyzed through three tools. They are Chi square, Correlation and weighted average.

DATA ANALYSIS AND INTERPRETATION

Chi square test is a non-parameter test that establishes the in dependence between variables. It is measured by comparing the observed with those of expected frequencies based on the hypothesis. It is given by:

Table-1: Analyze for the Relationship between the Age and Feel Engaged while Performing their Duties

Cross Tabulation							
S. No.		I Feel Engaged while Performing my Duties					Total
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
Age	Gen X	10	9	0	0	0	19
	Millennial	0	8	13	11	9	41
Total		10	17	13	11	9	60

Sources: Authors Compilation

H_0: There is no independent relationship between the Age and feel engaged while performing the duties.
H_1: There is independent relationship between the Age and feel engaged while performing the duties.

Table-2

Chi-Square Tests			
	Value	**d.f.**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	40.427[a]	4	.000
Likelihood Ratio	51.412	4	.000
Linear-by-Linear Association	30.925	1	.000
N of Valid Cases	60		
Note: a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 2.85.			

Sources: Authors Compilation

At 5% Level of Significance
Degrees of Freedom = 4
Tabulated Value = 21.03
Calculated Value = 40.427
Calculated Value < Tabulated Value

We Accept Null Hypothesis (H_0)

Decision: From the above calculation, it is inferred that there is no independent relationship between the Age and feel engaged while performing the duties.

Correlation Analysis

Table-3: Relationship between levels of Satisfaction in Meeting Organizational Commitments and the Working Hours of the Organization

N= Number of Respondents	ΣX= Level of Satisfaction in Meeting Family Commitments	ΣY= Working Hours in the Organization	$(\Sigma X)^2$	$(\Sigma Y)^2$	ΣXY
60	231	230	977	935	901

Sources: Authors Compilation

(H_0): There is no significant relationship between level of satisfaction in meeting organizational commitments and the working hours of the organization.
(H_1): There is significant relationship between level of satisfaction in meeting organizational commitments and the working hours of the organization.

Correlation coefficient

$$\frac{60\,(901) - (231)\,(230)}{\sqrt{60\,(231)^2-(977)}\ \sqrt{60\,(230)^2-(935)}}$$

$$= \frac{3840}{(95.06)(113.14)}$$

$$= 0.35704$$

Decision: *X* and Y have a strong positive linear correlation; *r* is close to +1 which is 0.35. An *r* value of exactly +1 indicates a perfect positive fit. Positive values indicate a relationship between *x* and *y* variables such that as values for *x* increase, values for y also increase.

Weighted Average Method

Table-4: Weighted Average Method for Open to the Idea of Flexible Timing

Factors	Weight (W)	Number of Respondents (X)	(XW)
Strongly Agree	5	49	245
Agree	4	42	168
Neither Agree Nor Disagree	3	17	51
Disagree	2	8	16
Strongly Disagree	1	4	4
	ΣW=15	**ΣX=60**	**Σ(WX)= 242**

Sources: Authors Compilation

$$\textbf{Weighted Average} = \frac{\Sigma (wixi)}{\Sigma (xi)}$$

$$= \frac{242}{60} = 4.033 \text{ (Approx-4)}$$

Decision: As per the weighted average, the employees say that they agree that the individual should be open to the idea of flexible timing.

SUGGESTIONS

- Supervisors and Managers should meet at regular intervals with the employees to discuss about the improvement in the company, at work place and in their living of standard, family problems etc.
- Gap between managers and the employees should be reduced by raising the level of engagement. For example, by conducting extra co-curricular activities like social and cultural programs.
- Few employees feel that their ideas or work cannot be recognized or appreciated. So encourage them by making them feel that their ideas as well as they are important for the company.
- Create good and healthy environment at work place and increase the environment process.

CONCLUSION

Employee Engagement is the buzzword, term for voice between employee and organization. It is a positive attitude held by the employees towards the organization and its values. It is rapidly gaining popularity, use and importance in the workplace and impacts Organizations in many ways. Employee engagement emphasizes the importance of employee communication on the success of a business. An organization should thus recognize employees, more than any other variable, as powerful contributors to a company's competitive position. Therefore, employee engagement should be a continuous process of learning, improvement, measurement and action. We would hence conclude that raising and maintaining employee engagement practices lies in the hands of an organization and requires a perfect blend of time, effort, commitment and investment to craft a successful endeavor.

The overall employee satisfaction towards Employee Engagement initiatives is good. Is focus on analyzing the importance of Employee Engagement practices? The organization allows utilizing the job resource but some innovations has to be done for further improvement. The companies have paid less attention towards implementing new practices at regular interval.

From the article, it is well identified that the employee engagement practices is balanced effectively among organization in IT, OMR, Chennai. Hence, the management can take additional steps to improve the employee engagement practices who are suffering from the imbalance to participate.

Based on the information collected from the employees, they are satisfied with the activities of employee engagement practices.

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editorinchief@pezzottaitejournals.net,contactus@pezzottaitejournals.net

Editor-In-Chief
Pezzottaite Journals,
24, Saraswati Lane, Bohri, Near Modern Dewan Beverages,
Jammu Tawi – 180002, Jammu and Kashmir, India.
(Mobile): +91-09419216270 – 71