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PREFACE

Welcome to the International Conference on Inter Disciplinary Research in Engineering and Technology (ICIDRET) 2015 in DSIIDC, Government of NCT, New Delhi, India, Asia on 29 – 30 April, 2015. If this is your first time to New Delhi, you need to look on more objects which you could never forget in your lifetime. There is much to see and experience at The National Capital of Republic of India.

The concept of Inter Disciplinary research was a topic of focus by various departments across the Engineering and Technology area. Flushing with major areas, this ICIDRET '15 has addressed the E&T areas like Mechanical Engineering, Civil Engineering, Electrical Engineering, Bio-Technology, Bio-Engineering, Bio-Medical, Computer Science, Electronics & Communication Engineering, Management and Textile Engineering. This focus has brought a new insight on the learning methodologies and the terminology of accepting the cross definition of engineering and the research into it.

We invite you to join us in this inspiring conversation. I am pretty sure that this conference would indulge the information from the various parts of the world and could coin as a global research gathering.

With more and more researchers coming into ICIDRET, this event would be as an annual event. This conference is sure that, this edition and the future edition will serve as a wise platform for the people to come with better research methodologies integrating each and every social component globally. If there would have been a thought of not integrating the RJ45 and few pieces of metal / plastic along with a PCB, today we could haven't used the telephones and mobile phones. With an ear-mark inspiration and constant support from the Global President Dr. S. Prithiv Rajan, ASDF International President Dr. P. Anbuoli, this publication stands in front of your eyes, without them this would haven't been possible in a very shortest span.

Finally, I thank my family, friends, students and colleagues for their constant encouragement and support for making this type of conference.

-- **Kokula Krishna Hari K**

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A Study On Customer Relationship Management Practices In Canara Bank Branches In Tamilnadu

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Abstract-*The purpose of this study was to examine the various facets of customer relationship management practices adopted by Canara bank in Tamil Nadu. The research design in this study will consist of exploratory research whereby different aspects with regards to CRM in the Canara bank have been extracted from existing studies and tested on a sample of customers. This study examined demographic profile of customers, customer awareness on CRM policies, customer perception on CRM practices, factors influencing CRM practices and role of E-CRM measures of Canara bank in customer satisfaction. This study utilized 100 samples in various parts of Tamil Nadu. The data for the study have been collected through questionnaire. The statistical tools like simple percentage, chi-square, t-test, cronbach alpha, factor analysis and multiple regression analysis was used in this study. This study revealed that the customer relationship management practices followed in Canara bank is satisfactory to the customers.*

Key words used: Customer perception, Customer relationship management, CRM Policies, CRM practices, Customer awareness, Canara bank.

I INTRODUCTION

Indian banking system has witnessed rapid growth in recent past with the initiation of financial sector reforms. The thrust of financial sector reforms is to improve efficiency, competitiveness and productivity of the financial system. Building relationship with customers is now recognized as over-riding goal of marketing and especially emphasized in service based sectors. Customer Relationship Management (CRM) is a vital factor to improve the performance of the banks and to ensure customer satisfaction. Customer relationship management involves organising activities around the sole customer which can ensure differentiation at each point of service by creating a unique experience. In fact with augment competition in the retail banking sector has intensified the use of CRM as a means of securing competitive advantage.

A Banking Sector in India

The banking system in India includes commercial and cooperative banks, of which the former accounts for more than 90 per cent of banking business. Moreover a few foreign and Indian private banks, the commercial banks largely comprised with nationalized banks. Nationalized banks, along with regional rural banks, represent the public sector banking system in India. The banking sector in India is extensively different from that of other countries because of the unique geographic, social, and economic characteristics. In India, banking system is monitored by Reserve Bank of India. Almost about 30 to 35 present of the population resides in metro and urban cities and the rest is spread in several semi-urban and rural areas. The banking system in India has had to serve the ambition of economic policies enunciated in consecutive five year development plans, predominantly concerning equitable income distribution, balanced regional economic growth, and the diminution and elimination of private sector monopolies in trade and industry. In order for the banking industry to serve as an instrument of government policy, it was subjected to various nationalization schemes in

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different phases. About 92 present of the country's banking business is under public sector bank control while the balance comprises private sector and foreign banks. Business competition and ideology of customers towards safety features led to private and foreign banks to implement the importance of maintaining relationship with customers. At present there are 151 commercial banks operating with 1, 09,811 branches in India.

B Banking Network in Tamil Nadu

In the financial service sector Tamil Nadu is one of the leading states in India. The banking statistics relate quite closely with the RBI's expectation and pan India achievement thus highlighting that the Tamil Nadu is way ahead in its financial achievements. The number of branches is on the increase over the three year period and this increase is reflected in the rural, semi-urban and the urban areas in the state. Total number of bank branches in Tamil Nadu is 8140 and which consists of branches of nationalized banks 4347, branches of state bank group 1161, branches of other public sector banks 75, branches of private sector banks 2159, branches of regional rural banks 374, and branches of foreign banks 24 as of June 2013. Similarly, its distribution shows that 2467 branches located in rural areas, 2788 branches located in semi-urban areas, 1614 branches in urban areas, and rest 1271 located in metropolitan city of Chennai. From the total of 8140 branches, Canara bank has 561 branches, it occupies 6.89% share in commercial bank network in Tamil Nadu.

C Policy Guidelines

According to the directions of RBI, banks are required to constitute a customer service committee of the board and include experts and representatives of customers as invitees. The role of the committee includes that formulation of deposit policy, issue addressing, product approval process, depositor satisfaction survey, audit, examining banking Ombudsman report. Banks are also required to launch Standing Committee to review the practice and procedures prevalent in the bank and take prevalent corrective action on an on-going basis. In addition to that banks are further required to set up Customer Service Committee at branch level to encourage a formal channel of communication between the banks and its customers at the branch level.

II CUSTOMER RELATIONSHIP MANAGEMENT

A Significance

CRM is a business policy focused on maximizing shareholder value through charming, growing, and keeping the right customers. It deals with two aspects, at first concentrating on the most important from company's perspective customers and second of all retaining long-term relationship with them (Urbanowicz, 2008). Anu (2013) customer relationship management practices are becoming fashionable across several industries and have emerged as prime business strategy in today's competitive environment. In this new epoch, businesses are forcing on managing customer relationships, particularly customer satisfaction with the intention of efficiently maximize revenues (Contentions, 2003). At present marketing is not immediately developing, delivering and selling, it is moving towards developing and mutually long-term relationships with customers (Buttle, 1996). In this era of established and intense competitive forces, it is crucial that banks maintain a loyal customer base. Increasing competition from both inside and outside the industry is leading to compression of profits and forcing banks to serve efficiently only with the available resources to satisfy customers. On positive fallout of competition is the greater choice available to customers, and the increased level of sophistication and technology in banks (Puja, 2010). This trend paves the way for the establishment of customer relationship management actively in banks.

B CRM in Indian Context

It is evident that there has been a phenomenal change and paradigm shift towards customer focus during the past five decades in India. Banking industry in India has fives facets in the delivery of services to the customer. The progress of customer relationship management can be explained with the help of the figure-1. The CRM in Indian banking is evolved like service, satisfaction, pleased approach, delighting and maintaining relationship with the customers.

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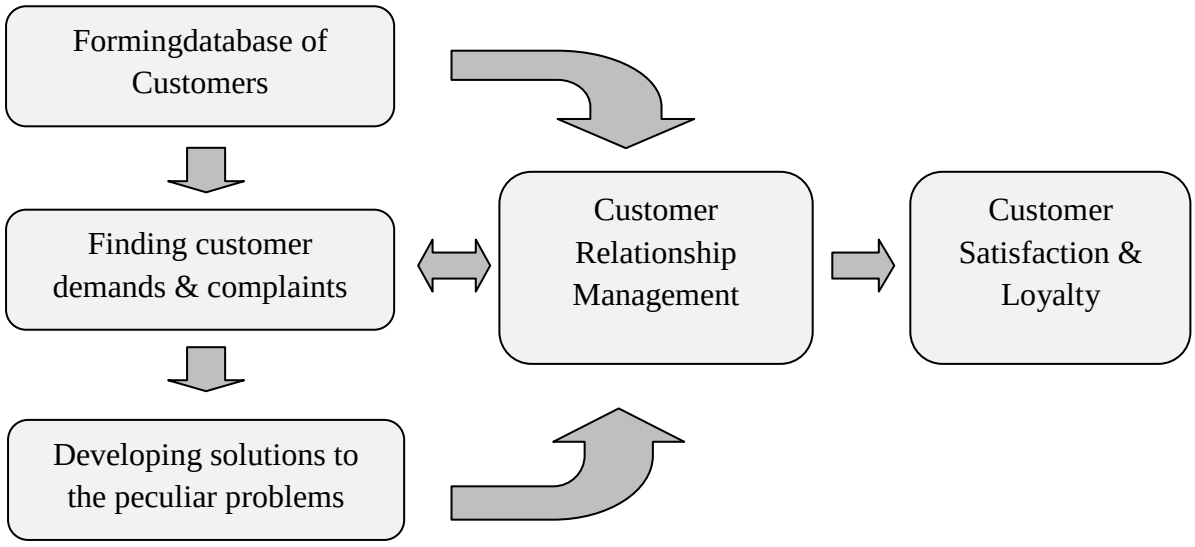
Figure – 1: CRM in Indian Banking Sector

1961-1970	-	Servicing the Customer
1971-1980	-	Satisfying the Customer
1981-1990	-	Pleasing the Customer
1991-2000	-	Delighting the Customer
2001 and beyond	-	Relating the Customer

The fact that banks have as much information as possible about the customers, constitute customer databases and promote them in the course of time form the source of customer relationship management. Recognizing the customer demands and complaints by keeping in contact with the customers and developing solutions peculiar to the customer are the next steps of customer relationship management. Ultimately well-planned CRM will result in customer satisfaction and loyalty. This can be explained in figure-2.

Figure – 2: CRM Practices



C Statement of the problem

Banks are increasingly developing various marketing strategies so as to increase a competitive advantage that provides customers with greater value compared to competitive offerings. With the extreme competition among the banks and broad use of technology for service innovation and delivery, banks are attempting to satisfy and retain the customers. It is apparent that now there are progressively marketing oriented banks, using IT systems that are focussed on individual customers. In this line, banks develop customer relationships across a broad spectrum of touch points such as branches, kiosks, ATMs, internet, PDA, e-mails, electronic banking, smart cards, call centres' and phones. Commercial banks have understood that customer relationship is imperative for their continued existence in the banking sector. By preserving good relationship with existing customers, banks can enhance the profit in the long-run. Keeping this point, the study intends to test the CRM practices in Canara bank branches in Tamilnadu.

III OBJECTIVES OF THE STUDY

This study is started with the following objectives:

1. To know the demographic profile of customers who are all using Canara bank services.
2. To study the customer awareness on customer relationship management policies of Canara bank.
3. To check the customer relationship management practices followed in branches of Canara bank in Tamilnadu.

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4. To study the factors influencing customer relationship management practices in Canara bank.
5. To study the role of E- CRM strategies in bringing customer satisfaction.

IV REVIEW OF LITERATURE

Organizations and research studies have exposed that retaining current customers is much less expensive than attracting new ones (Desatnick 1988,Stone et al.1996). The best way to retain customers is to keep them satisfied, a number of studies have shown that customer satisfaction can lead to brand loyalty, repurchase intention and repeat sale, in short customer retention. Customer retention, in turn, seems to be related to profitability (Oliver, 1999).Singh (2006) focused on customer management in banks and aimed to target the customer with a view to gain customer insight and provide value added products and services. Arunkumaret al. (2012) considered customer relationship management scale development and validation in Indian banking sector. This study identified the organization structure and customer support service quality, trust, technology, personalisation and market orientation were critical factors of CRM. Even though marketing researcher have identified various factors for retaining customers, very important are customer satisfaction, trust, commitment (Morgan and Hunt, 1994) loyalty (Berry and Parasuraman, 1991) and service quality (Guo et al. 2008). Ndubisi (2007) identified relationship quality antecedents and identified that significant positive relationship between trust, commitment and conflict handling on relationship quality.

Rootman et al. (2008) examined the variables that influence the customer relationship management of bank from the employee perspectives. The study conclude that attitude of the employee and knowledgeable of bank employee have made significant impact on customer relationship management strategies of bank. Osarenkhone (2007) revealed that CRM strategy requires commitment from top management, systematic cross-functional communication, and customer loyalty training programmes for all employee. Chaturvedi et al. (2007) focussed on CRM provides interactive, personalized and relevant communication with customer to develop and maintain relationships. The banking sector has already been described (Parasuraman et al. 1985) as exhibiting modest market orientation and satisfying services with little regard to customer needs, as well as including branches disparate in efficiency (Berger et al..1994). Long lines, limited time for customer servicing, transaction errors due to the bankhuman resources, and excessive bureaucracy have been said to be the most common troubles in using banking services (Sachdev et al. 2004).

Chen and Ching (2004) illustrated CRM as a relationship of information technology that described customers from record to be more effectual in relationship. Maximizing customer satisfaction through the delivery of effective and quality service have been described as the ultimate weapon (Davidow&Uttal 1989). While the direction of the relationship has been a subject of debate in some studies (Bitner, 1990; Yavas et al., 1997), the widely accepted belief is that the delivery of high service quality is a must for attaining customer satisfaction, and a precondition for a number of desirable behavioural outcomes that lead to high performance in retail banking (Ting, 2004; Yavas et al., 2004). The cost of retaining an existing customer is lower than that of finding new customers (Bitran and Mondschein, 1997; Chattopadhyah, 2001; Massey et al. 2001). Customer relationship management are one of the tools for retaining customers (Debjain 2011).

V RESEARCH METHODOLOGY

The study is intended to investigate how customer relationship management practices followed in Canara bank branches in Tamilnadu. Population for this study is customers of Canara bank, target population is retail customers. Data have been collected from sample of 100 at different branches of Canara bank. Data is gathered through field survey. A well-structured questionnaire is developed to collect the data. This is a descriptive study using primary data collected through survey. The instrument is structured with 5-parts, part-1 is pertaining to the demographic profile of customers; part-2 focused specifically customer awareness on CRM policies of Canara bank;part-3 is concerned with customer perception on CRM practices; part-4 deals with factors influencing customer relationship management practices and part-5 focus on role of E-CRM strategies in customer satisfaction. The scale 1 to 5 have been developed, where 1 stands for strongly agree and 5 for strongly disagree. Prior to data collection, a pilot test was conducted to ensure comprehensiveness, clarity and reliability of the questionnaire. The pretesting was done among 10 customers randomly, resulting in minor modifications of the wordings of some questions in instrument. The following statistical tools are applied to get the reliable inferences, that is, simple percentage analysis, chi-square test, factor analysis, multiple linear regression test and t-test.

VI RESULTS & DISCUSSIONS

A Analysis of Demographic Profile

Demographic profile of customers and its frequency is listed in table-1. It shows the results of customer's profile, majority of the customers are male, aged between 41-55 years. 51% of the customer's monthly income falls between Rs.10,001 - 25,000, 35% of customers have PG qualifications. The outcome of the occupation shows that 29% are private sector and 27% are from the Government sector. From the aspect of using online banking, 66% of customers agreed that they are using online banking.

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Table – 1: Analysis of Demographic Profile

Characteristics	Distribution	Frequency	Percentage
Gender	Male	78	78%
	Female	22	22%
Age	18 - 25 Years	23	23%
	26 - 40 Years	28	28%
	41 - 55 Years	36	36%
	56& Above	13	13%
Monthly Income	Less than 10,000	15	15%
	10,001 - 25,000	51	51%
	25,001 - 50,000	21	21%
	50,001 & above	13	13%
Educational Qualification	Up to HSC	34	34%
	UG	15	15%
	PG	35	35%
	Professional	16	16%
Occupation	Private Sector	29	29%
	Government Sector	27	27%
	Self-Employed	26	26%
	Student and others	18	18%
Online Banking Habit	Yes	66	66%
	No	34	34%

(Source: Primary Data)

To observe the relationship between customer awareness on CRM policies of Canara bank and demographic profile, chi-square test is computed. It is used to test whether there are any significant differences in awareness, since there are different factions involved in the study. The results of Chi-square test presented in table-2 shows that as an overall, there are no significant differences between customer awareness on CRM policies of Canara bank based on gender, age, education, occupation. It is evident that in all cases the calculated value is greater than the table value as shown in table-2. This implies that customer's awareness on CRM policies in Canara bank is similar, regardless of gender, age, education and occupation. Thus it is examined that when Canara bank want to recognize the awareness of customers on their CRM policies, demographic profiles did not persuade what customers perceived.

Table-2: Descriptive Statistics on CRM Polices and Demographic Factors (Pearson One-way ANOVA)

CRM Policies	Gender		Age		Education		Occupation	
Descriptive Statistics	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.
Customer recognition	3.14	0.76	13.22	0.25	17.23	0.24	6.44	0.64
Quick response	3.90	0.62	11.53	0.37	9.42	0.61	12.34	0.56
Retention strategy	2.93	0.78	8.24	0.89	17.34	0.01*	13.87	0.75
Technology based service	4.53	0.64	11.58	0.43	13.28	0.72	7.47	0.76
Personnel assistance	5.22	0.28	10.52	0.63	16.97	0.53	24.56	0.37
Transparency in cost	3.75	0.45	6.26	0.76	11.35	0.42	15.29	0.83
Grievance redressal	4.47	0.84	12.58	0.74	6.85	0.54	7.25	0.21
May I help you service	7.43	0.15	14.59	0.55	11.23	0.68	12.57	0.54
Information on new service	1.54	0.56	9.84	0.63	15.24	0.37	13.65	0.65
ATM Service	7.35	0.54	15.47	0.48	14.26	0.56	8.28	0.58
Online banking service	5.06	0.27	11.41	0.62	12.35	0.36	15.69	0.69

(Source: Primary Data) *significant at 5% level

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B Customer Relationship Management Practices

The true banking business is to keep and satisfy customers, CRM has caught the attention of practicing commercial banks. This research provides the essential insight into the relationship management practices of this revolutionary concept. This study provides 12 variables of CRM practices followed in Canara bank, such as, courtesy of employees, ambience of bank, environment of bank, facilities in the bank, customer friendly products, promptness in services, ability to help customers, knowledge of customer redressal, familiarity of the customer, ATM locations, working hours and execution of service. The application of t-test is to evaluate the computed mean value based on the perception of customers. In this t-test the computed mean value of the customers is compared with hypothesized mean value 3 to get the significance or insignificance value. The results are depicted in the following table-3.

Table-3: Customers Perception on CRM Practices

(N = 100)

Variables	Mean	Std. Deviation	Std. Error Mean	t-value	Sig (2 tailed)
CRMP1	3.7935	1.1357	0.3674	13.679	.000
CRMP2	4.5623	0.6465	0.4257	36.794	.000
CRMP3	4.4675	0.6873	0.2675	23.588	.000
CRMP4	3.6426	1.1531	0.5278	12.689	.000
CRMP5	4.8153	1.2648	0.3426	-10.099	.000
CRMP6	2.7383	1.0676	0.3899	22.098	.000
CRMP7	2.0653	1.0354	0.4973	-12.985	.000
CRMP8	4.2558	0.9742	0.5296	-19.591	.000
CRMP9	3.7479	1.0222	0.5824	22.565	.000
CRMP10	3.6156	0.5637	0.2367	16.295	.000
CRMP11	2.7615	1.2135	0.3795	17.934	.000
CRMP12	2.8695	1.2641	0.3966	14.462	.000

(Source: Primary Data)

It is found in the above table that the mean value of the CRM practice variable range from 2.0653 to 4.8153. In particular, it is identified that the variable number from CRMP1 to CRMP4, and from CRMP8 to CRMP10 the mean values are strictly greater than 3. It is found that the bank customers are strongly agreed the t-values are greater than '3' that is, 13.679, 36.794, 23.588, 12.689, 22.098, 22.565, 16.295, 17.934 and 14.462 which are statistically significant at 5% level. The customers are disagreed that the t-values are 10.099, 12.985, and 19.591. Therefore it could be concluded that the CRM practices followed in Canara bank is agreed by the customers.

C Factors Influencing CRM Practices

The internal consistency of the instrument is tested with reliability analysis. The reliability test is to run to find out how sturdily the variables are related to each other (Hair et al. 2003). The reliability estimate of Cronbach's alpha for the factors are as follows, physical services (0.812), reliability in service (0.784), openness in service (0.758), service delivery (0.704), need understanding (0.723) and personal welfare (0.751), suggesting a high degree of reliability. To explain the factors influencing CRM practices, the factor analysis is performed. The data validity for factor analysis is tested with the help of Kaiser-Mayer-Olkin (KMO) measures of sampling adequacy and Bartlett's test of Sphericity. The KMO measures of sampling adequacy (0.871) and Zero percent level of significance of Chi-square satisfy the conditions of validity of data for factor analysis. The factors and its variables are exhibited in table-4.

Table – 4: Factor Analysis

Factors (Factorial Mean)	Components	Factor Loadings	Eigen Value	% of Variance
Physical Services (2.93)	ATMs spread and network	0.846	9.75	21.45
	Service options in ATM	0.788		
	Adequate Cheque drop boxes	0.779		
	Issue/Renewal of credit/ATM cards	0.811		
	Issue of monthly statements	0.736		
	Responsiveness in counter service	0.727		
	Proper safety on internet banking	0.801		
	Face-to-face interaction on demand	0.785		

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Reliability in service (2.77)	Safety and Security in ATMs etc. Transparency in service charges Accuracy in account maintenance Wide acceptability of cards Privacy in account transactions Dedication of employees Timely service on customer request	0.821 0.852 0.778 0.782 0.799 0.762 0.820	7.63	16.43
Openness in service (2.74)	Willingness to help customers Good relationship with customers Response to customer doubts Prompt service Kindness in help desk service Customer centric actions	0.823 0.736 0.747 0.801 0.769 0.778	5.21	12.32
Service Delivery (2.64)	Knowledge in service delivery Ability to inspire and help Safety on transactions Confidence building Interest in updation of services	0.814 0.811 0.769 0.758 0.781	4.12	8.51
Need understanding (2.48)	Caring on customer needs Personal attention of customer need Interest on customer affairs Delivery of services as per need	0.778 0.781 0.780 0.774	3.64	5.65
Personal welfare (2.29)	Minimum waiting time Parking and other amenities Mail on safety alerts/birthdays etc.	0.773 0.776 0.675	2.61	3.28

(Source: Primary Data)

The narrated five antecedents of factors influencing CRM practices explained the variables to the extent of 67.64 percent. The most important factor is physical services since its respective Eigen value is 9.75. It consists of eight variables with the reliability coefficient of 0.812. Since the second and third important factors are reliability in service and openness in service since their Eigen values are 7.63 and 5.21 respectively. The variables explained by these factors are 16.43 and 12.32 percent respectively. Similarly, service delivery and need understanding have Eigen values 4.12 and 3.64 with variance of 8.51 and 5.65 percent respectively. The next important factor influencing CRM practice is personal welfare since its respective Eigen value is 2.61, it consists of three variables with the reliability coefficient of 0.751. It is understood that the factors are largely influenced CRM practices of Canara bank in Tamil Nadu.

In order to test the influence of six factors presented in factor analysis, multiple linear regression analysis has been performed to analyze the factors influencing CRM practices of Canara bank. Since six underlying factors are considered as independent variable and the CRM practice is assumed as dependent variable, which are depicted in table-5.

Table – 5: Multiple Linear Regression Analysis

Independent Variables	Dependent Variable	Un-standardized coefficients		Beta coefficients	t value	Sign.
		Beta	Std. Error			
Constant	CRM Practices in Canara Bank	-0.821	0.620		-1.466	0.002
Physical Service		0.414	0.061	0.456	6.933[@]	0.001
Reliability in Service		0.213	0.074	0.161	1.724[$]	0.003
Openness in Service		0.219	0.081	0.143	1.676[$]	0.003
Service Delivery		0.178	0.043	0.088	0.834[$]	0.014
Need Understanding		0.156	0.061	0.113	1.226[$]	0.007
Personal Welfare		0.112	0.034	0.118	1.252[$]	0.025

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R	0.800
R^2	0.640
Adjusted R^2	0.56
F Value	29.554@

Note: @ significant at 1%, and $ significant at 5%.

Multiple linear regression analysis shows that all six independent variable are positively related with the CRM practice of Canara bank. Table 5 reveals the value of R^2 and adjusted R^2 as 0.640 and 0.56 respectively, which indicates that 64% of variation on CRM practice, explained by six underlying factors. Physical service in bank having highest beta coefficient 0.414 and t value 6.933 is statistically significant at 1% level. It indicates that the strong influence on customer relationship management practices of Canara bank. Reliability in service, openness in service, service delivery, need understanding and personal welfare are statistically significant at 5% of level. From this analysis, it is found that there is significant influence on CRM practices in Canara bank.

D Role of E-CRM Strategies

E-CRM strategies play a significant role in customer satisfaction. The role of following factors such as, internet banking, data warehousing & mining, ATMs, mobile banking, E-mails, smart cards, fund transfer and e-cheque has been presented among the customers. The customers are asked to rate their satisfaction level to the variables on the basis of five point scale. The components are identified in the pre-test and customers are asked to rate the most appropriate strategies to enhance CRM in electronic way. One sample t-test is applied on the above variables in E-CRM strategies; it is performed with assigning test value 3 to the identified variables.

Table – 6: One-Sample T-Test

Variables	Test Value = 3					
	T	df	Sig.	Mean difference	95% Confidence Interval of the difference	
					Lower	Upper
Internet banking	21.856	99	.000	.943	.887	1.074
Data warehousing	16.267	99	.000	.901	.799	1.112
ATMs	22.527	99	.000	.847	.826	1.153
Mobile banking	19.854	99	.000	.773	.646	.816
E-mails	20.357	99	.000	.728	.613	.799
Smart cards	21.267	99	.000	.847	.775	.986
Fund transfer	18.169	99	.000	.816	.724	.916
e-cheques	17.745	99	.000	.763	.711	.824

(Source: Primary Data)

It is clear from the above table that t-test values are extensively greater than the test value 3 at 5% level of significance. It acknowledges that E-CRM factors mostly rely with the beginning of many strategies in electronic mode. The customersoverwhelmingly believe that the internet banking, ATMs, E-mails, smart cards, here the t-values are greater than 20. Furthermore data warehousing & mining, mobile banking, fund transfer and e-cheque has moderate impact on the bringing satisfaction to them. E-banking leads to maintain good rapport with the customers by providing speedy services. This test proves that E-CRM strategies have significant impact on the customer satisfaction.

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VII FINDINGS& CONCLUSION

In this modern technology era, when the customer is having access to a variety of products and services it is fetching very difficult for banks to endure. In this circumstances, when customer inquiries are not met easily or transactions are convoluted, the customer will asks for new levels services, and only choose those banks who are making a real effort to provide a high level of quality, fast and efficient service through the bank touch points, ATMs, and other e-banking services. Hence the commercial banks are considering this fact with the maintenance of good relationship. The findings of the study show that the influence of demographic factors on customers' awareness towards CRM policies in Canara bank was examined. Analysis of variance and chi-square were executed to test whether the means of the customers' awareness differ by gender, age, education and occupation. The results indicate that there was no significant difference in means between customers' awareness on CRM policies among banks based on these demographic factors. This would imply that customers' awareness on CRM policies in Canara bank was similar regardless of demographic variables. The customer perception on customer relationship management practices adopted by the Canara bank is agreed about nine practices. In factor analysis, this research identified six key dimensions of various antecedents of CRM; they are physical service, reliability in service, openness in service, service delivery, need understanding and personal welfare. In order to assess the impact of different antecedents of customer relationship management, multiple regressions is also used. The results clearly revealed that there is a significant impact exists among the variables. E-CRM has significant attention on the maintaining relationship with the customers. It is seen that banks are applying customer oriented relationship management and attempting for the establishment of long-term relationships.

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An Study About Factors Influencing Cross Cultural Negotiation In International Business

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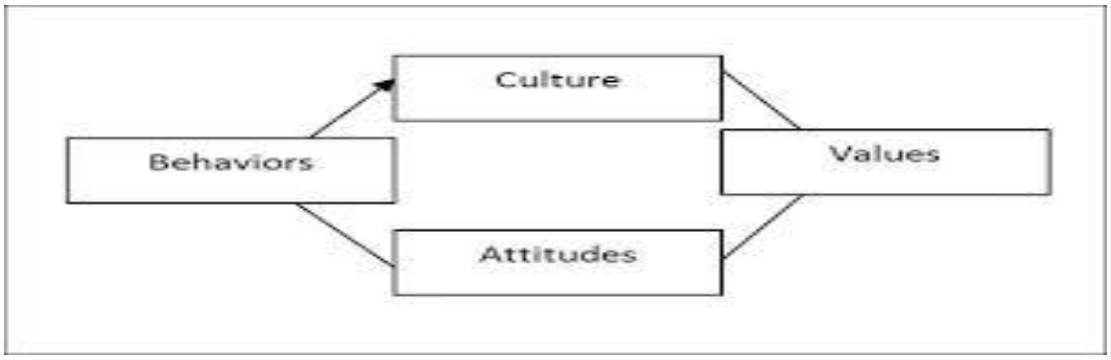
Abstract- *Negotiation in general terms refers to the process of getting a fair price for our product. Cross culture is a vital issue in international business, as the success of international trade depends upon the smooth interaction of employees from different cultures and regions. Cross cultural negotiation is one of many specialized areas within the wider field of cross cultural communications. By taking cross cultural negotiation training, negotiators and sales personnel give themselves an advantage over competitors. There is an argument that proposes that culture is inconsequential to cross cultural negotiation. It maintains that as long as a proposal is financially attractive it will succeed. However, this is a naïve way of approaching international business. This article deals in detail about what are the influencing factors of Cross Cultural Negotiation.*

KEYWORDS: Negotiation, Cross Cultural Negotiation, Competitors, Culture

I INTRODUCTION

A Culture - Defined

The customary beliefs, social forms, and material traits of a racial, religious, or social group; also: the characteristic features of everyday existence (as diversions or a way of life) shared by people in a place or time



'Cross Culture'-Defined

The interaction of people from different backgrounds in the business world. Cross culture is a vital issue in international business, as the success of international trade depends upon the smooth interaction of employees from different cultures and regions. A growing

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number of companies are consequently devoting substantial resources toward training their employees to interact effectively with those of companies in other cultures in an effort to foment a positive cross-cultural experience. Cross culture can be experienced by an employee who is transferred to a location in another country.

OBJECTIVES OF THE STUDY

- To study about the Theoretical Background of Cross Culture
- To study about Factors to be considered for an International Business
- Factors Influencing Cross-Cultural Negotiations
- To arrive at valuable Findings and Recommendations as a result of the study

II LITERATURE REVIEW- THE IMPACT OF CULTURE ON NEGOTIATIONS

International business comprises a large and increasing portion of the world's total trade (Johnson et al., 1994; Czinkota et al., 1995). The growth of international business has gained momentum faster than previously recorded, outstripping domestic business (Daniels and Radebaugh, 1995). The impact of such growth on many companies is that they are now "rushing to become insiders in international markets they formerly paid little attention to, or ignored completely" (McDaniel, 1990, p. 1).

International markets, it is believed, offer companies opportunities to market their products and services on a worldwide scale and reap the benefits of the particularly high stakes involved (Mintu and Calantone, 1991). Companies involved in international business, deal with sales transactions or negotiations which span national and cultural boundaries. That means, sales negotiators interact with individuals from unfamiliar cultures that exhibit different negotiation styles, behaviours and expectations about the normal process of negotiation (Graham and Sano, 1984).

This presents several potential culture-related obstacles that confront the international negotiator (Deutsch, 1984; Frank, 1992; Graham and Sano, 1984; Hall and Hall, 1987; Tung, 1984; Zimmerman, 1985) and a failure to anticipate, understand and effectively remove these obstacles can lead to a failure in cross-cultural negotiations. Competence, therefore, in international negotiations is one of the most important and indispensable skills in all kinds of international business (Fayerweather and Kapoor, 1972, 1976; Root, 1987; Wells, 1977).

Negotiation is one of the most important elements of the selling and buying functions, (Neslin and Greenhalgh, 1983). Negotiation is "a process in which two or more entities come together to discuss common and conflicting interests in order to reach an agreement of mutual benefit" (Harris and Moran, 1987, p. 55).

The negotiation process is a complex process which is significantly influenced by the culture(s) within which the participants are socialised, educated and reinforced (Graham, 1985a; Hamner, 1980; Harnett and Cummings, 1980; Tung, 1982).

The intra-cultural literature which examines sellers and buyers from the same cultures, provides evidence for this consistency (e.g. French (DuPont, 1982); Mexicans (Fisher, 1980); Brazilians (Graham, 1983, 1985a); Middle Eastern Arabs (Muna, 1973; Wright, 1983); Chinese (Graham and Lin, 1987; Pye, 1982; Shenkar and Ronen, 1987; Tung 1984) and Japanese (Graham, 1984; Tung, 1984; Van Zandt, 1970)). Despite the rather rich literature pertaining to intra-cultural negotiation behaviours, there is little attention paid to inter-cultural or cross-cultural negotiation behavior (Adler and Graham, 1989; Mintu and Calantone, 1991).

METHODOLOGY

- Research Type : Exploratory
- Data Collection Technique used : Secondary Data , through Referred Journals, Periodicals, Web Sites etc.

III THEORETICAL BACKGROUND

Factors to be considered for an International Business

When doing business internationally, we need to consider (Salacuse, 1991):

1. The negotiating environment
2. Cultural and sub-cultural differences
3. Ideological differences
4. Foreign bureaucracy
5. Foreign laws and governments

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6. Financial insecurity due to international monetary factors
7. Political instability and economic changes

FACTORS INFLUENCING CROSS-CULTURAL NEGOTIATIONS

The Impact of Culture on Negotiation

Negotiation Factors			
Goal	Contract	⟷	Relationship
Attitudes	Win/Lose	⟷	Win/Win
Personal Styles	Informal	⟷	Formal
Communications	Direct	⟷	Indirect
Time Sensitivity	High	⟷	Low
Emotionalism	High	⟷	Low
Agreement Form	Specific	⟷	General
Agreement Building	Bottom Up	⟷	Top Down
Team Organization	One Leader	⟷	Consensus
Risk Taking	High	⟷	Low

Negotiating Goal and Basic Concept: How is the negotiation being seen? Is mutual satisfaction the real purpose of the meeting? Do we have to compete? Do they want to win? Different cultures stress different aspects of negotiation. The goal of business negotiation may be a substantive outcome (Americans) or a long-lasting relationship (Japanese).

Protocol: There are as many kinds of business etiquette as there are nations in the world. Protocol factors that should be considered are dress codes, number of negotiators, entertainment, degree of formality, gift giving, meeting and greeting, etc.

Communications: Verbal and non-verbal communication is a key factor of persuasion. The way we express our needs and feelings using body language and tone of voice can determine the way the other side perceives us, and in fact positively or negatively contributes to our credibility. Another aspect of communication relevant to negotiation is the direct or indirect approach to exchanging information.

Risk-Taking Propensity - Uncertainty Avoidance: There is always risk involved in negotiations. The final outcome is unknown when the negotiations commence. The most common dilemma is related to personal relations between counterparts: Should we trust them? Will they trust us? Certain cultures are more risk averse than others, e.g. Japan (Hofstede 1980). It means that less innovative and creative alternatives are available to pursue during the negotiation, unless there is a strong trust-based relationship between the counterparts.

View of Time: In some cultures time is money and something to be used wisely. Punctuality and agenda may be an important aspect of negotiation. In countries such as China or Japan, being late would be taken as an insult. Consider investing more time in the negotiating process in Japan. The main goal when negotiating with an oriental counterpart is to establish a firm relationship, which takes time. Another dimension of time relevant to negotiation is the focus on past, present or future. Sometimes the past or the distant future may be seen as part of the present, especially in Latin American countries .

Decision-Making System: The way members of the other negotiating team reach a decision may give us a hint: who we shall focus on providing our presentation. When negotiating with a team, it's crucial to identify who is the leader and who has the authority to make a decision.

Form of Agreement: In most cultures, only written agreements stamp a deal. It seems to be the best way to secure our interests in case of any unexpected circumstances. The 'deal' may be the contract itself or the relationship between the parties, like in China, where a contract is likely to be in the form of general principles. In this case, if any unexpected circumstances arise, parties prefer to focus on the relationship than the contract to solve the problem.

Power Distance: This refers to the acceptance of authority differences between people. Cultures with low *power distance* postulate equality among people, and focus more on earned status than ascribed status. Negotiators from countries like Britain, Germany and Austria tend to be comfortable with shared authority and democratic structures. When we face a high *power distance* culture, be prepared for hierarchical structures and clear authority figures.

Personal Style: Our individual attitude towards the other side and biases which we sometimes establish all determine our assumptions that may lead the negotiation process towards win-win or win-lose solutions. Do we feel more comfortable using a formal or informal approach to communication? In some cultures, like America, an informal style may help to create friendly relationships

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and accelerate the problem solving solution. In China, by comparison, an informal approach is proper only when the relationship is firm and sealed with trust.

COPING WITH CULTURE

Negotiating in the international environment is a huge challenge for any negotiator. How do we cope with the cultural differences? What approach is more efficient and proper when dealing with Japanese, Americans or Germans? There are some very helpful guidelines we can apply (Salacuse, 1991):

1. ***Learn the other side's culture***

   It is very important to know the commonest basic components of our counterparty's culture. It's a sign of respect and a way to build trust and credibility as well as advantage that can help us to choose the right strategies and tactics during the negotiation. Of course, it's impossible to learn another culture in detail when we learn at short notice that a foreign delegation is visiting in two weeks' time. The best we can do is to try to identify principal influences that the foreign culture may have on making the deal.

2. ***Don't stereotype***

   Making assumptions can create distrust and barriers that expose both your and the other side's needs, positions and goals. The way we view other people tends to be reserved and cautious. We usually expect people to take advantage of a situation, and during the negotiations the other side probably thinks the same way, especially when there is a lack of trust between counterparts. Instead of generalizing, we should make an effort to treat everyone as individuals. Find the other side's values and beliefs independently of values and beliefs characteristic of the culture or group being represented by your counterpart.

3. ***Find ways to bridge the culture gap***

   Apart from adopting the other side's culture to adjust to the situation and environment, we can also try to persuade the other side to use elements of our own culture. In some situations it is also possible to use a combination of both cultures, for example, regarding joint venture businesses. Another possible solution is to adopt a third culture, which can be a strong base for personal relationships. When there is a difficulty in finding common ground, focusing on common professional cultures may be the initiation of business relations.

FINDINGS

The top ten ways that culture can affect the negotiation when doing business internationally,

1. Negotiating goal: Contract or relationship?

Negotiators from different cultures may tend to view the purpose of a negotiation differently. For deal makers from some cultures, the goal of a business negotiation, first and foremost, is a signed contract between the parties. Other cultures tend to consider that the goal of a negotiation is not a signed contract but rather the creation of a relationship between the two sides. Although the written contact expresses the relationship, the essence of the deal is the relationship itself.

It is therefore important to determine how your counterparts view the purpose of your negotiation. If relationship negotiators sit on the other side of the table, merely convincing them of your ability to deliver on a low-cost contract may not be enough to land you the deal. You may also have to persuade them, from the very first meeting, that your two organizations have the potential to build a rewarding relationship over the long term. On the other hand, if the other side is basically a contract deal maker, trying to build a relationship may be a waste of time and energy.

2. Negotiating attitude: Win-Lose or Win-Win?

Because of differences in culture, personality, or both, business persons appear to approach deal making with one of two basic attitudes: that a negotiation is either a process in which both can gain (win-win) or a struggle in which, of necessity, one side wins and the other side loses (win-lose). Win-win negotiators see deal making as a collaborative, problem-solving process; win-lose negotiators views it as confrontational.

3. Personal style: Informal or formal?

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Personal style concerns the way a negotiator talks to others, uses titles, dresses, speaks, and interacts with other persons. Culture strongly influences the personal style of negotiators. It has been observed, for example, that Germans have a more formal style than Americans. A negotiator with a formal style insists on addressing counterparts by their titles, avoids personal anecdotes, and refrains from questions touching on the private or family life of members of the other negotiating team. A negotiator with an informal style tries to start the discussion on a first-name basis, quickly seeks to develop a personal, friendly relationship with the other team, and may take off his jacket and roll up his sleeves when deal making begins in earnest.

4. Communication: Direct or indirect?

Methods of communication vary among cultures. Some emphasize direct and simple methods of communication; others rely heavily on indirect and complex methods. The latter may use circumlocutions, figurative forms of speech, facial expressions, gestures and other kinds of body language. In a culture that values directness, such as the American or the Israeli, you can expect to receive a clear and definite response to your proposals and questions. In cultures that rely on indirect communication, such as the Japanese, reaction to your proposals may be gained by interpreting seemingly vague comments, gestures, and other signs. What you will not receive at a first meeting is a definite commitment or rejection.

5. Sensitivity to time: High or low?

Discussions of national negotiating styles invariably treat a particular culture's attitudes toward time. It is said that Germans are always punctual, Latins are habitually late, Japanese negotiate slowly, and Americans are quick to make a deal. Commentators sometimes claim that some cultures value time more than others, but this observation may not be an accurate characterization of the situation. Rather, negotiators may value differently the amount of time devoted to and measured against the goal pursued. For Americans, the deal is a signed contract and time is money, so they want to make a deal quickly. Americans therefore try to reduce formalities to a minimum and get down to business quickly. Japanese and other Asians, whose goal is to create a relationship rather than simply sign a contract, need to invest time in the negotiating process so that the parties can get to know one another well and determine whether they wish to embark on a long-term relationship.

6. Emotionalism: High or low?

Accounts of negotiating behavior in other cultures almost always point to a particular group's tendency to act emotionally. According to the stereotype, Latin Americans show their emotions at the negotiating table, while the Japanese and many other Asians hide their feelings. Obviously, individual personality plays a role here. There are passive Latins and hot-headed Japanese. Nonetheless, various cultures have different rules as to the appropriateness and form of displaying emotions, and these rules are brought to the negotiating table as well. Deal makers should seek to learn them.

7. Form of agreement: General or specific?

Whether a negotiator's goal is a contract or a relationship, the negotiated transaction in almost all cases will be encapsulated in some sort of written agreement. Cultural factors influence the form of the written agreement that the parties make. Generally, Americans prefer very detailed contracts that attempt to anticipate all possible circumstances and eventualities, no matter how unlikely. Why? Because the deal is the contract itself, and one must refer to the contract to handle new situations that may arise. Other cultures, such as the Chinese, prefer a contract in the form of general principles rather than detailed rules.

8. Building an agreement: Bottom up or top down?

Related to the form of the agreement is the question of whether negotiating a business deal is an inductive or a deductive process. Does it start from an agreement on general principles and proceed to specific items, or does it begin with an agreement on specifics, such as price, delivery date, and product quality, the sum total of which becomes the contract? Different cultures tend to emphasize one approach over the other. Some observers believe that the French prefer to begin with agreement on general principles, while Americans tend to seek agreement first on specifics. For Americans, negotiating a deal is basically making a series of compromises and trade-offs on a long list of particulars. For the French, the essence is to agree on basic principles that will guide and indeed determine the negotiation process afterward. The agreed-upon general principles become the framework, the skeleton, upon which the contract is built.

9. Team organization: One leader or group consensus?

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In any negotiation, it is important to know how the other side is organized, who has the authority to make commitments, and how decisions are made. Culture is one important factor that affects how executives organize themselves to negotiate a deal. Some cultures emphasize the individual while others stress the group. These values may influence the organization of each side in a negotiation.

IV CONCLUSION

Thus it is clear from the entire above context that cross culture negotiations has got a vital role to play in the success of an international business. Only when a business man is able to cope up with the culture and its changes he could shine in the field of international business as a successor. Emphasis should be given to the various factors that influence the cross culture negotiations and those factors should be strictly adhered to so that desired level of the outcome could be achieved.

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A Study On Impact Of Information Technology In Banking Sector With Reference To Southern Tamilnadu

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Abstract- *This study addresses the impact of information technology on the banking services offered to the customers. Information technology provides economies of scale in service delivery, covering new customers and developing innovative services. Banking sector in India has made rapid pace in reforming and aligning technology to the new competitive business. It adopts internet, mobile, and communication systems to deliver speedy service. This present study was started with the objective of knowing customers demographic profile, factors influencing on service accessibility, customer satisfaction on technology based service and strategies required to improve this service portfolio. This study was conducted in Southern Tamilnadu, which covered 100 samples in number. The data for the study was collected through well-constructed and open-ended questionnaire. This study seeks to test the above objectives with simple percentage analysis, factor analysis, and multiple linear regression test, mean score, t-test and chi-square test. This study was concluded that banking services through information technology platform offers satisfied service to the customers and simultaneously needs to improve as per changing technology inclination.*

Key words used: Commercial Banks, Banking Service, Information Technology, Service Accessibility, Customer Satisfaction, Technology-enabled Service.

I INTRODUCTION

Banking technology is identified as the information and communication technologies employed by banks to deliver different services to its customer in a safe and reliable way in an electronic platform. Both customers and banks have been increasingly profited from the adoption of state-of-the-art information technology during the last two decades to deliver its regular work. Customer service, branch productivity, innovation in service delivery, fast and reliable service, seamless fund transfer, risk management and real time information system are some of the benefit derived through the information technology. Growth of information technology has opened up new markets, new products, new services and efficient delivery channels for the banking sectors. The progress of technology and the development of worldwide banking networks have significantly increased the transfer of funds from one place to another place and provision of core banking services to its customers. Information technology provides the opted solutions to banks to take care of their front office and back office obligations. Implementation of information technology in banks were started in the early 2000s with an emphasis of the adoption of core banking solutions, centralization of operations and complete automation of banks. Information technology offers a chance for banks to build new systems that address a wide range of customer needs including many that may not be imaginable today. Technology innovations are tracking a big impact in the reshaping of the banking industry, by leading to the development of new financial products and of new means of delivering to its customers.

II REVIEW OF LITERATURE

Barnes et al. (2003) suggested that modern innovations in telecommunications have facilitated the instigate of new access methods for

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banking services, one of these is mobile banking; whereby a customer interacts through a mobile phone with the bank. Shu and Strassmann (2005) perceived that even though Information Technology has been one of the most essential dynamic factors relating all efforts, it cannot improve banks' earnings. Kozak (2005) investigated the pressure of the evolution in Information Technology on the profit and cost effectiveness of the banking. This study designated optimistic relationship among the executed Information Technology and together productivity and cost savings. Sathye (2005) investigated the impact of the introduction of transactional Internet banking on performance and risk profile of major credit unions in Australia. Amaoko (2012) contributed optimistically to the provision of banking services and the growth of the Ghanaian banking industry. Morufu et al. (2012) researched on banker's perception of electronic banking in Nigeria purposely to find out how bankers perceive the benefits and threats associated with electronic banking by investigating banks employees' perception on electronic banking and its implications on bank service delivery. Agboola (2006) observed that payments are automated and absolute volume of cash transactions have declined under the impact of electronic transaction brought about by the adoption of ICT to the payment system particularly in the developed economies.

III OBJECTIVES OF THE STUDY

This study is carried out with the following objectives:

1. To identify the demographic profile of customers involved in the use of modern day banking services.
2. To ensure factors influencing on service accessibility of customers with the adoption of information technology enabled system.
3. To examine constructive strategies to improve the technology enabled services from the customer's standpoint.

IV RESEARCH METHODOLOGY

This research could be started with the suitable research plan and methodology, the sample for the study is customers who are all accessing services in the commercial banks with the aid of information technology in Southern part of Tamilnadu. This study randomly selects 100 samples at the various places across the sample area. This study collects data from the respondents, who are all having savings bank account and used information technology based service at least one year time frame. This study formulated on the basis of descriptive research design. The survey instrument has been constructed with three parts; first parts deals with demographic profile of respondents, second part seeks to ensure the factors influencing on service accessibility of customers with the adoption of information technology. Third part covers constructive strategies to improve the IT enabled service from the customer's point of view. The survey instrument was pretested; therefore questionnaire has been designed for collecting data. Collected data has been analyzed by using simple percentage analysis, principal component factor analysis, and multiple linear regression analysis and T-test.

V RESULTS AND DISCUSSIONS

A Analysis of Demographic Profile

The demographic profile of bank customers is analyzed presented in Table-1. Simple percentage analysis has been adopted to analyse demographic profiles of respondents.

Table – 1: Demographic Profile of Respondents

Profile	Distribution	Frequency	Percentage
Gender	Male	83	83%
	Female	17	17%
Age	18 – 25	23	23%
	26 – 40	35	35%
	41 – 59	27	27%
	60 & Above	15	15%
Academic Qualification	Illiterate	2	2%
	Up to HSC	36	36%
	Diploma/UG	38	38%
	PG/Professional	24	24%
Monthly Income	Less than 15,000	21	21%
	15,001 – 35,000	32	32%
	35,001 – 50,000	34	34%
	Above 50,001	13	13%
Marital status	Married	69	69%

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	Unmarried	31	31%
Occupation	Housewife/Retired	10	10%
	Employed	32	32%
	Business/Profession	39	39%
	Agriculture	11	11%
	Student	8	8%
Type of Service	Internet banking	36	36%
	Mobile banking	12	12%
	Direct branch visit	52	52%
Frequency of use	Daily	2	2%
	Weekly	19	19%
	Monthly	51	51%
	As and when	28	28%

Source: Primary Data

It could be ascertained in the above table-1, profile of the respondents are clearly analyzed. The gender level shows that about 83 per cent are male respondents while the rest 17 per cent are female respondents. Age of the customers apparently expresses that majority 35% are ranges between 26 – 40 years. 38% customers are diploma / under graduate degree holders, monthly income of the respondents' states that 34% respondents are earning income of Rs.35,001 – 50,000. Marital status reveals that 69% respondents are married and rest 31% are unmarried respondents. Occupation of the respondents are gathered in five intervals and shows that 10% are housewife/retired category, 32% are employed in private and public sector, 39% are conducting their own business or profession, 11% are agriculturists and remaining 8% are students and other category. Type of service shows that 52% are directly visit to banks and frequency of use reveals that 51% customers are using once in a month technology enabled service.

B Factors Influencing Service Accessibility

Factors influencing on service accessibility of customers with the adoption of information technology enabled system is designed with six parts such as, banking services, add-on services and delivery, front office services, safety of services, technology-enabled services and reliability of services. Taking this fact into consideration, this analysis has been conducted with principal component factor analysis. In order to check the reliability factor among the factors and components, the Cronbach alpha has been executed and it strongly acknowledges that reliability of data ranges from 0.93 to 0.97.

Table – 2: Factor Analysis

Factors (Mean)	Variables	Factor Loadings	Eigen Value	% of Variance
Banking Services (2.89)	Internet banking	0.811	13.94	27.12
	Mobile banking	0.816		
	Core banking	0.812		
	Debit and credit cards	0.813		
	Private Banking	0.682		
	ATM facility	0.825		
	Electronic Fund Transfer	0.723		
	Agency Services	0.702		
	ECS facility	0.724		
	Cheque deposit in drop box	0.786		
	RTGS	0.670		
Add-on Services & Delivery (2.39)	24x7 Service access	0.811	10.26	18.67
	Competitive charges	0.765		
	Service quality improvement	0.727		
	Balance/Statement enquiry	0.788		
	Cheque book facility	0.799		
	Online shopping provision	0.586		
	Standing instructions fulfillment	0.767		
	Demat services	0.750		
	Loan applications	0.711		
Front Office Services (2.28)	Speedy service	0.806	7.21	13.06
	Short waiting time	0.735		
	Secured transactions	0.769		
	Guidance on service access	0.636		
	Cash withdrawal	0.789		

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	Provision of clear instruction Retail banking	0.654 0.722		
Safety of Services (2.21)	Convenient ATM Location Cheque/cash deposit Transparency Advanced Technology Better control on transactions Convenient and time saving Balance enquiry and maintenance	0.803 0.801 0.753 0.576 0.763 0.624 0.756	5.63	7.87
Technology-Enabled Services (2.17)	Friendly technology to adapt Less cost Adequate voice prompts Access on necessity Back office support	0.777 0.726 0.736 0.711 0.697	3.22	4.47
Reliability of Service (2.10)	Error free service Familiar on service Fast data transmission Comfortable transaction	0.793 0.723 0.687 0.646	2.63	3.76

Source: Primary Data

It is evident from Table-2, the factorial mean shows that banking services (2.89), add-on services and delivery (2.39), front-office services (2.28), safety of services (2.21), technology-enabled services (2.17) and reliability of services (2.10). The content validity ratio is also computed for all the components and the scale falls more than 0.5 only considered. This factor analysis is performed with six factors and 43 variables and it explains 74.95% of variance in data. Banking services is the main influencing factor to the customers, which covers eleven components and explains 27.12% of variance in data with Eigen value of 13.94. ATM facility, mobile banking, debit and credit cards, core banking and internet banking are most influencing factor to use banking services in this category. Furthermore, add-on services and delivery have noteworthy influence in accessing services because of information technology implementation in banks. It explains 18.67% of variance in data with Eigen value of 10.26. Information technology helps to avail 24x7 service access, cheque book facility, and balance enquiry often to the customers. Technology assists to deliver front-office services in an efficient manner; it has been loaded with seven components and 13.06% variance in data with Eigen value of 7.21. Speedy service and guidance on service access actively largely create benefit to the customers. Information and communication technology assist to deliver fast and fine service to the bank customers for all banking needs.

Technology ensures safety in many aspects to the bank customers; hence, safety of services is loaded with seven components. It explains 7.87% variance in data with Eigen value of 5.63. Customers are using technology-enabled services by themselves in lot of circumstances and it is loaded with five components. It explains 4.47% variance in data with Eigen value of 3.22. Friendly technology to adapt, adequate voice prompts and less cost are the leading factor, which influences use banking services. Finally, reliability in the use of service through technology creates several ifs and buts to the customers. Hence their belief as to reliability is checked with four components, it explains 3.76% variance in data and Eigen value 2.63. Error free service and familiar on service is largely influence on the use of banking services. All these six factors are largely influenced on the accessibility of banking services with the adoption of information technology.

The trustworthy of results derived in the factor analysis has been tested with multiple linear regression analysis. Access of banking service is dependent on various factors and components listed in the above factor analysis. As a result, the factors are taken as independent variables and service accessibility is assumed as dependent variable. Based on this fact, multiple linear regression analysis has been performed and results are presented in table-3.

Table – 3: Multiple Linear Regression Analysis

Independent Variables	Dependent Variable	Un-standardized coefficients		Beta coefficients	t-value	Sign.
		B	S.E.			
Constant	Service Accessibility	-0.819	0.654		-1.643	0.128
Banking Service		0.379	0.093	0.383	4.342[@]	0.006
Add-on Service & Delivery		0.252	0.082	0.178	1.811[$]	0.073
Front-Office Services		0.231	0.072	0.151	1.647[$]	0.163
Safety of Services		0.207	0.075	0.123	0.668[*]	0.184

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Technology-Enabled Services		0.161	0.069	0.134	1.651$	0.056
Reliability of Services		0.129	0.067	0.131	1.233*	0.102
R	0.798					
R^2	0.64					
Adjusted R^2	0.56					
F Value	25. 718@					

Note: @ significant at 1%, $ significant at 5% and *significant at 10%.

Table-3 evidences that all independent variables such as, banking service, add-on service and delivery, front-office services, safety of services, technology-enabled services and reliability of services are absolutely correlated with the service accessibility. The values of R^2 and adjusted R^2 are found as 0.64 and 0.56 respectively which shows that 64% variation on the banking service accessibility. Banking service is the highest beta coefficient factor (0.383) and its t-value is statistically significant at 1% level. It is widely recognised that it has considerable influence on the service accessibility of commercial banks. Similarly, add-on services and delivery, front-office services and technology-enabled services are also significantly correlated with the service accessibility in banks and statistically significant at 5% level. Safety of services and reliability of services are also bearing influence in service accessibility with the adoption of information technology and statistically significant at 10% level. Based on the results from the above analysis, all six factors are having significant influence in the service accessibility of banking services.

C Strategies to Improve Technology Enabled Services

The following variables are identified in pre-test and discussion with field experts, the customers are asked to rate the most important strategies to improve technology enabled services. One sample t-test is taken to analyse the above variables with assigning test value 3 to the ascertained variables.

Table – 4: One-Sample T-Test

Variables	Test Value = 3					
	T	df	Sig.	Mean difference	95% Confidence Interval of the difference	
					Lower	Upper
SMS for cash transactions	22.364	99	.00	.971	.877	1.112
Weekly account statement	21.755	99	.00	.925	.862	1.105
E-Cheque provisions	18.263	99	.00	.851	.812	.975
Unlimited withdrawal	16.358	99	.00	.784	.674	.829
Cyber crime safety	19.284	99	.00	.753	.685	.838
ATMs on rural areas	19.775	99	.00	.845	.752	.974
Increased memory storage	18.127	99	.00	.815	.774	.932
E-mail alerts	21.705	99	.00	.921	.920	.998

(Source: Primary Data)

It is obvious from the table-4 that the calculated t-test values are significantly higher than the test value 3 at 5% level. It shows that technology enabled service mainly requires innovative strategies to develop. The customers are intensely believe SMS for cash transactions, e-mail alerts and weekly account statement are the important strategy to improve technology based services. Followed to that cybercrime safety and ATMs on rural areas are the second important factor to improve technology platform. Finally, e-cheque provisions, increased memory storage and unlimited withdrawal are also similarly gained importance in bringing improvement in technology based services.

D Chi-square Test

The relationship between the demographic profile customers and type of service and frequency of use are tested with chi-square test. In this connection, null hypothesis (H_0) states that there is no relationship between demographic profile of customers and type of service / frequency of use. As contrary to that alternate hypothesis (H_1) states that there is a relationship between demographic profile of customers and type of service / frequency of use.

Table - 5: Chi-Square Test (Significant at 5% level)

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No relationship between	Degrees of Freedom	Table Value	Calculated Value	Result
Gender and Type of Service	2	5.991	6.839	Rejected
Age and Type of Service	6	12.592	13.253	Rejected
Income and Frequency of use	9	16.919	18.185	Rejected
Education and Frequency of use	9	16.919	19.106	Rejected
Occupation and Frequency of use	12	21.026	22.245	Rejected

It could be identified in table-5 that the demographic profile of customers such as gender and age have been tested with type of service and monthly income, academic qualification and occupation have been checked with frequency of use. It is recognized from above test, the null hypothesis for all cases have been rejected and accepts the alternate hypothesis. The calculated chi-square value is more than table value at 5% significant level. Hence it is concluded that there is a relationship between demographic profile of customers and type of service / frequency of use.

VI CONCLUSION

The summary of responses obtained as well analysis of these responses is provided as under. 83% are males, mostly falls in the age group of 26 – 40 years, 38% are diploma/UG degree holders. Monthly income is Rs.35, 001 – 50,000 to 34% of respondents, 69% are married, 39% are belongs to own business, 52% are directly visiting to branch and 51% are using banking services monthly once. Factor analysis reveals that all six factors having impact on the using of technology enabled banking services. Put together the factors and variables explain 74.95% of variance in data. Customers are expecting some strategies to improve technology enabled service portfolio. The chi-square test rejects the null hypothesis about the relationship between demographic profile and type of service and frequency of use of banking services. It is widely acknowledged that the customers now seeks to fulfil their lifestyle aspiration at right times with right kind of technology for deposit, withdrawal and transfer of funds. This is leading to growing demand for competitive and sophisticated technology based services. The time has arrived to shift towards a customer-friendly approach; customers granted an opportunity to take pleasure in their share of benefits stemming from information technology development. Information technology has massive influence on the use of banking services and affords utmost satisfaction to the customer with new contemporary strategies often. It is concluded that information technology innovation in banks facilitate to avail all version of service to the customers in a cost effective way.

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Hybrid Embedded System Design For Real Time Monitoring The Growth and Detection Of Diseases in Oryza Sativa L and Triticum Aestivum

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Abstract- *In recent days, world population is incredibly growing, so it is an essential need to develop the agriculture. Oryza sativa L (Paddy) and Triticum aestivum (Wheat) are the most important food crops in India. This proposed research work introduces a new technology for paddy and wheat cultivation in agriculture. The objectives of proposed research are to monitor and control the plant soil moisture sensor and water level sensor and also to identify the diseases are occurred in Paddy and Wheat. The values detected by sensors and it are transmitted through Wireless Sensor Network (WSN) for further controlling process. Plant cultivation is always under surveillance using wireless IP camera. The diseases are identified using LabVIEW image processing techniques such as preprocessing, feature extraction and classification. In this paper, texture features are extracted using GLCM and Mean, Standard deviation, Kurtosis and Skewness. K- Nearest Neighbor (KNN) and Support Vector Machine (GRBF) are used for classifications. The results obtained by WSN and identified diseases from SVM (GRBF) and KNN are sent to the concerned person using GSM and E-MAIL using Ethernet techniques. This idea saves a lot of man power, increase quality with quantity and feasible for application in precision agriculture.*

Keywords: LabVIEW, Image Processing, WSN, GSM and Precision agriculture

I INTRODUCTION

Advancing in Electronics and Instrumentation have made possible of precision agriculture, plant disease detection automatically, quality and quantity loss plays a significant economic in the whole country. Paddy and Wheat are the most important food in the world, India is the second largest producer of Paddy and third largest of wheat in the world [1]. Paddy is the staple food for approximately semi of the world population. Tamil Nadu is mostly contributed to Paddy cultivation in India. Paddy crop growing duration time for short duration varieties (90 – 120 days), medium duration varieties (120 – 140 days) and long duration varieties (140 – 180 days). Spring wheat crop growing period ranges from 100 – 135 days and winter wheat crop growing period ranges from 185 – 230. Uttra Pradesh is the largest wheat producer in India.

Today water management system is very important for Paddy and wheat cultivation [2]. The Wireless Sensor Network is a wireless network consisting of spatially distributed autonomous device using sensors to monitor physical or environmental conditions. Water level sensor indicates the presence of water in the cultivated field. Soil moisture sensor has more contributed for Paddy and wheat use less water to grow a crop to increase yield and quality. The data collected from the Water level sensor and soil moisture sensors are sent to LabVIEW software through wireless sensor network. If the data across the limit range, without any delay a message can be send to concern person by GSM modem. We must prevent Paddy and wheat diseases for increasing the quantity and quality. The diseases which often affect the Paddy are Zinc deficiency and Mycorellosiellaoryzae, in wheat, stripe rust and Barley yellow dwarf virus. The symptoms of Zinc deficiency diseases are small round, dark spots to oval sopts with gray or white center.

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Mycorellosiellaoryzae symptoms are long narrow lesions with white center and brown boarders. Stripe rust of wheat disease symptoms are rust pustules are yellow and arranged into long conspicuous stripes. Barley yellow dwarf virus disease symptoms are stunted, poorly tillered across a field. The diseased images of paddy and wheat are acquired by wireless IP camera. The acquired image is having some kind of noise namely salt and pepper noise. Median filter is the most popular method for removing salt and pepper noise [3]. After preprocessing statistical features are extracted using GLCM and mean, standard deviation, kurtosis and skewness. The results of the feature extraction are given as an input to the classifiers. In this paper, Support Vector Machine (GRBF) and K- Nearest Neighbor (KNN)is employed to detect the diseases.
The rest of this paper is structured as follows section. In Section 2 Related work, Section3 describes the materials and methods in brief. Experimental results and discussion are given in Section 4. Section 5 outlines the conclusion obtained from the study.

II RELATED WORK

SantanuPhadikar et al. [4] proposed a rice diseases classification using feature selection and rule generation techniques. This paper focused on classifying from the infected regions in the rice plant image. Symptoms of the diseases colour, shape and position of the infected portion and extracted by developing novel algorithms. Mohammad Ashiklqbal Khan et al. [5] proposed a neck blast disease influences grain yield and quality traits of aromatic rice. The neck blast disease increased grain sterility percentages, reduced grain size, yield and quality traits at seeds. The transmission of a blast pathogen from the branches to the seed is very poor. MitsuroHyakumachi et al. [6] proposed a novel method for controlling rice blast disease using fan – forced wind on paddy fields. Rice blast disease is one obstacle of rice producing countries. The effects of fan – forced wind on the incidence of rice blast disease were studied in two successive seasons. Electric fan and wind fan set on the ridge of paddy field.

VeeraRabhavuluBitra et al. [7] proposed an effect of wheat grass powder on aluminiuminduced Alzheimer's disease in Wistar rats. This paper out of the effect of wheat grass on an aluminium induced Alzheimer's disease. This study clearly demonstrated the benetical effects of wheat grass the shows good antioxidant properties. Stefano Sforza et al., [8] proposed a genetic and environmental factors affecting pathogenicity of wheat as related to celiac disease. This paper explains the gluten proteins are the basis of the theological properties of wheat derived products such as bread and pasta. The results demonstrated a very high variability in the amount of pathogenic peptides producer of different lines. Jose A. Lopez et al. [9] proposedthe economics of foliar fungicide applications in winter wheat in Northeast Texas. This paper among plant pathogenic organisms, fungi are a major reason for crop losses around the world and have a significant impact on yield and quality.

Francisco G. Montoya et al., [10] proposed an a monitoring system for intensive agriculture based on mesh networks and the android system. One of the most important changes in the southeast Spanish lands is the switch from traditional agriculture to agriculture based on the exploitation of intensive farmlands. For this type of farming it is important to use techniques that improve plantation. Web applications, database and advanced mobile system to facilitate real time data acquisition for effective monitoring. Deqin Xiao et al. [11] integrated soil moisture and depth sensor for paddy fields. This paper reports the development of a wireless, integrated, frequency domain soil moisture sensor for paddy fields. This soil sensor is able to measure soil moisture content and water depth at the same time and tranismit the collect data wirelessly to target receiver.

Changying Li et al. [12] proposed a development of software for spectral imaging data acquisition using LabVIEW. This paper presents the design and implementation of a data acquisition program using LabVIEW for a liquid crystal tunable filter based spectral imaging system (900-1700nm). The image acquisition process, modeled by a finite state machine was implemented in the LabVIEW to control the spectral imaging system to collect hyperspectralof multispectral images. This program is a useful data acquisition tool for the filiter – based spectral imaging system.

Antonio-Javier Garcia-sanchez et al., [13] proposed a wireless sensor network deployment for integrating video-surveillance and data-monitoring in precision agriculture over distributed crops. Crop monitoring in precision agriculture may be achieved by a multiplicity of technologies, however the use of wireless sensor network result in low-cost and low-power consumption deployments by intruders (human or animals) and insufficient control of the production process. The only cost-effective technology employed is IEEE 802.15.4, and it efficiently integrates crop data acquisition, data transmission to the end-user and video-surveillance tasks. M. Mohammad El-Basioni et al., [14] proposed a precision farming solution in Egypt using the wireless sensor network technology. This paper gives an overview of the wireless sensor network and its application in precision farming, and its importance for improving the agriculture in Egypt.

YAO Qing et al. [16] proposed an Automated Counting of Rice Planthoppers in Paddy Fields Based on Image Processing. This paper describes a handheld device for easily capturing plant hopper images on rice stems and an automatic method for counting rice plant hoppers based on image processing. The handheld device consists of a digital camera with WiFi, a smartphone and an extendable pole. For the counting of plant hoppers on rice stems of detection is a Support Vector Machine (SVM) classifier based on the histogram of oriented gradient features.

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A nearest neighbour approach to the simulation of spread of barley yellow dwarf has been proposed by T.J. Chaussalet et al. [18]. In this paper, virus spread is described by the probability of a plant becoming infected conditioned on the number of infected plants neighbouring it. This has the advantage that the influence of aphid movement can be incorporated into the definition of the probability of a neighbour becoming infected.

III MATERIALS AND METHOD

A Soil moisture and Water level sensor

Soil moisture sensor consists of probe, sensor acquisition module, communication module, processor module and power supply module. This soil sensor sensing soil moisture [1]. At the same time water level sensor senses the water in the field. These two sensors are placed at the paddy and wheat field, sensor output is connected to WSN node. Several WSN nodes connected one WSN gateway using Wireless Sensor Network (mesh network topology). This WSN gateway connected to LabVIEW through serial communication. The main advantages WSN modules are low power consumption, low cost and long distance data communication. In LabVIEW, serial communication can be done using VISA tool. To initialize the program, we have to set the baud rate, data bit, parity, and stop bit.

Leaf sample collection

The Paddy samples are used in this research were collected from a Uppupalayam, Namakkal district in Tamil Nadu, India. Moreover 200 samples collected for investigation in this research. (100 Zinc deficiency and 100 Mycorellosiellaoryzae), 110 training samples and 90 testing samples. The wheat samples used in this research were collected from a Indur, Maharashtra in India. More the 150 samples collected for stripe rust of wheat and barley yellow dwarf virus diseases. The complete detection methodology is shown in the figure 1 and it is described in the following subsections.

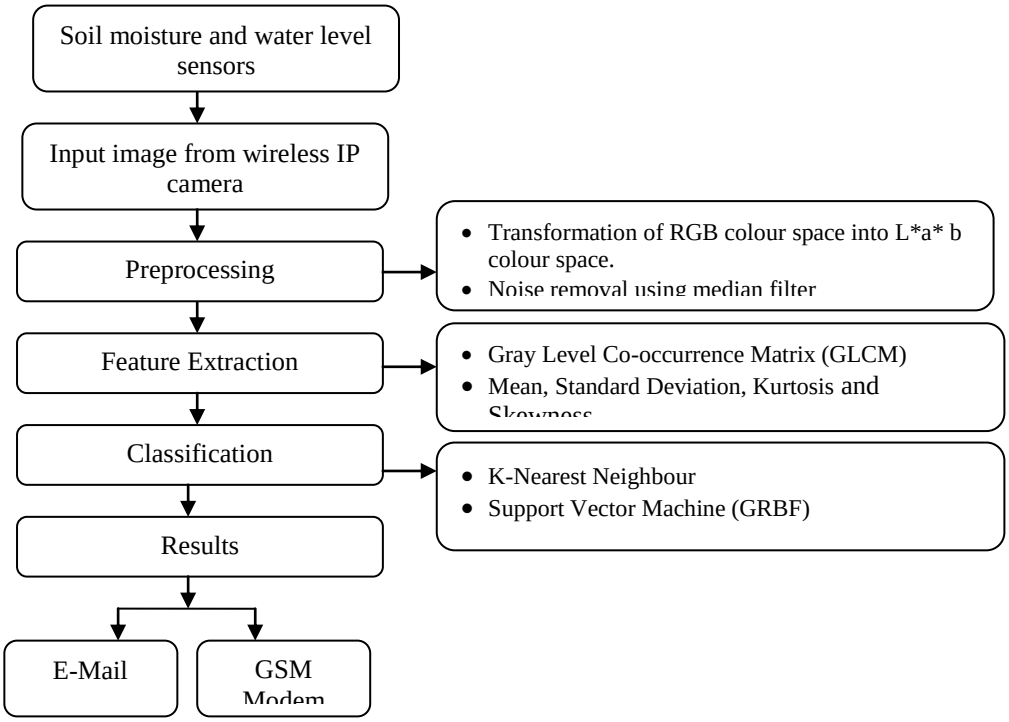

Figure 1. Block diagram of proposed approach

B. Image acquisition

A LabVIEW IMAQ Vision system was applied to acquire the paddy and wheat images through wireless IP camera. This camera capture a video using IMAQ AVI using file path tool box, IMAQ vision acquisition tool box. And it was converted into a number of frames using IMAQ AVI read tool box.

Median filter

The image acquired by camera having many kinds of noise. These noises are removed using median filter. Median filter is a nonlinear filter which replaces the center pixel value by the median of the gray levels in the image area enclosed by the filter. LabVIEW median

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filter tool box using removal of noise. The image obtained by the IP wireless camera is an RGB color component; it is a device-dependent color space. To find the disease in the images, they had to be transferred to the device-independent color space. In the device-dependent color space, the resultant color depends on the equipment employed to produce it, whereas in a device-independent color space, the coordinates specify the color and produce the same color regardless of the device used to draw it. Therefore, L*a*b*was developed as the device-independent color space transformation.

C *Feature Extraction*

Texture is one of the important characteristics used in identifying objects or regions of interest in an image. Texture contains important information about the structural arrangement of surfaces. The textural features based on gray-tone spatial dependencies have a general applicability in image classification. Textural features contain information about the spatial distribution of tonal variations within a band. In this paper, texture features are extracted using Grey Level Co-occurrence Matrices (GLCM).

TABLE I
EXTRACTED FEATURES

GLCM features	Formula	Statistical features	Formula
Contrast	$\sum_{i,j} \lvert i-j \rvert^2 p(i,j)$	Mean	$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$
Energy	$\sum_{i,j} p(i,j)^2$	Standard Deviation	$s = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2}$
Entropy	$\sum_{i,j} p(i,j) log_2 p(i,j)$	Kurtosis	$k = \frac{\mathrm{E}(x-\mu)^4}{\sigma^4}$
Homogeneity	$\sum_{i,j} \frac{p(i,j)}{1+\lvert i-j \rvert}$	Skewness	$s = \frac{\mathrm{E}(x-\mu)^3}{\sigma^3}$
Correlation	$\sum_{i,j} \frac{(i-\mu i)(j-\mu j)p(i,j)}{\sigma_i \sigma_j}$		

D Classification

Classification is the final step of disease identification. In this paper Support Vector Machine and Nearest Neighbour classifier is used.

E Support Vector Machine (GRBF)

The Support Vector Machine (SVM) is a widely used for classification and regression analysis. It is a supervised learning models associated with learning algorithms that analyze data and recognize the patterns. It was first introduced in the1992 by Boser, Guyon, and Vapnik (1992). The initial form of SVMs is a binary classifier where the output of learned function is either positive or negative. An input space represented by $X = x_1, x_2 \ldots . x_d$ is classified to output space, which is represented by $C_1, C_2, \ldots C_j$. To classify the data in input space, SVM tries to find the optimal separating hyperplane among all possible separating hyper planes. So, it maximizes the margin and obtains good generalization ability. A separating hyperplane is a linear function that can separate the training data into two classes (Class1=+1 and Class2=−1) in the separable feature space, as shown in Figure 2

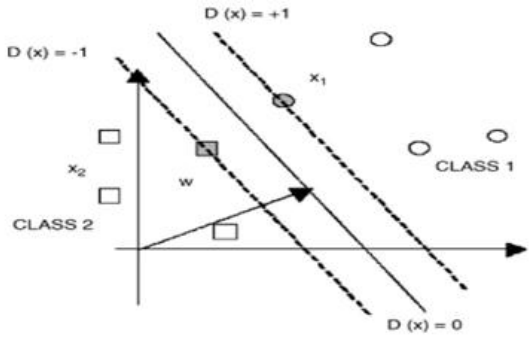

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Figure 2. SVM classification

The following function describes a separating hyperplane function

$$D(x) = (\omega * x) + \omega_0 \quad \text{---------- (1)}$$

All separating hyperplanes must satisfy the following equation:

$$Y_i[(\omega * x_i) + \omega_0] \geq 1 \quad i = 1, \ldots . n \text{ -------- (2)}$$

In this paper we used the kernel function while developing SVM model. Gaussian kernels are used to modify the input space into high dimensional feature space. The kernels having the following equation.

$$K(x_i, x_j) = e^{-||x_i - x_j||^2/2\sigma^2} \text{ (Gaussian radial basis function kernel) ----- (3)}$$

In this paper, Gaussian radial basis function kernel function is used.

F K-Nearest Neighbors classification method (KNN)

The KNN classification algorithm is a supervised method with a desirable computational speed along with the acceptable classification accuracy. The KNN-based classifier does not require the train stage and is based on a simple theory and mathematics. The structure of the KNN classifier imposes lower computational burden.

In order to formulate the KNN classification algorithm, suppose that the pair $\left(x_i, \delta(x_i)\right)$ contains the feature vector x_i and its corresponding label $\delta(x_i)$ where $\delta \in \{1,2, \ldots . , n\}$ and $i = 1,2, \ldots . , N$ (n and N are the number of classes and the number of train feature vectors, respectively). For an arbitrary feature vector x_i, calculation of a defined distance between this feature and the feature vector x_j is possible as follows,

$$d(i, j) = f(X_i, X_j) \quad \text{---------- (4)}$$

Where $f(X_i, X_j)$ is a scalar distance function. For instance, $f(X_i, X_j)$ can be defined as

$$\begin{cases} \text{(a) } f(X_i, X_j) = (X_i - X_j)^T \sum (X_i - X_j) \\ \text{(b) } f(X_i, X_j) = (\sum_{k=1}^{p} \left(X_i(k) - X_j(k)\right)^r)^{1/r} \\ \text{(c) } f(X_i, X_j) = \frac{1}{p} \sum_{k=1}^{p} abs(X_i(k) - X_j(k)) \end{cases} \text{---------- (5)}$$

Where the first term of the Eq. (5) called generalized distance and for the weight matrix $\sum = 1$ the famous Euclidean norm will be achieved. While the second term of the Eq. (5) is called Minkovski distance of degree r and for $r = 2$, again the Euclidean distance appears. The third term of Eq. (5) is called the City Block distance and is used in many pattern recognition cases. If the distance vector $D(i)$ is defined by following equation

$$D(i) = \{d(i, j) | i = 1,2, \ldots , N_{train}\} \quad \text{---------- (6)}$$

By sorting the $D(i)$ vector in an ascending fashion, and choosing the first K elements (which is called K nearest neighbors) as follows

$$D_N(i) = sort\left(D(i)\right) \quad \text{---------- (7)}$$

Asending

$$V = \{\delta(D_N(i)(1)), \ldots , \delta(D_N(i)(K))\} \quad \text{---------- (8)}$$

According to the KNN algorithm, the test feature xi belongs to the class with the major votes in the K-nearest vote vector V. In order to determine the optimum K corresponding to the best accuracy, a simple way is to alter the K from 1 to a large enough value (in this paper k=10) and choosing the K for which the best accuracy is obtained for all test features.

IV RESULTS AND DISCUSSION

In this paper, water level sensor and soil moisture sensor values are sending to WSN gateway through WSN node. The acquired result is higher or lower than the set point value, this information immediately send to the concerned person through message and Gmail. Water level sensor and soil sensor values are acquired in the WSN node and this information send to concerned person via message are shown in the figure 3.

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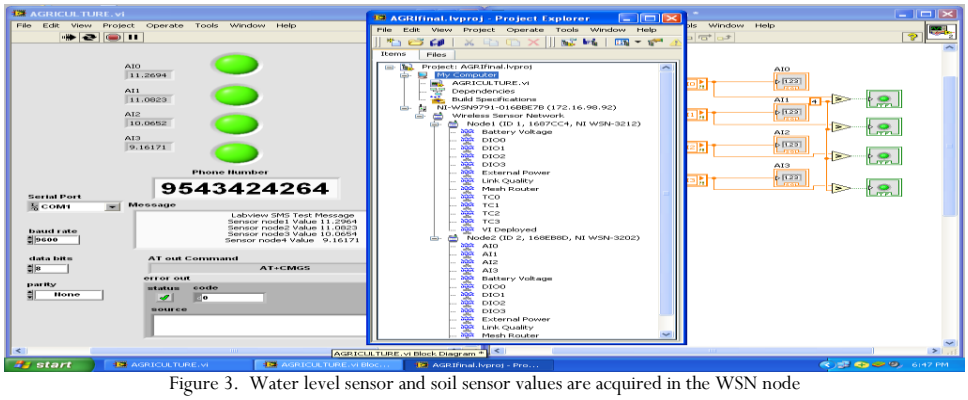

Figure 3. Water level sensor and soil sensor values are acquired in the WSN node

The paddy and wheat images are acquired using wireless IP camera. Moreover 200 samples of each diseases are collected. In this paper, Zinc deficiency and its gray image and Mycorellosiellaoryzae of paddy image and its gray image are shown in figure 4 and 5. Stripe rust and its gray image and Barley yellow dwarf virus attacked wheat image and its gray image is shown in figure 6 and 7.

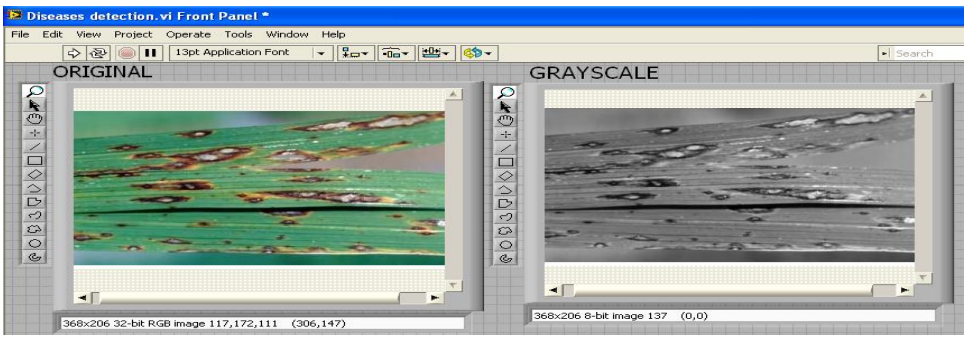

Figure 4. Zinc deficiency paddy and its gray image

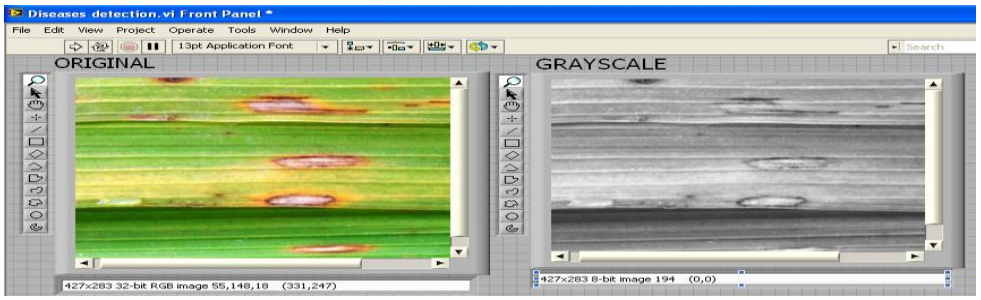

Figure 5. Mycorellosiellaoryzae of paddy and its gray image

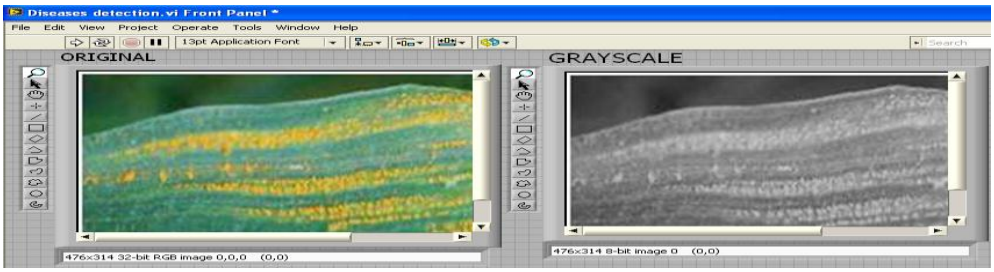

Figure 6. Mycorellosiellaoryzae of paddy and its gray image

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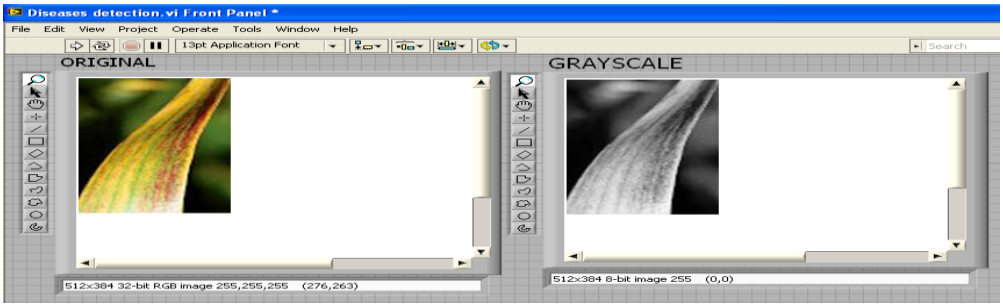

Figure 7. Barley yellow dwarf virus attacked wheat and its gray image

The acquired image is having some kind of noise due to transmission. This noise is removed using median filter. The texture features are extracted for the preprocessed image using GLCM and mean, standard deviation, kurtosis and skewness. The feature extraction results are shown in table 2 to table 11.

TABLE II

GLCM FEATURES FOR NORMAL PADDY

S. No	Entropy	Contrast	Correlation	Energy	Homogeneity
IMAGE 1	6.8403	0.0673	0.9875	0.5702	0.9732
IMAGE 2	6.3220	0.0783	0.9862	0.4031	0.9762
IMAGE 3	6.8293	0.582	0.9858	0.4830	0.9763
IMAGE 4	6.2015	0.0341	0.9881	0.5165	0.9832

TABLE III

MEAN, STANDARD DEVIATION, KURTOSIS AND SKEWNESS FEATURES FOR NORMAL PADDY

S. No	Mean	Standard Deviation	Kurtosis	Skewness
IMAGE 1	149.3516	3.0039	684.2631	-11.0540
IMAGE 2	148.5908	3.7355	690.5899	-12.7127
IMAGE 3	148.7042	3.5482	687.6249	-12.0819
IMAGE 4	148.9201	3.8028	694.8445	-12.5141

TABLE IV

GLCM FEATURES FOR ZINC DEFICIENCY

S.No	Entropy	Contrast	Correlation	Energy	Homogeneity
IMAGE 1	7.8149	0.6178	0.9085	0.0731	0.8224
IMAGE 2	7.8146	0.6171	0.9078	0.0726	0.8219
IMAGE 3	7.8039	0.6133	0.9054	0.0619	0.8102
IMAGE 4	7.8152	0.6182	0.9088	0.0736	0.8235

TABLE V

MEAN, STANDARD DEVIATION, KURTOSIS AND SKEWNESS FEATURES FOR ZINC DEFICIENCY

S.No	Mean	Standard Deviation	Kurtosis	Skewness
IMAGE 1	160.3277	2.8723	72.3196	-2.6600
IMAGE 2	160.3270	2.8853	71.3006	-2.7650
IMAGE 3	160.3370	2.8053	74.3126	-2.5550
IMAGE 4	160.3290	2.8967	72.9854	-2.6168

TABLE VI

GLCM FEATURES FOR MYCORELLOSIELLAORYZAE

S.No	Entropy	Contrast	Correlation	Energy	Homogeneity
IMAGE 1	7.8037	0.6130	0.9052	0.0619	0.8101
IMAGE 2	7.8147	0.6174	0.9080	0.0729	0.8228

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S.No	Entropy	Contrast	Correlation	Energy	Homogeneity
IMAGE 3	7.8141	0.6165	0.9072	0.0721	0.8214
IMAGE 4	7.8138	0.6161	0.9069	0.7118	0.8210

TABLE VII

MEAN, STANDARD DEVIATION, KURTOSIS AND SKEWNESS FEATURES FOR MYCORELLOSIELLAORYZAE

S.No	Mean	Standard Deviation	Kurtosis	Skewness
IMAGE 1	160.3316	2.8677	75.6889	-2.5019
IMAGE 2	160.3308	2.8904	75.6991	-2.5010
IMAGE 3	160.3435	2.7841	76.3897	-2.4978
IMAGE 4	160.3455	2.7741	76.4298	-2.3697

TABLE VIII

GLCM FEATURES FOR STRIP RUST DISEASES

S.No	Entropy	Contrast	Correlation	Energy	Homogeneity
IMAGE 1	7.8136	0.6158	0.9065	0.7115	0.8208
IMAGE 2	7.8042	0.6138	0.9059	0.0629	0.8109
IMAGE 3	7.8151	0.6180	0.9085	0.0734	0.8233
IMAGE 4	7.8143	0.6169	0.9077	0.0725	0.8218

TABLE IX

MEAN, STANDARD DEVIATION, KURTOSIS AND SKEWNESSS FEATURES FOR STRIP RUST DISEASES

S.No	Mean	Standard Deviation	Kurtosis	Skewness
IMAGE 1	160.3352	2.8574	74.3024	-2.5010
IMAGE 2	160.3371	2.8064	74.3148	-2.5561
IMAGE 3	160.3378	2.7895	74.3356	-2.5493
IMAGE 4	160.3475	2.7234	76.1155	-2.3986

TABLE X

GLCM FEATURES FOR BARLEY YELLOW DWARF VIRUS ATTACKED WHEAT

S.No	Entropy	Contrast	Correlation	Energy	Homogeneity
IMAGE 1	7.8137	0.6160	0.9067	0.0717	0.8209
IMAGE 2	7.8153	0.6184	0.9091	0.0739	0.8237
IMAGE 3	7.8029	0.6119	0.9041	0.0607	0.8089
IMAGE 4	7.8135	0.6155	0.9063	0.7111	0.8202

TABLE XI

MEAN, STANDARD DEVIATION, KURTOSIS AND SKEWNESS FEATURES FOR BARLEY YELLOW DWARF VIRUS ATTACKED WHEAT

S.No	Mean	Standard Deviation	Kurtosis	Skewness
IMAGE 1	160.3339	2.8854	75.4926	-2.4953
IMAGE 2	160.3482	2.7124	76.1004	-2.2986
IMAGE 3	160.3291	2.8996	72.9794	-2.6102
IMAGE 4	160.3288	2.8922	72.9752	-2.6098

The above feature extraction results are given as an input to the classifiers. In this paper KNN and SVM (GRBF) classifiers are used. The performance metrics are used for evaluating the classifiers. Cross Validation and confusion matrices are used to evaluate the performance of the classifiers. In this paper a 10 fold cross validation is used.

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TABLE XII
A CONFUSION MATRIX

Actual Value	Predicted Value	
	Negative	Positive
Negative	TN	FN
Positive	FP	TP

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN} \qquad Specificity = \frac{TN}{TN + FP}$$

$$Sensitivity = \frac{TP}{TP+FN} \qquad PositivePredictiveValue\ (PPV) = \frac{TP}{TP+FP}$$

$$NegativePredictiveValue\ (NPV) = \frac{TN}{TN + FN}$$

TN (True Negative) – Correct Prediction as normal
FN (False Negative) – Incorrect prediction of normal
FP (False Positive) – Incorrect prediction of abnormal
TP (True Positive) – Correct prediction of abnormal

The overall effectiveness of the system can be measured by using accuracy. The accuracy which computes the proportion between correctly classified samples and total samples. Sensitivity and specificity are the most widely used statistics to describe a diagnosis test. Sensitivity measures the proportion of actual positives which are correctly identified as positives. Specificity measures the proportion of actual negatives which are correctly identified. (i,e) The sensitivity and specificity are used to approximate the probability of the positive and negative label being true. Positive predictive value indicates the positive results which were correctly predicted.

TABLE XIII
PERFORMANCE METRICS FOR SVM (GRBF) AND KNN FOR ZINC DEFICIENCY

Name of the classifier	Errors	FN	FP	TP	TN	PPV	NPV	ACCURACY (%)	SPECIFICITY (%)	SENSITIVITY (%)
KNN	31	13	18	187	182	91.21	93.3	92.25	91	93.5
SVM (GRBF)	27	11	16	189	184	92.19	94.93	93.25	92	94.5

TABLE XIV
PERFORMANCE METRICS FOR SVM (GRBF) AND KNN FOR MYCORELLOSIELLAORYZAE

Name of the classifier	Errors	FN	FP	TP	TN	PPV	NPV	ACCURACY (%)	SPECIFICITY (%)	SENSITIVITY (%)
KNN	27	11	16	189	184	92.19	94.35	93.25	92	94.5
SVM (GRBF)	25	10	15	190	184	92.6	94.87	93.75	92.5	95

TABLE XV
PERFORMANCE METRICS FOR SVM (GRBF) AND KNN FOR STRIPE RUST DISEASE

Name of the classifier	Errors	FN	FP	TP	TN	PPV	NPV	ACCURACY (%)	SPECIFICITY (%)	SENSITIVITY (%)
KNN	33	14	19	186	181	90.73	92.8	91.75	90.5	93
SVM (GRBF)	30	13	17	187	183	91.66	93.36	92.5	91.5	93.5

TABLE XVI
PERFORMANCE METRICS FOR SVM (GRBF) AND KNN FOR STRIPE RUST DISEASE

Name of the classifier	Errors	FN	FP	TP	TN	PPV	NPV	ACCURACY (%)	SPECIFICITY (%)	SENSITIVITY (%)
KNN	26	11	15	189	185	92.64	94.38	93.5	92.5	94.5
SVM (GRBF)	23	10	13	190	187	93.5	94.92	94.25	93.5	95

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The experimental results presented in table 13, 14, 15 and 16 KNN and the SVM (GRBF). As observed by the experimental results, the SVM (GRBF) outperforms the KNN techniques in terms of classification performance such as accuracy, specificity, sensitivity, positive predictive value and negative predictive value. The system accuracy measures the effectiveness of the classifier. In this present study, SVM (GRBF) has a higher accuracy than KNN classifier. This indicates that the SVM (GRBF) has a better generalization capability for the classification four types of paddy and wheat diseases. Water level sensor and soil sensor values are acquired in the WSN node and disease detection results using SVM (GRBF) and KNN results are sent to concern person via Gmail.

V CONCLUSION

In this paper, paddy and wheat diseases are identified with the help of SVM (GRBF) and KNN classifiers. Texture features such as GLCM and mean, standard deviation, kurtosis and skewness features are extracted. Water level sensor and soil sensor are sends the information to WSN gateway through WSN node. The disease detection results and Water level sensor and soil moisture sensor results are sent to concerned person through GSM and the data from both the sensors and details of detected diseases are also converted to excel sheet by every one hour. This excel sheet is sent to concern people through E – mail.

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Prioritization Of Risks In Bicycle Supply Chain Using Multi Criteria Decision Making

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Abstract- *Recent supply chain management optimization practices, while reducing costs and leaning inventory levels, have left companies with unprecedented levels of risk. Many companies have recognized this and are now undertaking supply chain risk management programs. This work deals with the application of Multi Criteria Decision Making (MCDM) techniques such as Analytic Hierarchy Process (AHP), Technique for Order Preference by Similarity to Ideal Situation (TOPSIS) and Fuzzy Analytic Hierarchy Process (FAHP) for prioritization of eight supply chain risks identified through literature and the expert opinion for a bicycle manufacturing company. A comparative analysis to know the certainty of decision making is done between AHP, TOPSIS and FAHP. The usefulness of these multi criteria decision making for this case study indicates that it can be applied to assist decision makers in prioritizing the risks in the supply chain.*

Keywords: Supply chain Management, Risk Management, AHP, TOPSIS, FAHP

I INTRODUCTION

In today's world of globalization, it is very difficult to build strong supply chains to gain advantage over their competitors to offer better value to customers. Even-though, careful attention is paid by the organizations in designing the supply chain network, often the designed supply chains are facing critical risks due to complex and dynamic activities. A supply chain can briefly be described as a network of all the individual enterprises that collaborate to produce a product to satisfy the customer needs. The objective of the supply chain is to support the flow of material, information and knowledge from the original supplier through multiple production and logistics operations to the ultimate consumer. According to Kajuter [7], Supply Chain Risk Management (SCRM) is responsible for the implementation of collaborative and structured approach to manage both every day and exceptional risks in the supply chain with the objective of reducing vulnerability and ensuring the achievement of the supply chain goals. Supply chain risk management seeks to establish mitigate and contingent strategies for how to deal with the risks and their potential impact on the supply chain. For this the first step is to identify and prioritize the critical risk factors. The objective of this study is to identify various risks in the bicycle supply chain and rank them using different Multi Criteria Decision Making (MCDM) techniques.

II LITERATURE REVIEW

This section deals briefly the review of literature related to risks in supply chain and Multi criteria Decision Making (MCDM) techniques which support the decision-makers (DMs) in evaluating a set of alternatives. Depending upon the situations, criteria have varying importance and there is a need to weigh them.

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A. Supply Chain Risk

Enkel et al [3] explained diverse risk management, a comprehensive risk management method will minimize various inherent risks in customer integration with company's examples. Vanany et al [19] surveyed supply chain risk management (SCRM) related literature for the period 2000 to 2007. The author analyzed those papers and classified SCRM into five categories. They also looked at the papers in terms of the industry sectors, the types of risks, the risk management process or strategies addressed, and the unit of analysis. Aundhe and Mathew [1] explained the effect of risks due to offshore IT outsourcing using grounded theory. The key area that contributing the risks according to them were nature of contract, nature of client and relationship maturity. Salunke et al [14] identified the risks involved in the reverse supply chain using survey. After the analysis the key risks are identified six sigma tools are used to mitigate the major risks in reverse supply chain.

Wu [21] analyzed the potential risk sources, and the characteristics of supply chain risk assessments in light with the existence of these risks. Yuen et al [23] proposed the Pre-ERM Model for supply chain risks at enterprise level. This classifies the enterprise risks under four pillars namely. Zhang and Li [25] suggested that more attention should be paid to the studies related to the formation mechanism of supply chain risk, models of default correlation and risk assessment in supply chain. Liu [9] used AHP to establish a risk assessment index system and also classified supply chain risk according to supply chain risk sources.

Mahalik[10] focused on the analytical frame work for analyzing uncertainty and risk in SCM and suggested a priority of risk using Analytic Network Process. Zandhessami and Savoji[24] explained risk management in supply chain by DEMATEL technique to analyze the severity of risks relating to each other in supply chain. The purpose of Tang and Musa [17] work is to concentrate on the development of research in SCRM. Related journals in the fields of supply chain has been reviewed, classified the potential risks and also to identified some research gaps.

To manage integrated supply chain information and forecast the risks, Li sha and Gu[8] designed the base functions for the early warning system according to its desires. Feng et al [4] gave a framework for mitigating disruptions in the supply chain. The work analyzes the strategies for dealing with disruption risks and provides directions for future research in the supply chain risk management. Vilko et al [20] assessed the information exchange and its risks in a supply chain. The authors investigated the different supply chain actors in a systematic way and concluded that control and visibility over the supply chain is dependent on cognitive barriers and internal organizational factors. The authors also states that risk management practices also dependent upon contingent factors that drive changes in supply chains.

Srinivasan et al [16] studied the relationship between partnership quality of buyer supplier and supply chain performance through a survey, due to supply, demand and environment risks. Yang et al [22] developed a comprehensive quantitative risk evaluation and mitigation model in global supply chains. The author identified four risks including supply, operational, demand and financial risks and modeled as probabilistic distributions of the outcome. Heckmann[5] reviewed the prevailing quantitative methods for Supply chain risk Management. This research helps in defining the Supply chain related risks and its measurement.

B. Multi Criteria Decision Making

Opricovic and Tzeng[11]uses different normalization methods in VIKOR and TOPSIS to study the different effects due to normalization with a numerical illustration. Vaidya and Kumar [18]gives an extended overview about the applications of AHP over the years and its growth in different fields referring almost 150 various reputed journals. Jahanshahloo et al [6] proposed new method for DMUs ranking using TOPSIS with interval data. Ramkumar et al [13] proposed a model for selection of TPLs network with an objective to create a favorable environment for improving coordination and integration using AHP and TOPSIS approach. A comparative analysis on decision-making certainty between the classical AHP and TOPSIS approach were also discussed.

Azadeh et al [2] presented a robust decision-making methodology based on Fuzzy Analytical Hierarchy Process (FAHP) for evaluating and selecting the appropriate software package. The FAHP is used to evaluate existing alternatives based on the proposed criteria for choosing the proper simulation software. Pires et al [12] had done a study to integrate the AHP and TOPSIS for alternative screening and ranking to help decision makers in a Portuguese waste management system. Zhang et al [26] analyzed the factors of supply risks in a systematic way and constructed the framework for calculating supply risk assessment index using hybrid weighting method and AHP.

One of the greatest challenges of supply chain is the uncertainty associated within it. This uncertainty allows room for numerous risks in the supply chain which poses challenge for forecasting and planning products. In order to improve the supply chain, a thorough analysis of risks and the means to minimize risks must be given permanent attention. This work mainly focus on identification, and prioritization of risk related to bicycle manufacturing supply chain.

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III METHODOLOGY

This section explains the methodology followed in this work to identify the critical risks in the bicycle supply chain. MCDM techniques support the decision-makers (DMs) in evaluating a set of alternatives. In MCDM, a problem is affected by several conflicting factors in selection, for which a manager must analyze the tradeoff among the several criteria. The Analytic Hierarchy Process (AHP) is a structured technique for dealing with complex decisions. AHP helps decision makers to find one that best suits their goal and their understanding of the problem. Analytic Hierarchy Process (AHP) is one of the most widely used tool since its invention, has been a tool at the hands of decision makers and researchers. TOPSIS (Technique for order preference by similarity to an ideal solution) is being used by several practitioners and researchers for solving various MCDM. TOPSIS approach is based on an aggregating function representing closeness to the reference point. The basic principle is that the chosen alternative should have the shortest distance from the ideal solution and the farthest distance from the negative-ideal solution.

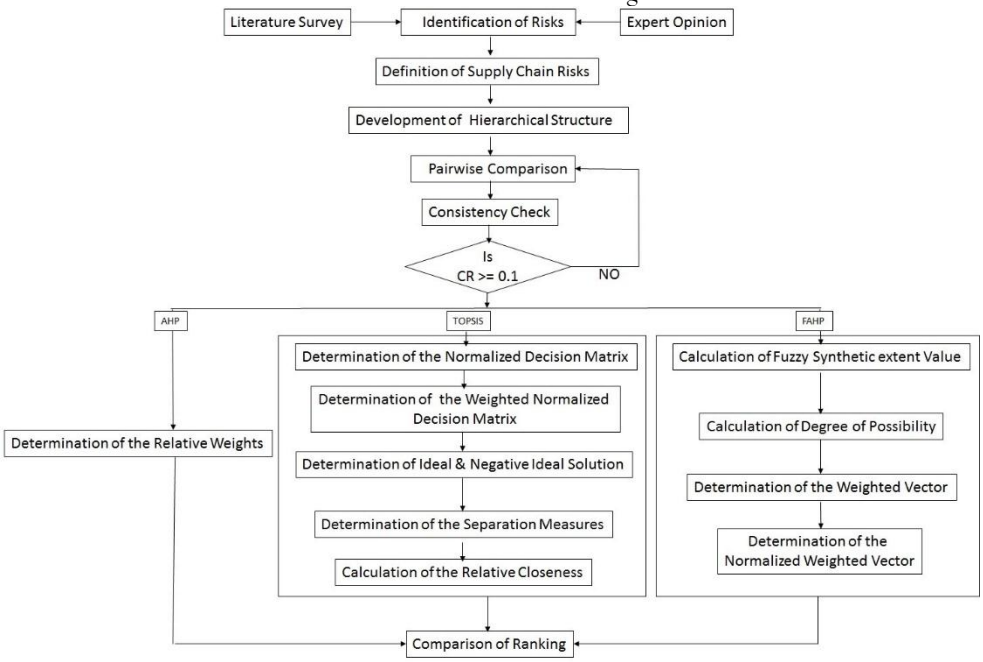

Figure 1: Schematic Diagram for Prioritizing the Supply Chain Risk

The fuzzy AHP technique can be viewed as an advanced analytical method developed from the traditional AHP. Decision makers judgments, fuzziness and vagueness existing in many decision-making problems may contribute to the imprecise judgments of decision makers in conventional AHP approaches. The extension of Saatys theory, have provided evidence that fuzzy AHP shows relatively more sufficient description of these kind of decision making processes compared to the traditional AHP methods.
Figure 1 shows the sequence of steps to be followed in prioritizing the critical risks in the bicycle supply chain.

IV CASE STUDY

The developed model is applied to a bicycle manufacturing company located in southern part of India. A supply chain of particular brand is selected for implementation of the methodology shows in figure 1. In this case, eight risks in the supply chain are considered and prioritized.

A. Prioritization Using AHP

This section provides the steps needed to calculate the priority value to rank the supply chain risk using AHP for the case study considered.

1. Define Decision Criteria

Eight risks namely Supplier, Storage, Process, Demand, Information, Transportation, Finance and Environment were identified as the relevant risks for this case through literature and expert opinion. The definition of each risk is given below.

1. Supply Risk(SU) - All issues with the movement of materials into an organization, including sources, supplymarket conditions, constraints, limited availability, supplier reliability, lead times, material costs, delays, etc.,

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2. Storage Risk(ST) - Lack of care in maintaining quality, space lacking for storage.
3. Process Risk(PR) - Risks from product features, product mix, range, volumes, materials used and standardization.
4. Demand Risk(DE) - All aspects of customer demand, such as level of demand, variability, alternative products, competition and patterns of change.
5. Information Risk(IN) - Includes the availability of data, data transfer, accuracy, reliability, security of systems.
6. Transportation Risk(TR) - Movements of materials, including risks to the infrastructure, vehicles, facilities and loads.
7. Finance Risk(FI) - all money transactions, including payments, prices, costs, sources of funds, profit and general financial performance.
8. Environment Risk(EN) - Risks that are external to the supply chain.

2. Structuring the Hierarchical Model

This step involves building the AHP hierarchy model. Figure 2 shows hierarchy for this problem considered. The developed Hierarchy structure contains two levels: the goal and the risks.

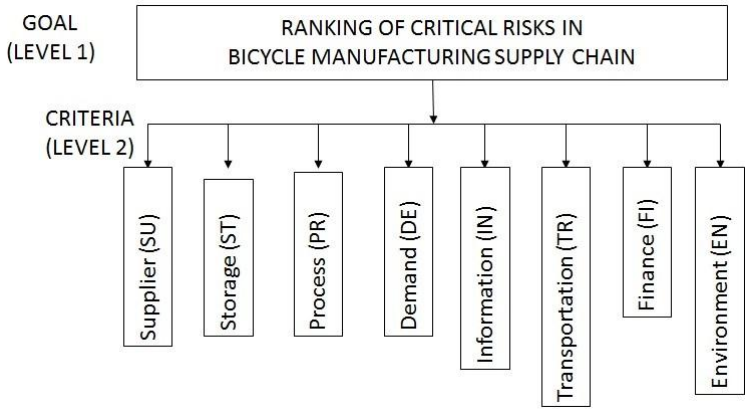

Figure 2: Hierarchy Structure for Prioritizing Supply Chain Risks

3. Pairwise Comparison

This step involves pairwise comparison of risks. Structured interview consisting of eight supply chain risks is used to collect the pair-wise comparison judgments from all evaluation team members. The function of the pairwise comparisons is to find the relative importance of the risks which is rated by the nine-point scale proposed by Saaty[15], as shown in Table 1. After obtaining the pairwise judgments, the next step is the computation of a vector of priorities or weighting of elements in the matrix.

Table 1

Relative Importance of the risks

Verbal judgment or preference Numerical	Rating
Extremely preferred	9
Very strongly preferred	7
Strongly preferred	5
Moderately preferred	3
Equally preferred	1
Intermediate values between two adjacent judgments (when compromise is needed)	2,4,6 and 8

4. Consistency Check

The consistency ratio (CR) is used to determine and justify the inconsistency in the pair-wise comparison made by the respondents. Based on Saaty's[15], empirical suggestion that a CR = 0.10 is acceptable. Table 2 shows the pair wise comparison of criteria. From the pair wise matrix, weighted sum vector and λ max values are calculated.

For calculating CR, equation (1) is used.

$$CI = \frac{\lambda \max - n}{n-1} \qquad (1)$$

Where, n is the number of criteria compared and RI is the index from standard table for the corresponding value of n. Here RI = 1.41

$$CR = \frac{CI}{RI} \qquad (2)$$

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Table 2
Pairwise Comparison Matrix of Main Criteria

Risks	SU	ST	PR	DE	IN	TR	FI	EN
SU	1	4	2	3	2	3	3	5
ST	0.25	1	0.33	0.33	0.5	0.5	0.5	0.33
PR	0.5	3	1	3	4	3	3	5
DE	0.33	3	0.33	1	2	2	3	2
IN	0.5	2	0.25	0.5	1	0.25	0.5	0.5
TR	0.33	2	0.33	0.5	4	1	3	4
FI	0.33	2	0.33	0.33	2	0.33	1	2
EN	0.2	3	0.2	0.5	2	0.25	0.5	1
Sum	3.44	20	4.77	9.16	17.5	10.33	14.5	19.83

λ max value found to be 8.83 and the CI value is computed as 0.119 using equation (1). From these values, CR value is calculated as 0.08 using equation (2) which is lesser than 0.1. So there exists consistency. This shows the judgment given by the respondents are consistent.

5. Determination of the Relative Weight

The relative weight of each risks is calculated by the row sum of the normalized pairwise comparison matrix. The result of prioritized risks and its weights are shown in Table 3.

Table 3
Priority Weights for Main Criteria with Rank

Risks	Local Weight	Rank
SU	0.26	1
ST	0.04	8
PR	0.23	2
DE	0.13	4
IN	0.06	7
TR	0.13	3
FI	0.08	5
EN	0.07	6

B. Prioritization Using TOPSIS

The following steps are followed to calculate weightage for prioritizing the supply chain risk for the case study considered using TOPSIS.

1. Formulating Normalized Decision Matrix

The normalized value R_{ij} is calculated using the equation (3).

$$R_{ij} = \frac{X_{ij}}{\sum_{i=1}^{m} X_{ij}}, i = 1,2,\ldots..,m;\ j = 1,2,\ldots.,n. \quad (3)$$

By using the values given in Table 2, the normalized value (R_{ij}) is calculated using equation (3) and the results are shown in Table 4.

1. Weighted Normalized Decision Matrix

The weighted normalized decision matrix Table 5 is obtained using equation (4).

$$V_{ij} = W_i * R_{ij},\ j = 1,2,\ldots.,J;\ i = 1,2,\ldots.,n \quad (4)$$

Where, W_i- Weight of the i^{th}criterion, $\Sigma^{m}_{i=1} W_i = 1$

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Table 4
Normalized Matrix

Risks	SU	ST	PR	DE	IN	TR	FI	EN
SU	0.0100	0.0402	0.0201	0.0301	0.0201	0.0301	0.0301	0.0502
ST	0.0025	0.0100	0.0033	0.0033	0.0050	0.0050	0.0050	0.0033
PR	0.0050	0.0301	0.0100	0.0301	0.0402	0.0301	0.0301	0.0502
DE	0.0033	0.0301	0.0033	0.0100	0.0201	0.0201	0.0301	0.0201
IN	0.0050	0.0201	0.0025	0.0050	0.0100	0.0025	0.0050	0.0050
TR	0.0033	0.0201	0.0033	0.0050	0.0402	0.0100	0.0301	0.0402
FI	0.0033	0.0201	0.0033	0.0033	0.0201	0.0033	0.0100	0.0201
EN	0.0020	0.0301	0.0020	0.0050	0.0201	0.0025	0.0050	0.0100

Table 5
Weighted Normalized Matrix

Risks	SU	ST	PR	DE	IN	TR	FI	EN
SU	0.0026	0.0016	0.0046	0.0039	0.0012	0.0039	0.0024	0.0035
ST	0.0007	0.0004	0.0008	0.0004	0.0003	0.0007	0.0004	0.0002
PR	0.0013	0.0012	0.0023	0.0039	0.0024	0.0039	0.0024	0.0035
DE	0.0009	0.0012	0.0008	0.0013	0.0012	0.0026	0.0024	0.0014
IN	0.0013	0.0008	0.0006	0.0007	0.0006	0.0003	0.0004	0.0004
TR	0.0009	0.0008	0.0008	0.0007	0.0024	0.0013	0.0024	0.0028
FI	0.0009	0.0008	0.0008	0.0004	0.0012	0.0004	0.0008	0.0014
EN	0.0005	0.0012	0.0005	0.0007	0.0012	0.0003	0.0004	0.0007

2. ***Determination of the Ideal and Negative Ideal Solution***

Ideal (A^*) and negative ideal (A^-) solutions are calculated using equations (5) and (6). Ideal Solution

$$A^* = \{V_1^*, V_2^*, ..., V_n^*\} \quad (5)$$
$$= Max_j V_{ij} \text{for all i}$$

Negative Ideal Solution

$$A^- = \{V_1^-, V_2^-, ..., V_n^-\} \quad (6)$$
$$= Min_j V_{ij} \text{for all i}$$

The calculated Ideal and Negative Ideal Solutions and shown in column 2 and 3 of Table 6.

3. Determination of the Separation Measures From Ideal and Negative Ideal Solutions

The separation of each alternative from the ideal solution (D^*_j) is calculated using equation (7) and separation of each alternative from the negative ideal solution (D^-_j) is calculated using equation (8). The computed values are given in column 4 and 5 in Table 6.

$$D_j^* = \sqrt{\left\{\sum_{i=1}^{n} \left(V_{ij} - V_i^*\right)^2\right\}}, \; j = 1,2,.....J \quad (7)$$

$$D_j^- = \sqrt{\left\{\sum_{i=1}^{n} \left(V_{ij} - V_i^-\right)^2\right\}}, \; j = 1,2,..J \quad (8)$$

4. Calculation of Relative Closeness to Ideal Solution

Relative closeness to the ideal solution (C_i^*) gives the score of each alternative. The relative closeness of the alternative with respect to $A^*$is given by equation (9).

$$C_j^* = \frac{D_j^-}{\left(D_j^* + D_j^-\right)}, \; j = 1,2,....J \quad (9)$$

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Relative closeness to the ideal solution is shown in the column 6 of Table 6 This gives the score for each supply chain risk.

Table 6
Separation Measure and Relative Closeness

Risks	A^*	A^-	D^*	D^-	C^*	Rank
SU	0.0026	0.0005	0.0012	0.0080	0.868878	1
ST	0.0016	0.0004	0.0079	0.0005	0.055361	8
PR	0.0046	0.0005	0.0027	0.0070	0.722828	2
DE	0.0039	0.0004	0.0057	0.0036	0.387934	4
IN	0.0024	0.0003	0.0077	0.0010	0.111761	7
TR	0.0039	0.0003	0.0060	0.0041	0.401968	3
FI	0.0024	0.0004	0.0072	0.0017	0.18746	5
EN	0.0035	0.0002	0.0077	0.0013	0.146596	6

C. Prioritization Using FAHP

The following steps are followed to obtain the rank the supply chain risk considered in the case using FAHP.

I Calculate Fuzzy Synthetic Extent Value

Table 7 shows the pairwise matrix for supply chain risk. The fuzzy synthetic extent value with respect to the i^{th}risk is defined by equation 10.

Table 7
Pairwise Comparison Matrix for FAHP

Risks	SU	ST	PR	DE	IN	TR	FI	EN
SU	1,1,1	3,4,5	1,2,3	2,3,4	1,2,3	2,3,4	2,3,4	4,5,6
ST	0.2,0.25,0.33	1,1,1	0.25,0.33,0.5	0.25,0.33,0.5	0.33,0.5,1	0.33,0.5,1	0.33,0.5,1	0.25,0.33,0.5
PR	0.33,0.5,1	2,3,4	1,1,1	2,3,4	3,4,5	2,3,4	2,3,4	4,5,6
DE	0.25,0.33,0.5	2,3,4	0.25,0.33,0.5	1,1,1	1,2,3	1,2,3	2,3,4	1,2,3
IN	0.33,0.5,1	1,2,3	0.2,0.25,0.33	0.33,0.5,1	1,1,1	0.2,0.25,0.33	0.33,0.5,1	0.33,0.5,1
TR	0.25,0.33,0.5	1,2,3	0.25,0.33,0.5	0.33,0.5,1	3,4,5	1,1,1	2,3,4	3,4,5
FI	0.25,0.33,0.5	1,2,3	0.25,0.33,0.5	0.25,0.33,0.5	1,2,3	0.25,0.33,0.5	1,1,1	1,2,3
EN	0.17,0.2,0.25	2,3,4	0.17,0.2,0.25	0.33,0.5,1	1,2,3	0.2,0.25,0.33	0.33,0.5,1	1,1,1

$$S_i = \sum_{j=1}^{m} M_{gi}^{j} \otimes \left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j} \right]^{-1} \quad (10)$$

For Example,

$$S_1 = \frac{\sum SU_{ij}}{SUM}$$

$$= \frac{(16,23,30)}{135.33,99.567,68.55} = 0.118,\ 0.231,\ 0.437$$

Similarly for other risks ($S2$,$S3$,…,$S8$) the Fuzzy Synthetic Value is calculated and are given in Table 8.

Table 8
Fuzzy Senthetic Extent Value

Risks	L	M	U
SU	0.118227	0.231001	0.085096
ST	0.021789	0.037663	0.085096
PR	0.12069	0.225979	0.423049
DE	0.062808	0.137261	0.27717
IN	0.027586	0.055239	0.126428
TR	0.080049	0.152327	0.291758
FI	0.036946	0.083696	0.175055
EN	0.038424	0.076833	0.158035

II Calculate Degree of Possibility of Each Pair

The degree of possibility of $M_2(l_2,m_2,u_2) >= M_1(l_1,m_1,u_1)$ is defined by equation (11) where x and y are the values on the axis of membership function of each risk.

$$V(M_2 >= M_1) = \sup[\min(M_x, M_y)] \quad (11)$$

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$$y >= x$$

This expression can be equivalently written by equation (12) given below:

$$V(M_2 \geq M_1) = \begin{cases} 1, if\ (m_2 \geq m_1) \\ 0, if\ (l_1 \geq u_2) \\ \dfrac{l_1 - u_2}{(m_2 - u_2)(m_1 - l_1)}, otherwise \end{cases} \quad (12)$$

Check the condition by comparing for two risk values S_1 and S_2 using equation (12), the values for S_1 compared with all S_i is [1,1,1,1,1,1,1] . Similarly for all the combinations the condition is verified using equation (11) and (12).

III Determination of Weighted Vector

The degree possibility for a convex fuzzy number to be greater than k convex fuzzy number M_i(i= 1,2,3,4, ,k) can be defined by $V(M >= M_1, M_2, M_3, \ldots\ldots, M_k) = \min V(M >= M_i), i = 1,2,3,\ldots.k.$

$d'(A_i) = \min V(S_i \geq S_k)$ For k=1,2,3,……., n;k≠i. (13)

Then the weight vector is given by equation (14);

$$W' = (d'(A_1), d'(A_2), \ldots\ldots\ldots\ldots, d'(A_n))^T \quad (14)$$

Where A_i(i=1,2,3,……,n)

Cal-culate the minimum of $(S_1 >= S_i)$ using equation (13), $\min V(S_1 >= S_2) = 1$ Similarly on comparing all S_i for all min value, W is obtained as W = [1, 0, 1, 0.63, 0.024, 1, 0.489, 0.355]

IV Determination of Normalized Weighted Vector

The normalized weight vector are obtained by equation (15).

$$W = (d(A_1), d(A_2), \ldots\ldots, d(A_n))^T, for i = 1,2,\ldots,n \quad (15)$$

W (Normalized) = [0.22, 0, 0.22, 0.14, 0.005, 0.22, 0.11, 0.08]

Table 9
Priority Weights for Main Criteria with Rank using FAHP

Risks	Local Weight	Rank
SU	0.22	1
ST	0	8
PR	0.22	2
DE	0.14	4
IN	0.005	7
TR	0.22	3
FI	0.11	5
EN	0.08	6

Table 10
Comparison Of Priority Weights Of AHP, TOPSIS and FAHP

Sl.No	Risks	AHP	TOPSIS	FAHP	Rank
1	SU	0.26	0.8689	0.22	1
2	PR	0.23	0.7228	0.22	2
3	TR	0.13	0.4020	0.22	3
4	DE	0.13	0.3880	0.14	4
5	FI	0.08	0.1875	0.11	5
6	EN	0.07	0.1466	0.08	6
7	IN	0.06	0.1118	0.005	7
8	ST	0.04	0.0554	0	8

V RESULTS AND DISCUSSION

The weights obtained by AHP, TOPSIS and FAHP for the criteria are compared by calculating the gap between the adjacent prioritized criteria by each method which is discussed below.

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Table 10 provides the weightages computed for eight supply chain risks considered by using AHP, TOPSIS and FAHP. From Table 10, it is observed that all the three methods considered provide the same ranking for the supply chain risks. Supply risk is identified as the most primary risk followed by process risk and the storage risk is ranked as the least important risk among the eight risk considered in this study. Also it is seen that there is no much different in weight obtained by AHP and FAHP where as there is a meaningful difference in weightages obtained by TOPSIS when compared to that of AHP and FAHP.

From Figure 3, it is clear that all the gap between adjacent prioritized criteria were clearly high for TOPSIS compared to AHP. Also by comparing AHP and FAHP there is no difference in the prioritization but considering the gap between adjacent prioritized criteria some vales are high for AHP and some are high for FAHP. Whereas all the gap between adjacent prioritized criteria were clearly high for TOPSIS compared to FAHP. For example, Figure 3 shows the gap between the adjacent ranks for the three techniques. The gap between rank 1 and 2 using AHP gives 0.03 and FAHP gives 0 were clearly less significant compared to the difference when using TOPSIS which gives 0.15. So it is clearly evident that considering the three MCDM techniques, TOPSIS gives more clear idea of ranking compared with AHP and FAHP in this case.

VI CONCLUSION AND FUTURE WORK

In current dynamic environment risk management became an extremely important activity in supply chain management.In this work, three MCDM techniques AHP, TOPSIS and FAHP were adopted to rank the critical supply chain risk for an bicycle manufacturing company. Eight important supply chain risks were identified as significant risk for the case considered. The result obtained from AHP, TOPSIS and FAHP were same. Supplier risk found to be the most important one and storage risk given the last priority. But TOPSIS technique gives more clear difference between the criteria. In future, for the same case other MCDM techniques like DEMATEL, Fuzzy TOPSIS can be applied to guide decision makers.

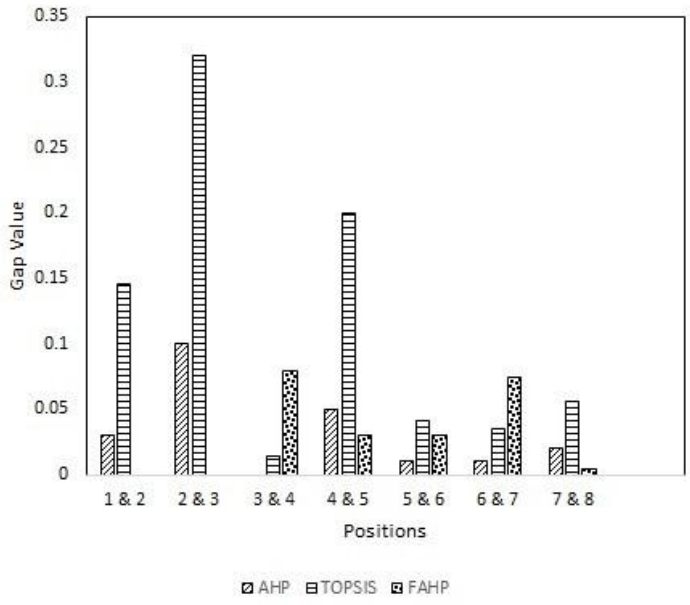

Figure 3: Gap Analysis

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Design and Implementation of Small Wind and Stair Climbing Power Generation System

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Abstract- *The world is in demand of consistent supply of electricity due to population expansion and industrial development. This research paper describes the new design of the Hybrid Renewable Energy system of small wind and stair climbing system. This system comprises an off-grid system which is controlled by Programmable Logic Controller (PLC) and monitored using* Supervisory Control and Data Acquisition *(SCADA). The stair climbing system could generate a maximum voltage of 240V, when moving from one step to another. In a small wind system 120V has been generated by a permanent magnet AC synchronous motor according to air flow rate. Both small wind and stair climbing are connected to inverter through the controller and energy from the source could be accumulated in the battery by an inverter. The power generated from these sources is given to off-grid system through 600VA inverter. The aim of the hybrid system of small wind and Stair climb is that it could be used as gadget to run home appliances independently.*

Keyword: PLC/SCADA, AC Synchronous Motor, Stair Climbing, Small Wind, Inverter

I INTRODUCTION

Worldwide demand for electricity is resolved by the use of energy that is derived from nuclear power plant. Increasing the nuclear power plant production will result in an increase in the emission of greenhouse gases and toxic gases which is harmful to the environment. Considering all these environmental issues such as the greenhouse effect, toxic gas emission there is a need to find alternate energy resources. In India, most of the rural/remote areas don't have access to electricity. To overcome this problem, there is a need to find some alternate solution.

In Renewable Energy, power for a sustainable future has discussed the state of progress for technologies for various renewable resources. Also explains the basic energy conversion processes and individual renewable sources [1]. D.B. Nelson [2] et al. Performed hybrid system using wind/ fuel cell along with a solar photovoltaic system, in this hydrogen storage tank is used as the energy storage system and also this system has been compared with traditional hybrid energy storage system. W.D. Kellogg investigated stand-alone system of wind, photovoltaic and hybrid wind/PV power generation system for remote area and examined with economic analysis for a total annual cost [3].

Kiran Boby et al. Explained the foot energy power generation system using piezoelectric transducer and applied in real time for both serial and parallel conditions. From this they conclude that power in serial was 0.7 Volts @ 3MicroAmps and in parallel was 0.7Volts @ 7MicroAmps [4]. Electric current or voltage from the piezoelectric was harvested using Euler - Bernoulli beam theory [5]. J. Ghosh et al. Proposed their research work in electrical power generation using foot step and examined the obtained results [6].

In [7] author Investigated on theoretical analysis for piezoelectric transducers, explained that the piezoelectric generator has low power

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output with deprived characteristics in voltage, current and impedance.

In [8] author described the usage of piezoelectric polymers, which can harvest the energy from people walking. In order to increase the energy from piezoelectric polymer material, electrostatic generator has been included in the piezoelectric polymers fabricated shoe. In the research article [9] foot energy was tapped and converted into electrical energy. Harvested power has been connected to the inverter for battery storage and the backup voltage was utilized.

Jarapala Murali Naik [10] projected the conversion of force into electrical energy using Permanent Magnet D.C generator and output was 12Volt. This DC 12Volt was stored in a Lead-Acid Battery. Several existing works for foot step energy harvesting has developed by using DC motor for power generation [11] and also research works are being carried out by simulation methods.

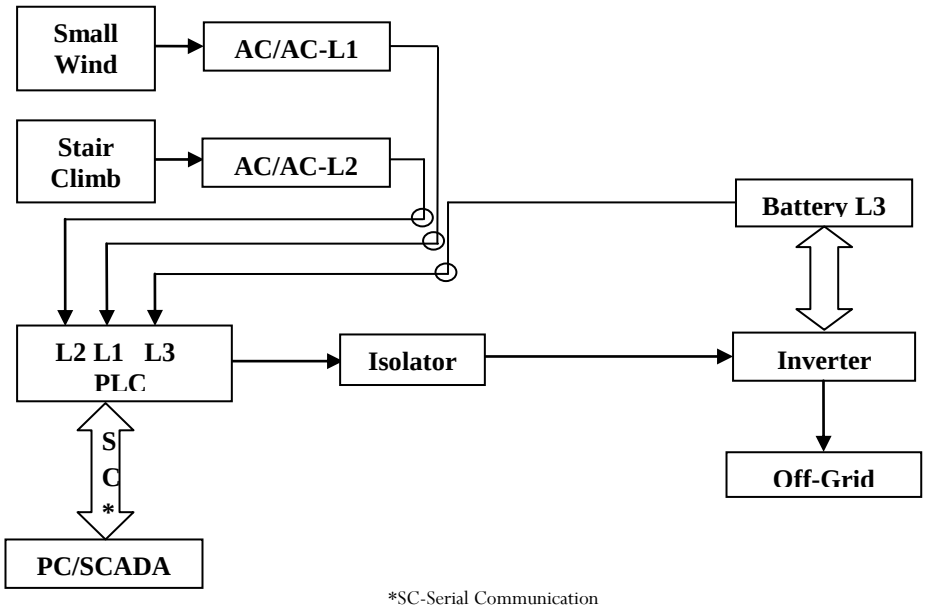
High performance synchronous motor for wind energy is implemented in [15] and the simulated test results are described using Matlab software. In [16] Stand alone system, hybrid wind and solar system are implemented in a simulation method using HOMER software by author Getachew bekele. Also elaborated the range of wind speed and solar irradiation, PV panel price and diesel price has been defined as input to the software and results have been generated.

The objective of this work is to generate the power of the combination of small wind and stair climbing. Through this combination the proposed system generates renewable power without any distraction. The organization of the rest of this paper is as follows, section 2 describes the construction of the hybrid module. Hardware description of the proposed system of HPGS is given in section 3. Section 4 gives the details of software description. In section 5, experimental results are presented. The conclusion of this paper is given in section 6.

II CONSTRUCTION OF HYBRID MODULE

The proposed framework and the idea behind the stair climbing system is when climbing the step, pressure or stress (by leg) induced in each step, the pinion wheel and the gear wheel to rotate the Permanent Magnetic AC Synchronous Motors (PMAC) which would produce an AC voltage. For every rotation, the mechanical energy is converted into electrical energy. In this system the IR sensor that is placed at the rear of the pinion wheel and this will recognize the number of rotations for each step. This system has calibrated to 240Volt for every six rotation. The output of the AC voltage is connected to inverter circuit and it could be used for recharging the battery and it can be utilized as off-grid system.

The proposed small wind module is constructed with the help of 18" three rotor blade, 33 feet hinged vane and the hub. Depending on the air flow the rotor blades, rotates the permanent magnet AC synchronous motor. Every rotation of rotor blade is evaluated by IR senor and the system has calibrated to 30 AC Volts per rotation. The experimental output of this system is calculated in real time and the test results are plotted. The Block Diagram of the Hybrid power generation system is shown in the figure 1 and specifications are described in Table 1.



*SC-Serial Communication

Figure 1. Block Diagram of Hybrid Power Generation System (HPGS)

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Table 1. Specification of HPGS

Source	PLC Line	Instrument	Power	Grid system	Remark
Small Wind	L1	AC Converter	PMAC	Off	Sensors are connected to the PLC
Stair Climb	L2	AC Converter	PMAC	Off	Sensors are connected to the PLC
Battery	L3	Inverter	L1 and L2	Off/Backup	V and I have indicated in PLC
Hybrid	L2/L1	L1 and L2 are compared by PLC			Maximum power fed to Inverter

III HARDWARE DESCRIPTION FOR HPGS

3.1 Small Wind System

The proposed small wind system operates based on air flow rate. Construction of small wind mechanism is shown in figure 2. It has been constructed with the help of bearings, rotor blade, hinging vane and gear wheel. This experimental setup is constructed in real time and the test results are verified.

Figure 2. Constructed Module of Small Wind System

3.2 Stair Climb System

The operation of this proposed stair climbing system is based on the movement from one step to another step. During this operation, simultaneously disabling and enabling processes have been done. "When the first step is climbed, power is produced in the first step, mean time the 2nd step is made disabled. Similarly, when the 2nd step is climbed, power is produced and the 1st step is made disabled". Thus the process is continued until the final step is reached. This proposed system operation is based on Kinetic Energy, where the mechanical energy is converted into the electric energy and this stair climbing system is compared with piezoelectric technology, piezoelectric transducer would produce only low voltage with low watts.

The stair climbing step system is constructed with the help of spring, rack wheel, pinion, bearing, chain drive, gear wheel, flywheel, chain sprocket and shaft. The IR Sensor placed at the rear the of pinion wheel moreover, it is used to find the number of rotations per cycle and it is illustrated in figure 3 and 4.

Figure 3. Stair Climbs System

The construction part of PMAC, power production in hybrid system is shown in figure 4, it has a 14" shaft of 10mm bore, 2 bearings and 6.5" flywheel which is built with a permanent magnet AC synchronous motor along with gear wheel produces 240V for high torque rotation.

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Figure 4. Power Production Mechanism of Hybrid System

The HPGS is designed by using the following Construction parts and it is shown in Table2.

Table 2. Construction parts of HPGS

S. NO	Name	Requirement	Qty
1	Spring	6.5"	2
2	Rack	11.5"	1
3	Gear wheel	6"	3
4	Chain sprocket	56"& 36.5"	2
5	Bearing	1.3/4" outer-16"bore	6
6	Flywheel	6.5"	1
7	Pinion	2"	1
8	Shaft	18" and 14"	4
9	AC Synchronous Motor	1000Watts	1
10	Inverter circuit with transformer	600VA	1
11	IR-Infrared Sensor	AH and AL Pins-5V	1
12	Blade	16"	3

IV SOFTWARE DESCRIPTION

The proposed framework is developed using Crouzet Programming Logic Controller (PLC). The programming language ladder diagram/Function Block Diagram is converted into binary instruction codes that can be stored in Erasable Programmable Read-Only Memory (EPROM) / Random Access Memory (RAM) [12]. Then the instruction code is debugged and executed by Millenium 3 Logic controller software. Each Input and output connection of a PLC has an address which is used for identifying the I/O bit and it organized into three regions, namely Discrete Input (I), Output relay (O), and Internal Memory (M). The Crouzet PLC configurations are shown in Table 3.

Table 3. PLC- CD 20 Configurations [13]

Pin Configuration	No. of pins Available	No. of pins Used
Discrete Inputs (I)	6	2
Analog Inputs (I)	4	4
Output Relays (O)	8	4
LED Display	36*72	Digital Display
Register Memory (M)	368bits	-

Application of Ladder diagram Program will scan and execute rung by rung and then debug the program of various functional rungs. The updated outputs are stored in output image memory (O) this output values are used to set/reset the outputs of the PLC. For the given PLC, scan time for executing the program is 0-20 ms and maximum programming capacity are 350 Blocks [14]. PLC is programmed for off-grid system based on two condition normal high power and low power. Only on the high power condition the system would be in online mode and it could recharge the battery bank. The execution of the proposed program is shown in figure 5.

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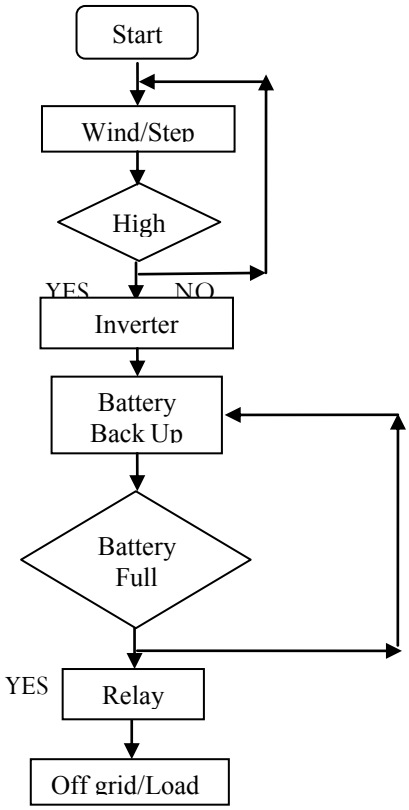

Figure 5. HPGS Flow chart

V RESULT AND DISCUSSION

A small wind system has been implemented in real time and tested with various conditions. The system has produced power at the various air flow rates and the results are shown in Table 4 and the graph is shown in Figure 6. The stair climbing system was implemented and tested with varied conditions herewith it was found that, the system produced voltage for each step and results are shown in Table 5 and graphical illustration shown in Figure 7. This unit is designed for person weighing 70 Kg. However, person below 60 kg weight can also operate, but the power produced will be low. The dual power generators are connected to Inverter circuit through an auto switch relay. This auto switch will change automatically according to the corresponding output voltage. Figure 8 proves the sine wave at the rate of 49.92 Hz by using NI-myDAQ Labview (DEI_BU_Coimbatore).

Table 4. Small wind Module

S.No.	Km/h	No. of rotation	Volts	m/s
1	1	3	120	0.3
2	0.5	2	70	0.1
3				03
4				0
5				0.1

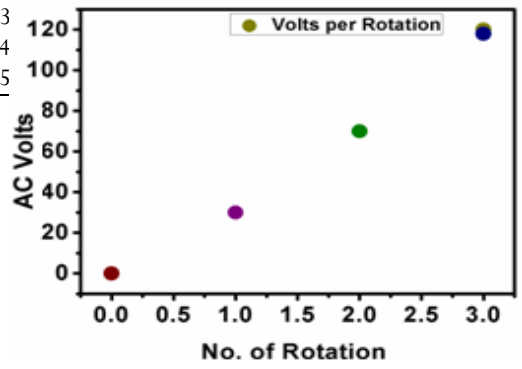

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Figure 6. Voltage rating for Small Wind

Table 5. Stair Climbing Module

S.No.	Step	AC Volts (V)	Time (Sec)	No. of Rotation
1	1	239	1	4
2	2	235	2	4
3	3	240	3	4
4	4	228	4	4
5	5	225	5	4
6	6	240	6	4

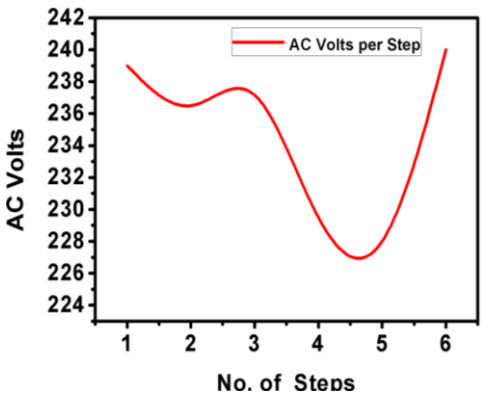

Figure 7. Voltage rating for Stair Climbing

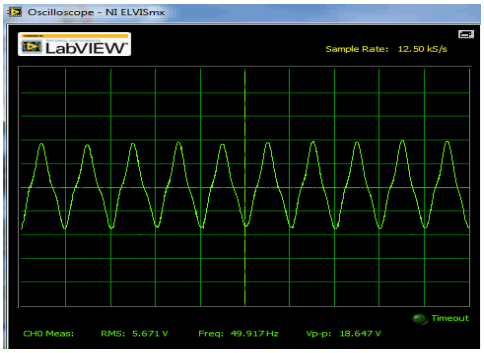

Figure 8. Frequency Response

VI CONCLUSION

The Energy Management Distribution system is performed by PLC network and monitored through the SCADA system along with HMI, thus the Power management of this gadget is totally manipulated and the power quality has been verified. In this research paper, the proposed hybrid power generation using small wind and the stair climbing system shows different characteristics of data, hence the system proves to be versatile and efficient for real time implementation. The experimental data shows the overall efficiency is nearly 50.833% and hence proposed system gives less execution time, low cost and provides high accuracy compared to the existing systems.

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Feature Extraction and Classification for ECG Signal Processing based on Artificial Neural Network and Machine Learning Approach

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Abstract-*In present day, several types of developments are carried toward the medical application. There has been increased improvement in the processing of ECG signals. Get the accurate detection of ECG signals with the help of detection of P, Q, R and S waveform. However these waveforms are suffered from some disturbances like noise. Initially denoising the ECG signal using filters and detect the PQRS waveforms. ECG signal is analyzed or classify using Extreme Learning Machine (ELM) and it compared with Support Vector Machine (SVM) and Back Propagation Neural Network (BPN). The paper classifies the ECG signal into two classes, Normal and Abnormal. ECG waveform is detected and analyzed using the 48 records of the MIT-BIH arrhythmia database. The classifier performance is measured in terms of Sensitivity (Se), Positive Predictivity (PP) and Specificity (SP).*

Keywords: Electrocardiogram, Extreme Learning Machine, Support Vector Machine, Back Prorogation Neural Network, MIT-BIH arrhythmia database.

I INTRODUCTION

ECG is abbreviated as Electrocardiogram and it is used to represent the electrical activity of the heart. It means that it showing the heart muscle contraction and relaxation. Electrocardiography is another term is used to give or provide the heart condition. Analysis of the ECG waveform is used to identify the heart normal and abnormalities. Basically ECG waveform has some basic waves they are P, Q, R, S, T and U. These waveforms are used to analyses the heart condition. The main important one in ECG is depolarization and repolarization. Atrial depolarization is represented by P waveform and ventricular depolarization is represented by QRS complex waveform and then repolarization of the ventricle is represented by T waveform [1].

There are several existing methods for ECG waveform analysis and provides the system with accuracy and sensitivity. These methods are based on various techniques that are wavelet, RBF Neural network, fuzzy with clustering technique, machine learning of SOM and autoregressive modeling [2, 3, 4, 5 and 6]. There are several techniques are analyzed the ECG signal and it is described in [7-11].

Combination of recurrent neural networks and eigenvectors are used to analyze the ECG signal [12]. Another combination of novel method for analyzed the ECG signal using particle swarm optimization and radial basis function neural network [13]. Apart from MIT-BIH database, ECG signal is collected from European ST-T database and it is described in [14] for normal and abnormal ECG, ECG beat segmentation technique is introduced in [15]. ECG noise removal by sparse derivatives is explained in [16].

The paper is organized as follows. In Section 2, describes about some related work. In Section 3, the proposed ECG algorithm, In Section 4, we show how the classification method helps increase the overall detection accuracy. The system is applied to the whole MIT-BIH Arrhythmia database and the performance is compared to some other state-of-art methods.

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II RELATED WORK

In [18] ECG signal is analyzed using cluster analysis method, this technique consists of three major steps they are extracting the QRS waveform, second stage is selecting qualitative features and the third stage is determining heartbeat case. This method analyses and classified the normal and abnormal heartbeat. In [17] ECG signal noise reductions are carried through the novel approach of combination of discrete wavelet transform and artificial neural network. The work of the wavelet transform is decomposes the ECG signal and remove the noise then the second stage of the artificial neural network is implemented the inverse transform and adaptive filtering for remove the remaining noise. In [19], author presented a KNN algorithm as a classifier for detection of QRS complex. In [20], author has presented an algorithm for detection of R-peak. In [21], authors have used three type of classification that are (i) Back Propagation Network (BPN), (ii) Feed Forward Network (FFN) and (iii) Multilayered Perceptron (MLP)

III METHODOLOGY

Block diagram of proposed framework is shown in figure 1. The figure provides that the whole framework is divided into three stages that are preprocessing, peak detection, heart beat classification. Input signal are picked from MIT-BIH arrhythmia database s given to preprocessing. Preprocessing is used to denoised the ECG signal and this process is given as an input to the next stage.

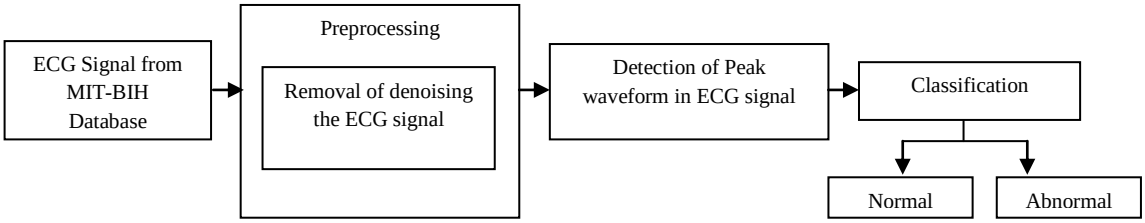

Figure. 1 Block Diagram of proposed Framework

Algorithm: QRS Complex

Input: ECG Signal; **Output:** QRS Complex

```
Initialize Count=0
Y=Noise Removal of ECG signal; Y1=Differentiation of Y signal
Y2= Differentiation of Y1 signal;  Y3= Take Cumulative value of Y1 and Y2 signal
To find out the QRS Complex using threshold value
Threshold= absolute (maximum (Y3))
Threshold 1= Threshold/2;
for  i=1: length (Y3)
    if  Y3(i)>Threshold 1
        QRS (i) = 1
        Increment the cunt value and increment the i value
   else
        QRS (i) = 0
end
end
Plot the QRS with the approximate time
```

The next stage of the proposed framework is peak detection and QRS complex, before QRS complex ECG signal is decomposed used Wavelet transform. It is one of the powerful techniques in biomedical signal processing. QRS complex features are given as input to classifier and identified the heartbeat as a normal and abnormal. ECG signal are classified by BPN, SVM and ELM. Compared to BPN and SVM, ELM provides the simpler implementation, learning speed is fast and provide better performance

A. Preprocessing

Preprocessing is one of the important tasks in signal and image processing. This is the first step for proposed ECG classification. The work of the preprocessing is to eliminate the noise in the input ECG signal using various filters approaches. Proposed work handled median filter, FIR filter, Gaussian filter and Butterworth filter for noise removal in ECG signal [23]. Preprocess result is used to get the better efficiency of the ECG signal. Peak detection efficiency is increased due to preprocessing work. Various filters approaches used to remove the noise of baseline wander, power interference, and instrumental error. Elimination of baseline wander is therefore needed in the ECG signal analysis to diminish the irregularities in beat morphology.

B. Peak detection

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ECG signal is extracted using wavelet decomposition; this is done by Daubechies6 (DB6) multiresolution wavelet. First denotes the wavelet decomposition vector and their wavelet bookkeeping vector. Then reconstruct the signal based on wavelet decomposition. ECG signal is decomposed up to eight levels. This type of decomposition is used to extract the features and helpful for the selection of P, Q, R and S wave. Then all the peaks are identified by minimum and maximum value. Figure 2 illustrates the algorithm for QRS complex. Using QRS complex, in this paper find out the heart beat and these beats are given to the classification to deliver the classify output as normal and abnormal.

C. Classification

Feature extraction output is given as an input to classifier. In this paper three types of classification are carried over to classify as normal and abnormal heart beat that are BPN, SVM, and ELM.

1) Back Propagation Neural Network (BPN)

Given a finite length input patterns $X_1(k), X_2(k), \dots, X_n(k) \in R, (1 \le k \le k)$ and the desired patterns $X_1(k), X_2(k), \dots, X_m(k) \in R$.

Step 1: Select the total number of layers M, the number $n_i(i = 1,2, \dots, M-1)$ of the neurons in each hidden layer, and an error tolerance parameter $\varepsilon > 0$.

Step 2: Randomly select the initial values of the weight vectors $W_{aj}^{(i)}$ for $i = 1,2, \dots, n_i$.

Step 3: Initialization:

$$W_{aj}^{(i)} \leftarrow W_{aj}^{(i)}(0), E \leftarrow 0, k \leftarrow 1 \quad (1)$$

Step 4: Calculate the neural outputs

$$\begin{cases} s_j^{(i)} = \left(W_{aj}^{(i)}\right)^T X_a^{(i-1)} \\ X_j^{(i)} = \sigma\left(S_j^{(i)}\right) \end{cases} \quad (2)$$

For $i = 1,2, \dots, M$ and $j = 1,2, \dots, n_i$

Step 5: Calculate the output error

$$e_j = d_j - X_j^{(M)} \quad (3)$$

For $j = 1,2, .., m$

Step 6: Calculate the output deltas

$$\delta_j^{(M)} = e_j \sigma'\left(s_j^{(M)}\right) \quad (4)$$

Step 7: Recursively calculate the propagation errors of the hidden neurons

$$e_j^{(i)} = \sum_{l=1}^{n_i+1} \delta_l^{(i+1)} W_{lj}^{(i+1)} \quad (5)$$

From the layer $M-1, M-2, \dots,$ to layer 1.

Step 8: Recursively calculate the hidden neural delta values.

$$\delta_j^{(i)} = e_j \sigma'\left(s_j^{(i)}\right) \quad (6)$$

Step 9: Update weight vectors

$$W_{aj}^{(i)} = W_{aj}^{(i)} + \eta \delta_j^{(i)} X_a^{(i-1)} \quad (7)$$

Step 10: Calculate the error function

$$E = E + \frac{1}{k} \sum_{j=1}^{m} e_j^2 \quad (8)$$

Step 11: if k=K then go to step 12; otherwise, $k \leftarrow k+1$ and go to step 4.

Step 12: if $E \le \varepsilon$ then go to step 13; otherwise go to step 3.

Step 13: learning is completed. Output the weights

2) Support Vector Machine (SVM)

Support Vector Machine (SVM) is one of the learning system and it is used mainly in classification. It was developed in the year of 1998 by Vapnik and it is one of the most techniques to solve the supervised classification problem. In essence, SVM classifiers maximize the margin between training data and the decision boundary (optimal separating hyperplane), which can be formulated as a quadratic optimization problem in a feature space. The subset of patterns those are closest to the decision boundary are called support vectors.

Consider a set of training examples $(x_1, y_1), \dots, (x_l, y_l)$, here input $x_i \in R^N$ and class labels $y_i \in \{R^N\}$ and class labels $y_i \in \{-1, +1\}$. For a linearly separable classification problem, the construction of a hyperplane is $w^T x + b = 0$ so that the margin between the hyperplane and the nearest point is maximized and can be posed as the following quadratic optimization problem:

$$\min_w \frac{1}{2}(w^T w) \quad (9)$$

Subject to $y_i\left((w^T x_i) + b \ge 1\right)$, where $i = 1, \dots, l$

Based on below equation, forces a rescaling on (w, b) so that the point nearest to the hyperplane has a distance of $(1/\|w\|)$ [24].

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In many practical situations, a separating hyperplane does not exist. To allow the possibilities of violating (2), slack variables ξ_i are introduced like

$$\xi_i \geq 0, i = 1, \dots, l \quad (10)$$

To get

$$y_i((w^T x_i) + b) \geq 1 - \xi_i, i = 1, .., l \quad (11)$$

The optimization problem now becomes as follows:

$$\min_{w,\xi} \frac{1}{2}(w^T w) + C\sum_{i=1}^{l} \xi_i \quad (12)$$

subject to constraints (10) and (11). The C is a user defined constant. It is called regularizing parameter and determines the balance between the maximization of the margin and the minimization of the classification error.

By introducing Lagrange multipliers $\propto_i$ and using Karush–Kuhn–Tucker theorem of optimization theory, the solution is given by;

$$w = \sum_{i=1}^{l} y_i \propto_i x_i \quad (13)$$

Only a small fraction of the $\propto_i$ coefficients are nonzero. The corresponding pairs of x_i entries are known as support vectors and they fully define the decision boundary. All other training examples with corresponding zero $\propto_i$ values are now rendered irrelevant and automatically satisfy constraint (4) with $\xi_i = 0$. The hyperplane decision function for the vector x can be written as follows

$$f(x) = \mathrm{sgn}\left[\sum_{i=1}^{l} y_i \propto_i (x^T x_i) + b\right] \quad (14)$$

By replacing the inner product $(x^T x_i)$ with kernel function $K(x, x_i)$; the input data are mapped to a higher dimensional space [24]. It is then in this higher dimensional space that a separating hyperplane is constructed to maximize the margin.

3) Extreme Learning Machine

Extreme Learning algorithm use a finite number of input and outputs for training in supervised batch learning system. In this system consider N arbitrary distinct samples $(X_i, t_i) \in R^n \times R^m$, in this X_i is an $n \times 1$ input vectors and t_i is an $m \times 1$ target vector. If an SLFN with $\tilde{N}$ hidden nodes can approximate these N samples with zero error, it then implies that there exist β_i, a_i and b_i such that

$$f_{\tilde{N}}(X_j) = \sum_{i=1}^{\tilde{N}} \beta_i G(a_i, b_i, X_j) = t_j, j = 1, \dots, N \quad (15)$$

The above equation can be written as

$$H\beta = T \quad (16)$$

Where

$$H(a_1, \dots, a_{\tilde{N}}, b_1, \dots, b_{\tilde{N}}, X_1, \dots, X_N) = \begin{bmatrix} G(a_1, b_1, X_1) & \dots & G(a_{\tilde{N}}, b_{\tilde{N}}, X_1) \\ \vdots & \dots & \vdots \\ G(a_1, b_1, X_N) & \dots & G(a_{\tilde{N}}, b_{\tilde{N}}, X_N) \end{bmatrix}_{N \times \tilde{N}} \quad (17)$$

$$\beta = \begin{bmatrix} \beta_1^T \\ \vdots \\ \beta_{\tilde{N}}^T \end{bmatrix}_{\tilde{N} \times m} \text{ and } T = \begin{bmatrix} t_1^T \\ \vdots \\ t_N^T \end{bmatrix}_{N \times m} \quad (18)$$

H is called the hidden layer output matrix of the network [14]; the i^{th} column of H is the i^{th} hidden node's output vector with respect to inputs $X_1, X_2, \dots, X_N$ and the jth row of H is the output vector of the hidden layer with respect to input X_j.

In real applications, the number of hidden nodes, $\tilde{N}$, wil always be less than the number of training samples, N, and, hence, the training error cannot be made exactly zero but can approach a nonzero training error $\in$. The hidden node parameters a_i and b_i (input weights and biases or centers and impact factors) of SLFNs need not be tuned during training and may simply be assigned with random values according to any continuous sampling distribution [9], [10], [11]. Linear system and the output weights β are estimated as

$$\hat{\beta} = H^+ T \quad (19)$$

Where H^+ the Moore-Penrose is generalized inverse [15] of the hidden layer output matrix H. The ELM algorithm which consists of only three steps, can then be summarized as

ELM Algorithm: Given a training set

$\aleph = \{(X_i, t_i) | X_i \in R^n, t_i \in R^m, i = 1, \dots, N\}$, activation function $g(x)$, and hidden node number $\tilde{N}$.

STEP 1: Assign random hidden nodes by randomly generating parameters (a_i, b_i) according to any continuous sampling distribution, $i = 1, .., \tilde{N}$.

STEP 2: Calculate the hidden layer output matrix H.

STEP 3: Calculate the output weight β such as $\beta = H^+ T$

IV EXPERIMENTAL RESULT

The proposed framework results are carried out in MATLAB. The input for proposed work is collected from the MIT-BIH arrhythmia database, and it gives the classification output as Normal and Abnormal. Totally 48 patient records are collected from that database. In this 50% are used for training and another 50% is used for training. The classification is done by three methods that are Back Propagation Neural Network (BPNN), Support Vector Machine (SVM) and Extreme Learning Machine (ELM). In this paper

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classification performance are evaluated using some metrics that are Sensitivity, Positive Predictivity and Specificity. The following equations are used to calculated these metrics

$$\text{Se}(\%) = \frac{\text{TP}}{\text{TP+FN}} \times 100 \quad (20)$$

$$\text{PP}(\%) = \frac{\text{TP}}{\text{TP+FP}} \times 100 \quad (21)$$

$$\text{Sp}(\%) = \frac{\text{TN}}{\text{TN+FP}} \times 100 \quad (22)$$

In the above three equation TP denotes the number of true positive samples, FN indicates the number of false negative samples, TN denotes the number of true negative samples and FP indicates the number of false positive samples. These TP, TN, FP and FN are used for classification and it is defined as

FP: Normal class classifies as abnormal; TP: Abnormal class classifies as abnormal; FN: Abnormal classifies as normal.

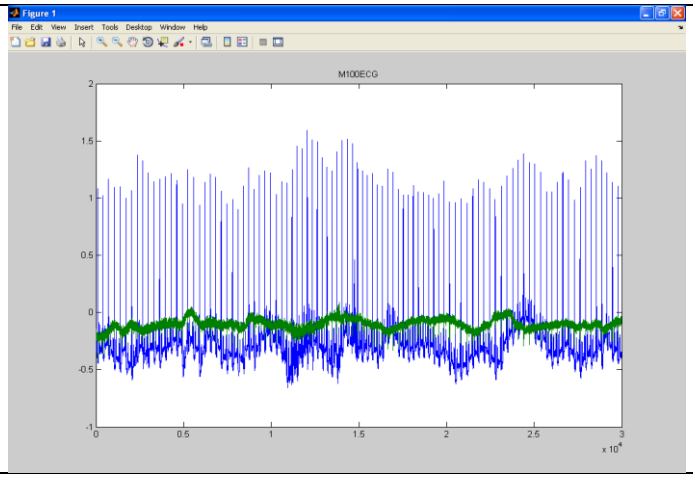
TN: Normal class classifies as normal. Then Overall classification accuracy is evaluated using below equation

$$\text{Overall Accuracy } (\%) = \frac{\text{Correctly classified samples}}{\text{Total Number of samples}} \quad (23)$$

TABLE 1

OVERALL PERFORMANCE OF ELM, SVM AND BPN

Methods	Proposed Targets	Normal	Abnormal	Se (%)	PP(%)	Sp(%)	Accuracy
ELM	Normal class	24	1	100	95	96	97
	Abnormal class	0	20				
	Total	24	21				
SVM	Normal class	22	3	90	86	88	73%
	Abnormal class	2	18				
	Total	24	21				
BPN	Normal class	20	5	90	78	72	64%
	Abnormal class	2	18				
	Total	22	23				



Input Image

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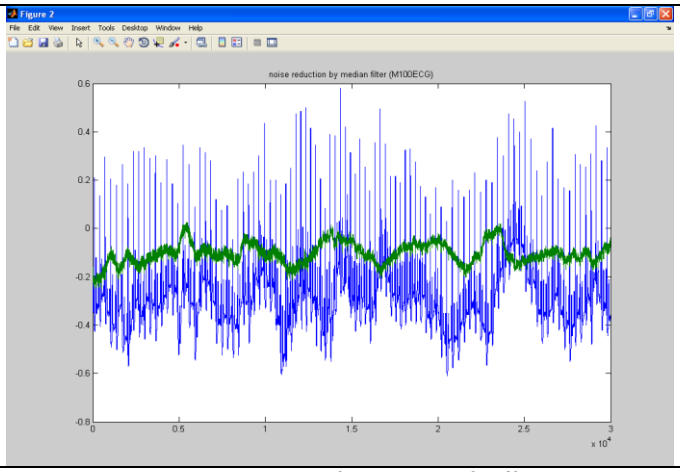


Noise reduction using Median filter

Figure 3: (a) Input image (b) Noise Reduction using Median filter

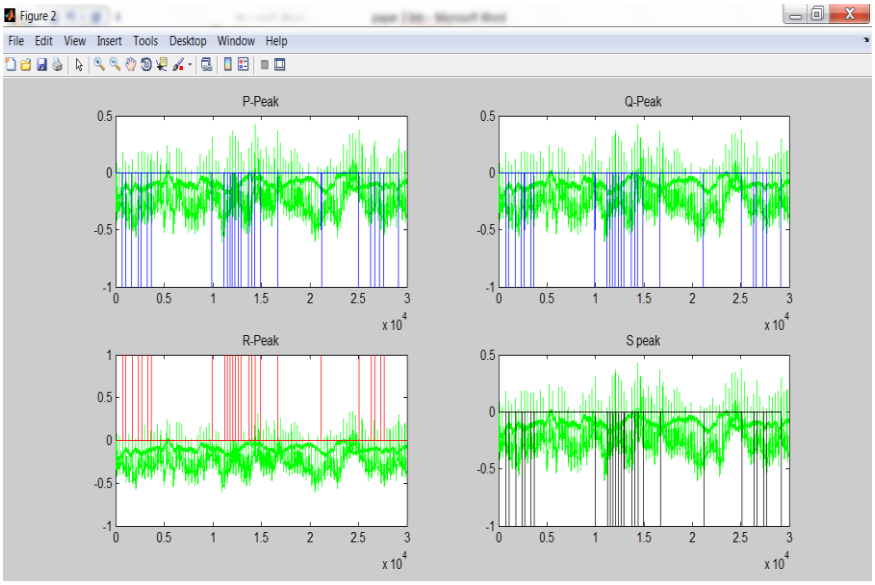
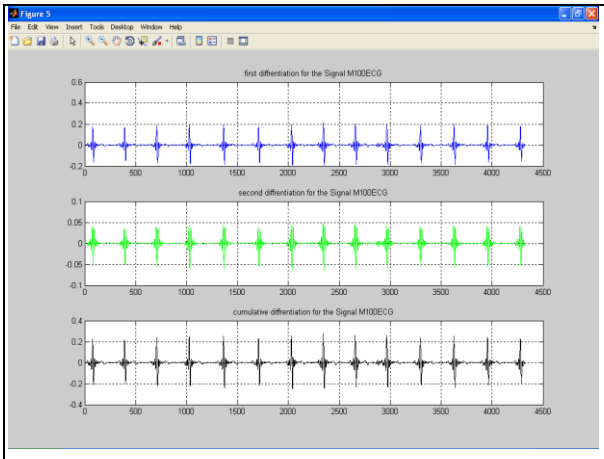
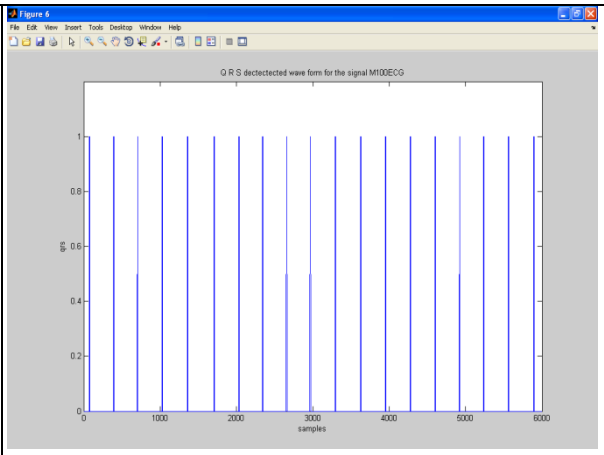


Figure 4: Feature Extraction results of PQRS waveform peak detection



Differentiation for M100ECG signal



QRS detected in number of Heart Beat in 12 Seconds

Figure 5. QRS Complex

Figure 3 illustrates the preprocessing output, figure 3(a) shows the original image and 3(b) illustrates the noise reduction using median filter. The original image is collected from the MIT-BIH arrhythmia database and each signal is digitized at 360 samples per second per

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channel with 11-bit resolution over a 10 mV range. The preprocessing output of median filter is given as the input to the feature extraction. Feature extraction is used to detect the PQRS peak waveform and it is shown in figure 4. Peak detection is done by maximum and minimum value of the signal. Figure 5 illustrates the QRS complex and their heart beats. Table 1 provides the results such as overall performance metrics for ELM, SVM and BPN. Classification results are shown and given by a confusion matrix, through this confusion matrix accuracy, specificity, sensitivity and Positive Predictivity is produced. Totally 48 ECG signals are picked from the MIT BIH arrhythmia database, in this 50 signals are used for training and 50 signals are used testing. In testing 25 and 20 signals are divided as normal and abnormal. From the confusion matrix of TP, TN, FP and FN, accuracy is calculated and given the output of 97% for ELM, 89% for SVM and 84% for BPN it is given in table 1 and also provides the comparative result of individual class sensitivities, Positive Predictivity, and specificity of various classifiers such as ELM, SVM and BPN.

V CONCLUSION

The proposed paper analysis ECG signals using Extreme learning machine. Classified the ECG signal as normal and abnormal classes and it is collected from the MIT-BIH arrhythmia database, 48 records are collected from this database, and split 50 for training and 50 for testing. PQRS features and QRS complex are extracted in this paper. This extraction is useful for the classification of normal and abnormal beats. The method achieves are shown in experimental results that ELM gives the best result that is 97% accuracy, a sensitivity of 100%, specificity of 96% and a positive predictively of 95%. Different kinds of noise and artifacts contained in the ECG signals of the database are reduced using median filter.

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Candidate Region Extraction in Retina images through Extended Median Filter and Gabor Filter

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Abstract-Early detection of Diabetic Retinopathy is important task for patient vision. This diseases is affected by several abnormality, one of the first sign of disease is Microanerysms. To detect this abnormality, we have to extract all candidate regions for Microanerysms in retina images. In this paper, proposed three stages for extraction of candidate region from retina images. In the first stage, the system removes the noise in the retina image and in second stage applied contrast enhancement to retina image for improvement of candidate of lesions. In third stage, all possible candidates are extracted from retina images through Gabor filter. In this paper, proposed Extended Median filter for the removal of noise and with the combination of Gabor filter, matching filter and local entropy thresholding technique, this system ensemble to improve the candidate lesions extraction. The proposed system is evaluated using Driven database.

Keywords: Medical Image Processing, Diabetic Retinopathy, Microanerysms, Extended Median Filter, Gabor Filter.

I INTRODUCTION

Diabetic retinopathy is one of the major causes of blindness and it happen due to the variation in the blood vessels structure. Retinal vessels are part of circulation system, it is only part can be directly visualized and analyzed. Vascular network in retina is affected by diseases like diabetes and hypertension [1]. Changes in the blood vessels can be detected by the retinal vessel segmentation and this process gives the details about the vessel location. Through this detection of abnormality such as Microanerysms (MAs), exudates are easy [2, 3]. According to recent research outcomes that 285 million people are in the age group of 20-79 are affected by diabetes in the year 2010 worldwide [4]. 50.8 million People affected by diabetes in India in the year of 2010 [5].

Detection of abnormality is important task for detection of diabetic retinopathy. For this detection, extract the candidate region it gives all possible objects in MAs. These regions are given to feature extraction, based on the feature vector diagnose the disease of diabetic retinopathy. Due to the presence of noise in the retina images, it is difficult to identify the blood vessels. So need to remove the noise through preprocessing.

During image acquisition, image and video signals can be corrupted by salt and pepper noise. Image corrupted by the salt and pepper noise, the noisy pixel is denoted by maximum and minimum grey value. Maximum value is 255 and minimum value is 0. Many nonlinear filters have been proposed for removal of salt and pepper noise from the image. Among the most popular nonlinear filter is standard median filter, this filter replace the center pixel by the median value without considering whether it is uncorrupted or corrupted. So it remove some of the edges and it also applicable and effective one for low level noise density [6].

In [13, 14, 15 and 16], authors used median filter for the removal of noise in the retina image. Gaussian low pass filter is used to reduce the influence of noise through this accurately detect the Microanerysms in the classification stage is described in [17]. Mean

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filter and Gaussian filter in preprocessing step is described in [18] for removal of noise in retina image.

Basically segmentation of blood vessels is classified into two types that are pixel processing-based methods and vessel tracking methods [1]. In [19], author proposed the edge detection, matched filtering and region growing methods all combined and used for the detection of retinal blood vessels in retinal images. Combination of morphological filters and cross-curvature are used for the segmentation of blood vessels in the retina images are described in [20]. In [21] different image segmentation techniques are used for the segmentation of blood vessel in the retina images, survey of various segmentation of blood vessel techniques are described in [22].

This paper presents a candidate lesions segmentation through Gabor filter, matched filtering, entropy based thresholding. The main components of the fundus retina images are blood vessels; it is used to analyze the disease in the retina image. Noise removal is more important one, because due to noise the detection of blood vessel is difficult. So in this paper removal of noise is carried over through proposed extended median filter algorithm. Gabor filter is implemented for frequency selection.

The organization of the rest of this paper is as follows. Section 2, gives the related work, Section 3, describes about the new noise detection and filtering algorithm for retina image and the removal of blood vessel and extraction of candidate lesions. In section 4, experimental results are presented and it is compared with existing median filter with discussion. The conclusion of this paper is given in section 5

II METHODOLOGY

The system extracts the candidate region for increase the accuracy of classifier. In this paper candidate region extraction in three phase. In phase 1, it improves the noiseless retina image through proposed Extended Median filter. Phase 2, it improves the contrast of dark regions through smoothing and contrast enhancement. In the final phase, remove all blood vessels from the candidate pixel to improve the classifier accuracy.

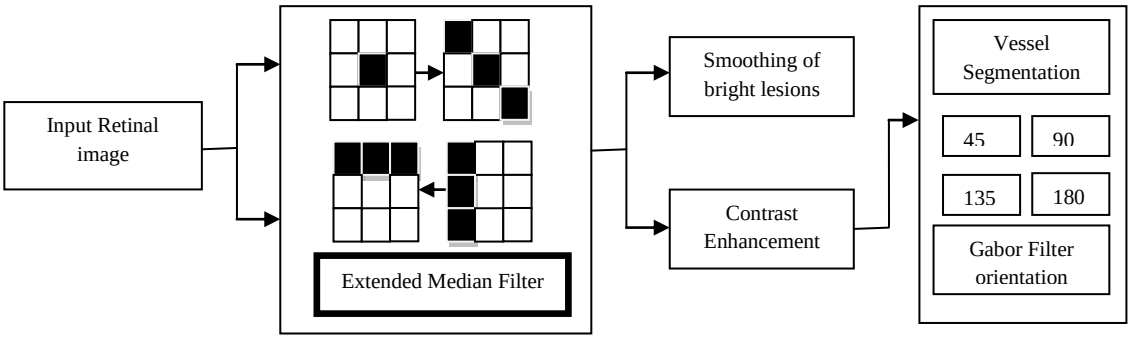

Figure 1. Block Diagram for the proposed system

A. Extended Median Filter:

Preprocessing is a vital process in an image processing. It is initial process and it is useful for extracting the features accurately and it would be helpful in classification stage. The captured fundus images are affected by noise due to movement of camera or respective patient in the time of image acquisition or unfavorable lighting condition. So in this process the images are denoised and enhanced. In medical field noise removal is difficult one because this may affect the whole image and their results. Many types of filter are available in medical images. Median filter is efficient in removal of noise and for smoothing the image. In this, proposed Extended Median Filter for removal of noise in the retina image. The input fundus image contains red, blue and green channel. In this paper green channel have to be taken for processing, because it is absorbed by blood vessels and reflected by retina pigment. It also has higher contrast between the blood vessels and retina background while red channel is rather saturated and the blue channel is dark. Noise is corrupted by salt and pepper noise, the noisy pixels are randomly are corrupted by two values are 0 and 255 [12]. There are four cases in our proposed algorithm for removal of noise in the retina image.

p_{11}	p_{12}	p_{13}
p_{21}	p_{22}	p_{23}
p_{31}	p_{32}	p_{33}

Figure 2. Sample 3×3 sliding window

Here $P_{11}, P_{12}, P_{13}, P_{21}, P_{22}, P_{23}, P_{31}, P_{32}$ and P_{33} are the pixels in the given 3×3 sliding window. First extract the green channel from the fundus image for further processing.

Case 1: Select 3×3 sliding window, in this case p_{22} is a processing pixel. Check whether the processing pixel contains noise (0/255 pixel value) or not. Following condition is satisfied

$$\left.\begin{array}{l} 0 < P_{22} < 255 \text{ uncorrupted pixel} \\ P_{22} = 0 \text{ or } 255 \text{ corruptedpixel} \end{array}\right\} \text{condition} \quad (1)$$

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In this case, second condition is happened then sorted the nine pixels in the ascending order. We get a sorted sequence: $\overline{P_{11,}P_{12,}}, \overline{P_{13,}}, \overline{P_{21,}}, \overline{P_{22,}}, \overline{P_{23,}}, \overline{P_{31}}, \overline{P_{32}}, \overline{P_{33}}$. Through this sequence extracting the median value P_M. Then the corrupted pixel is replaced by the extracting median value P_M.

$$P_{22} = P_M\} \text{ for condition 2} \quad (2)$$

Case 2: After the p_{22} processing pixel, have to check diagonal pixel $P_{11,}P_{22}, P_{33}$ in the same 3×3 sliding window. Check whether the diagonal pixel contains noise (0/255 pixel value) or not. Following condition is satisfied

$$\left.\begin{matrix} 0 < P_{11,}P_{22}, P_{33} < 255 \text{ uncorrupted pixel} \\ P_{11,}P_{22}, P_{33} = 0 \text{ or } 255 \text{ corruptedpixel} \end{matrix}\right\} \text{condition} \quad (3)$$

If the pixel is corrupted as noise then sorted the diagonal pixel $P_{11,}P_{22}, P_{33}$ in an ascending order. We get a sorted sequence:$\overline{P_{11,}P_{22}}$and $\overline{P_{33}}$. Then extracting the median value for this sequenceP_{DM}. Then the noisy pixel in the diagonal values are replaced by this median value P_{DM}.

Already we know that $P_{22} = P_M$.

$$P_{11,}P_M, P_{33} = P_{DM}\} \text{ for condition 2} \quad (4)$$

Case 3: After the diagonal pixels processing, check the vertical pixel in the same sliding window. Check whether the vertical pixel contains noise (0/255 pixel value) or not. Following condition is satisfied.

$$\left.\begin{matrix} 0 < P_{11,}P_{21}, P_{31} < 255 \text{ uncorrupted pixel} \\ P_{11,}P_{21}, P_{31} = 0 \text{ or } 255 \text{ corruptedpixel} \end{matrix}\right\} \text{condition} \quad (5)$$

If the three pixels are corrupted by noise, then we have to sort these pixels in ascending order. Ascending sorted sequence are $\overline{P_{11,}P_{21}}$and $\overline{P_{31}}$. Extracting median value for these sorted sequence is P_{VM}. Corrupted pixel in the vertical values are replaced by this median value P_{VM}. We know that $P_{11} = P_{DM}$ from case 2.

$$P_{DM,}P_{21}, P_{31} = P_{VM}\} \text{ for condition 2} \quad (6)$$

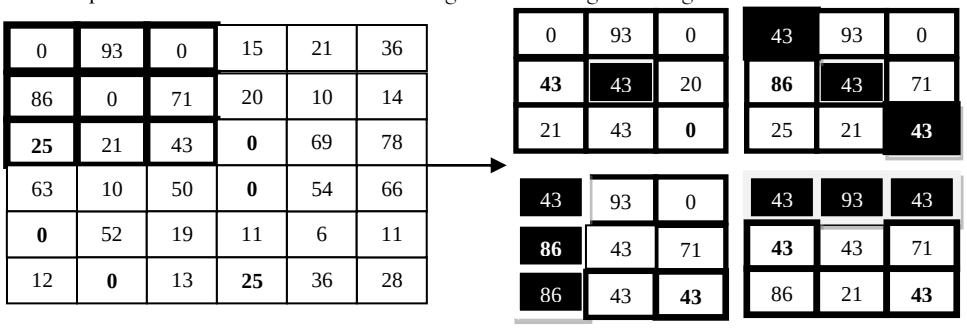
Case 4: After the vertical pixel processing, check the horizontal pixel in the same sliding window. Check whether the horizontal pixel contains noise (0/255 pixel value) or not. Following condition is satisfied.

$$\left.\begin{matrix} 0 < P_{11,}P_{12}, P_{13} < 255 \text{ uncorrupted pixel} \\ P_{11,}P_{12}, P_{13} = 0 \text{ or } 255 \text{ corruptedpixel} \end{matrix}\right\} \text{condition} \quad (7)$$

If the horizontal pixels are corrupted by noise, then replace this noisy pixel by median value P_{HM} of these three horizontal pixels, that are extracted from the sorted ascending sequence of these three values $\overline{P_{11,}P_{12}}$and $\overline{P_{13}}$. We know that $P_{11} = P_{DM}$ from case 2

$$P_{DM,}P_{12}, P_{13} = P_{HM}\} \text{ for condition 2} \quad (8)$$

Figure 3 gives the example for proposed extended median filter algorithm. Fig 3.a is the first 3×3 sliding window. After the fifth, diagonal, vertical and horizontal pixels, it switch over to second sliding window it is given in fig. 3.b



(a)

43	93	43	15	21	36
43	43	71	20	10	14
86	21	43	**0**	69	78
63	10	50	**0**	54	66
0	52	19	11	6	11
12	**0**	13	**25**	36	28

(b)

Figure 3.Example for proposed Extended Median Filter algorithm (a) First sliding window and their function of fifth, diagonal, vertical and horizontal pixel (b) Second sliding window

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B. Smoothing and Contrast Enhancement:

After the efficient noise removal technique, smoothing the image is needed. Morphological operation of opening and closing is done with structural element and it is described as:

$$\text{image openeing: } X^{(sB)}(f) = X^{(sB)}\left[\alpha^{(sB)}(f)\right] \quad (9)$$

$$\text{image closing: } Y^{(sB)}(f) = Y^{(sB)}\left[\beta^{(sB)}(f)\right] \quad (10)$$

In the above two equation sB is taken as structuring element B of size s and f is the filtered image. The output of smoothing image contains the dark lesions. For easy detection in the classification stage, to improve the lesions using adaptive contrast enhancement technique.

C. Gabor Filter:

Candidate region is a small circular object, it is shown as dark red dot and patches in the retina images. This region can be identified by our eye but sometime it can be varied through their texture, contrast and blood vessels. Through this variation in the images it can be difficult to identified, so they are extracted through Gabor filter and blood vessels are segmented.

Gabor filter have been used in texture analysis, image processing for their excellent properties of spatial frequency localization and to compute the simple cells in the visual cortex [7-9]. Gabor filter is important for frequency tuning and orientation selection. Due to this property, rotate the retina image and detect the blood vessels through this orientation. Basically Gabor filter centered at (0,0) in the spatial domain is described as

$$G(a, b, v_a, v_b, \sigma_a, \sigma_b, \theta) = \frac{1}{\sqrt{\pi\sigma_a\sigma_b}} e^{-\frac{1}{2}\left[\left(\frac{m_1}{\sigma_a}\right)^2 + \left(\frac{m_2}{\sigma_b}\right)^2\right]} e^{i(v_a a + v_b b)} \quad (11)$$

In the above equation $m_1 = a\cos\theta + b\sin\theta$ and $m_2 = -a\cos\theta + b\sin\theta$, spatial frequency is indicated by v_a and v_b, standard deviation is represented by σ_a and σ_b and finally θ denotes the orientation.

Spatial frequency gives the relation that is

$$v_a = \omega\cos\theta \text{ and } v_b = \omega\sin\theta \quad (12)$$

In the above relation ω gives the relation that is

$$\omega = \sqrt{v_a^2 + v_b^2} \quad (13)$$

Based on equation (2 &3), equation 1 changes into

$$G(a, b, \omega, \sigma, r, \theta) = \frac{1}{\sqrt{\pi r\sigma_a}} e^{-\frac{1}{2}\left[\left(\frac{m_1}{\sigma_a}\right)^2 + \left(\frac{m_2}{r\sigma_a}\right)^2\right]} e^{i\omega m_1} \quad (14)$$

In the above equation $r = \frac{\sigma_b}{\sigma_a}$, it is an elliptical Gaussian envelope aspect ratio. The Gabor filter is centered at $C(a', b')$ is simply described as $(a' - a, b' - b, \omega, \sigma, r, \theta)$. Given input image I is centered at (a', b') is computed as the convolution as

$$Z = \sum_a \sum_b I(a, b) G(a' - a, b' - b, \omega, \sigma, r, \theta) \quad (15)$$

The maximum Gabor filter using frequency and scale values is evaluated using below equation for θ spanning from 45^0 upto 180^0 at steps of 45^0.

$$M_f(\sigma, v) = \max|v(\sigma, v, \theta)| \quad (16)$$

After the extraction of candidate regions through Gabor filter. This region contains false lesion regions in their blood vessels pixels. So we have to remove that false lesion region for further processing. The accurate segmentation of blood vessel is carried out through matched filtering, entropy based thresholding, length filtering, and vascular intersection detection is described detailed in [10, 11].

D. Blood vessel segmentation:

Matching filter is used for the segment of blood vessels in the retina image. Equation for the matching filter is described as:

$$f(a, b) = -\exp\left(\frac{-a^2}{2\sigma^2}\right), \text{for } |b| \le \frac{L}{2} \quad (17)$$

In the above equation length of the segmentation is denoted by L, in which the vessel has fixed orientation. Blood vessel is oriented in different angles; kernel is needed to rotate to all possible angles. Blood vessel segments are extracted from the retinal images. Local entropy based threshold technique is implemented in this paper for extraction of vessels

I. Experimental Result

The proposed technique is tested for fundus retina image. Performance of proposed noise technique is computed using performance metrics such as PSNR, MSE. The images are collected from the driven database.

$$MSE = \frac{1}{ab}\sum_{i=0}^{a-1}\sum_{j=0}^{b-1}\left(I_{ij} - F_{ij}\right)^2 \quad (18)$$

$$PSNR = 10 \times \log_{10}\frac{255^2}{MSE} \quad (19)$$

MSE denotes the Mean Square Error, PSNR indicate peak signal-to-noise ratio. I define the input image and F indicate filtered image. The proposed technique is compared with existing median filter through performance metrics.

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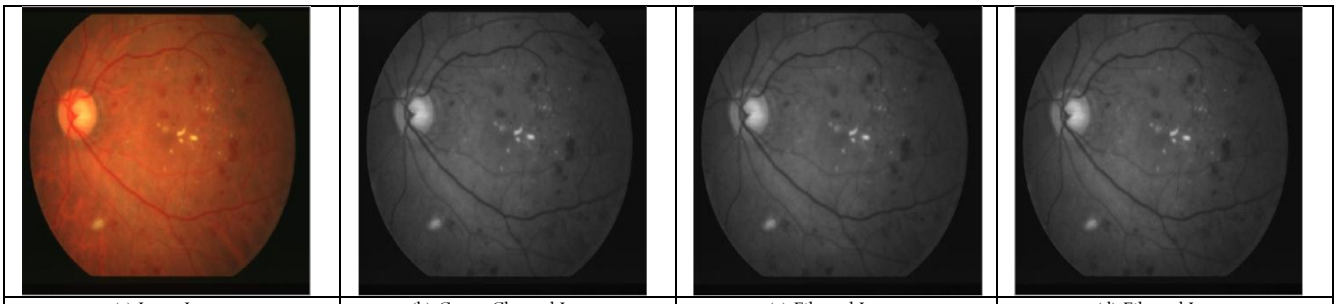
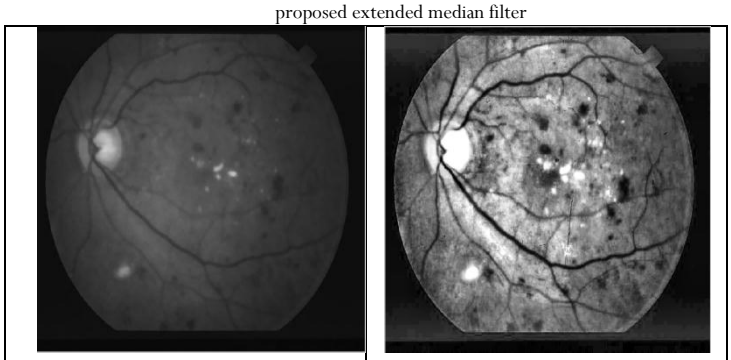


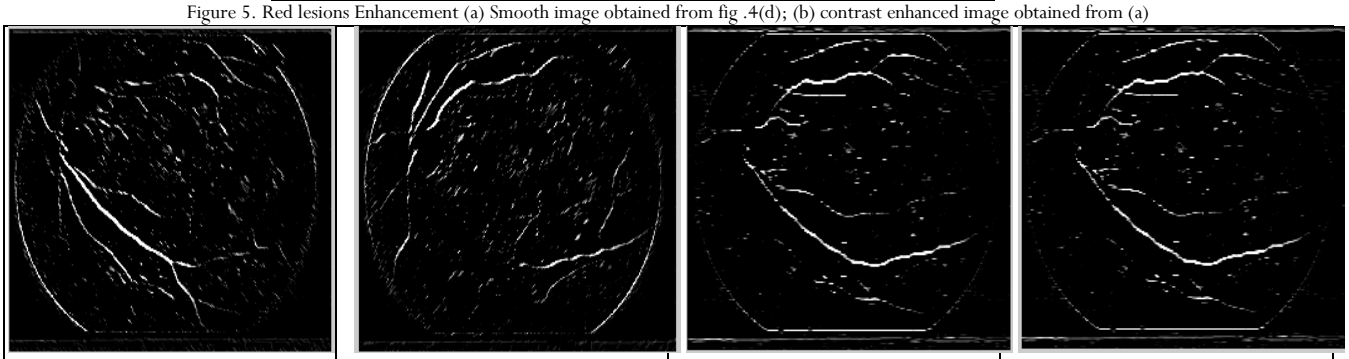
(a) Input Image | (b) Green Channel Image | (c) Filtered Image | (d) Filtered Image

Figure 4. Noise Removal: (a) Original retina image; (b) green channel obtained from (a); (c) filtered output from existing median filter; (d) filtered output from proposed extended median filter



(a) Smooth image | (b) Contrast Enhanced image

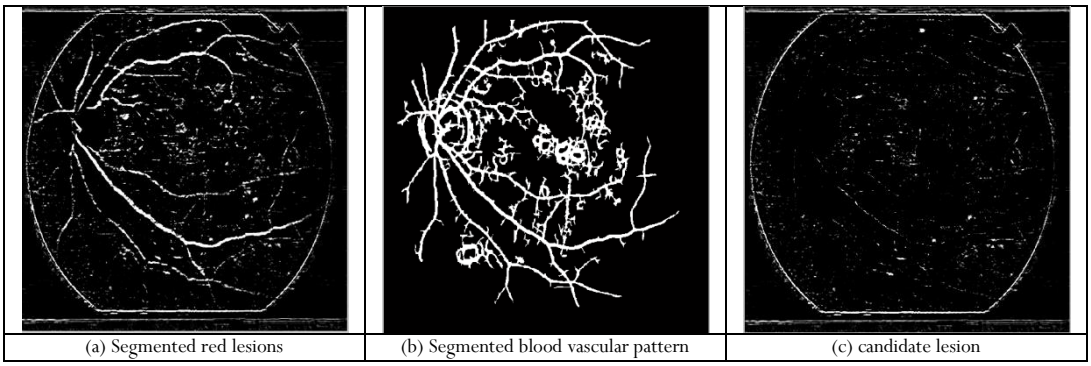
Figure 5. Red lesions Enhancement (a) Smooth image obtained from fig .4(d); (b) contrast enhanced image obtained from (a)



(a) 45 degree rotation | (b) 90 degree rotation | (c) 135 degree rotation | (d) 180 degree rotation

Figure 6. Gabor Filter banks and their orientation

Figure 7.Red



(a) Segmented red lesions | (b) Segmented blood vascular pattern | (c) candidate lesion

candidate lesions extraction. (a) Segmented red lesions containing spurious region; (b) segmented blood vascular pattern using [10, 11]; (c) candidate lesions after vessel subtraction

TABLE 1.

PSNR, MSE FOR TWO ALGORITHMS FOR RETINA IMAGE

Image	Existing Median Filter		Proposed Extended Median filter	
	PSNR	MSE	PSNR	MSE

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Image 1	48.7633	0.8713	64.9034	0.0213
Image 2	48.7344	0.8771	65.7270	0.0175
Image 3	48.0464	1.0276	63.3963	0.0300
Image 4	48.3754	0.9527	65/3643	0.0191
Image 5	49.7443	0.6951	64.9034	0.0212

The PSNR, MSE and RMSE are evaluated for simulation results and comparison of performance between proposed extended median filter and standard median filter is given in Table 1. Figure 4 illustrates the output of noise removal technique. Fig. 4 (a) illustrates the original retina image obtained from driven database. The input image contains red, blue and green channel, in the three channels green channel is more contrast. So extraction of Green channel of the retina image is illustrated in Fig. 4 (b). This green channel is used for further processing. Fig. 4 (c & d) provides the output of the standard median filter and proposed extended median filter. From the table clearly observed that the proposed extended median filter algorithm provides better result than existing median filter based on higher PSNR and lower MSE.

Enhancement of regions are illustrates in fig. 5; fig.5. (a) Shows the opening and closing of retina image it contains dark lesions but need enhancement and it is shown in fig.5. (b). Gabor filter orientation with$45^0, 90^0, 135^0$ and 180^0 is shown in fig. 6. Through this orientation easily observe the visualization of blood vessels in all direction. Fig. 7 shows the segmentation results before and after the removal of blood vessels. This removal is helpful for removing the false candidate present in the retina image.

III CONCLUSION

Automatic detection of diabetic retinopathy is one of the recent researches. The first manifestation of diabetic retinopathy is Microanerysms in retina image. This work is proposed to segment the candidate lesions from the blood vessels. The detection of blood vessel is crucial work, because it can be affected by some noise. So first noise removal is needed, in this paper noise removal is obtained by proposed algorithm of extended median filter. This algorithm is compared with existing median filter with performance metrics such as PSNR and MSE. The existing median filter only checks the fifth pixel in the given sliding window and it is switch over next sliding window. But proposed extended median filter not only fifth pixel, also checks the diagonal, vertical and horizontal pixels of the same sliding window. After this processing, it switches over to second sliding window. Experimental result proves that the proposed extended median filter algorithm gives better result than the existing median filter in terms of PSNR and MSE. After the noise removal technique, morphological operation of smoothing and contrast enhancement is carried for easily detection of blood vessel needed for accurately classified the diseases. Gabor filter is used in this paper for the extraction of different level or orientation of blood vessels. Gabor filters are applied to extract the blood vessels. Then finally segment the candidate lesions after the removal of blood vessels through matching filter and local entropy thresholding. This candidate lesions regions further given for feature vector, through this classification is carried and detect the abnormality in the diabetic retinopathy.

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A Study About The Impact Of Marketing In Software Industry

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Abstract-*The marketing plays a vital role in the rapid growth of software industry. Now a day's companies wants to maximize the profit by using marketing strategy. Every company uses different strategies to capture the market and some of them making mistakes in the marketing objectives. Marketing strategy increase the customer satisfaction .It creates a great impact in the software industry.*

KEYWORDS: Newsletter, Press releases, Blogging, Applications, Software industry, marketing

I INTRODUCTION

Marketing is an organizational function that contains a group of process for identifying the social needs, communicating and delivering values to the customers and for customer relationship management. The software industry includes businesses for development, maintenance and publication of software that is used for different business models and industries.

OBJECTIVE OF THE STUDY

1. To know about the impact of marketing in the software industry.
2. To know about the marketing strategy of software industry.

II LITRATURE REVIEW

1. ZsoltBicskey is the author of successful software marketing plan proposed the steps maximizes the market share of Software Company by using good marketing plans. He said customer service board plays a vital role in the software sale. A good marketing strategy includes good customer service, reliability of the company as well as software. Making a customer circle in online such as social blogs is very useful because whenever launching new software it helps for promotion. Highlight the features and specification in the landing pages. One of the best ways to reduce the cost in software marketing is to use affiliate marketers. Give salary only they achieve the target. So the company doesn't loss money. Only they get profit when the target is achieved by affiliated marketers.
2. Alyssa dverCEO for Mint Green Marketing she is the author of mistakes done by Software Company she proposed the drawbacks of marketing strategy in a software company. The company seeking to know about what users are wants and don't know about why that application is needed by him. It changes the marketing plan of a company. By analyzing the need of the customer makes good in marketing software.

III MARKETING

Marketing is used to communicate the value of a product or service to customers. The main motive of marketing is to selling the product or service to the customer. Marketing techniques contains the target markets through market analysis and market segmentation. Marketing is used to understanding the consumer behavior and Advertising a product or service value to the customer.

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IV IMPACT OF MARKETING IN SOFTWARE INDUSTRY

Marketing plays a vital role in the rapid growth of software industry especially in India. the software companies try to explain the uses of computer applications for consumers and they made success through marketing the software.

V MARKETING STRATEGIES OF SOFTWARE INDUSTRY

Cover the families

When software companies selling a educational software - or any software - into the home, they should concentrate on the sales message is targeted at all of the important decision-makers. For example the software should be useful for all the members in the home.

State software is unique

Companies can sell more software by point out to the website visitors that our software has unique features and benefits that they simply can't find in other applications.

Introductionof trial version

Give a trial version of software to the customers is the recent trend in market to know about the features and uses of that application and that trial version induces the customers to buy the full version.

Upgrade or update the software versions

The upgrade version of software gives the retention of customers. That satisfies the customer expectations and manages the competitors.

Encouraging the customers

Encourage your customers for promotion and customer retention. Because customer shares their experience to their friends. It reflects in the business. A good experience will gain profit otherwise a bad experience of a customer will affect the good will of the company

VI SOFTWARE PROMOTION

Introduce your software in social media example like face book, twitter etc. Highlight the features and benefits of your software in your own [companies websites] and social media.

VII WRITING OF NEWSLETTERS AND PRESS RELEASES

Now a day's newsletter is an effective way to stay in touch with your customers, prospects and affiliates. The success of an e-mail newsletter distribution system depends on your database you need to keep it up to date and accurate. Always ask permission to stay in touch with your customers and your affiliates. Offer the chance to unsubscribe from the newsletter in a very visible place. You can also take advantage of many websites that offer public relation services including free publishing of press releases.

ONLINE BLOGS

1. Write articles about the software. Writing should show the importance of that particular software.
2. Promote the software by creating a new friends as well as customers.
3. Maintain a good relationship of customers in blogs plays a vital role.

Free of cost

Giving the trial version of software to the free of cost to the educational institutes it gives an ultimate promotion to the software.

Regular Search Engine utilization and monitor

Maintaining a high ranking in the most important search engines

1. Update new information's in your website
2. Improving your link popularity
3. Regularly monitor the website results
4. Spending time in updating the design and the usability of your website.

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VIII MISTAKES DONE BY SOME SOFTWARE INDUSTRY IN MARKETING

1. Asking what users want and not why
Generally the marketing people ask customers what is their need for the purpose of creating software. But not why it is needed. When you ask why it is needed for you? It clarifies many things and shows the difficulties in creating such software

2. Lack of information/training before selling software gives detailed information about the software. Lack of information or training makes the customers unhappy. Some people of marketing not completely explain the features and benefits of the software.

3. Accepting every requirement of customers without knowing possibilities sometimes marketing people does not explain which is possible to create and which is not possible to create at the present scenario. In this cases customer expectation is increased and at the time of delivery of software they thing something is not done. This reduces the customer retention and generates complaints.

4.Lack of customer relationship the lack of customer relationship creates unknowing of customer needs to the organization.

STEPSTO OVERCOME THIS MISTAKES
Explain the real benefits of the software
Only tell about the true benefits of the software. If the company creates on high expectation of on software is good but at the same time it doesn't satisfies expectation of customer it creates .it gives an uncomfortable feel to work in the application
Communicate clearly with the customer
Ask the customer needs and why it is needed? Give detailed information about the software. Clearly explains the benefit and features of the software before sale.
Press Releases
It plays a vital role in your software marketing plan. Share information about your software launch and development. Share stories that will attract the attention of leading software publications and bloggers,

USES OF MARKETING STRATEGY IN SOFTWARE INDUSTRY
1. Maximize the profit
2. Increase the customers
3. Satisfies the customer needs
4. Make customer retention

FINDGINGS
1. Software marketing strategy plays a vital role in rapid growth of software industry.
2. Marketing strategy induces the customers to buy the software applications
3. It explains the need or importance of the computer application
4. It is used to maximize the company's profit
5. It is used for client retention

IX CONCLUSION

The marketing always helps in maximizing the profit and maintain good customer relationship for the software industry but in some cases wrong marketing objectives, plans and strategies makes the software company into losses. Make market analysis and find the current trend in software industry and then choose a appropriate marketing objectives and strategies to maximize the profit.

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Mobile Computing

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Abstract-*Due to increase in the number of portable computers and the need for network connectivity, mobile computing has become an important part in day to day activities. Mobile computing offers many benefits for organizations who choose to integrate their technologies into fixed organizational system. From wireless laptops to cellular phones mobile computing has become an unavoidable part. Mobile computing improves quality, accessibility, efficiency and enhances management effectiveness. The scope of this paper is to discuss about characteristics, applications and issues that arise in mobile computing.*

Keywords: Mobile computing, Wireless Technology, Application, Limitations.

I.i INTRODUCTION

Mobile computing is a human-computer interaction by which a computer is expected to be transported during normal usage. Mobile computing involves mobile communication, mobile hardware and mobile software. Mobile communication is the concept of using small and portable devices with wireless connections in an unknown location or the location which is not predefined. A concept of creating an information management platform which is free from temporal and spatial constraints is called mobile computing. The connectivity mode that has been used is known as "Mobile Connectivity".
The mobile connectivity between two nodes exists if they are continuously connected through wireless channels and could utilize the channels without subject to temporal and spatial constraints.

A. CHARACTERISTICS OF MOBILE COMPUTING

Mobile computing is a combination of computer hardware, software and application software and some communication mediums. Some of the characteristics are based on the following:

- Hardware
- Software
- Communication

a HARDWARE

The factors such as size, weight, storage (primary and secondary), microprocessor, forms of input and output, battery life, durabilityetc., determine the characteristics of computer hardware.

b SOFTWARE

Mobile computing uses following two types of software:

- System Software
- Application Software

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Some of the system software's used are Windows, Android etc. Each operating environment has a form of Integrated Development Environment (IDE) for application development. Most operating environments provide more than one development environment.

B.COMMUNICATION

Communication is a very important characteristic in mobile computing. The way of communication in a mobile computing can be classified into the following

- Connected
- Weakly Connected
- Batch
- Disconnected

The connected state implies that there is continuous and high speed connection available. The weakly connected state denotes that communication is continuous but the connection is a slow speed one. A batch connection denotes that the mobile computer is not continuously available for communication. Disconnected state denotes that there is no connection available between the mobile computer and the fixed information system.

(i) COMMUNICATION TECHNOLOGIES THAT ARE AVAILBLE

There are many technologies that are available for the communication of mobile computers. Some of the technologies that are available are given below

- Wireless Local Area Networks(WLAN's)
- Personal Communication Systems(PCS's)
- Specialized Mobile Radio Service(SMR)

I.i WORKING OF MOBILE COMPUTING

Information flows through wireless channels in mobile computing. The processing unit is free from temporal and spatial constraints. A processing unit (client) is free to move about the space while getting connected to server. This is a powerful facility which allows users to get to data site independently. The working of mobile computing has its basics in Personal Communication Systems (PCS's.).PCS refers to a wide variety of wireless access and personal mobility services. PCS includes high-tier cellular systems and low tier cellular systems.

A. HIGH-TIER CELLULAR SYSTEMS:

High-tier digital cellular systems include the following:

- Global system for mobile communications.
- Personal digital cellular.

B. LOW-TIER CELLULAR SYSTEMS:

Low-tier digital cellular systems include the following:

- Cordless Telephone System 2(CT2).
- Personal Handy Phone Systems (PHPS).

I.ii MOBILE COMPUTING COMPONENTS

There are three components in mobile computing:

- Handheld mobile computing device
- Communication Technology Component
- Centralized Information System

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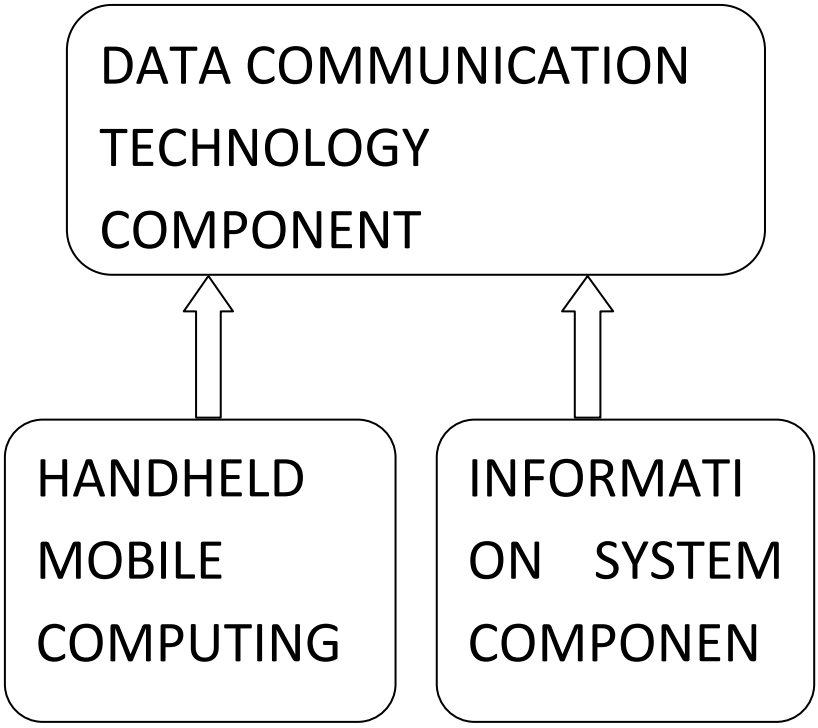

A. APPLICATIONS OF MOBILE COMPUTING

There are two types of applications of mobile computing:

- Horizontal Applications
- Vertical Applications

C. HORIZONTAL APPLICATIONS

- Web browsing
- Word processing
- Scheduling
- Contact management

D. VERTICAL APPLICATIONS

- Retailing
- Shipping
- Medical
- Public safety

E. BENEFITS OF MOBILE COMPUTING

- Improved Information Accessibility
- Increased Operational Efficiency
- Increased Management Effectiveness
- Emergency Services

F. LIMITATIONS OF MOBILE COMPUTING

- Insufficient Bandwidth
- Security Standards

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- Power Consumption
- Potential Health Hazards

I.iii CONCLUSION

Mobile computing is an important, evolving technology. It enables mobile personnel to effectively communicate and interact with the fixed organizational information system while remaining unconstrained by physical location. Mobile computing offers significant benefits for organizations that choose to integrate the technology into their fixed organizational information system. Mobile computing is made possible by portable computer hardware, software, and communications systems that interact with a non-mobile organizational information system while away from the normal, fixed workplace. Mobile computing is a versatile and potentially strategic technology that improves information quality and accessibility, increases operational efficiency, and enhances management effectiveness. Mobile computing may be implemented using many combinations of hardware, software, and communications technologies. The technologies must be carefully selected and the applications designed to achieve the business needs required from the overall organizational information system. Here in this paper we have in term identified some of the challenging issues, applications of mobile computing along with few of the characteristics of Mobile computing.

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A Descriptive Study About Brand Marketing

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Abstract-*The cornerstone of many companies' marketing strategy is to develop loyal customers willing to pay premium prices for branded goods and services. Throughout the 1980s, brand marketing moved from its stronghold in the consumer goods industry to the mainstream of business activity. Companies in almost every industry invested heavily in building brands for their products, services, business units. By the mid-1990s, it had become apparent that the investment in creating a brand was no longer a guarantee of long-term and defensible advantage in the market place. One famous brand after another found that it could no longer command strong price premiums to their competitors nor expect the automatic loyalty of its customers Choice modeling implications of the branding concept and the challenges of incorporating main and interaction effects of branding as well as the impact of competition are discussed.*

Keywords: Innovation, Brand equity. Customers

I INTRODUCTION

Brands serve several valuable functions. At their most basic level, brands serve as markers for the offerings of a firm. For customers, brands can simplify choice, promise a particular quality level, reduce risk, and/or engender trust. Brands are built on the product itself, the accompanying marketing activity, and the use (or non-use) by customers as well as others. Brands thus reflect the complete experience that customers have with products. Brands also play an important role in determining the effectiveness of marketing efforts such as advertising and channel placement. Finally, brands are an asset in the financial sense. Thus, brands manifest their impact at three primary levels – customer-market, product-market, and financial-market. The value accrued by these various benefits is often called brand equity. Brand Intangibles An important and relatively unique aspect of branding research is the focus on brand intangibles – aspects of the brand image that do not involve physical, tangible, or concrete attributes or benefits (see Levy 1999). Brand intangibles are a common means by which marketers differentiate their brands with consumers (Park, Jaworski, and MacInnis 1986) and transcend physical products (Kotler and Keller 2006). Intangibles cover a wide range of different types of brand associations, such as actual or aspiration user imagery; purchase and consumption imagery; and history, heritage, and experiences (Keller 2001). A number of basic research questions exist concerning how brand tangibles and intangibles have their effects.

Objective of the study:

1. To understand importance of brand marketing.

2. Various strategies which have been used many companies.

Brand Cultures

Think of the brand as the culture of the product. We can borrow from the disciplines of anthropology, history, and sociology to understand products as cultural artifacts. Products acquire meanings—connotations—as they circulate in society. Overtime, these meanings become conventional, widely accepted as "truths" about the product. At this point, the product has acquired culture.

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Consider a new product that has just been introduced by a new company. While the product has name and a trademarked logo, and perhaps other unique design features—all aspects that we intuitively think of as "the brand"—in fact the brand does not yet exist. Names and logos and designs are the material markers of the brand. But, because the product does not yet have a history, these markers are "empty." They are devoid of meaning. Now think of famous brands. They have markers also: a name (McDonald's, IBM), a logo (the Nike "swoosh," the Traveler's umbrella), a distinctive product design feature (Harley's engine sound), or any other design element that is uniquely associated with the product. What is different is that these markers have been filled with customer experiences, with advertisements, with films and sporting events that used the brand as a prop, with magazines and newspaper articles that evaluate the brand, with conversations with friends and colleagues that mention the brand. Over time, ideas about the product accumulate and "fill up" the brand markers with meaning. A brand culture is formed. Let us consider how this happens.

Brand cultures accumulate as various "authors" create stories that involve the brand. Brands have four primary types of authors: companies, popular culture, influencers, and customers.

Companies The firm shapes the brand through all of its product-related activities that "touch" customers. All elements of the marketing mix—product, communication, channels, and pricing policies—can potentially "tell stories" about the product. We will take up the firm's authoring role inconsiderable detail below.

Popular culture Products are a prominent part of the world in which we live. As such, they are frequently used as props in films, television, books, magazines, on the Internet, across all mass media. These representations can have a powerful influence on brands. Popular culture can comment on brands directly—as when a talk show host like David Letterman spoofs an advertisement or when a product becomes a news story, such as when Firestone tires were recalled. Alternatively, brands can be used as props in entertainment products such as films—as with Reese's Pieces in E.T. and Pepsi in Wayne's World. For nearly a century, companies have sought to manage how their brands are presented in the media, through public relations efforts and paid sponsorships.

Customers help to author the brand culture as they consume the product. As they interact with the product, customers create consumption stories involving the product, which they often share with friends.

Influencers In many categories, non-customers opinions are influential. Think of trade Magazine reviews, the opinions offered by mavens and connoisseurs during work and leisure gatherings, and the opinions offered by retail sales people.

The cultural materials circulated by these authors come in three forms: stories, images, and associations. Stories and images are the more potent sources of brand culture. Brand stories and images have plots and characters, and they rely heavily upon metaphor to communicate and spur our imaginations. Think of brand associations as the residue of these stories and images. We may forget the specifics of a product story but still attribute some characteristics to the brand ("it's for old people," "often falls apart," etc.).

As these stories, images, and associations collide in everyday social life, conventions eventually form. A common story emerges as a consensus view (or, often enough, a few different common stories, each of which constitutes a customer segment for the brand). At this point the brand has become established as a cultural artifact. Marketers often think of branding at the individual level perceptions of individual consumers. But what makes branding so powerful is the collective nature of these perceptions, the fact that the stories/images/associations have become conventional and so are continually reinforced because they are treated as "facts" in everyday interactions.

Assessing Brand Performance

To manage brands properly, marketers should have a clear understanding of the equity in their brands – what makes them tick and what they are worth. Two interesting sub-areas of this topic are the measurement and valuation of brand equity at different levels – customer, product-market, and financial market – and the relationship of customer equity to brand equity.

Measuring Brand Equity

In recognition of the value of brands as intangible assets, increased emphasis has been placed on understanding how to build, measure, and manage brand equity (Kapferer 2005; Keller 1993, 2003). There are three principal and distinct perspectives that have been taken by academics to study brand equity.

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Customer-based

From the customer's point of view, brand equity is part of the attraction to – or repulsion from – a particular product from a particular company generated by the "non-objective" part of the product offering, i.e., not by the product attributes per se. While initially a brand may be synonymous with the product it makes, over time, through advertising, usage experience, and other activities and influences, it can develop a series of attachments and associations that exist over and beyond the objective product. Importantly, brand equity can be built on attributes that have no inherent value (Broniarczyk and Gershoff 2003; Brown and Carpenter 2000; and Carpenter et al. 1994), although Meyvis and Janiszewski (2002) show irrelevant information can be counterproductive in consumer decision-making.

Company-based

From the company's point of view, a strong brand serves many purposes, including making advertising and promotion more effective, helping secure distribution, insulating a product from competition, and facilitating growth and expansion into other product categories (Hoeffler and Keller 2003). Brand equity from the company perspective is therefore the additional value (i.e., discounted cash flow) that accrues to a firm because of the presence of the brand name that would not accrue to an equivalent unbranded product. In economic terms, brand equity can be seen as the degree of "market inefficiency" that the firm is able to capture with its brands.

Financial-based: From a financial market's point of view, brands are assets that, like plant and equipment, can, and frequently are, bought and sold. The financial worth of a brand is therefore the price it brings or could bring in the financial market. Presumably this price reflects expectations about the discounted value of future cash flows. In the absence of a market transaction, it can be estimated, albeit with great difficulty (Ambler and Barwise 1998; Feldwick 1996), from the cost needed to establish a brand with equivalent strength or as a residual in the model of the value of a firm's assets.

Strategically Managing the Brand

In many firms, the CEO is effectively the Chief Brand Officer (CBO) as well. Regardless of whom (if anyone) is in charge of managing the brand, several general strategic issues arise: the optimal design of brand architecture; the effects of co-branding and brand alliances; and cross-cultural and global branding strategies. Brand Architecture Brand architecture has been studied in the context of line extensions, vertical extensions, multiple brand extensions, sub-brands, and brand portfolios (Aaker 2004). Several researchers have examined characteristics of successful line extensions (Andrews and Low 1998;
Putsis andBayus 2001; Reddy etal. 1994). In the context of fast moving packaged goods, Cohen

et al. (1997) developed a decision support system to evaluate the financial prospects of potential new line extensions.

Although many strategic recommendations have been offered concerning "vertical extensions" – extensions into lower or higher price points (e.g., Aaker 1994) – relatively little academic research has been conducted to provide support for them (see Randall et al. 1998 for an exception). Kirmani et al. (1999) found that owners had more favorable responses than non- owners to upward and downward stretches of non-prestige brands (e.g., Acura) and to upward stretches of prestige brands (e.g., Calvin Klein and BMW). Downward stretches of prestige brands, however, did not work well because of owner's desire to maintain brand exclusivity. A sub-branding strategy, however, protected owners' parent brand attitudes from dilution.

Joiner and Loken (1998), in a demonstration of the inclusion effect in a brand extension setting, showed that consumers often generalized possession of an attribute from a specific category (e.g., Sony televisions) to a more general category (e.g., all Sony products) more readily than they generalized to another specific category (e.g., Sony VCR's). Research has shown that family brand evaluations depend on the expected variability of individual product quality and attribute uniqueness (Gurhan-Canli 2003; see also Swaminathan et al. 2001).

Research has also shown that a sub-branding strategy can enhance extension evaluations, especially when the extension is farther removed from the product category and less similar in fit (Keller and Sood 2004; Milberg et al. 1997; Sheinin 1998). A sub-brand can also protect the parent brand from unwanted negative feedback (Milberg et al. 1997; Janiszewski and van Osselaer 2000; Kirmani et al. 1999), but only in certain circumstances, e.g., if the sub-brand consists of a meaningful individual brand that precedes the family brand, e.g., Courtyard by Marriott (Keller and Sood 2004). Wanke et al. (1998) showed how sub-branding strategy could help set consumer expectations.
Bergen et al. (1996) studied branded variants – the various models that manufacturers offer different retailers (see also Shugan (1996)). They showed that as branded variants increased, retailers were more inclined to carry the branded product and provide greater retail service support. Other research has shown how brand portfolios can increase loyalty to multiproduct firms (Anand and Shachar 2004). Kumar (2003) argues that companies can rationalize their brand portfolios to both serve customers better and maximize profits (see also Broniarczyk et al. 1998).

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II CONCLUSION

Branding and brand management has clearly become an important management priority for all types of organizations. Academic research has covered a number of different topics and conducted a number of different studies that have collectively advanced our understanding of brands. Table 1 summarizes some of the generalizations that have emerged from these research studies that were reviewed in this paper. To put the academic literature in marketing in some perspective, it could be argued that there has been a somewhat of a preoccupation with brand extensions and some of the processes that lead to the development of brand equity. By contrast, there has been relatively limited effort directed toward exploring the financial, legal, and social impacts of brands. In terms of methodology, considerable effort has been devoted to controlled experimentation, although some work has focused on choice modeling of scanner data. Little integration of these two streams with each other or the qualitative work on branding has appeared.

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A Study About Internet Marketing

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Abstract-*Internet marketing is becoming a hot topic in every business sector, and gradually plays a truly important role in any company's multi-channel marketing strategy. However, how to apply Internet marketing especially how to utilize it to attract more visitors to a certain website is still a big question for a number of advertisers. The thesis mainly covers the acquisition process of Internet marketing after touching upon the basic knowledge of Internet marketing, how the Internet adapts to the marketing mix, as well as companies' and consumers' perspectives in pursuing Internet marketing. The two main purposes of this study are to bring a general picture of Internet marketing to its readers and dig into how to drive traffic or attract customers to the Flashgame4fun.com website. The information in the theory part is acquired through many textbooks, articles and websites by using qualitative research method, meanwhile quantitative method is used to collect all important data supporting the case study analysis.*

The effectiveness of the acquisition process is tested. There is an incredible boost of visits to the website after applying Search engine optimization and link building activities. However, all activities of acquisition process should be combined and implemented continuously to maximize quality visitors.

Keywords: Internet marketing, acquisition process, search engine optimization, link building.

I INTRODUCTION

The foundation of the Internet has offered new advanced business transactions and models for the world economy. Internet marketing is born to adapt to this rapid development of online business. Especially, online advertising has been achieving many successes. According to IDC, the total worldwide spending on Internet advertising will reach USD 65.2 billion in 2008, which represents nearly 10% of all ads spending across all media. It is predicted that this number will be over USD 106 billion in 2011.

Internet marketing is defined as the application of the Internet and related digital technologies in conjunction with traditional communications to achieve marketing objectives (Chaffey, D., Ellis-Chadwick, F., Johnston, K. and Mayer, R. 2006, 8). In reality, there are some alternative terms for Internet marketing such as e- marketing (electronic marketing) or digital marketing even though they have a broader scope since they include electronic customer relationship management systems (e-CRM systems) as well.

How important is Internet marketing to the success of an organization? There are no exact answers for this question. It depends on the nature of one company business line. There are many companies currently using the Internet as their main business transaction such as DELL, AirAsia, etc… However, companies such as UPM, the world's leading forest products producer only uses the Internet as a media to introduce the company and its products to customers via its website. Besides that, during the whole purchasing decision making process, customers not only use the Internet in isolation to search for products but other media such as print, TV, direct mail and outdoor as well.

These media still play an extremely important role for the marketers to communicate with customers, for example, direct or face – to – face marketing more or less helps marketers build up the trust in customers and encourage them to purchase the products. Therefore, it is better to use the Internet as part of a multi-channel marketing strategy which "defines how different marketing channels should integrate and support each other in terms of their proposition development and communications based on their relative merits for the customer and the company."

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This paper is carried out to explore one process of Internet marketing. It is divided it into two parts. The first part is about the theory or principles of Internet marketing which are gathered from books, research papers and articles. The authors focus on the basic definition of Internet marketing, how the Internet interacts with the marketing mix model, companies' and consumers' perspectives in pursuing Internet marketing, as well as Internet marketing acquisition activities. The second part is about the practice. Due to the limit of financial resources, only some of acquisition activities are applied to reveal how effective they are in order to attract more website visitors. However, we still cover all main issues of other activities in acquisition process to provide a common basic knowledge of them to our readers.

II RESEARCH METHODS

Research methods are important to provide a systematic approach to a certain study. "Empirical research methods are a class of research methods in which empirical observations or data are collected in order to answer particular research questions. While primarily used in academic research, they can also be useful in answering practical questions. Empirical research methods can be divided into: qualitative methods and quantitative methods. Qualitative methods which collect data in the form of text, images, sounds drawn from observations, interviews and documentary evidence, then analyze it using qualitative data analysis methods, is usually used in the early stages of research (exploratory research) and building a theory. Meanwhile, when theory is well built, or needs to be tested or refined, quantitative methods are the most appropriate choices since they collect numerical data then analyze it by using statistical methods. There are three most common quantitative methods: experiment (applying a treatment, measure results before and/or after), survey (asking questions by face to face interview, telephone, mail, or Internet) and historical data (looking for patterns in historical data). Case study (observations carried out in a real world setting) and action research (applying a research idea in practice, evaluate results, modify this idea) are the most two popular qualitative methods. However, "no research method is entirely qualitative or quantitative. For instance, a survey can either collect qualitative data by using open ended questions or quantitative data by using closed questions. In other cases, observations of participant behavior and measures of response time and accuracy can be happened in an experiment, or quantitative data (e.g. system usage statistics) and qualitative data (e.g. interviews with users) can be collected in a case study.

In this study, we would like to bring an overall picture of Internet marketing by discussing Internet marketing versus the marketing mix, the customer and company perspectives to our readers. Especially, the main points are to test the effectiveness of two activities of Internet marketing acquisition process after presenting common knowledge of it. Therefore, both qualitative and quantitative methods are applied to answer the research questions. As mentioned, qualitative methods is used to analyze of documents and materials. Hence, in the theory part, these methods is applied to exploring secondary data from books, researches and articles to give a thorough understanding the topic and draw answers for the research questions. However, both qualitative and quantitative methods. Case study method of qualitative methods helps us to observe the whole process of testing the most two cost effective Internet marketing's acquisition activities. Meanwhile, we also use experiment method ofquantitative methods to apply the two mentioned activities on the

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flashgame4fun website. After that, we collect, measure, analyze and compare the before and after data to have a conclusion of how effectiveness acquisition process activities.

III THE INTERNET AND THE MARKETING MIX

Nowadays, the concept of Internet marketing has expanded and brought more opportunities for companies to approach their customers. In the past, the Internet was only used as a tool to contact customers, part of direct marketing. Nowadays, the Internet, particularly websites has been becoming a popular media for any firms to introduce their products and services. The Internet is considered as an independent and effective marketing tool. During eight years, from 2000 to 2008, the number of Internet users has increased by 4 times from about 361 million to more than 1, 46 billion, in which, Asia, the continent with the biggest population accounts for 39.5% of World Internet Users.

It provides an effective strategic framework for changing different elements of a company's product offering to influence the demand for products within target market. However, the researchers only focus on the first main and traditional 4 Ps in this paper due to some limitations. In Finland, nearly four out of five Finns aged 15 to 74, or over three million persons, used the Internet in spring 2007. To understand precisely how the Internet offers new opportunities to traditional marketing model, it is necessary to examine it based on the marketing mix which is traditional but still applicable.

According to Philip Kotler (2003), Product is the solution to customers wants or/and needs. It refers to the characteristics of a product, service or brand. The Internet offers options for varying the core product, options for changing the extended products, conducting research online, velocity of new product development and velocity of new product diffusion. Many digital products now can be purchased easily over the Internet via providers' website. For other products, instead of providing actual products to customers, many companies publish the detailed product information with pictures or images. Dell is a typical example. For example, new drivers or updated package for a computer or software are easily downloaded via producers' websites. It brings conveniences for both of buyer and seller/ producers. In addition, it is obvious that the Internet provides a new tool to collect customer feedback quickly and accelerate new product development since process of testing new products is more rapid and effective. The information about new products will spread out more wildly and quickly.

Price is the most flexible element comparing to other three elements of the marketing mix, since it can be changed quickly to adapt to the market's demand. Companies can use the Internet to build differential price for different customers in different countries, based on IP (Internet Protocol) analytic technologies. For buyers, they are able to find out the price differences by visiting companies' websites or price comparison sites. In addition to this, the online payment method using credit cards is the most popular, efficient, convenient and flexible way for companies and customers.

Place in the marketing mix refers to how the product is distributed to customers. New method of distributing goods through online selling is offered by the improvement of the Internet. It is possible for customers to make their purchasing decisions anywhere at any time. The Internet has the greatest implications for the Place in the marketing mix because it has a large market place. Companies now can expand their business from local areas to the whole country even to international market. They also can use the Internet to exploit new markets with low cost international advertising since they do not have to establish sales infrastructure in different countries.

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Internet Advertising: It is a form of advertising that uses the Internet to attract customers by delivering messages through websites or advertising banners on other popular websites which leads online users to a company site. The company website must be well-organized, well-designed and user-friendly in order to attract more target customers. (Rowley, 2001)
Sales promotion: Thanks to the Internet, sales promotions such as competitions or price reductions can be provided to visitors of the company's website in a cost-reduced way. Not only encourage the customers to visit the company website again, this also provides the means for the company to build a long term relationship with their customers (Chaffey, 2006, 243-245).
Public relations: The Internet is a new medium for Public Relations (PR). Blogs, Podcasts / Internet radio shows, online newsrooms and media kits offer companies a new opportunity to publish the news directly while in traditional marketing they would wait for periodical publications (Chaffey, 2006, 243-245).
Direct marketing: Thanks to the Internet, companies nowadays have a new tool for direct marketing and advertising that may be cost effective and maximum delivery to targeted customers. By using e-mail addresses, the company can establish a two way communication method with customers (Chaffey, 2006, 243-245).

IV INTERNET MARKETING – COMPANY AND CUSTOMER PERSPECTIVES

Internet marketing – Company perspectives
The 21st century is predicted to be a century of technologies when everyone, every company, every organization apply them to make their works become much easier and more effective. The popularity of using the Internet, together with the improvement of computer hardware and software industries, completely boost the development of e-marketing in the whole process of buying from pre-sale to sale to post-sale and further development of customer relationship. New comers in this area have to consider very carefully the use of these modern channels. Since, the role of Internet marketing is to support the multi-channel marketing which is the combination of digital and traditional channels at different points in the buying cycle. They have to understand which the main marketing channel is and which the supportive marketing channel is. Below is some results drawn from different articles and researches which touch upon different parameters that make many companies pursue Internet marketing.

Drivers for Internet marketing:
What are factors which drive many companies to apply the Internet marketing and how does the size of a company relate to these drives? Bengtsson, Boter, Vanyushyn (2007, 27) who conducted a survey with various Swedish companies of different sizes; give their readers a set of quite satisfactory answers to these questions. Depending on the number of employees, the authors categorized them into three different sizes: small, medium and large (turnover and profit should be taken into consideration). They figure out that different factors drive different size companies to adopt Internet marketing including willingness to cannibalize, entrepreneurial drivers, management support, and market pressure. Besides that, they also find out which of these factors drive what size of companies.

Marketing channel preference:
Nowadays, many companies have to take the pros and cons of Internet marketing channels and traditional marketing channels into consideration seriously to decide which channel is suitable and more effective for their companies. By comparing and contrasting between companies' motivations to choose between Internet channels and traditional channels, Jaeki Song and Zahedi F.M in their study "Internet marketing strategies: Antecedents and implications", indicate that Internet marketing is another good choice for any companies. And what attracting customers is a reasonable price provided by companies. The results are only drawn from some successful websites. Failure websites, the reasons of failure, and many risks that consumers have to face when using Internet marketing for example Internet security, scammers etc. also need to be discussed.

Internet marketing – consumer perspectives:
In fact, customers also have their own opinions and attitude towards Internet marketing. There are some works which concern what would interest consumers to pursue e-marketing and be willing to use it as well as what would prevent them from using it.

Consumer privacy:
In an effort to understand New Zealand consumers more, Chung W. and Paynter J. (2002, 2402-2411), based on their work, drew a conclusion that it was a must for companies to have privacy policy statements under their website to protect consumer privacy information, to make sure that their customers' information cannot be misused. Some solutions were also discussed in this study to protect customers' privacy. For the authors, solutions such as legislation, self-regulation and technical solutions had be combined together to maximize its effectiveness.

Consumers decision making process in buying a product or using a service:
The fact is that any consumer is influenced by different factors in his or her decision making process of purchasing products or services. According to George Joye F, many customers feel confident to make an order only when they have made a few purchases. They are afraid their privacy can be revealed and misused without their acknowledgment. If buyers do not trust the company which provides online sales services, they will never want to make any online buying decisions. In addition, e-marketing helps consumers to have more

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different means to search for products' designs, functions, features, specifications, prices etc. so they can compare and contrast products and services before giving their final decisions.

Consumers decision making process in buying a product or using a service:
The fact is that any consumer is influenced by different factors in his or her decision making process of purchasing products or services. According to George Joye F (2002, 165-180), many customers feel confident to make an order only when they have made a few purchases. They are afraid their privacy can be revealed and misused without their acknowledgment. If buyers do not trust the company which provides online sales services, they will never want to make any online buying decisions. In addition, e-marketing helps consumers to have more different means to search for products' designs, functions, features, specifications, prices etc. so they can compare and contrast products and services before giving their final decisions. Davidson Alistair andCopulsky Jonathan found out that online customers would purchase via the Internet with web maven reviews influencing their mind set. Kim D.J, Kim W.J and Han J.S with their study about online travel agency service came to conclude that the top priority factor which affected customers' decision making in purchasing was lowest price, security, ease of navigation of the website and fast loading time of the website.

How consumers evaluate companies in the Internet:
The participants in Cheung Christy M K and Lee Matthew K O (2006, 479 - 492) work evaluated Internet merchants based on integrity, competence through professional websites and security. External factors such as third party recognition also are very important. A company and its website can gain customers' trust easily if a recognized third party certifies that the website is secured. In addition, guarantee terms also contribute to build trust in customers' minds. However, the study can bring more precise results if the participants come from different group ages.
Search Engine Optimization

Search engine optimization (SEO) is a structured approach used to increase the position of a company or its products/ services in search engine natural or organic results listings for selected key words/ phrase. In simple words, SEO is method of archiving higher ranking, faster indexing in different search engines. The term "organic search" refers to results from a keyword or key phrase (keyword phrase) search. Thus, the higher-ranking websites have higher chance of getting traffic from an organic search. How do the search engines rank a website? Each search engine has its own way of weighting. In common, most of the mechanism is based on spiders and robots. Search engines compile an index of words on websites by sending out spiders or robots to crawl around sites that are registered with that search engine traffic. After crawling contents of sites, each search engine has its own algorithm that weight the index based on different parameters.

Online Partnerships:
There are three kinds of online partnerships: link building, affiliate marketing, and online sponsorship.

Link building is a structured activity to include good quality hyperlinks to your website from relevant sites with a good page rank. Link building is a key activity for search engine optimization. It can be considered as a part of Online PR because the links to your website are visible in third parties websites. Link building is a time consuming process including building reciprocal links, links which are agreed between yourself and another organization. Getting a "good" or "quality" links to your website also can be done by purchasing from high ranking websites or Search Engine Marketing companies. There are some guidelines for link building which we should pay attention to such as: - These links must include our main keywords in the "anchor text". Anchor text is the actual text located within the link linking to our website. - It's best to get links from the exact same websites that the top ranked websites have their links on. - Try to get links from as many different IP Addresses as possible.

An affiliate marketing scheme is also known as associate marketing scheme. It is defined as a commission-based arrangement where an e-retailer pays sites that link to it for sales. In other words, a merchant pays the affiliate for links that are generated from the affiliate site to the merchant site. For instance, an e-retailer wants to sell his/her products through affiliate marketing. In fact, there are many companies which want to conduct surveys or want leads generated for them also find help from this scheme. They pay commission to affiliates' site whenever affiliates get a survey form filled through their website or generate a lead. This is named pay-per-lead.

Interactive Advertising:
Interactive marketing refers to place ad banners on other websites. If ad site visitors click on ad banners, visitors will be redirected to destination sites. In some aspects, it is quite similar with Pay-per-click search engine. The main difference between these two types of marketing activities is: there is no interference of the third parties or search engine providers. Besides traditional banner ads, there are now many different forms of interactive advertising such as pop- ups/ layer, video ads, or new large-format ad spaces (button 2, skyscrapers, wide skyscrapers, Leaderboards). The main purposes of interactive advertising for example are: delivering detailed information of a destination site's offer, leading to a sale, and brand awareness.
The foundation of interactive advertising results in the appearance of many new different terms, for instance page impression (occurs when an Internet user views a webpage), ad impression (occurs when a person views an advertisement on the webpage), reach (a number of unique individuals view an advertisement), Clickthrough (occurs each time a webpage visitor clicks on an ad banner which leads them to destination website) and clickthrough rate (CTR) (is the number of clicks your ad receives divided by the number of

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times your ad is shown (impressions) . According to an ADTECH research (2007), in Europe, the clickthrough rate has fallen from 0.33% in 2004 to 0.18% in 2007. Compared to other countries, the CTR in Finland is the lowest one, only 0.09%. Dirk Freytag, CEO, ADTECH, said: "The decreasing numbers overall in my opinion are due to the fact that the users have increasingly gotten used to online advertising during the last years. Banners are now commonplace on the Internet. New formats, such as video ads are needed to draw attention and generate clicks. Layer and Leaderboards in contrast have a high reminder potential even beyond the Web."

Email marketing:

Email marketing communications are separated into two categories: outbound email marketing and inbound email marketing, in which, outbound email marketing refers to emails are sent to customers and prospects from an organization, and inbound email marketing is the management of email from customers by an organization. This method of communication to customers through e-newsletter or periodic email blasts is considered as a vital communications technique for companies.

According to the Double click website, there are three key measures for email marketing: delivery rate (non-bounce rate), open rate and click through rate (click rate). Delivery rate simply shows the percentage of delivered emails. Emails will bounce when the email addresses is no longer exist or blocked by a spam filter. Open rate indicates how many emails are opened, however these figures are not accurate. It can be explained that a number of users have preview panes in their email reading programs which load the image even though it is deleted without reading. Besides that, some email readers such as Window Live Mail block images by default. It results to the open rate decline gradually through time. Click through rate or click rate refers to the number of delivered emails are clicked through by readers.

For any company, managing the number of inbound emails is absolutely important since it influences directly on the customer service quality. To be successful, an inbound customer contact strategies needs to be developed by organizations to reduce the cost of customer contact and improve the quality of customer enquiry management.

Online PR:

PR stands for "public relations". In some cases, it is also used as an acronym for "press release" or "press relations". According to Chaffey et al. (2006, 384 - 388), online PR refers to maximizing favorable mentions of an organization, its brands, products or websites on third-party websites which are likely to be visited by its target audience. Online reputation management, which controls the reputation of an organization through monitoring and controlling messages placed about the organization, is another aspect of online PR.

There are many activities which belong to Online PR. Communicating with media (journalists) online is one of Online PR activities. It uses the Internet to spread out press releases via email and on-site. A company can create a press-release area on its webpage or send email alerts about news that journalists and other third parties can sign up to. It also can choose to submit its news stories or releases to online new feeds. Link building is another activity of Online PR since it aims to make your brand visible on third parties' webpage. It must be well-structured effort to achieve as many links as possible into a website from referring websites. The third activity of Online PR is blogs, podcasting and RSS. Blog is an online diary or news source prepared by an individual or a group of people. It is an easy method to disseminate information. Business blogs can be created by people within the company but need to be under control to avoid releasing harmful information. Podcasts are set up by individuals and organizations to post online media (audio and video) which can be viewed in appropriate media players. However, it is difficult to make podcasts visible because their contents are usually only be recognized by tags. Moreover it is not easy to assess quality without listening to the start of a podcast. Really Simple Syndication (RSS) is an extension of blogging where blogs, news or other content Ares published by an XML standard and syndicated for other sites or read by users in RSS reader software services. Another activity of Online PR is to manage how your brand is presented on third- party websites. It is necessary to establish monitoring services as well as have resources to deal with negative PR. Creating a buzz – online viral marketing is part of Online PR which is discussed separately in this paper since it plays an important part in attracting more visitors to a site.

Offline campaigns:

"Offline promotion" refers to using communications tools such as advertising and PR delivered by traditional media such as TV, radio and print in order to direct visitors to an online presence (Chaffey et al. 2006, 370 - 373). This is one of the most useful activities to drive traffic to a website. In addition, the characteristics of offline media usually have a higher impact and are more creative as well as explain the online value proposition. Many organizations whose depend mostly on the Internet continue to invest heavily in offline media. Dell and AirAsia are two companies which use online sales services as their main business transactions but they still have to spend a lot of money on offline media every year.

IV CONCLUSION

The Internet is certainly the place for businesses to expand, reach new markets and provide new services but there must be a balanced approach to the Internet. The Internet must be regarded as a strategic resource important to the whole business. The technical detail of the Internet can be complex. Management responsibility however is more productively focused on managing the implementation

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process to achieve strategic goals and assure smooth, secure operations. The IS Manager must first define why the company wants to be connected to the Internet then move to establish the appropriate connection, choosing the most cost effective option between capacity and speed. For medium businesses it is recommended that high speed modem links to a provider with dedicated telephone lines would be most appropriate. Issues such as how to advertise and promote the company on the Web must then be tackled, taking into account the human and social issues on the net. Users of the Web can include both employees and potential customers.

By learning what and how the Internet can help the employees in their day to day work, non-business use of the Internet can be reduced, and by offering on-line services and supporting the customer via the Internet, a whole new market can be created for the business. A medium business would consider having a Web site with the Internet provider but perhaps creating and updating the web pages themselves. Finally security against intrusion has to be maintained. Technology is a vital tool to IS Managers to cope with this. Also by having the Web site at the provider and linking to the Internet by regular telephone lines it makes the company's data safe from hackers. In conclusion, with careful planning and proper management, putting a business on the Internet can make it more effective and productive. However understanding and knowing how the rapid changes and various complex issues that can be encountered in getting the business onto the Net is imperative to its success. This responsibility lies largely on the IS Manager who must know what options are available to him or her before being able to cope with it.

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A Study About "Knowledge Management"

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Abstract-*Knowledge management is not one single discipline. Rather, it an integration of numerous endeavours and fields of study. This paper provides a framework for characterizing the various tools (methods, practices and technologies) available to knowledge management practitioners. It provides a high-level overview of a number of key terms and concepts, describes the framework, provides examples of how to use it, and explores a variety of potential application areas. The most effective knowledge management systems are able to access information from multiple documents and databases, capture it in a centralized knowledgebase, and continually improve it for on-going use by individuals seeking answers. Typically, these individuals comprise the support agents in customer support environments, as well as the customers, employees, partners, and/or vendors they serve. This paper draws on our decade of implementing knowledge management systems for support organizations large and small to discuss the six best practices to success.*

Key words: Knowledge management, phenomena, endeavours.

I INTRODUCTION

Over the past several years, a number of authors have proposed a variety of approaches for classifying the tools (methods, practices and technologies) that typically comprise knowledge management systems. This is not the first attempt to develop a framework for organizing and understanding knowledge management tools.1 and, given the emerging practices and changing understanding of knowledge management; it will not be the last. As with any discipline that lacks a recognized unifying paradigm, various views will emerge, each based on what can be readily observed or what can be applied from practices associated with other disciplines. Likewise, as individuals encounter particular phenomena, they tend to describe and interpret them in different ways (Kuhn, 1996).

The most effective knowledge management systems are able to access information from multiple documents and databases, capture it in a centralized knowledgebase, and continually improve it for on-going use by individuals seeking answers. Typically, these individuals comprise the support agents in customer support environments, as well as the customers, employees, partners, and/or vendors they serve. As such, support centres are the perfect microcosm for successful knowledge management initiatives. Not only are they the most rigorous question-answer environment in the company, but they also record problem-resolution times, which helps measure the effectiveness of knowledge management technologies. Beyond this, support centres face increasing pressure to offset costs with self-service options that can deliver complete, accurate answers via the web. In the past, however, knowledge management systems have failed as often as they have succeeded. This paper draws on our decade of implementing knowledge management systems for support organizations large and small to discuss the six best practices to success.

Objective of study:

1. To understand about the knowledge model.
2. To know about Knowledge Life Cycle.

What is Knowledge Management?

Knowledge management has enjoyed increasing popularity in recent years, but as a term it often means different things to different people. For the sake of discussion, we will draw from Thomas Davenport, the prolific author of several works on the subject including, Information Ecology: Mastering the Information and Knowledge Environment and Working Knowledge: How

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Organizations Manage What They Know. Generally speaking, Davenport defines knowledge as what happens at the moment in time when information becomes valuable to the individual seeking it. In call centres, help desks, and other support environments, that individual is either the support agent seeking information to help a customer, or a customer (product user, employee, partner, or vendor) seeking answers in a web-based self-help environment. In either case, effective knowledge management systems are able to access information from documents and databases across the organization, capture it in a centralized knowledgebase, and continually enhance it for on-going use by individuals seeking answers. In the past, however, knowledge management systems have failed as often as they have succeeded for several reasons:

- In addition to their regular work, knowledge workers were expected to do extra work to support the knowledge initiative and maintain knowledge management processes.
- Knowledge workers were unable to access information when they needed it, because information was dispersed throughout the organization in inaccessible silos. In cases where they could access it, poor search technology typically returned irrelevant results. Yet, the time and effort required to recreate that information was prohibitive.
- The process of improving the body of knowledge that already existed in the organization through protracted knowledge engineering or quality assurance processes severely undermined the value of knowledge initiatives.

Knowledge flows comprise the set of processes, events and activities through which data, information, knowledge and meta-knowledge are transformed from one state to another. To simplify the analysis of knowledge flows, the framework described in this paper is based primarily on the General Knowledge Model. The model organizes knowledge flows into four primary activity areas: knowledge creation, retention, transfer and utilization (Figure 1)

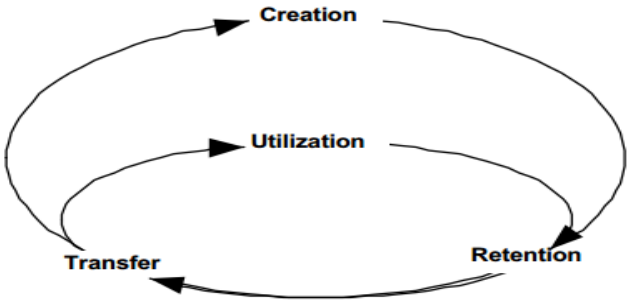

Figure 1. The General Knowledge Model

Knowledge Creation: This comprises activities associated with the entry of new knowledge into the system, and includes knowledge development, discovery and capture.
Knowledge Retention: This includes all activities that preserve knowledge and allow it to remain in the system once introduced. It also includes those activities that maintain the viability of knowledge within the system.
Knowledge Transfer: This refers to activities associated with the flow of knowledge from one party to another. This includes communication, translation, conversion, filtering and rendering.
Knowledge Utilization: This includes the activities and events connected with the application of knowledge to business processes.

The General Knowledge Model sequences the activity areas in a deterministic fashion. In reality, though, all but the most rigorously automated knowledge flows comprise complex systems that are built mostly from asynchronous processes. The model is valuable precisely because it relates the individual, highly dynamic behaviours and processes to general activity areas and, by association, to each other. Various theories of learning, problem solving and cognition may imply specific activity patterns, but they are usually not required to organize the key relationships and dependencies among the activity areas. The model allows analysts to trace individual knowledge flows by helping them to examine and understand how knowledge enables specific actions and decisions. Within each activity phase exists other, smaller knowledge flows and cycles. These layers span a wide range of macro- and micro-behaviours, ranging from broad organizational and multi-organizational processes to discrete actions and decisions, and include all the various intervening layers: activities, tasks, workflows, systems, interfaces and transformations.

Explicit Knowledge Artifacts:
These are knowledge artifacts that have been articulated in such a way that they can be directly and completely transferred from one person to another. This normally means that they have been codified so it is possible to touch, see, hear, feel and manipulate them (e.g. books, reports, data files, newsreels, audio cassettes and other physical forms).

Tacit Knowledge Artifacts:
These may be the most insidious and powerful of the three. Michael Polanyi referred to tacit knowledge as "knowing more than we can say" (Polanyi 1966). Simply stated, tacit artifacts are those that defy expression and codification.3 This is not to say that tacit knowledge artifacts are without influence. The most vivid example is the old saw about what would happen to the centipede if she

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were to stop and think about how to walk. It is important to note that, for the most part, artifacts are passive. While they can change (or, more accurately, be changed), they can't act. Has anybody ever seen a financial report make a decision or a book on aerodynamics build an airplane? Agents Knowledge artifacts do not perform actions and make decisions. Actions and decisions are undertaken by agents: people, organizations, or in some cases, technology. Agents carry out all the actions and exhibit all the behaviors within a knowledge flow.

Often, analysts attempt to apply the same behavioural models to all agents in a system. More appropriately, agents can be placed in three categories:
• Individual agents
• Automated agents
• Organizational agents.

Individual Agents:
These agents sit at the centre of almost every knowledge flow. For most analysts, the individual (human) serves as the prototypical active force for affecting change. In this paper, the term individual is used in the collective sense and is not meant to imply that every specific individual is capable of the full range of behaviours attributed to this class of agent. Individual agents are capable of working with knowledge and knowledge artifacts in all degrees of abstract articulation. They are limited, however, in their ability to deal with artifacts that are codified in ways that fall outside the range of human perception (radio waves, for example). The individual agent is the only agent capable of performing all aspects of knowledge development, retention, transfer and utilization without the need for intervention by either of the other two agents.

Automated Agents:
These agents can include any human construct that is capable of retaining, transferring or transforming knowledge artifacts. They are not exclusively computerized processes, as is often assumed in discussions of knowledge management. A conventional camera that encodes a representation of the visual world through chemical changes to the surface of a film could act as an automated agent, supporting knowledge creation and capture.

Organizational Agents:
These agents exist in situations in which knowledge retention and transfer cannot be fully attributed to individuals or specific automated agents. In these cases, the organization itself serves as an agent in the retention and dissemination of knowledge. As with tacit knowledge artifacts, current tools and concepts do not account very well for the roles of organizational agents in knowledge flows. Organizational value systems provide strong evidence for the existence of organizational agents. Much has been written about the ability of organizations and communities to establish value systems that outlive the involvement of specific individuals and the power that these value systems have to influence the behaviour of individuals and groups (Krogh and Roos, 1995; Kuhn, 1996). The principles and practices that make up these value systems are almost never codified.

How can support centres succeed with knowledge management initiatives?
In nearly a decade of implementing knowledge management systems for support organizations of all sizes, we have found six keys — or best practices — to success:

- Knowledge access, capture, use, and improvement are a natural part of the support centre's work processes.
- Existing information throughout the company — even from isolated silos — is available to the people seeking it.
- Executives actively support the knowledge initiative and commit the necessary resources to ensure long-term success.
- Management recognizes that knowledge-based support may entail a shift in cultural values and facilitate the transition.
- The knowledge initiative rewards knowledge workers for their participation.
- The knowledge management system includes analytical tools to report results and document areas that need improvement.

The Knowledge Life Cycle, the Business Processing Environment, and the DEC So far, our account of DLL/problem solving as involving sequences of DECs has focused on the individual level of analysis. But DECs may also form patterns of interpersonal collaboration, cooperation, and conflict, and these patterns may also integrate into knowledge processes. When they do, we can differentiate between problem formulation, developing alternative solutions, and error elimination, on the one hand, and problem claim formulation, knowledge claim formulation, and knowledge claim evaluation in order to distinguish the individual level of knowledge processing from the interpersonal and collective levels, respectively. We also distinguish information acquisition and individual and group learning, as additional knowledge sub-processes preceding knowledge claim formulation. Information acquisition includes activities of finding and retrieving knowledge claims produced in external systems. Individual and group learning is a category identifying levels of knowledge processing nested within the knowledge production process being analysed. Individual and group learning produces knowledge from the viewpoint of nested knowledge processes, and knowledge claims from the viewpoint of knowledge claim formulation at higher levels of analysis. When we view knowledge processing at levels of analysis higher than the individual level, we identify the pattern including problem claim formulation, information acquisition, individual and group learning, knowledge claim formulation, and knowledge claim evaluation as the knowledge production process resulting in both new tested and

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surviving beliefs and knowledge claims. Once new knowledge is produced at the collective level, it must be integrated into organizational memory, key DECs and business processes. This process of knowledge integration is made up of four more sub-processes, all of which may use interpersonal, electronic, or both types of methods in execution. They are: knowledge and information broadcasting, searching/retrieving, knowledge sharing (peer-to-peer presentation of previously produced knowledge), and teaching (hierarchical presentation of previously produced knowledge). Knowledge integration is about system-level knowledge claims being communicated from one part of the Distributed Organizational Knowledge Base (DOKB), the configuration of previously produced knowledge claims, beliefs and belief predispositions in the organization (Firestone and McElroy, 2003) to another. Knowledge claims are stored in media and information systems. Beliefs and belief predispositions are stored in minds. Through the DOKB, both knowledge claims and belief phenomena are accessible in varying degrees to individual decision makers in DECs, within both the Business Processing Environment, and the knowledge and KM processing environments. That is, the DOKB is the knowledge and information foundation for all of the organization's DECs and processing environments. When knowledge claims are evaluated, results of evaluation in the form of changes in beliefs and new knowledge claims, including those we call "meta-claims" which provide the "track record" of criticism, testing, and evaluation of knowledge claims produced during knowledge claim formulation, are stored in the DOKB. Knowledge claims, as well as meta-claims, are then integrated and reintegrated into the DOKB as they are broadcasted, retrieved, shared and taught again and again. A visual of knowledge processing and its relationship to operational business processing, the Knowledge Life Cycle (McElroy, 1999, 2000, 2003, Firestone, 2000, 2003a, Firestone and McElroy, 2003, 2003a, 2003b, Cavaleri and Reed, 2000, 2001). Actually, the KLC extends from problem claim formulation to the integration of knowledge and information in the DOKB. Knowledge claim evaluation (KCE) occupies a central place in the visual and in knowledge production. It is KCE that produces surviving, falsified, and undecided knowledge claims, and also meta-claims, for storage in the DOKB. Of course, the extent to which this "track record" is stored or lost depends on the specifics of each organization. The bottom of the figure illustrates the workings of the business processing environment, including its role in using knowledge for business processes and in recognizing problems that arise through mismatches of results and expectations, which, in turn, initiate DLL/knowledge production activity.

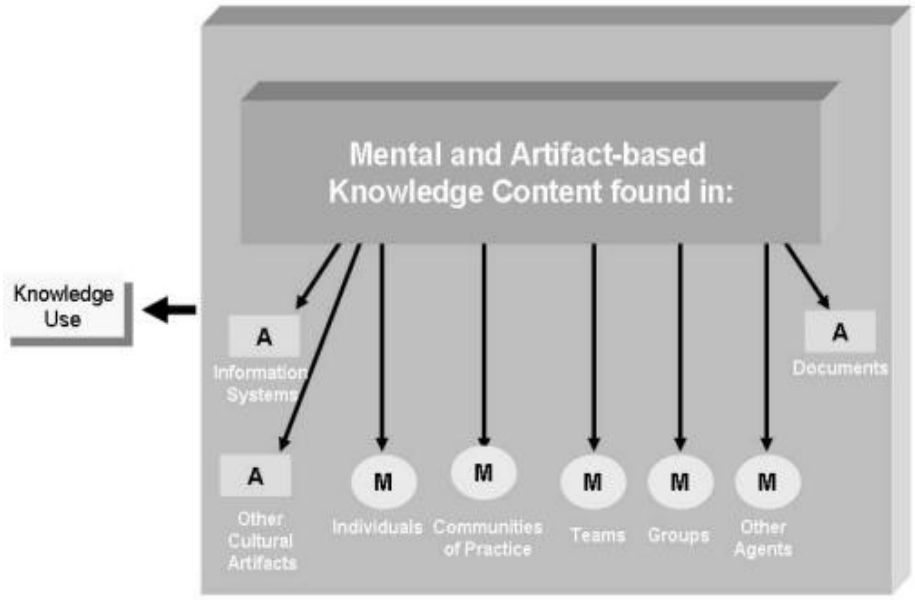

Fig 2 The Distributed Organizational Knowledge Base (DOKB)

II CONCLUSION

Selecting knowledge management technologies is often a daunting and risky task. Without an independent frame of reference, attempts to compare knowledge management technologies can be very confusing and fail to drive needed decisions. By providing a means to differentiate technologies according to their impacts on agents, artifacts and behaviours, the characterization framework described in this paper provides just the kind of neutral reference point organizations often need. The framework also adds value to supporting analytical, design, development and deployment activities by guiding the analysis of knowledge flows and construction of a usefully comprehensive picture. The framework provides a mechanism for developing a balanced, high-level view that can be used to set the stage for deeper analysis, identifying the compelling and critical issues that warrant more careful examination. Once the picture

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is complete, the framework can be used to identify the specific needs that can be met with off-the-shelf technology, localized customizations or change-management programs.

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A Study About "Management Information System to Help Managers for Providing Decision Making in an Organization"

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Abstract-*Management Information System (MIS) provides information for the managerial activities in an organization. The main purpose of this research is, MIS provides accurate and timely information necessary to facilitate the decision-making process and enable the organizations planning, control, and operational functions to be carried out effectively. Management Information System (MIS) is basically concerned with processing data into information and is then communicated to the various Departments in an organization for appropriate decision-making. MIS is a subset of the overall planning and control activities covering the application of humans, technologies, and procedures of the organization. . The information system is the mechanism to ensure that information is available to the managers in the form they want it and when they need it.*

Keywords: Management Information Systems (MIS), Information Technology, Decision Making and processing data.

Objectives of the Study

- To understand how the Information processed in the organization.
- To know about the Management Information System Applications.
- To study about is the mechanism to ensure that information is available to the managers in the form they want it and when they need it.

I INTRODUCTION

MIS provides several benefits to the business organization: the means of effective and efficient coordination between Departments; quick and reliable referencing; access to relevant data and documents; use of less labour; improvement in organizational and departmental techniques; management of day-to-day activities (as accounts, stock control, payroll, etc.); day-to-day assistance in a Department and closer contact with the rest of the world. MIS provides a valuable time-saving benefit to the workforce. Employees do not have to collect Data manually for filing and analysis. Instead, that information can be entered quickly and easily into a computer program. As the amount of raw data grows too large for employees to analyse, business analysts can build programs to access the data and information in response to queries by management. With faster access to needed information, managers can make better decisions about procedures, future directions, and developments by competitors, and make them more quickly. We are living in a time of great change and working in an Information Age. Managers have to assimilate masses of data, convert that data into information, form conclusions about that information and make decisions leading to the achievement of business objectives. For an Organization, information is as important resource as money, machinery and manpower. It is essential for the survival of the enterprise.

The term "management information system" (MIS) is synonymous with computer based systems. Used broadly, it is seen as the system satisfying all the information needs of managers. MIS is the study of providing information to people who make choices about the

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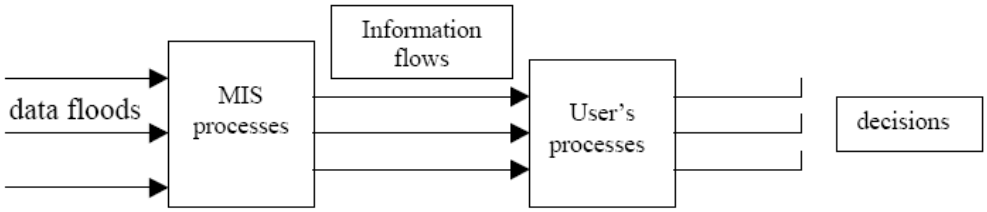
disposition of valuable resources in a timely, accurate, and complete manner at a minimum of cognitive and economic cost for acquisition, processing, storage, and retrieval. Another definition emphasizes the use to which the information is put, rather than the way it is produced. A system to convert data from internal and external sources into information and communicate that information in an appropriate form, to managers at all levels in all functions to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible. Others, however, give it more limited scope. They see it as a system collecting and analysing data and producing reports. Its purpose is to help managers to solve structured problems.

Information Technologies:

Management Information System (M.I.S.) is basically concerned with processing data into information. Data collection involves the use of Information Technology (IT) comprising: computers and telecommunications networks (Email, Voice Mail, Internet, telephone, etc.).Computers are important for more storage and retrieval; Special features are speed and accuracy, and storage of large amount of data. Telecommunications provide the means for one-way or two-way communication and for the transmission of messages. A combination of IT is used: telephone, computer, processor, printer, etc. A lot of time and money are saved and the security of data and messages is ensured. A management information system (MIS) enables businesses to provide answers to managers in search of knowledge. MIS does this by combining raw data about the organization's operations (contained in its basic information technology systems) with information gathered from employees in expert systems that reflect the organization's procedures. Before the widespread use of computers, many organizations found difficulties in gathering, storing, organizing and distributing large amounts of data and information. Developments in computer technology made possible for managers to select the information they require, in the form best suited for their needs and in time they want. This information must be current and in many cases is needed by many people at the same time. So it has to be accurate, concise, timely, complete, well presented and storable. Most firms nowadays depend on IT. But personal computers (PCs) themselves will not improve organizational productivity: this only comes about if they are used efficiently and effectively. Putting in place the advanced technological systems needed to collect and sort data and employee information can be costly unless senior management, especially the CFO, controls the purchasing of the basic systems needed by different functional areas from the outset. The information system is the mechanism to ensure that information is available to the managers in the form they want it and when they need it. It is designed to support their work through providing relevant information for their decision-making. Computer systems can clearly aid organizations in the processing of data into accurate, well presented, up-to-date and cost effective information. Weather that information is also concise, relevant, timely and complete will depend largely on the capabilities of the people involved in its processing and selection. The term management information system (MIS) made its first appearance in U.S. navy report on the use of computers to construct a single integrated system to manage all navy resources. It should provide a basis to analyse warning signals that can originate both externally and internally; this is the main function of data base. It should automate routine operations thus avoiding human work in the processing tasks. It should assist management in making routine decisions. It should provide the information necessary to make non-routine decisions. It should serve as a strategic weapon to gain competitive advantages.

Management Information System and decision-making:

Management Information System (MIS) is basically concerned with the process of collecting, processing, storing and transmitting relevant information to support the management operations in any organizations. Thus, the success of decision-making, which is the heart of administrative process, is highly dependent partly on available information, and partly on the functions that are the components of the process. Undirected viewing—this involves a general exposure to information where. The search could be that the viewer has No specific purpose in mind. Conditioned viewing—the directed exposure does not involve active search to a more or less clearly identified area or type of information. Informal search—this is a relatively limited and unstructured effort to obtain specific information for a specific purpose. The information wanted is actively sought. Formal search—this is a deliberate effort, usually following a pre-established plan, procedure or methodology to secure specific information relating to a specific issue. Figure 1 shows this understanding about information as data processed for a definite purpose.



MIS and decision-making process

There are so many definitions of MIS. For the purpose of this research, MIS can be defined as a system providing management with accurate and timely information necessary to facilitate the decision-making process and enable the organizations planning, control, and operational functions to be carried out effectively. So in this way MISs Increase competitiveness of the firm by reducing cost and improving processing speed. Almost all business organizations normally have some kind of information system for management.

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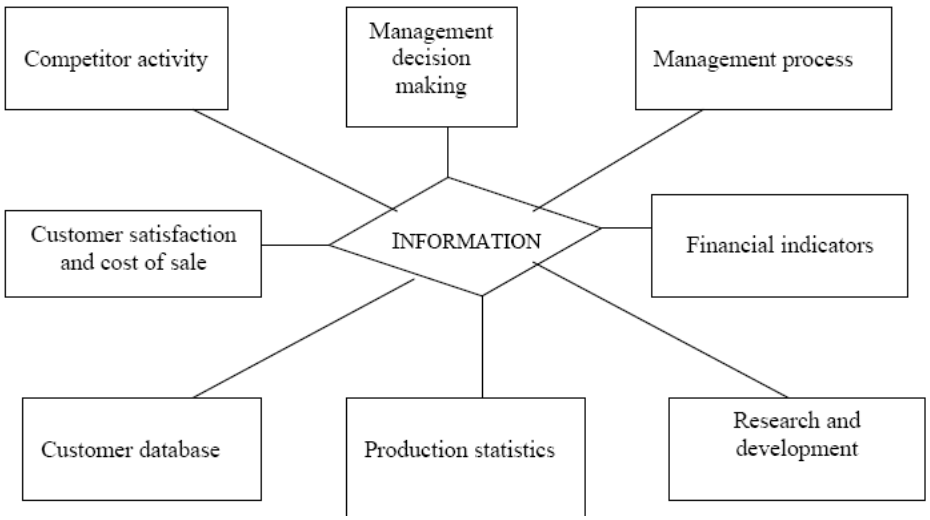
Accounting rules, stock control and market monitoring systems are the most traditional and common examples. The power of technology has transformed the role of information in business firm. Now information has become recognized as the lifeblood of an organization. Without information, the modern company is dead.



Information – the life-blood of the organization.

The Impact of Information Technology on Organization

One aspect of the IT impact on the organization is the use of new organizational structures which leads to the reduction of the number of administrative levels, and expand the scope of supervision and control, supervision in this way is based on staff confidence and less direct contact between supervisors and subordinates and relies on e-mail and software in achieving coordination between the individuals who perform common tasks, and increase managers delegation of decision-making responsibilities to lower levels, making the organization more responsive to its customers and its competitors.

II CONCLUSION

MIS differ from regular information systems because the primary objectives of these systems are to analyse their systems dealing with the operational activities in the organization. In this way, MIS is a subset of the overall planning and control activities covering the application of humans, technologies, and procedures of the organization. Within the field of scientific management, MIS is most often tailored to the automation or support of human decision making. Management information systems (MIS) make it possible for organizations to get the right information to the right people at the right time by enhancing the interaction between the organization's people, the data collected in its various IT systems, and the procedures it uses. It brings together the raw data collected by the various business areas of the organization, which, while useful for specific functions such as accounting, does not provide, by itself, information that can be used to make decisions. As organizations grow, MIS allows information to move between functional areas and departments instantly, reducing the need for face-to-face communications among employees, thus increasing the responsiveness of the organization.

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A Study About Out Of Home Advertising

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Abstract-*In today's media landscape where it's very difficult to shape consumers attitude and intentions and move them to next level of buying process, advertisers find it even more difficult and challenging to break through the clutter of competing advertisement. The advertising industry has experienced dynamic changes over the last several decades. The changes have been good in terms of Technology advancement, Medium and more methods to attract consumers and on Creativity. This study represents how creativity impacted advertising, also understanding the value of creativity in advertising through the review of various literatures. The importance of creativity factor in advertising has got wide recognition by many researchers, practitioner, but there is a miss of true & systematic research to define advertising creativity and how it relates to ad effectiveness. The review study discusses some campaigns that have left their strong impression on consumers. The presented review study tries to come up with some evidence of creativity by reviewing expert views, past literature in advertising, studied advertising campaign and marketing activities. The study discusses different forum on how creativity works, and what makes an ad to travel good or poorly. It summarized the value of creativity in advertising through Expert interviews, published material and related secondary data to understand the logic.*

Keywords: Consumers attitude, competing advertisement, advertising campaign, creativity works.

I INTRODUCTION

Any advertising done outdoors that publicizes your business's products and services. Types of outdoor advertising include billboards, bus benches, interiors and exteriors of buses, taxis and business vehicles, and signage posted on the exterior of your own brick-and-mortar location. Out of home advertising (or OOH advertising) is advertising that reaches the consumer while they are outside the home.

Out of home advertising is focused on marketing to consumers when they are "on the go" in public places, in transit, waiting (such as in a medical office), and/or in specific commercial locations (such as in a retail venue). OOH advertising formats fall into four main categories: billboards, street furniture, transit, and alternative.[1]

The OOH advertising industry in the USA includes more than 2,100 operators in 50 states representing the major out of home format categories. These OOH media companies range from public, multinational media corporations to small, independent, family-owned businesses.
Outdoor advertising works well for promoting your product in specific geographic areas. While billboards, bus benches, and transit advertising can be very effective for the small-business owner, any successful outdoor campaign begins with your own location's signage. Your outdoor sign is often the first thing a potential customer sees. Your sign should be sufficiently bright and conspicuous to attract attention (without being garish) and sufficiently informative to let prospective customers know what's sold there.

Ride around town and observe which signs catch your eye. Note which ones don't. Then think of the impression each sign gives you. Remember that you never get a second chance to make a first impression, so give this important marketing tool your best efforts. If you're involved in a business that has a fleet of vehicles conducting deliveries or providing a service, your company's name, logo, and phone number should be clearly visible on the vehicles. It's free advertising that allows you to increase your exposure in your market.

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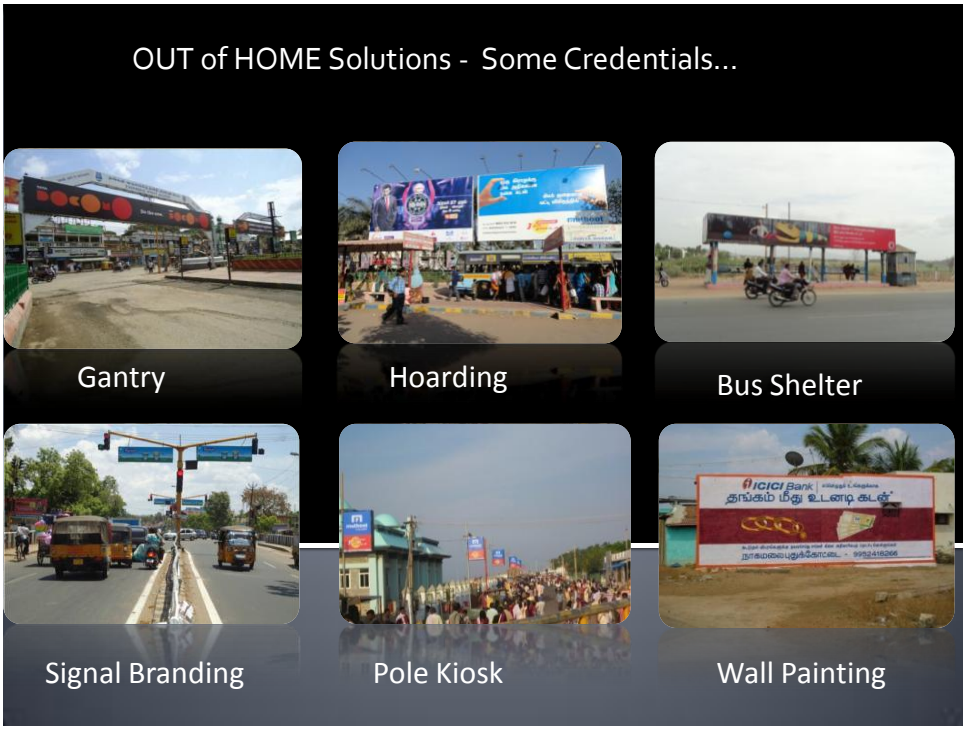
Billboards are most effective when located close to the business advertised. Because of their high cost, they're usually used to reach a very large audience, as in political campaigns. They're likely to be too expensive for most small firms, and some communities have strict ordinances governing the placement of billboards. In Vermont, for example, they're prohibited. Bus-bench advertising is an excellent medium because it's highly visible, like a billboard. Essentially, bus-bench advertisers have a huge audience, held captive at red lights or in slow-moving traffic. An account executive of a Los Angeles-based bus bench manufacturing company said that an advertisement on one bus bench at a busy Los Angeles intersection would be seen by 35,000 to 50,000 people per day.

Usually, the advertising consists of simple two-color artwork with your company's name, brief copy describing the product or service, address and phone number. Rates and terms vary depending on the city you're in. Call your city's mass transit department or local bus company to find out who rents advertising space on their bus-stop benches. Some outdoor advertising companies also handle this type of advertising. Transit advertising on buses and taxicabs reaches lots of people, especially commuters. Your ad is highly visible, and market research on transit advertising shows that it's very effective.

Out of home advertising is focused on marketing to consumers when they are "on the go" in public places, in transit, waiting (such as in a medical office), and/or in specific commercial locations (such as in a retail venue). OOH advertising formats fall into four main categories: billboards, street furniture, transit, and alternative. The OOH advertising industry in the USA includes more than 2,100 operators in 50 states representing the major out of home format categories. These OOH media companies range from public, multinational media corporations to small, independent, family-owned businesses.



Billboard advertising is a traditional OOH advertising format, but there has been significant growth in digital OOH (digital billboards and place-based networks) in recent years; for example, about 4,900 digital billboard displays have been installed in the United States.

Traditional roadside billboards remain the predominant form of OOH advertising in the US with 66 percent of total annual revenue. Today, billboard revenue is 73 percent local ads, 18 percent national ads, and 9 percent public service ads. Street furniture is made up of formats such as bus shelters, news racks, mall kiosks, and telephone booth advertising. This form of OOH advertising is mainly seen in urban centers. Additionally, this form of advertising provides benefits to communities, as building and maintaining the shelters people use while waiting for the bus.

Transit advertising is typically advertising placed on anything which moves, such as buses, subway advertising, trackside, food trucks, and taxis, but also includes fixed static and electronic advertising at train and bus stations and platforms. Airport advertising, which helps businesses address an audience while traveling, is also included in this category. Municipalities often accept this form of advertising, as it provides revenue to city and port authorities.

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OUT DOOR ADVERTISING CHARACTERISTICS

"Outdoor" advertising includes all forms of advertising that provide exposure out-of doors. These forms may be pictured, written or spoken [Association of National Advertisers, 1952][Agnew, 1985][Nelson & Sykes, 1953]. The most prevalent forms of outdoor advertising are billboards, street furniture, transit and alternative forms. (See table II). [Table II about here] Billboards are the predominant form of outdoor advertising and are further classified into bulletins, 80 sheet posters, 30 sheet posters, wrapped 30 sheet posters, squared wrapped posters, spectaculars and wall murals. Technology has provided outdoor advertisers with myriad options. 5 Most recently, the liberal use of electronics with "outdoor" has created "spectacular" billboards that are more like giant screen televisions, some even with sound.

Street furniture also provides very interesting options for out-of-home media usage. Some of the most prominent forms of street furniture consist of bicycle racks, bus bench / bus shelter advertising, kiosks, sidewalk posters, shopping mall displays, in-store displays and one sheet posters. Transit advertising options in outdoor media revolve around media on transit or places of transit in airports and subway stations, as well as on buses, taxicabs, trains, etc. Advertising on movable type media like taxicabs and trucks has been shown to provide high recall rates. Finally, there is an "alternative" form of outdoor media that comprises almost all options not covered in the above three forms. This is probably the fastest evolving category and includes such options as trash receptacle advertising, airborne displays, digital displays, carton and cup advertising, movie theater advertising and stadium and arena displays.

Outdoors today has the capabilities of reaching an audience on a national scale or on a market-by-market basis [Association of National Advertisers, 1952]. Outdoor advertising has evolved to the extent that it can be almost as useful as some traditional forms of advertising like newspaper, radio and TV. Outdoor is strikingly different from other media in one essential aspect – the medium does not circulate the message to market but the market circulates around the medium, "the medium delivers its message to people on their way to work, play or shop. [Association of National Advertisers, 1952] " For instance, an executive going to work to deal with a full day of computer related problems would probably "look out for" messages from Dell, Hewlett Packet or Epson. It may seem like a trivial distinction, but if one takes into account the psychological frame of mind of people at the time the message is delivered, it is surely a 6 powerful medium to access.

One of the biggest advantages of outdoor medium vis-à-vis other mediums like television or magazines are that "your audience can't zap, discard or even click away from it." This medium also differs in that it targets a "market in motion" and thus requires a special technique of presentation. Since the maximum number of words one can effectively use in outdoor advertising is seven [Business Wire, Dec. 4, 2002], there is no room for detailed explanations Outdoor advertising may best serve the purpose of a reminder medium that helps register the brand to achieve a top-of-mind recall when the "want" in the buyer needs to be fulfilled.

OUTDOOR & BUSINESS TO BUSINESS MARKETING

Despite the infrequent mention of outdoors as a medium for industrial advertising, the use of such medium can be very effective. The key characteristic of outdoor ads that give this medium the flexibility for use in business-to-business (BTB) advertising is the ability to deliver the message constantly and consistently to a select (and often very small) target market. Such a constant reminder could be the differentiating factor that enables the "brand to surpass the threshold level of awareness thus achieving meaningful additions in the brand preference share" [Hutt & Speh, 2001]. While a "larger-than-life" billboard could be an effective means of building the brand, outdoor media is also the most localized of all mass media, thus giving the advertisers the freedom to place it appropriately within the vicinity of the target market.

One of the biggest advantages of outdoor medium lies in its affordability when compared to other forms of advertising, especially the forms frequently used in business-to-business marketing. In 1999 outdoor advertising cost about 81 cents per thousand compared to

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$10.40 for a 30 second TV commercial on prime-time network, $11.03 for a quarter page newspaper ad, and or $9.14 for a four-color magazine ad [Goodgold, 2003]. 11 The use of outdoor advertising in a business-to-business context is explored next. First, we identify key BTB marketing characteristics and evaluate their implications for the associated use of outdoors as a medium. Second, we examine traditional advertising objectives used in BTB communication strategy and identify the niche that outdoors has the potential to fulfill. Subsequently, we look at the classification of business goods/services and evaluate the conduciveness of these different categories for using outdoor advertising medium. Finally, we conclude by examining the latest technological developments in the field of outdoor advertising and their impact towards its usage in a BTB context.

DIGITAL OUT OF HOME

Digital out of home (DOOH) refers to dynamic media distributed across placed-based networks in venues including, but not limited to: cafes, bars, restaurants, health clubs, colleges, arenas, gas stations, convenience stores, barber shops, and public spaces. DOOH networks typically feature independently addressable screens, kiosks, jukeboxes and/or jumbotrons. DOOH media benefits location owners and advertisers alike in being able to engage customers and/or audiences and extend the reach and effectiveness of marketing messages. It is also referred to as Digital Signage.

The overall industry grew 19 percent to $8.3 billion between 2011 and 2012 according to Patrick Quinn, CEO and founder of PQ Media, a Connecticut-based research and consulting firm. Quinn said gas station television is one of the largest and fastest growing segments of that category, based in part on its verifiable audience. With digital TVs in gas stations, nearly 52 million customers are getting snippets of weather, sports highlights, celebrity gossip and commercials with their gas each month, according to Nielsen. The weekly reach is actually larger than most of the prime-time TV shows. The largest company in the space is Gas Station TV with 27.5 million monthly viewers at more than 1,100 stations across the U.S., according to Nielsen. In addition to the large number of viewers, the audience profile of TVs at gas stations is unique. 100 percent are drivers. 76 percent are adults from age 18-49 with a median age of 40 and Median HHI $70k+. According to the Nielsen Intercept Studies, 89 percent of the consumers are engaged and watching TV at the gas station and 88 percent love watching every time they fuel because they have nothing else to do.

The reason that this category is growing so rapidly is because busy people are typically busy at home and with the introduction and acceptance of digital video recorders, it has diluted the frequency with which traditional television commercials are viewed. Every day

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more TV viewers are skipping past commercials with their DVRs which in turn has made out-of-home advertising all the more appealing. A Nielsen media research study in 2009 showed that 91 percent of DVR owners skipped commercials. As a result, traditional TV advertisers are hungry for an effective substitute, and digital out-of-home ads appear to be one of the solutions.

DOOH also includes stand-alone screens, kiosks, and interactive media found in public places. The availability of inexpensive LCD screens with built-in media players has opened the door for companies to add interactive video messages in Point of Purchase (POP) Displays. The displays allow consumers to get additional information at the moment of decision on a product or service. Growth in the DOOH industry has been increasing in 2009, with more POP manufacturers, advertisers, and content developers moving to digital.

NON DIGITAL OUT OF HOME

Since digital signage content may be frequently and easily updated, and also because of the interactive abilities available through the accompanying employment of real-world interfaces such as embedded touch screens, movement detection and image capture devices which enable these forms of signage to understand who and how users are interacting with them, they are gaining acceptance as an alternative to static signage.
One specific use of digital signage is for out-of-home advertising in which video content, advertisements, and/or messages are displayed on digital signs with the goal of delivering targeted messages, to specific locations and/or consumers, at specific times. This is often called "digital out of home" or abbreviated as DOOH. Vinyl decals allowing use of windows, on a side and rear advertisement for alcohol on a Berlin bus

Non-digital out-of-home refers to other types of media distributed across physical spaces. These are

Aerial Advertising - Towing banners overhead of beaches, events and gridlock traffic via a fixed wing aircraft [11]

Airship Advertising - An airship can provide one of the physically largest out-of-home advertising platforms.

Billboard bicycle - Billboard bicycle is a new type of mobile advertising in which a bike tows a billboard with an advertising message. This method is a cost efficient, targeted, and environmentally friendly form of advertising.

Billboard Bicycle in East Coast Park, Singapore

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Bulletin - Bulletin billboards are usually located in highly visible, heavy traffic areas such as expressways, primary arteries, and major intersections. With extended periods of high visibility, billboard advertisements provide advertisers with significant impact on commuters. This is the largest standard out of home advertising format, usually measuring at 11x48 in overall size

Bus advertising - Firmly establish brand awareness and generate quick recall with high profile exposure near point of purchase locations.
Commuter rail display - Reaches a captive audience of upscale suburban commuters. Additionally, reaches lunch-time patrons, shoppers and business professionals.

ComPark advertising - ComPark is a device used for car park advertising; which is placed onto the parallel lines of a bay and is able to gain instant exposure from motorists that have just parked their vehicle. The ComPark also serves as a guide to assist motorist in adhering to the parking bay size.

Lamppost banner advertising - Lamp columns are sited everywhere, allowing advertisers and events to use banners to target precise geographical locations and create massive promotional awareness.

Mobile billboard - Mobile billboards offer a great degree of flexibility to advertisers. These advertisements can target specific routes, venue or events, or can be used to achieve market saturation. A special version is the inflatable billboard which can stand free nearly everywhere. This product can also be used for outdoor movie nights.

Mobile inflatable billboard

Postcards - Free advertising postcards available in venues such as cafes & bars, arts & cultural institutions, universities and high schools. Postcards are taken from a specially designed display unit with signage indicating the postcards are free for the general public to take.

Poster - Target local audiences with these billboards, which are highly visible to vehicular traffic and are ideal for the introduction of new products/services. Marketers use posters to achieve advertising objectives and increase brand awareness by placing multiple units in strategic locations while lowering the cost per thousand impressions. This is a standardized poster format, typically measuring 12'3" x 24'6"; formally known as a 30-Sheet Poster

Premier panel - Premiere panels combine the frequency and reach of a poster campaign with the creative impact of a bulletin.

Premier Square - Bright top and bottom illumination on a premiere panel provide extra impact after dark.

Street advertising - The use of pavements and street furniture to create media space for brands to get their message onto the street in a cost-effective approach.

Taxi advertising - Taxi advertising allows advertisers to highlight their products, whether brand awareness, or a targeted message, directly to areas where people work, shop, and play.

II CONCLUSION

We aimed to analyze the impact of new forms of advertising on current society. We determined that technology is causing an arms race between consumers and advertisers. Furthermore, we determined that amateur-generated advertising and fan culture provides opportunities to change creative motivations, which leads to an increasing dependence on the consumer to create content for the advertiser. Lastly, we determined that technology caused consumers to have more power to dictate what ads they wanted to see, thus forcing advertisers to change their advertising strategies and business models. This is the present. With the increased prevalence of

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advertisement, what will happen to advertising in the future? Will all advertisements become advertisement Will the line between advertising and entertainment permanently blur. At this point, we cannot tell; however, we know that structural forces will play an incredibly large role in the process of change.

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A Study About Marketing Communications Effectiveness In The Business-To-Business Markets

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Abstract-*Much of the research into marketing communications has focused on the consumer market with little regard to date for the business-to-business market. This paper focuses on a development and testing of a model of marketing communication effectiveness in the business-to-business market. Building on past research from the marketing communications and business-to-business marketing literature, the model which incorporates facets of the marketing communication objectives, bidirectional communications, and communications channels are tested to examine the impact economic Research of these antecedent variables on marketing communications effectiveness and organizational performance. The concept of marketing communication effectiveness assumes that there are variables that can have a positive influence on the effectiveness of marketing communications, and the central concept of marketing communication effectiveness as having a positive impact on organizational performance. Managerial implications are discussed along with suggestions for further research.*

Keywords: Marketing communication effectiveness, business-to-business markets, marketing communication objectives, organizational performance, structural equation modeling.

I INTRODUCTION

This paper focuses on a new model for marketing communication effectiveness in the business-to-business context. Any company can develop a marketing communication program, regardless of budget. The key to implementing a successful program, however, is to incorporate measurement and analysis right from the beginning of marketing communication programmer. In recent years, the business-to-business marketing has experienced significant progress due to a number of theoretical and empirical findings published in the journals that examined the business-to-business market. A number of authors have written about the role and importance of marketing communications in the industrial markets. However, marketing communication in the business-to-business markets over's further potentially valuable opportunities of research, especially empirical research. With the increasing call for accountability of significant marketing communication spending, measuring the contribution of marketing communication effectiveness to performance is inevitable and valued. However, measuring marketing communication impact on organizational performance has historically proven to be difficult, if not impossible, argues that integrated marketing communications still has no standard form for testing its effectiveness.

Marketing communications are messages and related media used to communicate with a market. Marketing communications is the "promotion" part of the "marketing mix" or the "four Ps": price, place, promotion, and product. It can also refer to the strategy used by a company or individual to reach their target market through various types of communication.

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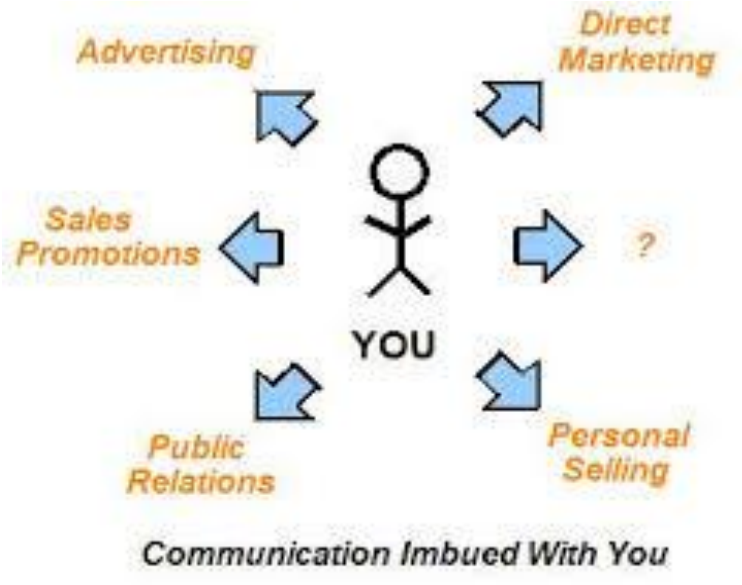

The problem associated with such performance measure for marketing is the conceptualization of marketing inputs. Marketing communications results have historically been measured on a medium-by-medium basis: One measure for advertising, another for publicity, stills another for sales promotion, and so on. These issues regarding the measurability of marketing communication programmers have also been a focus of discussion among academics and practitioners since the early stages of the development of the integrated marketing communications concept. In recognizing this complexity, this paper attempts to explain the effect of different factors on marketing communication effectiveness and subsequently on organizational performance. We hypothesize that a company's marketing communications effectiveness generates favorable organizational performance in Slovenian companies. In this context, we explore marketing communications effectiveness and how this effectiveness can influence organizational performance of selected firms.

A firm should have a business model that tracks how marketing communications effectiveness incenses what its customers know, believe, and feel, and ultimately of course how they behave. Another contribution of this paper is that it tests the model of marketing communications effectiveness within a homological net of antecedents and consequences. A unique contribution is an examination of the effect of marketing communication effectiveness on performance measure; we include such outcomes as market performance when assessing the effect of marketing communication effectiveness. In terms of contributions, this model provides managers a priori basis for focusing their efforts on the antecedents of whole marketing communications effectiveness which produces a much higher effect on organizational performance. First, we present a review of the literature, drawing on marketing communications effectiveness theory and business-to-business market theory, and past research to develop our model. Second, our hypotheses are developed.

CONCEPTUALISATION OF MARKETING COMMUNICATION EFFECTIVENESS AND ITS RELATED CONSTRUCTS

Interactions that occur among marketing communications variables form an important aspect of our understanding of marketing communication effectiveness overall. The effectiveness of marketing communications has been examined by innumerable authors (Schultz, Patti, 2009, 81; Evans, Fill, 2000, 391; Rust et al., 2004, 77; Smith, Gopalakrishna, Chatterjee, 2006, 564; Zabkar, 2007, 83). In order to develop further investigation in this research area, it is necessary to adopt first a perspective for defining actual marketing communication effectiveness and its associated r concepts. Next, it is necessary to identify or, alternatively, develop a valid, reliable measurement scale to use to evaluate these proposed concepts. In justifying and presenting our proposed model, the following concepts were conceptualized for the purpose of Structural Equation Modeling (SEM) application in the context of marketing communications effectiveness in a business- to-business context: Marketing communication objectives, bidirectional communication, communication channels, marketing communications effectiveness, and organizational performance. We also highlighted the various approaches to conceptualizing these concepts and identified the linkages between them.

MARKETING COMMUNICATION OBJECTIVES

Properly configured objectives of marketing communications will have a positive impact on effectiveness. This presumption is clear from the objectives of the integrated approach, as developed by Fisher, Maltz, Jaworski (1997, 56-57) and is based on the coordination behavior of individuals and groups within an organization with a view toward achieving the identified objectives. The approach is also based on cooperation and interaction between the groups. Effective marketing communications is the result of coordinated operation between the functions of an organization and its chosen strategy of marketing communication resulting from both strategic goals and business strategy organization (Kliatchko, 2009, 177; Reid, 2003, 233). These correlations conclude that the development of

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marketing communication objectives and coordination with firm business strategy can lead to a consistent and workable strategy of marketing communication.

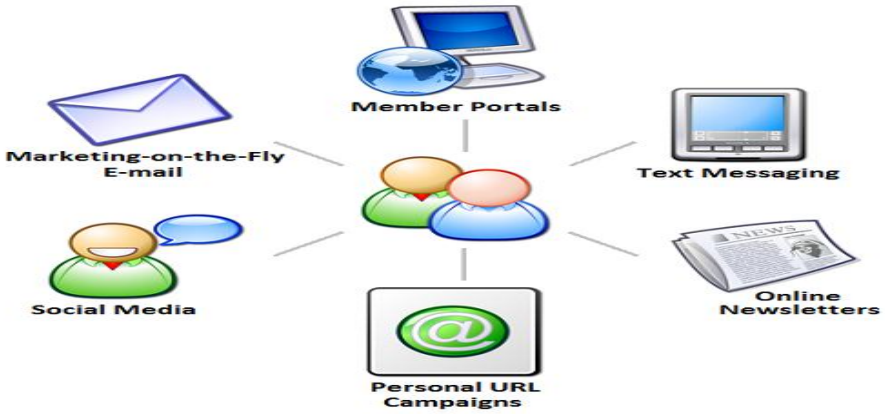
A strategy of marketing communication should be in line with the vision, strategy, and mission of the organization (Fill, 1999, 604) and in line with the chosen market strategy (Duncan, Moriarty, 1998, 2). Results of some studies demonstrate the positive impact of the mission of an organization on its financial performance. For effective marketing communications, it is necessary that there be consistency among all communication messages, so that trust can be built and there can be coherence in target audience perceptions. The key to managing the point of perception is to deliver and receive messages on a platform of strategic consistency (Kitchen, Schultz, 2003, 82). In line with market orientation, the sharing of information across departments, the involvement of all departments in the preparation of business plans and strategies, the interactions of marketing personnel with other departments, are the needed prerequisites for best inter functional coordination. Therefore, we hypothesize that: Marketing communication objectives positively associate with marketing communications effectiveness

BIDIRECTIONAL COMMUNICATION

Numerous studies have emphasized the role of high involvement in the communication message and its impact on changes in customer attitudes toward certain brands. The elaboration likelihood model for processing that information emphasizes the ability of communication to process and the motivation for processing the determined communication message. In order to initiate certain stimuli at the customer, the communication messages may differ both in content, which can be informative or emotional nature, and design and creative communication strategy (Brengman, Geuens, De Pelsmacker, 2001, 231). IMC has traditionally been identified as persuasion, which entails primarily a one-way communication mode (Spotts et al., 1998, 210). In marketing relation- ships, however, communication serves other roles other than just persuasion, including informing, listening, and answering, which can require interaction and two-way communication forms (Finne, Grnroos, 2009, 180). The increasing importance of communication in today's marketplace is demonstrated by its ability to manage two-way communication. An important part of any communication model is feedback, through which the receiver's response is made known to the sender (Duncan, Moriarty, 1998, 4). Marketing communications also need to provide clarity and fast, pertinent, timely information, so decisions can be made. Effective marketing communication occurs when the consumer can correctly interpret the initial message as it was meant to be sent. This bidirectional communication produces effective marketing communications. Bidirectional communication is thus hypothesized as being positively related to marketing communications effectiveness. There- fore, we hypothesize that: H2: Bidirectional communication positively associates with marketing communication effectiveness

COMMUNICATION CHANNELS

The marketing communication channel, which views human communication as a transmission process during which a message travels across a channel from a sender to a receiver, is represented by the communication dimensions of frequency and mode of communication. Communication frequency refers to the amount of communication that occurs between an organization and its public (Schultz, Patti, 2009, 81-82). Communication mode is defined as the channel, formal or informal, through which such information is transmitted to target groups. Previous research has found that information disseminated in a formal manner is seen as more credible (Mohr, Sohi, 1995, 393). Marketing communication channels are hypothesized to be positively related to marketing communication effectiveness. Therefore, we hypothesize that: H3: Marketing communication channels positively associate with marketing communication effectiveness.



In telecommunications and computer networking, a communication channel or **channel**, refers either to a physical transmission medium such as a wire, or to a logical connection over a multiplexed medium such as a radio channel. A channel is used to convey an information signal, for example a digital bit stream, from one or several *senders* (or transmitters) to one or

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several *receivers*. A channel has a certain capacity for transmitting information, often measured by its bandwidth in Hz or its data rate in bits per second.

Communicating data from one location to another requires some form of pathway or medium. These pathways, called communication channels, use two types of media: cable (twisted-pair wire, cable, and fiber-optic cable) and broadcast (microwave, satellite, radio, and infrared). Cable or wire line media use physical wires of cables to transmit data and information. Twisted-pair wire and coaxial cables are made of copper, and fiber-optic cable is made of glass.

MARKETING COMMUNICATION EFFECTIVENESS

A study conducted by Low (2000, 31) showed that implementing IMC (Integrated Marketing Communication) may be strongly related to better marketing results in terms of sales, market share, and profits for an organization. In seeking to understand the effectiveness of marketing communications, researchers have traditionally relied on measures of awareness, recall, and recognition.

Many researchers, through their theoretical and empirical contributions, de- scribe the impact of marketing communications on organization performance, particularly with a view to improving relations between the organization and its public, for example, its customers (McGoon, 1998, 15; Low, 2000, 36). Explanation of this relation can be found in the degree of marketing communication effectiveness and its impact on overall organizational performance (Kitchen, Schultz, 2009, 201; Young, Aitken, 2007, 53). Reid (2005, 41-47) in a research model displays a potential way of measuring and evaluating the implementation of IMC. The results of his research show a strong and significant positive impact of the performance of IMC on mar- ket performance. The relationship between the marketing communication and organizational performance is an important area of research, but only a fewempirical studies have supported this link (Cornelissen, Lock, 2000, 7-15, Low, 2000, 27-39).

An organization that possesses marketing communication capabilities can create successful communication programs and ensure long-term market performance. There is a positive impact between possessing strong marketing communication capabilities and organizational performance.The success of an organization can also result from the effectiveness of its marketing communication. In this area, many authors highlight the positive impact of marketing communications on organization performance. So, we hypothesize that Marketing communications effectiveness positively associate with organizational performance.

Marketing communications are messages and related media used to communicate with a market. Marketing communications is the "promotion" part of the "marketing mix" or the "four Ps": price, place, promotion, and product. It can also refer to the strategy used by a company or individual to reach their target market through various types of communication.The communication process is [sender-encoding-transmission device-decoding-receiver], which is part of any advertising or marketing program. Encoding the message is the second step in communication process, which takes a creative idea and transforms it into attention-getting advertisements designed for various media (television, radio, magazines, and others. Messages travel to audiences through various transmissions. The third stage of the marketing communication process occurs when a channel or medium delivers the message. Decoding occurs when the message reaches one or more of the receiver's senses. Consumers both hear and see television ads. Others consumers handle and read a coupon offer.

One obstacle that prevents marketing messages from being efficient and effective is called barrier. Barrier is anything that distorts or disrupts a message. It can occur at any stage in the communication process. The most common form of noise affecting marketing communication is clutter. Another channel for direct digital marketing is in-product communication (*also: in-product marketing*), which delivers marketing content directly to a user's internet-connected device or software.

In-product marketing content is often very similar to that of email marketing campaigns, but the segmentation and delivery is more targeted. Because email has become a standard tool in the digital marketing toolkit, the email channel often is overloaded and overused, leading to much lower open rates, lower engagement rates, lower click-through rates (CTR), and lower conversion rates. The rise of internet-connected devices is enabling a growing number of consumer products manufacturers to take advantage of this channel of marketing communications, to supplement other digital marketing channels.

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ORGANIZATIONAL PERFORMANCE

In order to evaluate the organizational performance of the respondents in this study, we employed some of the subjective measures more frequently used in other investigations, such as return on investment, and sales. Respondents were asked to indicate the evolution, in the last period, of the mentioned variables relative to a company's objectives. Organizational performance can be measured by both subjective and objective indicators. Subjective indicators are based on the subjective assessment of a company's performance in comparison with its competitors, with planned results compared to those for the previous period, etc. Objective performance indicators are based on data from the financial statements of a company.

Dess and Robinson (1984, 265) and Hansen and Wenerfelt (1989, 399) proved there are correlations between subjective and objective indicators of business performance. Market performance is typically related to market communication effectiveness expenditures for such variables as market share and sales. Marketing communication effectiveness can influence a market share and sales, thereby influencing its competitive market position. While achieving improved sales and market share is essential to any marketing communication effort, consider financial impact the most crucial measure of success for any marketing communication activity. Financial benefits from marketing communication effectiveness can be evaluated in several ways. Return on investment (ROI) is a traditional approach to use to evaluate return relative to the expenditure required to obtain that return. Financial performance involves an increase in revenues.

II CONCLUSION AND IMPLICATIONS

The model of marketing communication for business-to-business markets rep- resents a new perspective in marketing research. The central concept of the effectiveness of marketing communication assumes that there are variables that can have a positive influence on the effectiveness of marketing communication. In undertaking this study, we wanted to underline that the central area of this research is still not sufficiently studied, which forms the basis for new empirical research in this field. However, when we talk about marketing communication to business-to-business markets, we concluded that the research area is theoretically, and in particular, also poorly studied in empirical terms (Wickham, Hall, 2006, 100; Garber, Dotson, 2002, 1-17). This is due to a lack of empirical evidence on the effectiveness of marketing communication on these business-to-business markets, which represent a conceptual model which still has not verified the significant contribution to the field that marketing communication on the business-to-business markets can make. Further, another important theoretical contribution will be to study the area of effectiveness of marketing communication. In doing so, we came to the conclusion that marketing communication objectives do have a major impact on marketing communication effectiveness and best explain success. We also found we can explain the positive impact of bidirectional communication on the effectiveness of marketing communication.

The proposed positive relationship between communication channels and marketing communication effectiveness was confirmed. A further contribution would be confirmation of the positive relationship between marketing communication effectiveness and organizational performance. Another important theoretical contribution to the field would be further study of the effectiveness of marketing communication model from a strategic point of view, namely, as a central concept of the antecedents and consequences in a

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model for marketing communication effectiveness on business-to-business markets. This paper contributes to the literature by developing a structural equation model framework as a response to the call made by marketing communication researchers. This call suggested the use of more exploratory research to better operationalize both the concepts of marketing communication effectiveness and organizational performance and confirm that relationship.

An important contribution to management not only results in better performance of marketing communication, but the possibility that organizations can actually measure the effectiveness of marketing communication in terms of in- creased response to increased demand, sales and increased trust of target groups. It is a given that measuring instruments are the basis for achieving the effectiveness of marketing communication, and consequently achieving organizational performance. With the possibility of measuring the effectiveness of marketing communication are also opportunities for greater success of organizations operating in business-to-business markets. This contribution is important because the literature is filled with calls for more empirical research into the field of marketing communication in business-to-business markets. Designing and testing the conceptual model offered here does represent a modest first step in that direction.

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Study On Tele Marketing

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Abstract-*The mobile telephony has brought a revolution of its kind in the field of communication. Telemarketing has emerged as a powerful tool of direct marketing due to rapid growth of mobile telephony. It carries all the benefits of direct marketing but at a much lower cost. India too is witnessing the upsurge in telemarketing with rising number of mobile users. The Indian Mobile subscriber base has increased from approximately 5 million in 2001 to 7 Million in 2010 (Telecom Regulatory Authority of India). The rural teledensity increased from 9.46% at the end of March 2008 to 15.11% at the end of March 2009 and the urban teledensity increased from 66.39% to 88.84% during the same period. In this backdrop it becomes interesting to find out the products and services that are frequently marketed and the products and services that are readily accepted by customers through this medium of marketing. This paper is an attempt to know the perception and attitude of the customers towards telemarketing; benefits derived by the company in the perception of customers and an overall assessment of this marketing tool. Telemarketing has been selected for this paper to understand the role of various social-psychological issues attached to this medium especially in Indian context. The findings of the survey have given mixed response leading to the conclusion that marketers have to work harder to make this tool more effective.*

Key Words: *Telephone service, customers, financial market; consumer, social-psychological, teledensity.*

I INTRODUCTION

The present day society can be rightly called as the mobile information society. The spurt in mobile technology, the boom in mobile sale and the multiplicity of application areas has indeed been unprecedented. The mobile telephony has brought a revolution of its kind in the field of communication. The Indian Mobile subscriber base has increased in size by a factor of more than one hundred since 2001 when the number of subscribers in the country was approximately 5 million to 729.57 Million by November 2010, according to the Telecom Regulatory Authority of India. This number was 429.73 million in March 2009 and 76 million in December 2005. Rural tele density increased from 9.46% (March 2008) to 15.11% (March 2009) and the urban teledensity increased from 66.39% to 88.84% during the same period. The marketers have taken a lead in utilizing this growth in communication technology to their advantage by resorting to direct marketing regular touch with their customers/potential customers. The mobile phone owners are given a call either, recorded or manual or sms to inform about the company's product/service and promotion schemes there upon.

Objectives

The current paper aims to achieve the following objectives.
1. To investigate the relationship between the perceived and expected service quality among Malaysian consumers,
2. To determine which service quality dimensions are the best predictors.

Human Element in the Service Offerings

Till now, Parasuraman et al. (1988) conceptual model of service quality was considered as the best evaluative tool for the comparison of excellence service encounter by the customer (Rust and Oliver, 1994; Cronin and Taylor, 1994). However, Bitner et al. (1990) proposed in another way and they define the service quality as the consumers' overall impression of the relative inferiority / superiority of the organization and its service offerings. In most of the services, quality occurs during the interaction between the customer and the contact personnel of the service firm. For this reason, the service quality is highly dependent on the performance of

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employees during the service transactions. According to Bitner et al. (1990) the empirical results both from service quality and service satisfaction affirms that the importance of customer, employee interactions are interdependent and the importance of human element in the service transaction is also important. This has been further, supported by close examination of the scale items for each service quality dimensions which reveals that a majority of the service quality items relate directly to the human interaction element of service delivery. Thus, while providing the service the firms should give priority to the human values in developing a better service strategy. The following human values can be taken as guidelines namely, doing something extra and doing it imaginatively are the key elements in the service transaction. Managing the first and the last four minutes of transaction in an impressive manner is another area of concern. In addition, the studies also proved that the customers are ready to pay something more for the excellent services and hence, the price is not the important factor in the service offerings, when we offer imaginatively.

The service quality has become a principal competitive weapon in the service industry. Services by definition are intangible and are also not easily duplicated. Quality on the other hand, is differentiable and stems from the expectations of the customers, Hence, it is necessary to identify and prioritize the customers' expectations for service quality and incorporate these expectations into a service process for improving quality. (Goodman et al., 1986) Thus, understanding customers' expectations will enable the service provider and employees to make a concentrated effort to provide them. Further, what the customer expects from one type of service may not hold good for another service category and hence one should understand the right of expectation in order to provide a right strategy. (Cronin and Taylor, 1992) In other words, what a customer desires from a bank does not necessarily hold good for the telemarketing company. Hence, each service provider should identify their uniqueness in their service offerings.

The key variables in meeting customer expectations begin with identifying the specific characteristics of service quality as perceived by the customer who defines the nature and importance of service quality. In other words, there is a need to identify customer expectations by assessing the importance of each element of service quality and its offerings. As far as the telemarketing is concerned there are two aspects which are considered as important when evaluating its quality they are content and delivery. It is argued that the users of telemarketing services are in a best position to evaluate the service quality because in this transaction both product and also the quality of service (delivery)involved.

Tele Marketing Dimensions

Telemarketing is a practice where a business initiates a absenteeism and low productivity. Hence the challenge lies in setting predictive dealers in a way that shall avoid being a nuisance to potential customers and also in managing the employees. Although information technology has enabled global businesses to flourish, it also becomes one of the major enablers for sophisticated fraud schemes. The computer and network reliant world allows fraudsters to make acquaintance with victims and eventually committing crimes without any face-to-face contact. Since fraudsters are heavily reliant upon modern communication facilities and automatic financial systems, therefore the role of law enforcement agencies is significant to strengthen regulation and law enforcement in the communication industry, establish fraud account reporting and information sharing mechanisms among financial institutions, and provide timely consulting services to citizens. Conducted interviews with 47 people involved in telemarketing fraud. Their family background, educational qualification was studied and their motives for getting involved in fraudulent telemarketing were highlighted. Their class and family backgrounds provided them with high, but ill-defined, expectations for material success. Their preparation for successful conventional careers was unremarkable. As a result, they were predisposed to economic activities that required few credentials but provided a high income. Once involved in and aware of the deviant nature of their endeavors, continuation in fraud was facilitated by the income it produced and the lifestyle it permitted. Selling goods can be different from selling services. This paper aims at crystallizing out the relative effectiveness of telesales versus face-to-face presentation for selling goods versus services on consumer recall, attitude and behavioral I tensions. For services the recall was found to be higher in case of face-to-face presentation; whereas in case of goods face-to-face presentation and telesales have a constant effect. Face-to-face presentation and telesales have a constant effect. Attitude and behavior are more positive for service after telesales presentation than face-to-face presentation. For goods attitude and behavior are more positive after face-to face presentation as compared to telesales. According to Simon Cooke the Cooke Consultancy, 1996) there are two types of telemarketing outbound and inbound.

Learning Telemarketing

One of the most efficient ways to pursue a career in marketing is to enroll in a marketing education program. These programs teach the core principles of many marketing strategies, including telemarketing, in an environment geared toward professionals who are eager to enter a fast-paced field of business. Students in a marketing program will begin with courses that establish a foundation of best practices for corporate structures and team organization that emphasize communication and critical thinking. These classes will cover financing, time management, the development of research skills, and other subjects vital to functioning in any role on a marketing team. Marketing programs also introduce students to business technology they are likely to encounter in the workplace. This includes learning advanced applications in office suite programs for word processing, database management, and presentation development, as well as becoming familiar with popular information modeling and image editing software. Those interested in telemarketing will have the opportunity to explore customer management systems like Sales Force and learn how to operate modern business phones. Late-program coursework revolves around case studies of real-world marketing campaigns and the hands-on experience of student-run

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simulations. These exercises are excellent practice for any student who wants to get a better idea of how to set metrics for the success of a campaign and how to measure expected and actual results from campaign strategies. At this stage, students will be able to see methods like telemarketing in action and use what they learn to enter the job market with valuable skills and concrete knowledge.

Women in telemarketing

Telemarketing, as it was the case with telephone operators, is one of the fields known to be occupied mostly by women. The central reason for hiring women operators lied in the fact that women's work was considered a form of cheap labor female telemarketers earned about one-half to one-quarter of men's wages. It was also highlighted, however, that women were more polite and well-mannered than male operators. Moreover, the calming, more delicate nature of a woman's voice was considered to be women's natural quality. This naturalization led to normalizing the perception of women as telephone operators and consultants, which is currently reflected in the telemarketing.

1. WHY DOESN'T OUR TELEMARKETING WORK?

Most technology companies who need to employ a solution sales approach to close profitable new business use telemarketing for lead generation, either employing their own team or using an external 'telemarketing agency'

Telemarketing is perceived as a low cost, productive way of interacting with many potential customers but the results don't always meet the expectation of providing quality selling opportunities for your sales team.

We hear a number of comments on why telemarketing may not have delivered the desired results:

- "We were passed lots of leads but the quality was low"
- "The appointments we went on didn't actually know what we do or why we were there"
- "My sales person said that it wasn't a qualified appointment"
- "We attended appointments that were not with a real decision maker…"
- "He told me that we called him so many times that he just said yes…"
- "We had a number of leads but we couldn't convert one of them into new business"
- "The agency we used just didn't understand our business or value proposition and couldn't translate this into a call pitch"
- "We knew it was a scatter gun approach when we were travelling all over the country for 1appointment…"
- "The quality and delivery of activity reporting was poor"

Can you relate to some of these comments? Let's look at some of reasons behind these comments and identify what we can do to improve the quality.

2. WHAT'S THE PROBLEM?

It's important that we understand why Telemarketing should be part of an integrated marketing and sales process. If you haven't got an integrated process that is delivering repeatable sales opportunities and new business, then you are already reducing the chances of success. You are almost throwing your money at the task in the hope you'll get some appointments, in the same way the telemarketing agency will throw mud against the appointment wall hoping some of it will stick.

Before worrying about how telemarketing will be delivered as an activity, you need to validate that your value proposition and message is compelling and that you know it works. If you have gained appointments with a target organization at the appropriate level and sold to them, then you know a Telemarketing agency should be able to do the same. If you are outsourcing your Telemarketing to do the same.

II CONCLUSION

The Tele operators can be considered as professional voice users who are at a high risk for developing vocal disorders, since they usually present high indices of vocal symptoms. The most frequent symptom is dry throat. The auditory perceptual and acoustical assessments of voice showed no significant differences in the tele-operators vocal behavior, when the pre and post-workday conditions were compared. Almost 47% of people always ignore any telemarketing call whether through recorded voice, sms or manual calls. Manual calls and smses were more often received as against the recorded ones. Respondents had experienced maximum call on information about new services. 49% respondents in the age group of 25 years and below never wanted to get calls from new vendors whereas 60% respondents of the age group of 25 years and above preferred calls from new vendors sometimes. Majority of the respondents were of the opinion that at times useful and trustworthy information was provided through telemarketing calls and sms. Majority of the respondents did sometimes get influenced by telemarketing calls and sms and made their purchases after getting such information. 60% respondents in the age group of 25 years and below and 53% respondents in the age group of above 25 years were indifferent and did not switch to other vendors if their existing vendors did not call them regularly. 49% respondents in the age group of 25 years and below and 56% respondents in the age group of above 25 years felt that telemarketing calls interrupted privacy. While, 61% respondents in the age group of 25 years and below\ and 53% respondents in the age group of above 25 years found telemarketing calls irritating. 67% respondents believed that telemarketing generated sales for company.

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Rise of Job Nervous Tension, Sources Of Proficient Stress in the Fiscal Banking Sector: Emergent Concerns in Humanizing Bureau Yield In India

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Abstract-*This paper presents a detailed study on the growth of job stress among the employees of various public and private sector banks in the state of Tamil Nadu in India. This study is based on the survey conducted among 119 bank employees spread across four banks located in the Madurai District. A detailed questionnaire was devised to test the mental stress of the employees with preferences given to conflict in occupational roles, support of the co-workers and Supervisors in alleviating the stress along with the effect of various personal factors inducing the stress. The hypotheses were tested using t-test, ANOVAs and correlation analysis were also conducted to identify the outcomes using the statistical tool SPSS V20.0. The results suggest that, the employees are stressed reasonably and stress reduction programs and strategies are the need of the day to improve the efficiency of the workplace. This research provides an insight into the prevalence of stress in the banking sector and the factors contributing to the stress. As the banking sector is becoming more and more competitive and is having a consistent growth through the last decades, the necessity for the reducing the stress at workplace gains significance.*

Keywords: Job stress, Financial banking sector, Employees satisfaction and commitment.

I INTRODUCTION

The banking industry in India is growing in leaps and bounds. The growth of Indian economy has spiraled upwards the development of banking sector which is presently witnessing a steady growth rate. According to a recent statistics, the number of bank employees stood at 1,175,149 in a total of 109,811 branches in India and 171 branches abroad. The Indian banks clicked a net profit of US$17 billion or €13 billion against a turnover of US$17 billion or €13 billion during 2012-13. But these growths has put forth a challenging and demanding workplace which has every reason to bring in stress in the working environment. Tough deadlines and stringent targets push the employees to their limits to achieve their goals due to which, stress is eventually produced.

More than 80% of the world's technological inventions have occurred since 1900.There was more information produced in the 30 years from 1965-1995 than was produced in the entire 5,000-year period from 300BC to 1965. We have experienced more change in the past 20 years than the world encountered in the previous 2,000 years. Never before in our history has our life changed so rapidly and the stress increased so fast. Researchers from the American Institute of Stress estimated that stress costs businesses in the U.S. $300 billion a year due to sick days and lost productivity [1]. Stress in fact is a silent monster that pounds on the prey and make enormous losses to the business establishments every year.

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II STRESS IN WORK ENVIRONMENT – OCCUPATIONAL STRESS

Occupational stress is related to the stress at the place of work or occupation. Everybody feels pressure either at home or at office. The concept of stress comes into picture if we can no longer handle the pressure at ease or we can no longer cope up with the pressure. Normally, stress at workplace springs up if the worker cannot balance the demands of the job with his available resources and individual capability. The terms occupational stress or work stress and job stress are invariably the same. Increased workloads, adaptability to swiftness work environment, ever ending change in technology contribute to the stress greatly [2]. Luthens (2002) have emphasized that stress is the response to an event and not the event itself. He has also elaborated that only special and unusual situations produce stress whereas we can glide over unusual situations at ease [3].

Objectives of the study

a) To assess the job stress of employees in various public and private sector banks in the Madurai District.
b) To examine the level of support received from the co-workers and the Supervisor
c) To identify the stressors inducing stress

III NEED FOR THE PRESENT STUDY

Banking sector in India is presently witnessing a phenomenal growth. We presently have over 27 Public Sector Nationalized Banks, 31 Private Banks and 38 Foreign Banks. All these banks cater to over 114014 ATMs across the country. But the Average Population per Bank Branch (APBB) as on 31.3.2013 is only 12,100 [4]. This means, minimum numbers of banks are catering to a huge volume of people and the growing economy puts the stress right on the shoulders of the bank employees which makes the current study an inevitable one. Although several researches have been made in this area, this work tries to bring in a multidimensional study on the stress in the banking setup.

IV REVIEW OF LITERATURE

Bushara Bano and Rajiv Kumar Jha (2012) analyzed the impact of organizational stress among the public and private sector employees and found that both of them face reasonable levels of stress in work environment. Though there is no significant difference in terms of total stress levels, work experience and educational qualifications contribute certain differences [5].In the study by Vishal Samartha et.al (2013), employees of both public sector and private sector banks face the same level of stress. Among the various stressors in the public sector banks lack of efficient manpower and performance pressure play a major role. The other factors like, family demands, unexpected contingencies followed by job rigidity have least effect on stress. The employees of the private banks also face the same stressors along with certain new aspects like, adaptability to change and performance pressure also have some effect on stress[6].

Vijay Joshi and K.A. Goyal (2013) studied the exposure of stress during the mergers of Bank of Rajasthan with the ICICI Bank. Because of this kind of mergers, both the banks create a positive effect on their market base and the customers of the bank were also satisfied. During the merger the employees of the Bank of Rajasthan were totally against the merger process. Their research found that, after the completion of merger the employee's satisfaction levels were very low and the stress is very high. They discussed about the Cultural Fit and the Human Resource Policy Framework during the merger and felt that, if mergers and acquisitions were not managed properly, the stress at workplace will increase rapidly [7].According to a recent study by Dr. Vishal Samartha et.al(2014), the entry of private and multinational banks the public sector banks were forced to introduce new concepts, revise their existing setup and product line ups. This forced the employees of the public sector banks to work beyond their office hours and hence the stress levels are at par with the private bank employees [8].

Upon analyzing the employee turnover in banking sector, Santript Shukla& Dr. Ambalika Sinha (2013) found that the important factors for employee turnover are effective job satisfaction and an conducive work environment. The significance level for both these variables are very high and they imply that, irrespective of better salary compensation, the employees have a huge desire to push themselves into new avenues so as to seek a better work environment and job satisfaction. They suggested that, if the career oriented employees were given more freedom and opportunity in the work environment they may not switch companies in a short time. Callous management attitude and excessive workload will stress the career oriented employees and push them to seek better alternatives [9]. Muhammad Naeem Shahid et.al (2011) discussed about the six components of job stress: Lack of administrative support, excessive work demand, problematic customer relations, coworker's relationship, family & work life balance and riskiness of job. They studied the relationship between stress and performance and found that stress naturally affects employee performance [10].

Job stress leading to a counter-productive work behavior has been discussed by Hira Aftab and Anam Javeed (2012) by analyzing various factors like poor communication skills, forcing the employees to work beyond their capacity, an unfair performance evaluation system, inappropriate salaries and working conditions. Their findings have proved that job stress leads to counter productive work behavior thereby affecting the work environment. Sharma et.al (2012) discovered that, the commercial banks are also required to wake up to the fact that role stress has multifaceted relationship with performance-related benefits. Where performance benefits can

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lower the perception of underutilization at workplace, it may also increase the workload of employees. Nevertheless, an organization aiming at reducing the role stress at work faces an uphill task in optimizing utilization of the capabilities of its workforce and at the same time not increasing the workload of employees beyond a functional level [12].

Syed Sheraz Ali Shah and Syed Amjad Fared Hasnu (2013), identified the key factors that have effect on employee's job performance. Job instability has emerged as an issue which is creating job stress among employees resultantly their involvement in the job and job performance is being affected. This study is conducted to understand the causal relationship of job instability and job performance. The study aims to identify the key moderators of job performance in the banking sector of Pakistan. Six hypotheses are tested using AMOS 17.00 by applying the technique of Structural Equation Modeling. The findings showed that all the hypotheses are accepted with significant level. The findings have shown that job performance is affected negatively by job stress and job instability. Increase in job instability and job stress would decrease job performance. Job involvement has shown a significant and positive impact on job performance. The direct and indirect relationship showed that all the three variables are the mediators of job performance. Removing job instability and job stress is impossible but organizations can make efforts to reduce them to the minimum level [13].

Iqra Abdullah (2013), found that the employees who are extroverts, i.e the people who are more talkative and social outperform the introverts who are confined to their own self. Similarly the employees who were cooperative with their coworkers, superiors perform better than the non-cooperative ones. Their study has suggested that proper personality analysis has to be performed before recruiting banking professionals [14].

Hayford Adjei (2014) assessed the job related stresses at the Barclays Bank and found that the majority of the employees felt the stress at work. Their results showed that the long working hours contributed to their stress and various stress relaxation techniques were suggested to overcome the negative aspects of stress [15].

Hypotheses

The following hypotheses were framed for the conduct of our research;
H1: There is no significant difference in stress based on gender
H2: There is no significant difference in stress among different age groups
H3: There is significant difference in stress based on work experience
H4: There is significant difference in stress based on marital status
H5: There is no significant difference in stress based on the location of home from office
H6: There is no significant difference in stress base on number of dependants
H7: There is a significant difference in stress based on appointment type
H8: The private sector bank employees face more stress than public sector bank employees
H9: There is a significant difference between the stress and the educational qualifications.
H10: There is a significant difference between the stress and the academic performance (by considering the highest degree achieved) of the employees

V RESEARCH METHODOLOGY AND DATA ANALYSIS

Statistical Package for Social Sciences V.20.0 (SPSS) was used in the analysis and interpretation of data. Two public sector banks and two private sector banks were considered for the purpose of this research. A well-structured questionnaire containing 39 questions leading to 131 variables were used to collect data. The internal consistency has been checked using the Cronbach's Alpha and the value obtained is 0.866 which is considered as outstanding.

Finding and Suggestions

Table 1. Demographic profile of the respondents

Category	Type	Frequency	%
Gender	Male	91	76.48
	Female	28	23.52
Age Group	21- 30 years	24	20.2
	31- 40 years	33	27.7
	41 – 50 years	26	21.8
	51 – 60 years	22	18.5
	60 + years	14	11.8
Work Experience	< 1 year	23	19.3
	1 - 2 years	30	25.2
	2 - 5 years	22	18.5
	5 - 10 years	30	21.8
	> 10 years	14	15.1

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Marital Status	Single	8	6.7
	Married	69	58
	Divorced	10	8.4
	Separated	21	17.6
	Widower	11	9.2
Location of Home from Office	0 – 2 kms	34	28.6
	2.1 – 5 kms	46	38.7
	5.1 – 10 kms	20	16.8
	10.1 + kms	19	16.0
Number of dependents	One	55	46.2
	Two	45	37.8
	Three	18	15.1
	Four	1	0.9
Appointment type	Permanent	80	67.2
	Contract	39	32.8
Bank type	Public	52	43.7
	Private	67	56.3
Educational Qualifications	10^{th} Standard	2	1.7
	12^{th} Standard	1	0.8
	Diploma	9	7.6
	Under Graduate	57	47.9
	Post Graduate	50	42.0

Table 2. Impact of the socio-demographic factors on the Stress (t-test)

Hypothesis	Demographic Variable	Significance Value	Remarks
H1	Gender	1.40	Accepted
H7	Appointment Type	0.913	Not Accepted
H8	Bank type	0.37	Accepted

We used the t-test to identify the role of gender on the stress and found that there is no significant difference in stress based on the gender. Hence the hypothesis H1, which states that there is no significant difference in stress based ongender, is acceptable.Again t-test was performed to identify the role of appointment type on stress and we found that there is no significant difference in stress, thereby making the hypothesis H7 a not acceptable one. Similarly t-test was done related to the type of bank on stress and it was found that there is no significant difference in the type of bank being public or private on the stress which makes the H8 acceptable.

However the age group affects the stress levels of the employees. We ran an ANOVA test on the sample and found that there is a significant difference in stress between the employees with different levels of age. This implies that, H3 is a not-acceptable hypothesis. Similarly, an ANOVA on the work experience yields a significant difference making the hypothesis H3 as acceptable.Also there is a significant difference on effect of marital status on the stress making the H4 as an acceptable hypothesis. The distance of the office from the home definitely has an impact on the stress levels of the employees as the test results demonstrate a significant difference which puts the H5 as a not acceptable hypothesis. Also it is heartening to find that, there is no significant difference in the stress levels based on the number of dependents. This shows that, the size of the family have negligible effect on the stress levels thereby forcing the hypothesis H6 an acceptable one. Also the educational qualifications have no impact on the stress levels and the hypothesis H9 is not acceptable.

Table 3. Pearson Correlations

		Stress Score	Educational Achievement Score
Stress Score	Pearson Correlation	1	.797**
	Sig. (2-tailed)		.000
	N	119	119
Educational Achievement Score	Pearson Correlation	.797**	1
	Sig. (2-tailed)	.000	
	N	119	119
**. Correlation is significant at the 0.01 level (2-tailed).			

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Pearson's correlation coefficient (r) is a measure of the strength of the association between the two variables. The above table confirms that the educational achievements of the employees are positively associated with the overall job stress. However it cannot be taken for granted that, the educational achievement induces the stress in employees considerably. Suitable other statistical methods involving additional variables have to be utilized to narrow down on the factors contributing to stress.

Table 4. Coworker and Supervisor Support in the employees belonging to Public and Private Sector Banks

Group Statistics

	Bank type	N	Mean	Std. Deviation	Std. Error Mean
Coworker support	Public	52	34.8269	6.24255	.86569
	Private	67	35.7164	6.51526	.79597
Supervisor support	Public	52	33.5385	6.31668	.87597
	Private	67	34.1194	6.93809	.84762

Table 5 . Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Confidence Interval of the Difference	
									Lower	Upper
Co-worker support	Equal variance assumed	.193	.661	-.752	117	.453	-.88949	1.18241	-3.231	1.45220
	Equal variance not assumed			-.756	111.8	.451	-.88949	1.17600	-3.219	1.44062
Super -visor support	Equal variance assumed	.459	.499	-.471	117	.639	-.58094	1.23351	-3.023	1.86196
	Equal variance not assumed			-.477	113.9	.635	-.58094	1.21893	-2.995	1.83374

A total of 52 respondents belonging to Public Sector Banks and 67 respondents belonging to Private Sector Banks were analyzed and their mean and standard deviations are shown in Table 4. The scores of the coworker support and supervisor support in the public and private sector banks were subjected to an Independent Samples t-test. The output data shows that, t-test failed to reveal a statistically reliable difference between the public and private sector banks with reference to the co-worker support scale and supervisor support scales. ($t(117)=0.752$, $p=0.66$, $t(117)=0.471$, $p=0.49$).

Table 6. Frequency distribution of the responses given to the Co-Worker support

		Frequency	Percent
Listen to my problems	Strongly Disagree	10	8.4
	Somewhat disagree	30	25.2
	Neither agree nor disagree	48	40.3
	Somewhat agree	19	16.0
	Strongly agree	12	10.1
Comprehensive and Sympathetic	Strongly Disagree	23	19.3
	Somewhat disagree	19	16.0
	Neither agree nor disagree	45	37.8
	Somewhat agree	20	16.8
	Strongly agree	12	10.1
Respect me	Strongly Disagree	20	16.8
	Somewhat disagree	26	21.8
	Neither agree nor disagree	39	32.8

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	Somewhat agree	20	16.8
	Strongly agree	14	11.8
Appreciate the work I do	Strongly Disagree	16	13.4
	Somewhat disagree	31	26.1
	Neither agree nor disagree	45	37.8
	Somewhat agree	19	16.0
	Strongly agree	8	6.7
Make time for me if i want to discuss about my work	Strongly Disagree	31	26.1
	Somewhat disagree	41	34.5
	Neither agree nor disagree	29	24.4
	Somewhat agree	14	11.8
	Strongly agree	4	3.4
Feel comfortable for helping me	Strongly Disagree	16	13.4
	Somewhat disagree	38	31.9
	Neither agree nor disagree	41	34.5
	Somewhat agree	16	13.4
	Strongly agree	8	6.7
During frustrations, they try to understand	Strongly Disagree	16	13.4
	Somewhat disagree	30	25.2
	Neither agree nor disagree	48	40.3
	Somewhat agree	13	10.9
	Strongly agree	12	10.1
Help me figure out my problem	Strongly Disagree	10	8.4
	Somewhat disagree	36	30.3
	Neither agree nor disagree	51	42.9
	Somewhat agree	13	10.9
	Strongly agree	9	7.6
Cooperate with me to get things done	Strongly Disagree	8	6.7
	Somewhat disagree	30	25.2
	Neither agree nor disagree	57	47.9
	Somewhat agree	17	14.3
	Strongly agree	7	5.9
Take extra care to share my work	Strongly Disagree	7	5.9
	Somewhat disagree	33	27.7
	Neither agree nor disagree	46	38.7
	Somewhat agree	13	10.9
	Strongly agree	20	16.8
Can be relied on to help when things get tough at work	Strongly Disagree	5	4.2
	Somewhat disagree	15	12.6
	Neither agree nor disagree	59	49.6
	Somewhat agree	34	28.6
	Strongly agree	6	5.0
Share useful ideas or advices with me	Somewhat disagree	19	16.0
	Neither agree nor disagree	41	34.5
	Somewhat agree	37	31.1
	Strongly agree	22	18.5

The coworker support in the banks under study in this research tilts towards a negative scale which itself shows that the coworker support is declining and this may definitely lead to stress in the workplace. For certain vital supports like mutual respect, only 28.6% of the respondents (Strongly agree 11.8, Somewhat agree 16.8%)have told that they are respected by their coworkers and 32.8% neither agreed or not agreed which leads to 38.6% of employees are not respected by their coworkers.

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Table 7. Number training programmes attended

Nos.		Frequency	Percent	Valid Percent	Cumulative Percent
Program count	One	39	32.8	32.8	32.8
	Two	31	26.1	26.1	58.8
	Three	28	23.5	23.5	82.4
	Four& more	21	17.6	17.6	100.0
	Total	119	100.0	100.0	

Of the 119 samples surveyed a majority of 32.8% have responded to have attended only one training programmer, which shows that banks do a little to keep their employees abreast with the latest developments. With the current phenomenal increase in both market volume and technological aspects having more number of periodic training programmers is essential. However, only a minimal of 17.6% of respondents has replied of having completed four and more training sessions.

Table 8. Intention to work in the same bank

		Frequency	Percent	Valid Percent	Cumulative Percent
Responses from the individuals	Certainly	24	20.2	20.2	20.2
	Probably	21	17.6	17.6	37.8
	No Idea	31	26.1	26.1	63.9
	Probably Not	25	21.0	21.0	84.9
	Certainly Not	18	15.1	15.1	100.0
	Total	119	100.0	100.0	

Table 8 shown above depicts the intention of the employees to work in the same bank in the near future. This table provides a mixed responses with 36.1% of the respondents swinging to the negative side (Probably Not 21%, Certainly Not 15.1%) aiming to quit the job, whereas 26.1% have no idea about switching jobs. Similarly 37.8% of respondents have chosen to stay on the job (Certainly 20.2% and Probably 17.6%). This table shows the diversified mindset of the employees with the number of employees having 'no idea' will decide the factor of employee retention.

Table 9.Descriptive Statistics of Employee Retention Analysis based on their intention to stay in the same bank along with the scores of Coworker support and Supervisor Support

		N	Mean	Std. Dev.	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
Coworker support	Certainly	24	38.0833	7.30049	1.49021	35.0006	41.1661	29.00	51.00
	Probably	21	36.7143	3.84893	.83991	34.9623	38.4663	32.00	45.00
	No Idea	31	37.5161	4.98579	.89547	35.6873	39.3449	27.00	44.00
	Probably not	25	32.8000	6.31137	1.26227	30.1948	35.4052	24.00	45.00
	Certainly not	18	29.7778	5.44011	1.28225	27.0725	32.4831	20.00	36.00
	Total	119	35.3277	6.38604	.58541	34.1685	36.4870	20.00	51.00
Supervisor support	Certainly	24	33.5833	2.94761	.60168	32.3387	34.8280	30.00	40.00
	Probably	21	36.9524	7.61233	1.66115	33.4873	40.4175	30.00	52.00
	No Idea	31	35.6774	5.33783	.95870	33.7195	37.6354	31.00	50.00
	Probably not	25	32.5600	8.62690	1.72538	28.9990	36.1210	19.00	54.00
	Certainly not	18	29.3333	5.45570	1.28592	26.6203	32.0464	22.00	41.00
	Total	119	33.8655	6.65229	.60981	32.6579	35.0731	19.00	54.00

The table 9 provides the detailed descriptive statistics for the coworker and supervisor support scores with the retention level of employees. The table.10 shows whether the overall F ratio for the ANOVA is significant or not. The observed F ratio (8.299) for coworker support is significant ($p = .001$) at the .05 alpha level. i.e $F(4, 114) = 8.299$, $p < .01$. The 4 and 114 are the two degrees of freedom values (df) for the between groups "effect" and the within-groups "error," respectively. The 8.299 is the obtained F ratio, and the $p < .01$ is the probability of obtaining that F ratio by chance alone.

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Table 10. Anova

		Sum of Squares	df	Mean Square	F	Sig.
Coworker support	Between Groups	1085.246	4	271.312	8.299	.000
	Within Groups	3726.972	114	32.693		
	Total	4812.218	118			
Supervisor support	Between Groups	716.129	4	179.032	4.530	.002
	Within Groups	4505.720	114	39.524		
	Total	5221.849	118			

Similarly, the observed F ratio (4.530) for supervisor support is significant ($p = .001$) at the .05 alpha level. i.e $F(4, 114) = 4.530$, $p < .01$. The 4 and 114 are the two degrees of freedom values (df) for the between groups "effect" and the within-groups "error," respectively. The 4.530 is the obtained F ratio, and the $p < .01$ is the probability of obtaining that F ratio. The Anova table clearly shows that there exists a significant difference between the retention level of the employees with the Coworker and Supervisor support. However the exact factors contributing to the significant difference cannot be identified. For this, we have performed the post hoc test like Tukey HSD – Honest Significant Difference Test.

Table 11 . Tukey HSD Test

Dependent Variable	(I) Intention to work in the same bank	(J) Intention to work in the same bank	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Coworker support	Certainly	Probably	1.36905	1.70851	.930	-3.3668	6.1049
		No Idea	.56720	1.55461	.996	-3.7420	4.8765
		Probably not	5.28333*	1.63398	.014	.7541	9.8126
		Certainly not	8.30556*	1.78282	.000	3.3637	13.2474
	Probably	Certainly	-1.36905	1.70851	.930	-6.1049	3.3668
		No Idea	-.80184	1.61598	.988	-5.2812	3.6775
		Probably not	3.91429	1.69249	.148	-.7772	8.6057
		Certainly not	6.93651*	1.83659	.002	1.8456	12.0274
	No Idea	Certainly	-.56720	1.55461	.996	-4.8765	3.7420
		Probably	.80184	1.61598	.988	-3.6775	5.2812
		Probably not	4.71613*	1.53698	.022	.4557	8.9765
		Certainly not	7.73835*	1.69436	.000	3.0417	12.4350
	probably not	Certainly	-5.28333*	1.63398	.014	-9.8126	-.7541
		Probably	-3.91429	1.69249	.148	-8.6057	.7772
		No Idea	-4.71613*	1.53698	.022	-8.9765	-.4557
		Certainly not	3.02222	1.76748	.432	-1.8771	7.9215
	certainly not	Certainly	-8.30556*	1.78282	.000	-13.2474	-3.3637
		Probably	-6.93651*	1.83659	.002	-12.0274	-1.8456
		No Idea	-7.73835*	1.69436	.000	-12.4350	-3.0417
		Probably Not	-3.02222	1.76748	.432	-7.9215	1.8771
Supervisor support	Certainly	Probably	-3.36905	1.87854	.382	-8.5762	1.8381
		No Idea	-2.09409	1.70932	.737	-6.8322	2.6440
		Probably not	1.02333	1.79660	.979	-3.9567	6.0034
		Certainly not	4.25000	1.96025	.199	-1.1837	9.6837
	Probably	Certainly	3.36905	1.87854	.382	-1.8381	8.5762
		No Idea	1.27496	1.77681	.952	-3.6502	6.2001
		Probably not	4.39238	1.86093	.134	-.7660	9.5507
		Certainly not	7.61905*	2.01937	.002	2.0215	13.2166
	No Idea	Certainly	2.09409	1.70932	.737	-2.6440	6.8322
		Probably	-1.27496	1.77681	.952	-6.2001	3.6502
		Probably not	3.11742	1.68995	.353	-1.5670	7.8018

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		Certainly not	6.34409*	1.86299	.008	1.1800	11.5082
	probably not	Certainly	-1.02333	1.79660	.979	-6.0034	3.9567
		Probably	-4.39238	1.86093	.134	-9.5507	.7660
		No Idea	-3.11742	1.68995	.353	-7.8018	1.5670
		Certainly not	3.22667	1.94338	.463	-2.1602	8.6136
	certainly not	Certainly	-4.25000	1.96025	.199	-9.6837	1.1837
		Probably	-7.61905*	2.01937	.002	-13.2166	-2.0215
		No Idea	-6.34409*	1.86299	.008	-11.5082	-1.1800
		Probably not	-3.22667	1.94338	.463	-8.6136	2.1602
*. The mean difference is significant at the 0.05 level.							

From the above table it can be inferred that, in the coworker support scale, there is significant difference between the 'probably not' and 'certainly not' categories with the certainly and no idea responses. Also in the coworker support scale, there is significant difference between the 'certainly', 'probably' and 'no idea' categories with the 'probably not' response. In the supervisor support scale there exists a significant difference among the certainly not and probably responses.

VI SUMMARY OF FINDINGS AND RECOMMENDATIONS

This study assessed and provided an in-depth view of stress prevailing in the banks located in the Madurai District of Tamil Nadu, India. The results of various tests have proved that stress is invariably present everywhere in the banking system and the employees are subjected to increasing levels of stress. The work environment staggers under the influence of stress thereby leading to an unproductive environment. Moreover interpersonal work relationship is also under fire as the test results show a decline in co-worker support in the banks. Irrespective of the type, i.e. Government owned public sector banks or Private banks, employees of both them face considerable stress. Also it has been found that the work experience and marital status have an impact on stress in workplace. Interestingly, though the marital status adds its own weight on stress, the size of family does not have any effect on stress. The ever increasing menace of traffic congestion in today's' roads also puts its own contribution into the stress in the work environment. The tests have proved that the distance from home played a significant role in inducing stress. The co-worker and supervisor support were poor in the banks under study. The results reveal that the employees face considerable pressure because of the declining support from their colleagues.

The art of coping with the stress using various strategies is the need of the day. It should be understood that, the failure to protect the human assets will bring forth a gradual decay of a working culture. Banks should regularly organize de-stressing camps to help the employees relieve of their stress. The employees have to be educated about the stress and its negative impact on the family and work environment. Stress buster techniques have to be taught to the employees. The organizational setup has to be effectively redesigned so as to extract more work with little effort. The role of every employee should be defined clearly, so that role conflicts are negated. Every major bank with more than 50 employees shall have a separate space allotted for meditation room and a mini power gym. The employees shall be encouraged to make use of these facilities and the banks can also think about introducing incentives to those people who use them frequently. Frequent get-togethers should be organized to bridge the gap between the supervisors and employees and to build the relationship among coworkers.

VII CONCLUSION

Stress has virtually invaded our life in the modern 21st century. We can never imagine of an ideal World that does not have the part of stress in its day to day life. The banking industry in particular, bores the brunt of stress badly than any other business environment. The role of employee commitment forms the backbone of any industry and is inevitably responsible for running successful businesses. So the issue of job stress has to be addressed with due care and attention and has to be resolved to improve the productivity at workplace. As the present study has addressed only a few demographic variables with reference to the stress and analyzed the impact of co-worker support and supervisor support on these variables more research can be taken up in the future so as to improve the scope of the analysis.

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A New Therapeutic Applications for Drug Repositioning on the Cloud Computing

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Abstract *-Market pressures and reassess their current drug development model drugs by pharmaceutical companies to tap into new and innovative business models that have driven. Converter is used in medicine as a variety of techniques lend themselves to distributed computing model. Cloud optimizes resource usage and various pilot projects into pharmaceutical companies that reflect the current trend of a computer model. Widespread adoption of cloud security and data provenance drug Converter is the biggest challenge. Drug discovery and development are a time-consuming, expensive and risky venture. As an alternative approach, the pharmaceutical companies, the relatively low cost of failure risks in order to accelerate the drug discovery and development process of repositioning the drug (the drug Repurposing, drug re-profiling, drug review process, treatment modification) approach reduced. Drug repositioning existing drugs / pro-drugs / biologics process of developing a new symptom is a superb strategy to maximize the value of the optimal potential as a therapeutic drug. In other words, rather than an alternative to the drugs or other disease-diseases by targeting the sale of new drugs that are useful in explaining a part of a balanced biological Converter can be bypassed when compared to traditional drug discovery, drug discovery and development, common in many phases of de novo cost, risk and time -reduced has many advantages. Data mining, bioinformatics, and a variety of techniques including the use of novel screening platforms have been used for screening for the identification of potential candidates to replace. According to experts, Efficacy end points have the opportunity to meet with the same success as the original drug. Also, they are not without risks of original drugs. FDA's 505 (b) (2) approval to change the route and marketing allows companies to offer improved safety and efficacy of drugs will be able to reposition. Drugs can also be repositioned to provide the tools and understanding needed to create second-generation drugs. In the end, a large number of patients with a wide range of conditions and regulatory approval process to go through at least once and have an abundance of human experience that can benefit from such drugs. In various ways, such as disease or cancer drugs targeting other complex diseases (eg, obesity, rare diseases), drug converter can provide a good opportunity to have a goal. Drug repositioning technology experts have the opinion that better coordination of research in the next decade Pharma.*

Keywords: Drug Repositioning, in silico, Rare Disease, Drug Repurposing, High-Throughput Screening, Off-Target Drug Repositioning, On-target Drug Repositioning

I INTRODUCTION

Various drug discovery technologies, such as structure-based drug design, combinatorial chemistry, or high-throughput screening have not been successful as expected compared to conventionally developed drugs. However, it takes too long and costs too much to bring new drugs to market. Drug companies have turned to drug repositioning (also known as drug repurposing, drug re-profiling, drug re-tasking, drug rescuing, therapeutic switching, etc.) as a means of drug rediscovery. Drug repositioning concept evolved in the early 1990s and has become a matter of intense interest during the past few years. Repositioning failed or already marketed drug candidates for alternative disease indications (i.e., new diseases) offers a valuable opportunity to alleviate pipeline gaps and increases success rates 1. Increasing interest in drug repositioning has occurred due to sustained high failure rates and costs involved in attempts to bring new drugs to market. Reasons for epositioning clinical effect of drug compound are shown in Fig. 4. Failed drugs include; some for safety reasons, some for lack of efficacy in the target indication, some because the patient population has not been appropriately stratified to

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eliminate non-responders and some because they no longer fit into a portfolio. Little research has been done to address the huge opportunities that may exist to reposition existing approved or generic drugs for alternate uses in therapy of many diseases. Schematic diagram for drug positioning is given in Fig. 1.

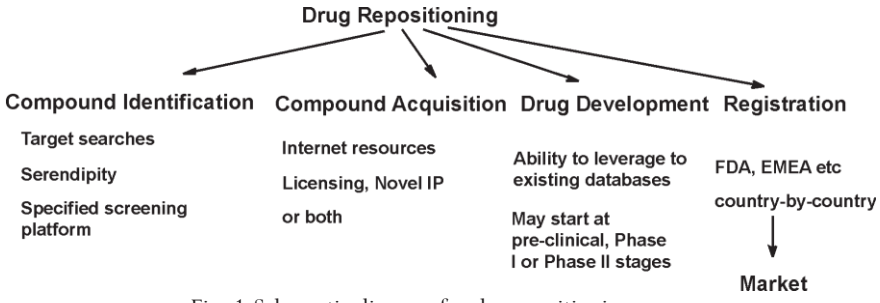

Fig. 1.Schematic diagram for drug positioning

In 'on-target" drug repositioning approach (Fig. 2), the drug's (e.g., galantamine) known pharmacological mechanism is applied to a new therapeutic indication. 'Off-target" drug repositioning approach (e.g. astemizole, Fig. 3) is looking for pharmacological mechanisms that have not yet been described for a known molecule. The discovery of novel drug targets is a significant challenge in drug development. Less than 400 proteins are used as drug targets in the treatment of diseases. On the other hand, many of the currently known drug targets are functionally pleiotropic and involved in multiple pathologies. Several of them are exploited for treating multiple diseases, which highlights the need for methods to reliably reposition drug targets to new indications. There are two approaches for drug repurposing (Fig. 5)

i) Known compound → new target ii) Known target → new indication

Examples of repurposed drugs invariably fit within one or both of these models. Some drugs such as Chlorpromazine fulfill both approaches for drug repositioning.

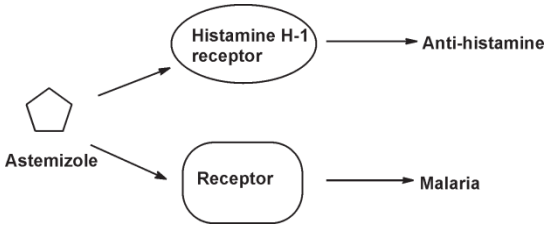

Fig. 2.On-target drug repositioning

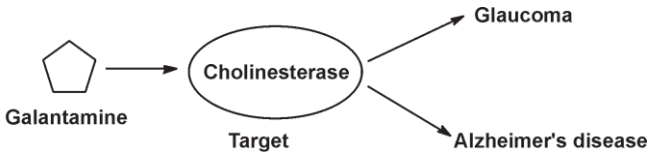

Fig. 3.Off-target drug repositioning

Many effective drugs act via modulation of multiple targets and many adverse drug reactions are due to activity towards multiple targets. Many drugs may have yet unknown therapeutic applications (drug repurposing).

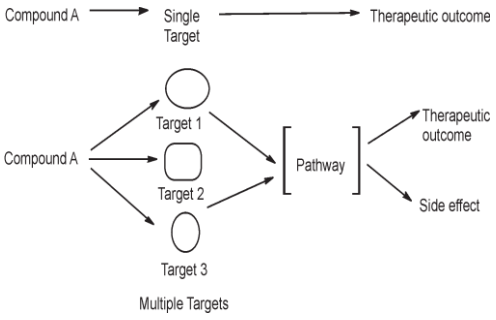

Fig.4. Clinical effect of drug compound

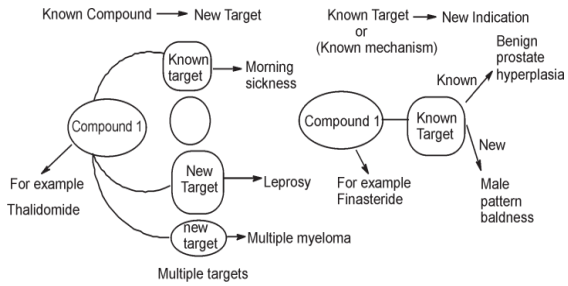

Fig. 5.Two approaching for drug repositioning

The Drug repositioning as a business opportunity was analyzed for pharmaceutical companies, weighing both challenges and

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opportunities of repositioning. Historically, drug repositioning has come from serendipitous discoveries in late stage clinical trials or post approval. The classic example is sildenafil (under brand name Viagra) which was unsuccessful in its development as a new drug for common hypertension but became immensely successful as a drug for male erectile impotence; it then established itself as a drug to treat pulmonary arterial hypertension. Sildenafil is a potent inhibitor of cGMP-specific phosphodiesterase type5) (PDE5), an enzyme that regulates blood flow. PDE5 degrades cGMP in penile corpus cavern sum tissue. When PDE5 actions is prevented, increased cGMP level result in smooth vascular muscle relaxation and increased blood flow to the penile sponge tissue resulting in erection. Recently discovered uses of this drug include alleviation of altitude sickness and jetlag [9].Examples of drug repositioning are numerous [10-24] (Table1).Many older drugs and drug candidates in development have never been fully explored. These can be exploited as resources, as they already have stores of valuable preclinical and clinical data on toxicity, safety, and dosing. Patent cliff, generics pressures, competitor adjacency threats, productivity and innovation are among the key trends that are paving the path in drug repositioning [25].

II ADVANTAGES OF DRUG REPOSITIONING OVER CLASSIC DRUG DISCOVERY PROCESS

A cost effective approach to reduce the burden of disease and increasing the productivity of the pharmaceutical industry may be new uses for existing drugs as repositioning candidates have frequently been through several phases of development (ADMET, absorption, distribution, metabolism, excretion and toxicity; EMEA, European Medicines Agency; FDA, Food and Drug Administration; IP, intellectual property; MHLW, Ministry of Health, Labor and Welfare) for their original indication. Drug repositioning offers real, valuable advantages of adopting or integrating a drug repositioning strategy. These include: i) the easy availability of active ingredients , ii) repositioned drugs have the potential to show increased success rates, decreased time to launch [26] and reduced development costs compared with conventionally developed drugs, iii) large numbers of "druggable" compounds sit in libraries with the potential to be repurposed, iv) repurposing technology will see increasing integration as a standard process of resource utilization, de-risking, and acceleration of drug development, v) repositioned drug will have passed a significant number of toxicology and safety assessments so the chances of failure are greatly reduced. Pharmaceutical companies can reduce risk and costs by finding new uses for existing products [27]. Acloser attention should be paid to the side-effects observed in trials not just to evaluate the harmful effects, but also to rationally explore the repositioning potential based on this "clinical phenotypic assay" [28]. Side-effects, the unintended consequence of therapeutic treatments, can also be seen as valuable read-outs of drug effects in humans. Some studies suggested that drugs with similar side-effect profiles may also share therapeutic properties through related mechanisms of action [28-29].

Two main selection criteria for drug repurposing candidates have been followed: i) known compounds with new targets in the first place, and ii) known mechanisms with new indications in the second place [26] Therapeutic Target Database has been developed to provide comprehensive information about efficacy targets and the corresponding approved, clinical trial and investigative drugs. Updates for facilitating target discovery and validation, drug lead discovery and optimization, and the development of multi-target drugs and drug combinations have been recently reported [30].

Screening technology platforms and drug repositioning process

Drug-target interaction is the basis of drug discovery and design. Computational methods find new uses for drugs and are important and necessary steps toward reducing the burden of disease. Two types of computational methods i) drug/target based (based on chemical or pharmaceutical perspective), ii) disease based (based on clinical perspective of a disease or its pathology and symptoatology) are used. In drug/target based methods, chemical similarity, molecular activity similarity and molecular docking are considered. In disease-based methods, side-effect similarity, shared molecular pathology and associative indicative transfer is considered [31].

In silico methods have been applied to drug repositioning projects. These include data mining, bioinformatics, and usage of novel screening platforms have been used for identification and screening of Potential repositioning candidates. Researchers reported computational methods to represent and align binding sites (Fig. 6). Ais a targeted by C to treat disease 1 and B is a therapeutic target for disease 2. Due to similarity of A to B, C could be re-positioned for disease [2].

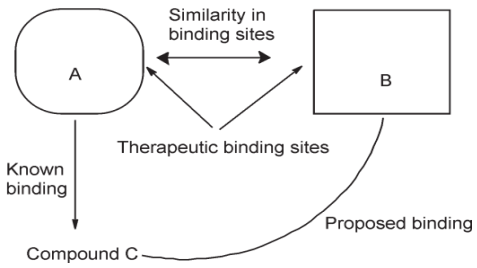

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Fig. 6. Exploiting binding sites similarities between A and B for binding of compound C.

An approach that analyzes protein structures and their binding sites to predict new proteins and off-target interactions for known compounds was reported [32]. In this context, a computational method based on full 3D comparisons of 3D structures was proposed. Using this approach, scientists described how MED-SuMo reproduces the repurposing of tadalafil from PDE5A to PDE4A and a structure of PDE4A with tadalafil. Searching for local protein similarities generated more hits than for whole binding site similarities and therefore fragment repurposing occurred more than for drug-sized compounds. This was illustrated by mining the PDB for proteins sharing similarities with the hinge region of protein kinases. The experimentally validated examples, biotin carboxylase and synapsin, were retrieved. Further to fragment repurposing, this approach was applied to the detection of druggable sites from 3D structures and was illustrated with detection of the protein kinase hinge motif in the HIV-RT non-nucleosidic allosteric site [32].

Unimodal approaches are likely to be limited by their respective shortcomings, e.g. inverse docking by scoring limitations [33]. Multimodal approaches may offer better solutions by offsetting the weakness of individual methods. In this direction, integrative analysis of chemical-genomic features and molecular networks of drug-targeted interactions, combined with structure-based high-throughput docking could be successfully applied to drug repurposing for potent inhibitor discovery. This approach was applied to identification of existing drugs as ACK1 inhibitors for prostate cancer treatment, and multiple potent inhibitors have been discovered. Repositioned marketed drugs can receive approval from the FDA in the United States through a type of NDA (new drug application) known as the 505[b][2] application. This can use the FDA's existing data to reduce the number of trials required and does not require a "right of reference" from the original applicant (repositioned pipeline drugs will use the standard 505[b][1] route). The EMEAArticle 10 of Directive 2001/83/EC are a similar approach in Europe. Researchers developed an in silico approach based on topic modelling to calculate a probabilistic topic distribution of adverse event terms appearing in the sections related to safety issues for each drug . Drugs considered to be similar by topic modeling may often be effective for the same disease and this modeling framework suggests drugs that can be repurposed, and also provides insight into the safety of repositioned drugs [34].

By combining PharmDB, an integrated tripartite database (which integrates data associated with disease indications, drug development, and associated proteins, and known interactions extracted from various established databases), with Shared Neighborhood Scoring (SNS) algorithm, researchers developed a knowledge platform to rationally identify new indications for known FDA approved drugs, which can be customized to specific projects using manual curation. PharmDB reported data is open access and can be easily explored with phExplorer and accessed via BioMart web service [35] [36]. Approaches used to identify drug repurposing opportunities with a focus on hematologic malignancies and regulatory issues were reported [37]. Drug repositioning to identify new drug candidates for Alzheimer's disease was reported [38]. The basic principles and recent advances in structure-based virtual screening have been reported. The powerful synergy of in silico techniques in drug repositioning has been demonstrated [39].

Table 1: Repositioned drugs.

Drug	original indication	New indication
Sildenafil	Angina	Erectile dysfunction, pulmonary hypertension
Thalidomide	Morning sickness	Leprosy, multiple myeloma and erthema nodosum leprosum
Raloxifene hydrochloride	Osteoporosis in postmenopausal women	Breast cancer in postmenopausal women
Amphotericin B	Fungal infections	Leishmaniasis
Lipitor	Statin class of cholesterol reducing drugs	Strokes
Aspirin	Inflammation, pain	Antiplatelet agent helping to prevent blood clotting, hint at a role for aspirin in the prevention of certain cancers
Amantadine	Influenza	Parkinson's disease
Zyban	Antidepressant	Smoking cessation
Celecoxib	Anti-inflammatory	STAT3 inhibitors for osteosarcoma therapy
Etanercept	Rheumatoid arthritis	Anti-TNF treatment for neurological disorders.
Bromocriptine	Parkinson's disease	Diabetes mellitus
Buprenorphine	Anti-analgesic	Treatment of drug addiction (for detoxification and long term replacement therapy)

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Buproprion	Depression	Smoking cessation
Finasteride	Benign prostate hyperplasia	Male pattern baldness(Hair loss)
Gemcitabine	Viral infections	Cancer
Methotrexate	Cancer	Psoriasis, rheumatoid arthritis
Amitriptyline	Antidepressant	Effective in the relief of neuropathic pain
Minoxidil	Hypertension	Hair loss
Tamoxifen	Treats metastatic breast cancers.	Bipolar disorder
Pentostatin	Leukemia	Hairy Cell Leukemia.
Lomitapide	Lower cholesterol and triglycerides,	To treat a rare genetic disorder that causes severe cholesterol problems called homozygous familial hypercholesterolemia.
Rapamycin	Prevent organ transplant rejection.	Autoimmune Lympho-proliferative Syndrome and lymphangioleiomyomatosis, a rare lung disease.
Colesevelam	Low-density lipoprotein cholesterol lowering agent	Improve glycemic control in adults with type 2 diabetes mellitus
Rogaine	High blood pressure	Hair loss
carmustine	Oncology	Anti- amyloid beta drug (AD)
Memantine	Anti-influenza	Parkinson disease
Donepezil	Alzheimer's	Other neurological disorders
Depoxetine	Analgesia	Premature ejaculation (PE) in men
Cymbalta	Antidepressant	Fibromyalgia, a long-term condition which causes pain all over the body
Gemzar	antiviral	Cancer
Bexarotene	Used to treat patients with T cell lymphoma	Pathological and behavioral improvements in transgenic mouse models of AD, Bexarotene's effect in human AD patients is unknown

Ibuprofen	Anti-inflammatory	Parkinson's disease
Nelfinavir	AIDS	Cancer
Gabapentin	An epilepsy drug	Anxiety disorders and neuropathic pain
Pregabalin	An epilepsy drug	Anxiety disorders and neuropathic pain
Ritonavir	AIDS	Tuberculosis(TB)

Orlistat	Obesity	Alzheimer's disease
Ropinirole	Parkinson,'s	Angina
Targretin	Anti-cancer	Work synergistically with 5-Fluorouracil in treating colorectal cancer.
Carvedilol	Treat heart failure and hypertension	At specific regime dosages, RDC5 also functions to delay ageing related phenotypes in cultured mammalian tissues.
levo-Leucovorin	The rescuing of patients from high-dose methotrexate treatment.	Tuberculosis
RDC5	Anti-ageing factor	Muckle –Wells syndrome
Iproniazid	Antidepressant	Pertuzumab and trastuzumab have a synergistic effect.
Canakinumab	RA in a Phase II trial	Fibromyalgia
Pertuzumab	HER2-positive metastatic breast cancer	Major depression and anxiety disorders
Milnacipran	Antidepressant	Restless leg syndrome
Paroxetine hydrochloride	An immediate-release formulation	Immuno-stimulant used to multiply hematopoietic stem cells in cancer patients
Pamipexole	Parkinson's disease	Multiple myeloma
Plerixafor	HIV	Chronic musculoskeletal pain.

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Plerixafor	HIV infection	Prevention of chronic migraine.
Duloxeti	Major depressive disorder, neuropathic pain	Glioblastoma
Onabotulinumtocin	Cervical dystonia, severe primary axillary hyperhidrosis and upper limb spasticity	Premenstrual dysphoria
Fulvestrant	Cancer	Antiarthritic
Fluoxetine	Depression	Eyelash growth
Hydroxychloroquine	Antiparasitic	Antipruritic
Bimatoprost	Glucoma	Certain types of tremor associated with multiple sclerosis
Doxepin	Antidepressant	may provide a new option for treating advanced Pulmonary Arterial Hypertension.
Isoniazid	Tuberculosis	Pleural effusion
Imatinib	Certain types of leukaemia and soft tissue sarcoma	Renal transport
Bleomycin	Various cancers	Tuberculosis
Azathioprine	Immunosuppressant Rheumatoid arthritis	Attention deficit hyperactivity disorder
Cycloserine	Urinary tract infection	Migraine prophylaxis
Atomoxetine	Antidepressant	Acute promylelocitic leukemia
Propranolol	Hypertension	Various cancers
Retinoic acid	Acne	Various cancers
Rituximab	Rheumatoid arthritis	Mediterranean fever, recurrent paricarditis
Interferon alfa	Hepatitis B and C	Sleeping sickness
Colchicine	Gout	HIV/AIDS
Eflornithine	Unwanted facial hair	Metastatic breast cancer
Zidovudine	Cancer	Sedative and antinausea effects when given at higher dosages, anti-emetic, chlorpromazine's role in inhibition of an important mitotic kinesin (Combination, CRx-026, inhibits the growth of tumor cell lines *in vivo* more effectively than either pentamidine or chlorpromazine alone)
Avastin	Metastatic colon cancer and nonsmall cell lung cancer	
Chlorpromazine	Antipsychotic action, Treat schizophrenia.	
	Cancer	
	Restless Leg Syndrome and SSRI-induced sexual disfunction	
Xalkori	Adult lung cancer	Two rare childhood cancers, childhood form of lymphoma, neuroblastoma
Clofazimine	Leprosy	Drug-resistant tuberculosis
Mirapex	Parkinson's disease	Restless Leg Syndrome
Duloxetine	Antidepressant	Fibromyalgia
Azidothymidine	Cancer	HIV
Galantamine	Glaucoma	Alzheimer's disease
Cicletanine	Antihypertensive	Pulmonary Hypertension
Benzbromarone	Gout	MRSA Infections
Clioquinol	Antiprotozoal	Neuroprotection
Astemizole	Anti-histamine	Malaria
Nilotinib	Leukemia	Alzheimer's disease, Parkinson's disease

III DRUG REPOSITIONING FOR RARE/ORPHAN AND NEGLECTED DISEASES

An orphan drug is a pharmaceutical agent that has been developed specifically to treat a rare medical condition, the condition itself being referred to as an orphan disease. There is enormous need and opportunity to discover therapeutics for rare or orphan diseases. However, pharmaceutical companies are not likely to engage in drug repositioning efforts for rare childhood diseases. Drug repositioning has the potential to identify medications for rare and neglected diseases. Combining current in silico technologies with chemical information, biological activities data, and in vitro screening data could improve and enhance repositioning efforts specifically

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for rare and neglected diseases. Researchers introduced and recommended the Collaborative Drug Discovery database which is particularly useful for neglected diseases [40]. In addition, Blatt et al. [41] found that approximately 10% of drugs with primary uses in pediatrics have been repositioned in pediatric hematological oncology or other pediatrics uses. Breast cancer drug Fulvestrant was found as a potential treatment against glioblastoma. Researchers described a novel computational workflow for designing therapy using Ariadne Genomics Pathway Studio software. They used publically available microarray experiments for glioblastoma and automatically constructed ResNet and ChemEffect databases.

Computational techniques for systematic analysis of transcriptomics (Connectivity Map, CMap), side effects, and genetics (genome-wide association study, GWAS) data to generate new hypotheses for additional indications were explored. In addition, data domains such as electronic health records and phenotypic screening are promising for novel computational repositioning methods [42]. Personalized drug repositioning could be particularly rewarding for diseases that are rare or have specific mutations. An increasing number of drugs were approved for rare cancer subtypes, thus it is expected that personalized medicine and repositioning approaches are poised to significantly modify the diagnosis of diseases, deduce treatments and develop new drugs [43].

Drug repositioning through pharmacological spaces integration based on networks projections approach can be successfully applied to discover potential drug candidates for novel therapeutic indications [44]. Widely accepted in medical practice, off-label prescribing is not regulated by the FDA. In some cases, doctors in clinical practice prescribe medications off-label—that is, for uses other than those approved by the FDA. Examples include albuterol which is approved for treating asthma but is sometimes prescribed for patients with chronic obstructive pulmonary disease. The anticonvulsant gabapentin is often prescribed for pain. The biological processes associated with diseases along with their known drugs and drug targets predicted Biological Process-Drug relationships. Network analysis was used to further refine these associations to eventually predict new Disease-Drug relationships [45].

Bioinformatics-based approaches offer systematic insights into the complex relationships among drugs, targets and diseases which are necessary for successful repositioning. The key bioinformatics steps essential for discovering valuable repositioning methods include: repurposing with a purpose, repurposing with a strategy and repurposing with confidence which can be used alongside currently available resources to improve *in silico* drug repositioning [46].

A two-step method for drug repositioning based on the protein -protein interaction network of genes shared by two diseases and the similarity of drugs prescribed for one of the two was proposed. At the first step, scientists applied the proposed two-step method to four different types of diseases: hypertension, diabetes mellitus, Crohn disease, and autism. Some repositioning candidates were found both at the first and second steps. However, experimental investigations are required to verify whether the candidates can actually be repositioned. Scientists are planning to fully automatize the repositioning processes [47].

IV SYSTEMS PHARMACOLOGY AND DRUG REPOSITIONING

PROMISCUOUS is a database for network based drugs repositioning and provides a public resource to predict off-target effects by integrating relationship between drugs, targets, and side effects [48]. Researchers reported strengths and weaknesses of academic-based drug repositioning research. Translational, target and disease foci were found strategic advantages fostered by close proximity and frequent interactions between basic and clinical scientists, which often result in discovering new modes of action for approved drugs. The development of a more streamlined regulatory process worldwide, and the development of precompetitive knowledge transfer systems such as a global healthcare database focused on regulatory and scientific information for drugs worldwide, is among the ideas proposed to improve the process of academic drug discovery and repositioning [49]. Personalized medicine and drug repositioning both aim to improve the productivity of current drug discovery pipelines and can alter the way we diagnose diseases, infer treatments and develop new drugs [50].

V GENOME-BASED DRUG REPOSITIONING APPROACHES

Every biological state can be described by a given gene expression signature [51]. Genome-based drug repositioning approaches include: disease signature, drug response signature. It is considered that drugs "reverting" a phenotype signature "revert the phanotype". Drugs eliciting similar transcriptional responses could share therapeutic effect [52]. Alibrary of 2,687 existing drugs was created and screened for inhibitors of the human malaria parasite *Plasmodium falciparum*. The antihistamine astemizole and its principal human metabolite were found promising new inhibitors of chloroquine-sensitive and multidrug-resistant parasites, and they showed efficacy in two mouse models of malaria [53]. Network-based methods have been successfully applied to prioritize novel disease-associated genes. Common to all methods is the understanding that novel disease-associated candidates are in close overall proximity to known disease genes. However, the relevance of these methods to the prediction of novel drug targets has not yet been assessed.

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VI DRUG REPOSITIONING IN THE TREATMENT OF MALARIA AND TUBERCULOSIS (TB)

Some examples of repurposing of drugs in the treatment of TB, newer candidates for repurposing for which there is already preliminary evidence of activity and possible new options need further study. Researchers reported how drug repositioning has been used in the past to discover antimalarial and anti-TB drugs, and summarized strategies that can lead to the discovery and development of new drugs. For example, sulfa-based drugs for malaria, and fluoroquinoline for TB were initially developed for the treatment of non-malaria or TB diseases [54]. Current anti-tuberculosis therapeutics is not sufficiently effective against drug-resistant tuberculosis. Clofazimine could be considered as an additional therapeutic option in the treatment of drug-resistant tuberculosis. However, the optimal dose of clofazimine and duration of use require further investigation. In the field of TB, there have been several examples in recent years of drug repositioning approach leading to the use of drugs for which there is undeniable evidence of efficacy in the treatment of the disease, the best example being the fluoroquinolones, which were not developed originally to treat TB [55].

VII DRUG REPOSITIONING FOR TREATMENT OF ALZHEIMER'S DISEASE

Due to the recent failures of various novel disease-modifying therapies in clinical trials for Alzheimer's disease, a complementary strategy based on repositioning drugs that are approved for other indications could be attractive. Indeed, a substantial body of preclinical work indicated that several classes of such drugs have potentially beneficial effects on Alzheimer's-like brain pathology, and for some drugs the evidence is also supported by epidemiological data or preliminary clinical trials. Researchers highlight several compounds for which sufficient evidence is available to encourage further investigation to clarify an optimal dose and consider progression to clinical trials in patients with Alzheimer's disease [56]. The clinical relevance of an attractive candidate compound carmustinee reported in a recent paper [57] as well as perspectives regarding the possible repositioning of oncology drugs for the treatment of AD were reported [58]. Researchers from Georgetown University successfully used small doses of the drug nilotinib, used to treat chronic myelogenous leukemia in order to eliminate abnormal protein build-up in the brains of mice [59].

VIII REGULATORY ISSUES RELATED TO DRUG REPURPOSING

In the United States, there are three common paths available to obtain approval for drug products: 505(b)(1), 505(j), and 505(b)(2). The 505(b)(2) pathway focuses on a new formulation or new use of an already approved drug product. In this pathway, the previous findings of safety and efficacy of known drugs can be leveraged so that only studies necessary to support the safety and/or efficacy of the new indication need to be conducted. In other regions, including Canada, Australia, and Europe, regulatory paths similar to the 505(b)(2) mechanism exist. Like the United States, the regulatory agencies will accept data from the published literature and drug product monographs to support trials of drug repositioning. Three dedicated extensions to the risk-adjusted net present value calculation for drug discovery projects were reported. The process of setting parameters for the models and their overall utility has been discussed [60] Researchers reported systems biology-based methods for repositioning known pharmaceutical compounds to new indications (anti-breasttumor initiating cell, orphan diseases), through the identification of network-based signatures. Methods for identifying anti-breast tumor initiating cell-based therapeutics were reported [61].

The drug-target bipartite network-based inference method could be a useful tool for fishing novel drug-target interactions in molecular poly-pharmacological space [62]. In selecting a drug for successful repositioning, careful consideration must be given to sources of potential competition in view of patent and regulatory exclusivity available to protect the repositioned drug product in the marketplace. The strongest and longest lived exclusivity should attach to resurrected APIs that have never been on the market, or have been recalled from the market (so no generic substitutes are available), and are being applied to new indications.

Drug repositioning is a major approach to identify novel treatments for Duchenne muscular dystrophy. DART Therapeutis Inc. and Biovista have entered into a research collaboration to identify and develop novel drug repositioning candidates for using Biovista's Clinical Outcome Search Space (COSS) ™ technology. Identification of novel repositioning candidates will be carried out by Biovista and DART Therapeutics will have the option to select a certain number for further development.

Recently, signatures have been used as proxies of clinicopathological phenotypes. Drug–drug/drug–disease 'connections'have been inferred by signature matching. Researchers described related methods, case studies and resources while discussing challenges and benefits of exploiting existing repositories of microarray data that could serve as a search space for systematic drug repositioning [63].

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IX DRUG REPOSITIONING AND INTELLECTUAL PROPERTY CHALLENGES

Successful repositioning of a drug product depends on integration of both intellectual property and regulatory exclusivities. Patent strategies directed to protecting new formulations, indications and methods of use, when combined with strategically repositioned products, can provide effective and long lasting product exclusivity even where the underlying API, and the original formulations, indications and methods of use are off-patent. Strategies that include IPand legal input can transform an apparently nonviable drug repurposing project into a success [64-65].

X CONCLUSION AND PERSPECTIVE

Although medical science and technology is advancing by leaps and bounds, there remain many illnesses with no effective cure. Market pressures have driven pharmaceutical companies to reassess their current drug development model. The most fruitful basis for the discovery of a new drug is to start with an old drug. There are likely many undiscovered uses of known (safe and approved) drugs to new therapeutic indications. In this context, drug repositioning is promising and valuable as developing a drug de novo is a lengthy and costly venture. This approach has opened up a new source of revenue to large, medium and small Pharma companies as well as attracting venture capital funding. Many drug targets were found involved in multiple biological pathways, and, as such, can be repurposed against that same target acting in a different disease or biological process. The safety advantage, the money savings advantage, the market potential advantage, return on investment potential, the out-licensing potential and motivations are among significant advantage of drug repositioning over traditional drug development. One limitation is the dependence on public domain data that can have an impact on drug repositioning as there is a risk that their discovery may be found simultaneously by others, and thus repositioned drug should have at least some patent protection. In addition, it may be difficult for drug repositioning companies to get funding and many may be more familiar with traditional drug development.

Anew drug Xalkori, originally targeted as a treatment for adult lung cancer, showed great promise against two rare childhood cancers. This drug eradicated the cancer in seven of eight children with a childhood form of lymphoma and in two other children with a lethal form of anervous-systemcancer called neuroblastoma. Sodium nitrite (antidote to cyanide poisoning) is under testing as a treatment for the chronic leg ulcers associated with sickle cell and other blood disorders. Physicians Group Calls on the FDA to repurpose existing drug Enbrel (already approved for the treatment of rheumatoid arthritis and psoriasis) for thetreatment of TBI, stroke and Alzheimer's disease. Public available gene expression massive data potential has not been fully exploited. Genome-wide signature-matching methods have been used to identify drug repositioning opportunities. Academia, industry, and non-profit charitable organizations should work together to enhance drug repurposing. In addition to providing new treatments, repurposing can assist in dissecting complex disorders, discovering molecular targets, and unraveling disease processes. Drug repositioning may be fruitful for economic and public health for Pharmacy companies, regulatory agencies, patients and taxpayers. The scope of repurposing should be extended to the repurposing of excipients as therapeutic agents as NIH reports on repurposing cyclodextrin as a potential therapy for Niemann-Pick type C1 are there. Thus, drug repurposing holds much appeal and has the potential to accelerate the drug discovery.

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Methods Of Improving Higher Education Through Innovative Learning Models And Maintaining High Quality Standards

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Abstract- *Education neither begins nor stops at the University. Higher education is concerned with the refinement of the mind, with living gracefully with partial knowledge. Today we are living in a knowledge world where intellectual capital plays a very important role. Educational Institutions being the home of intellectual capital can play a vital role in knowledge sharing and disseminating. The role of higher education in stimulating national economic growth and the value of international students to national economies exacerbates the need to ensure quality within Higher Education. These forces demand that quality assurance processes are both rigorous and transparent, and that quality enhancement initiatives are firmly embedded in any quality management programmer. Quality has begun to replace effectiveness as institutional level variable in higher education. Quality is the key for success and deploying quality in engineering education leads to better outcome for the institutions. One of the major tools that can be used in the graduate level to achieve the expectations of the recruiters is "QFD (Quality Function Deployment)". Developing and scaling innovative learning models helps address education priorities by employing novel approaches to meeting student learning needs but in the same time one has to maintain the quality standards of education. Important strategies are necessary to achieve our nation's education goals that include online and blended learning; high - access, technology - rich learning environments; and personalized learning models, e-learning, virtual learning, self-motivated project works, digital and open content. This research aims to provide the institutions of higher education a new dimensional teaching standard based on comprehensive quality standards that have been developed for each member of teaching in higher education institutions.*

I INTRODUCTION

Education has been the main instrument of human development and its importance has been emphasized through fundamental rights, principles, statutes / acts in a number of countries. At the international level, attempts have been made at various congregations to focus on aspects of education as a part of fundamental human right.India has witnessed tremendous development in educating and training its vast human resource of over one billion through sustained effort of conventional and distance mode of education. In pursuit of making Right to Education a reality, the Government has been initiating efforts for developing the educational infrastructure and training human capital. Consequently, the Country is with a literacy rate of 64.84%, at higher education level.

Recently Indian education focuses on efforts of improving the career opportunities of graduates and college readiness, initiatives, science technology, engineering and mathematics (STEM) project-based collaborative learning, digital and open content, and dropout prevention programs.

Despite these challenges, the predominant model of engineering education remains similar to that practiced in the 1950's - "chalk and talk", with large classes and single-discipline, lecture-based delivery the norm, particularly inthe early years of study. It is about

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teaching a student how to open a tap not about filling a bucket! The primary purpose is not to train the student to be fit for employment in any specific industry. The university emphasizes unity in knowledge while the industry thrives on differences. So while being sensitive to the needs of the industry the university concentrates on wholeness of knowledge and even while pursuing narrow specializations in research, driving force continues to be intellectual curiosity than market goals.

Developments in student-centred learning such as problem-based and project-based learning have so far had relatively little impact on mainstream engineering education. This paper begins by examining the critical issues for engineering education and their impact on accreditation requirements.

Present critical issues on engineering education

Recent studies have informed reviews of engineering education conducted in several countries have had a major influence on the revision of national accreditation criteria for engineering programs. The new accreditation approach shifts emphasis away from "what is being taught" to "what is being learned". Engineering programs are now required to demonstrate that their graduates are achieving a set of specified learning outcomes, and the means of demonstrating this is left to each university to decide and implement. There are also some requirements in each country for increased management education, design education and industry relevance of programs. If the industry studies, accreditation criteria and reviews of engineering education are examined it is clear that the profession, the industry employers and the students themselves are calling for significant changes to the current philosophy and delivery of engineering education. What are the critical issues that need to be addressed? These can be summarised as follows:

- Engineering curricula are too focussed on engineering science and technical courses without providing sufficient integration of these topics or relating them to industrial practice. Programs are content driven.
- Current programs do not provide sufficient design experiences to students.
- Graduates still lack communication skills and teamwork experience and programs need to incorporate more opportunities for students to develop these.
- Programs need to develop more awareness amongst students of the social, environmental, economic and legal issues that are part of the reality of modern engineering practice.
- Existing faculty lack practical experience, hence are not able to adequately relate theory to practice or provide design experiences. Present promotion systems reward research activities and not practical experience or teaching expertise.
- The existing teaching and learning strategies or culture in engineering programs is out dated and needs to become more student-centred.

Methods to improve the higher education standards

- Practical based learning (pbl) technique
- Learning through case-studies
- Project-based learning in engineering
- Virtual and simulated learning modules.

Practical Based Learning (PBL) Technique

PBL is a teaching strategy that leads students to learn to learn and encourages students to develop critical thinking and problem solving skills that they can carry for life. [7] PBL is the search for solutions to life's messy problems. Problem-based learning (PBL) is an emerging teaching approach which has taken its prominence in higher education in recent years [8]. [9] PBL crosses a broad spectrum of instructional patterns, from total teacher control to more emphasis on self-directed student inquiry. It is a shift from the traditional didactic teaching where the core knowledge discovery process lies almost entirely in the hands of the learner rather than the faculty. Practical Based Learning is perceived to be a student centered approach to learning. Teaching is considered as an input directing the learning process. The problem is open ended and the focus is on the application and assimilation of previously acquired knowledge. In a project the production of an end product is the focus of the students.

TABLE 1 shows learning strategies differences between lectures and PBL

Strategies used more in lectures than PBL	**Strategies used more in PBL than lectures**
Using material from class sessions and objectives	Using library resources
Using recommended texts, basic science texts	Using general reference texts
Reading assigned material is useful	Preparing for class sessions
Taking notes in class sessions	Participating in class

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Regular review of class notes and Writing review notes in own words	When working in groups each person looks up one topic and then explains to others.

Principle Involved in PBL

- Principles of practical based learning in common are as follows:
- Student's work together in groups and collaborate on project activities.
- A real world problem that affects the life of the student's is presented for investigation.
- Student's discuss findings and consult the faculty for guidance, input, and feedback.
- The maturity level of student's skills determines the degree of guidance provided by the concerned faculties.
- Final products resulting from project-based learning can be shared with the community-at-large, thus fostering ownership and responsible citizenship in addressing real world problems.
-

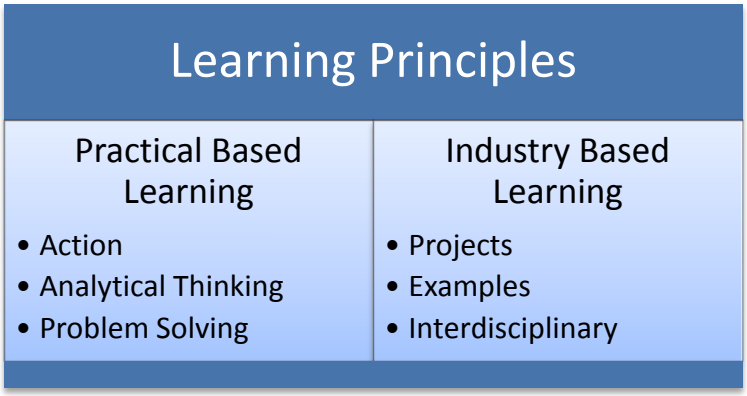

Figure 1: Differentiation of Practical Based Learning and Industry Based Learning

Project based Learning and Case-Studies

Learning is an active process of analysis and development based on the learner's interest, curiosity and experience and should result in expanded insights, knowledge and skills [13]. The approaches include new learning procedures which are learning approach, content approach and social approach. The learning approach as problem and project-based learning means that learning is organized around problems, the content approach concerns especially interdisciplinary learning and the social approach is team based learning [14]. One institution approach to project based learning may possibly look very much similar to another institution with adequate variance in the teaching methods and learning outcomes, assignment project appears in the more traditional learning concept but the project or problem is centered on the notion of learning which gives the learner the opportunity to be involve in learning process. From this observation, university projects are mostly discipline projects, which are pigeonholed by subjects chosen beforehand, and industry projects are claiming problem project that determines the self-directed learning process. Establishing a new educational practice requires not only an understanding of new learning principles, but also understanding content-based curriculum issues, students' collaborative-learning process, and the development of new concepts of project based learning knowledge while establishing new organizational and institutional practices [15]. An engineering project activity is carried out either in conjunction with industry or simulates a real engineering work environment, thereby contributing to Work Integrated Learning (Self-directed project based learning in small groups). Many of the characteristics and benefits of project-based learning make it a relevant pedagogical strategy in engineering education where realistic problems can be posed. Design is the vehicle for learning and an inductive mode of teaching can be employed [16]. Project-based learning shifts away from teacher directed learning to a more student centered learning activities that focus on real world issues and practices. Learning through projects, students get opportunities to interact with their colleagues and make new colleagues through cooperative projects [17].

The following graph indicates the Current Level of participation of students in Engineering Projects.

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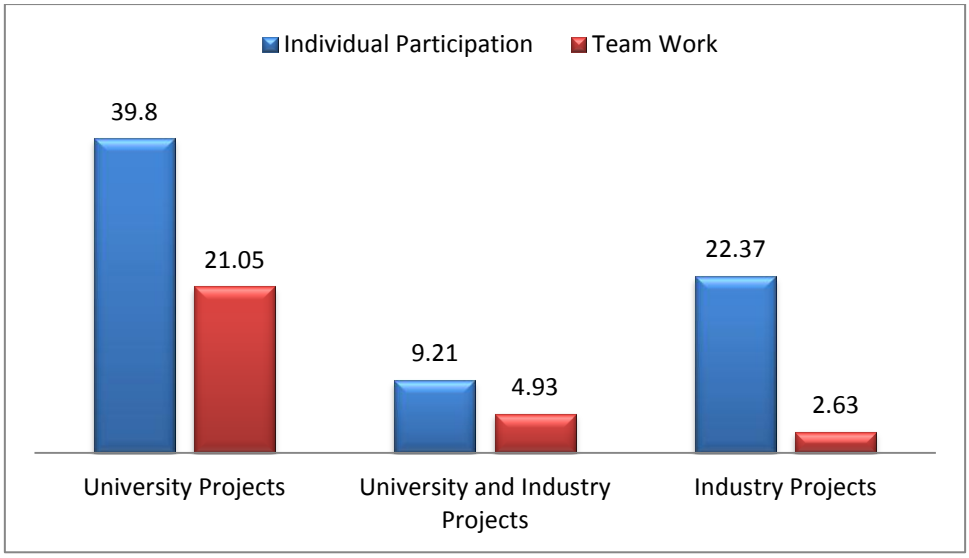

From the above graph mentioned represents that the individual participation is more when compared to team work. If practical based learning is employed in educational institutions, students not only get knowledge how to approach the problem but he also learns the essence of team work. This improves the quality of the fresh engineers and makes them readily employable.

Virtual and simulated learning modules

This virtual learning environment will enhance undergraduate engineering education by utilizing technology as a learning tool in lean, by fostering student development through active learning in the classroom, and through projects based on current real-world challenges, thus improving student learning, motivation, and retention. The paper highlights the learning modules to be developed in the virtual learning environment. The long-term goal is to evaluate the impact of the curriculum changes on student learning, outreach, and industrial collaboration.

The introduction of simulated learning exercises in a virtual environment would greatly increase the effectiveness of current curricula by providing greater access, standardization, and control than course projects, and greater depth and realism than manual simulations and also provide a wide challenge through increased emphasis on hands-on learning throughout its engineering curricula, taking first year students "out of a massive lecture hall" and immersing them in hands-on design processes through work in a new Ideas to Innovations Learning Laboratory, which includes a Design Studio, Innovation Studio, Rapid-Prototyping Studio, Fabrication and Artisan Laboratories, and Demonstration Studio. Given that children under 18 spend on average over an hour a day using computers, one of the hands-on instruction methods with the most potential to inspire and enhance the educational experience of the 'web generation', is the use of computer simulations and virtual environments

SBES - scientific and mathematical basis for the simulation of engineered systems

SBES is defined as the discipline that provides the scientific and mathematical basis for the simulation of engineered systems, and fuses the knowledge and techniques of traditional engineering fields—industrial, mechanical, civil, chemical, aerospace, nuclear, biomedical, and materials science—with the knowledge and techniques of fields such as computer science, mathematics, and the physical and social sciences.

The specific benefits of using computers for promoting active learning have been recognized for several decades. For instance, Squire documents the history of one type of virtual environment, video games, in the American culture and their introduction into education. Video games were first used for drills and practice games for factual recall, and have evolved into simulation and strategy games in order to model a system that is more consistent with the complexity of reality. Squire argues that video games enable learners to interact directly with a complex system, which helps the learner understand the system's dynamics. Evaluating the effectiveness of these virtual simulations has been the focus of other studies. For example, Freitas and Oliver evaluated the effectiveness of educational games and simulation with respect to their particular learning context and subject area. Their research presents a four-dimensional framework to evaluate the potential of using games- and simulation-based learning. The framework dimensions include context (classroom-based, outdoors, access to equipment, technical support), learner specific (learner profile, pathways, learning background, group profile), mode of representation (level of fidelity, interactivity, immersion), and pedagogic considerations (learning models used, approaches taken). The format of the framework helps educators evaluate potential games and simulations.

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Maintaining the quality of education through QFD

Quality function deployment (QFD) is a "method to transform user demands into design quality, to deploy the functions forming quality, and to deploy methods for achieving the design quality into subsystems and component parts, and ultimately to specific elements of the manufacturing process.

QFD is designed to help planners focus on characteristics of a new or existing product or service from the viewpoints of market segments, company, or technology-development needs. QFD involves receiving feedback from existing or new customers about their experience with the product and about the changes needed in it. Those are generally viewed as customer requirements.

Methods used in QFD to improve education standards

- Voice of requirement form the student
- House of quality
- Effect analysis
- Lean-Kaizen academics
- Six-sigma
- Trend analysis, etc

Voice of requirement form the student

House of Quality

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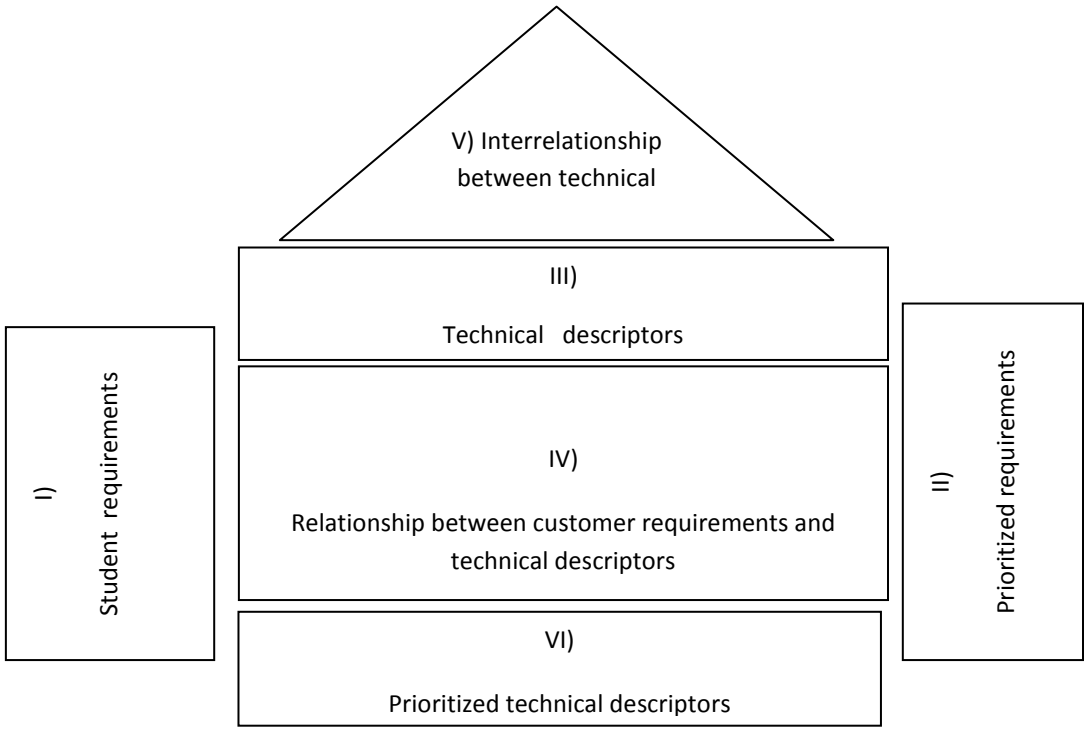

II CONCLUSION

The educational environment in many engineering colleges still remains predominantly instructive, regardless of the discipline, where as in a decentralized era, an age of which knowledge is available to anyone, anywhere, at any time professional life merges work and learning. It is a challenging task for academic staff to implement a project-based approach and integrate technology into projects in meaningful ways. It provides a framework for embedding experiential and rich learning activities, integrated with discipline-based curriculum that improves employment and career outcomes.

A good infrastructure alone will not ensure a quality education. It should also be accessible to each individual student in the institution. More the resources are accessible to a student, the more the knowledge he/she gains and more the outcome, which itself means that a quality education is being delivered to the student. In order to achieve this, Quality Function Deployment is a major tool that can be used effectively and efficiently.

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A Study about "The Various Factors Influencing Job Satisfaction of Mba Teachers in Colleges with Special Reference to Madurai District, India"

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Regional Office, Madurai

Abstract-*Teaching is regarded as one of the noble professions. Job satisfaction, despite being one of the most common areas researched, still continues to fascinate. It is therefore important that people who join the teaching profession should be dedicated, competent and satisfied in their work. Every profession has certain aspects responsible for job satisfaction; teaching too is not an exception unless and until a teacher derives satisfaction on job performance, he/she cannot initiate desirable outcomes to cater to the needs of the society. Only satisfied and well-adjusted teachers can think of the well-being of their pupils. The teachers are responsible for imparting education and guidance to students and also for undertaking research development in their respective fields for enriching the quality of teaching and research. Therefore the aim of this study is to analyze the job satisfaction level and the factors that influence them among the teachers inMBA Colleges.*

Keywords: Teaching, Job Satisfaction, Relationship Factors.

I INTRODUCTION

The most used research definition of job satisfaction is by Locke who defined it as "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences." Job satisfaction simply put is how content an individual is with his or her job, in other words, whether or not they like the job or individual aspects or facets of jobs, such as nature of work or supervision. Others believe it is not so simplistic as this definition suggests and instead that multidimensional psychological responses to one's job are involved. Researchers have also noted that job satisfaction measures vary in the extent to which they measure feelings about the job (affective job satisfaction) or cognitions about the job (cognitive job satisfaction).

The quality of education depends upon the quality of the teachers. Thus, the role of the teachers is very important in making the nation. If the teachers are versatile, intellectually enlightened, morally strong, emotionally balanced, socially and culturally advanced then the nation will have enlightened and excellent citizens. Job satisfaction plays a very important role in our everyday life, both for employees and organizations. Organizations have significant effects on all employees and how they feel at work is reflected in their jobs as well. Based on many studies, when employees are satisfied with their jobs they will be more committed to their employer and will be more productive. Job satisfaction impacts employee productivity, well-being and consequently impacts job quality. Job satisfaction is a result of employees' perception of how well their job provides those things that are considered important from their side. There are three dimensions of job satisfaction such as emotional respond to the work situation, the fitness between yield and their expectation and the individual attitude that reflects a relationship among employees. Source: European Journal of Social Sciences – Volume 18, Number 1 (2010).

OBJECTIVES OF THE STUDY

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- To study about the Factors Influencing Job Satisfaction
- Relationship between Factors Influencing and Job Satisfaction
- To study about theoretical background
- To arrive at various Findings, Recommendations &Suggestions from the study.

LITERATURE REVIEW

Frederick Herzberg's two-factor theory (also known as motivator-hygiene theory) attempts to explain satisfaction and motivation in the workplace. This theory states that satisfaction and dissatisfaction are driven by different factors – motivation and hygiene factors, respectively. An employee's motivation to work is continually related to job satisfaction of a subordinate. Motivation can be seen as an inner force that drives individuals to attain personal and organizational goals (Hoskinson, Porter, & Wrench, p. 133).

Motivating factors are those aspects of the job that make people want to perform, and provide people with satisfaction, for example achievement in work, recognition, promotion opportunities. These motivating factors are considered to be intrinsic to the job, or the work carried out. Hygiene factors include aspects of the working environment such as pay, company policies, supervisory practices, and other working conditions.

While Herzberg's model has stimulated much research, researchers have been unable to reliably empirically prove the model, with Hackman & Oldham suggesting that Herzberg's original formulation of the model may have been a methodological artifact.

Furthermore, the theory does not consider individual differences, conversely predicting all employees will react in an identical manner to changes in motivating/hygiene factors. Finally, the model has been criticised in that it does not specify how motivating/hygiene factors are to be measured.

Research on teachers' job satisfaction suggests that educators are most satisfied from the teaching itself and their supervision and dissatisfied from their salary and promotional opportunities (Dinham and Scott, 2000).

II THEORETICAL BACKGROUND

An employee's overall satisfaction with his job is the result of a combination of factors -- and financial compensation is only one of them. Management's role in enhancing employees' job satisfaction is to make sure the work environment is positive, morale is high and employees have the resources they need to accomplish the tasks they have been assigned

Working Conditions

Because employees spend so much time in their work environment each week, it's important for companies to try to optimize working conditions. Such things as providing spacious work areas rather than cramped ones, adequate lighting and comfortable work stations contribute to favorable work conditions. Providing productivity tools such as upgraded information technology to help employees accomplish tasks more efficiently contributes to job satisfaction as well.

Opportunity for Advancement

Employees are more satisfied with their current job if they see a path available to move up the ranks in the company and be given more responsibility and along with it higher compensation. Many companies encourage employees to acquire more advanced skills that will lead to the chance of promotion. Companies often pay the cost of tuition for employees taking university courses, for example. During an employee's annual performance review, a supervisor should map out a path showing her what she needs to accomplish and what new skills she needs to develop in order to be on a track to advancement within the organization.

Workload and Stress Level

Dealing with a workload that is far too heavy and deadlines that are impossible to reach can cause job satisfaction to erode for even the most dedicated employee. Falling short of deadlines results in conflict between employees and supervisors and raises the stress level of the workplace. Many times, this environment is caused by ineffective management and poor planning. The office operates in a crisis mode because supervisors don't allow enough time for employees to perform their assigned tasks effectively or because staff levels are inadequate.

Respect from Co-Workers

Employees seek to be treated with respect by those they work with. A hostile work environment -- with rude or unpleasant coworkers -- is one that usually has lower job satisfaction. In an August 2011 survey published by FoxBusiness.com, 50 percent of those responding said they had personally experienced a great amount of workplace incivility. Fifty percent also believe morale is poor where they work. Managers need to step in and mediate conflicts before they escalate into more serious problems requiring disciplinary action. Employees may need to be reminded what behaviors are considered inappropriate when interacting with coworkers.

Relationship with Supervisors

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Effective managers know their employees need recognition and praise for their efforts and accomplishments. Employees also need to know their supervisor's door is always open for them to discuss any concerns they have that are affecting their ability to do their jobs effectively and impeding their satisfaction at the office.

Financial Rewards

Job satisfaction is impacted by an employee's views about the fairness of the company wage scale as well as the current compensation she may be receiving. Companies need to have a mechanism in place to evaluate employee performance and provide salary increases to top performers. Opportunities to earn special incentives, such as bonuses, extra paid time off or vacations, also bring excitement and higher job satisfaction to the workplace.

Common aspects of job satisfaction include (Agarwal and Umesh, 1978)

- Satisfaction with Pay.
- Satisfaction with Tasks.
- Satisfaction with Supervision.
- Satisfaction with Co-workers.
- Satisfaction with the Work Setting.
- Satisfaction with Advancement Opportunities.

HYPOTHESIS TO BE TESTED

- There is no relationship between **Career Growth**and **Job Satisfaction**
- There is no relationship between **Financial Growth**and **Job Satisfaction**
- There is no relationship between **Working Condition**and **Job Satisfaction**
- There is no relationship between **Demographic Factors**and **Job Satisfaction**
- There is no relationship between **Recognition**and **Job Satisfaction**

METHODOLOGY

- **Design:** Exploratory Research
- **Sampling:** Non-probability/ Convenience sampling
- **Sample Size :** 50
- **Data collection:**
  - Primary - Structured Questionnaire
  - Secondary - Books, Journals, Magazines, Published Research Papers, etc.
- **Target Respondents:** MBACollege Teachers in Madurai district
- **Tools:**
  - ***Chi-Square Test***

    Chi-square is a statistical test commonly used to compare observed data with data we would expect to obtain according to a specific hypothesis. For example, if, according to Mendel's laws, you expected 10 of 20 offspring from a cross to be male and the actual observed number was 8 males, then you might want to know about the "goodness to fit" between the observed and expected. Were the deviations (differences between observed and expected) the result of chance, or were they due to other factors. How much deviation can occur before you, the investigator, must conclude that something other than chance is at work, causing the observed to differ from the expected.

    The chi-square test is always testing what scientists call the **null hypothesis,** which states that there is no significant difference between the expected and observed result**.**

    Chi-square is the sum of the squared difference between observed (*o*) and the expected (*e*) data (or the deviation, *d*), divided by the expected data in all possible categories.
  - ***Karl Pearson Correlation Coefficient***

    The common usage of the word **correlation** refers to a relationship between two or more objects (ideas, variables…). In statistics, the word correlation refers to the relationship between two variables. We wish to be able to **quantify** this relationship, measure its strength, **develop an equation** for predicting scores, and ultimately **draw testable conclusion** about the parent population. This lesson focuses on measuring its strength, with the equation coming in the next lesson, and testing conclusions much later.

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\text{sqrt}[n(\sum x^2) - (\sum x)^2] \cdot \text{sqrt}[n(\sum y^2) - (\sum y)^2]}$$

FREQUENCY ANALYSIS USING SPSS

Frequency Variables: Age, Marital Status, Gender, Relationship between Employers

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Frequencies

Statistics

		Age	marital status	gender	smooth relationship
N	Valid	50	50	50	50
	Missing	1	1	1	1

Frequency Table

age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	below 25	38	74.5	76.0	76.0
	25-35	4	7.8	8.0	84.0
	35-45	5	9.8	10.0	94.0
	above 50	3	5.9	6.0	100.0
	Total	50	98.0	100.0	
Missing	System	1	2.0		
Total		51	100.0		

marital status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	married	40	78.4	80.0	80.0
	single	10	19.6	20.0	100.0
	Total	50	98.0	100.0	
Missing	System	1	2.0		
Total		51	100.0		

gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	39	76.5	78.0	78.0
	female	11	21.6	22.0	100.0
	Total	50	98.0	100.0	
Missing	System	1	2.0		
Total		51	100.0		

smooth relationship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	18	35.3	36.0	36.0
	no	32	62.7	64.0	100.0
	Total	50	98.0	100.0	
Missing	System	1	2.0		
Total		51	100.0		

experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	33	64.7	66.0	66.0
	5-10	10	19.6	20.0	86.0
	10-15	2	3.9	4.0	90.0
	above 15 yrs	5	9.8	10.0	100.0
	Total	50	98.0	100.0	

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Missing	System	1	2.0		
Total		51	100.0		

current pay

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	satisfied	5	9.8	10.0	10.0
	neutral	13	25.5	26.0	36.0
	dissatisfied	32	62.7	64.0	100.0
	Total	50	98.0	100.0	
Missing	System	1	2.0		
Total		51	100.0		

working condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	satisfied	37	72.5	74.0	74.0
	neutral	9	17.6	18.0	92.0
	dissatisfied	4	7.8	8.0	100.0
	Total	50	98.0	100.0	
Missing	System	1	2.0		
Total		51	100.0		

Recognitionforworkdone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	always	37	72.5	74.0	74.0
	sometimes	10	19.6	20.0	94.0
	no	3	5.9	6.0	100.0
	Total	50	98.0	100.0	
Missing	System	1	2.0		
Total		51	100.0		

CORRELATION ANALYSIS USING SPSS

Correlations

		working condition	Recognitionforworkdone	Currentpay
working condition	Pearson Correlation	1	-.247	.280*
	Sig. (2-tailed)		.084	.049
Recognitionforworkdone	Pearson Correlation	-.247	1	.121
	Sig. (2-tailed)	.084		.401
Currentpay	Pearson Correlation	.280*	.121	1
	Sig. (2-tailed)	.049	.401	

***. Correlation is significant at the 0.05 level (2-tailed).**

b. Listwise N=50

FINDINGS OF THE STUDY

General Findings

1. Majority of the Respondents are **Male**
2. Majority of the Respondents possess **PGdegree** as their Qualification
3. Majority of the Respondents are **Married**
4. Majority of the Respondents Possess an experience of **0-5 years**
5. Majority of the Respondents Possess a **previous work experience**
6. Majority of the Respondents are between the age group of **25 to 35**
7. Majority of the Respondents feel **Dissatisfied** about their current pay

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8. Majority of the Respondents express that they **do not have smooth relationship** with their heads
9. Majority of the Respondents feel **satisfied** about their working condition
10. Majority of the Respondents express that they are **being recognised** for their achievements like producing 100% results or publishing research articles by the management and their heads.

Statistical Findings

11. It is inferred from the Chi Square testing that there is a connection/relationship between job satisfaction and Demographic factors
12. The following findings were arrived at from the Correlation Testing
    - There is a **positive relationship** between opportunity for Career Growth and Job Satisfaction (Since the r value that is computed is of a Positive Value)
    - There is a **positive relationship** between Financial Rewards and Job Satisfaction(Since the r value that is computed is of a Positive Value)
    - There is a **positive relationship** between Working Condition and Job Satisfaction(Since the r value that is computed is of a Positive Value)
    - There is a **positive relationship** between Recognition and Job Satisfaction(Since the r value that is computed is of a Positive Value)

SUGGESTIONS OF THE STUDY

- Since Financial Rewards play a vital role in job satisfaction, it is suggested that theCurrent Pay system should be **revised**to achieve a desired level of Job satisfaction**.**
- It is found from the study that, in most of the institution there is **No Smooth Relationship** between the staff members and their heads / management. A smooth relationship should prevail in the premises at all levels to achieve a desired level of Job satisfaction.
- In most of the organisation though the Publication Work/ other Extracurricular Works of teachers are Recognised and Appreciated, they are **Not Financially Supported**. Management can sponsor for the faculty members to attend Seminars/ FDPs/ Conferences/ Publication of Journals etc. This would result not only in Job Satisfaction but also in Employee Retention which means an advantage for the employers (as this would indirectly result in Loyalty of employees etc.)

III CONCLUSION

Thus if the teachers are satisfied, their quality in teaching will considerably improve a lot and so will the job satisfaction. So, the top level authorities must not only focus on the students and their curriculum but also give equal importance, focus and attention to the teaching fraternity, so that they are satisfied in what they do. From the findings mentioned above we come to a conclusion that the key factors that contribute to the job satisfaction are promoting, pay, fairness, financial support and working conditions. At the end of the day all the people employed as teachers work for money. If they are given good pays, they will feel motivated and committed in their work. Healthy relations between staff members and their department heads/management motivate the teachers to do more, consequently increasing their performance levels. Instilling a positive attitude rests with fair treatment of teachers. The best outcome can only be achieved by treating the teachers with fairness which plays a pivotal role in ensuring job satisfaction. The management must also ensure that the employees/teachers are secure in their job and make them feel proud of the work that they do which is educating the future entrepreneurs and budding business magnates.

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Applications of Social Network using Quantum Computing

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Abstract- *Social network handle large volume of data day by day as there are thousands of new entrants in the social sites. To handle those data and computing efficiently and fast, we require a fast computing device rather than classical computing which is unable to do this kind of complex computing in the days to come. As quantum computing has the capable of complex computing with ease and efficient, the social network analysis seems to be appropriate application for such type of environment. The paper starts with brief discussion on basic issues related to quantum computing and then proposes a scenario for implementing social networking analysis through quantum computing environment.*

Keywords: bit, qubit, classical computing, quantum computing, social network

I INTRODUCTION

The creation of the first computer in 1941 by the Germany based engineer KonradZuse was clearly inspired from the early ideas of Charles Babbage, who is also known as the father of Computer. The huge bulky devices weighing about 30 ton equipped with some 18000 vacuum tubes and 500 miles of wiring can be considered as the ancestors of today's high speed computer and processing devices. With the due passage of time, technologies have advanced drastically leading to the emergence of more compact technologically superior computers thereby increasing the performance in performing an assigned task with ease. Talking about the task of earlier days to these days, it is almost same i.e. to manipulate and interpret an encoding of binary bits into a useful computational result.

A classical computer has a memory made up of bits, i.e. 1 or 0 which are used for all the computational purposes. In terms of physical representation, each can be physically realized through a macroscopic physical system, such as the magnetization on a hard disk or the charge on a capacitor.

If a document has n-characters to be stored on the hard disk of a typical computer can be described as a string of eight numbers of 0s and 1s. The classical computer obeys the laws of classical physics. Whereas the quantum computer obeys the laws of quantum-mechanical phenomea. The data operations take place with the help of its superposition and entanglement.

A quantum computer is a device that harnesses physical phenomenon unique to quantum mechanics (especially quantum interference) to realize a fundamentally new mode of information processing. Quantum computing is a quantum computational operations are executed on a very small number of qubits (quantum bits).

II QUANTUM COMPUTER

A classical computer obeys the well understood laws of classical physics, where as a quantum computer is a computation system that makes direct use of quantum-mechanical phenomena, such as superposition and entanglement, to perform operations on data. A

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quantum computer [2, 3, 8] is a device that harnesses physical phenomenon unique to quantum mechanics (especially quantum interference) to realize a fundamentally new mode of information processing. Quantum computers are different from digital computers based on transistors. Whereas digital computers require data to be encoded into binary digits (bits), each of which is always in one of two definite states either 0 or 1. Quantum computation uses qubits (quantum bits), which can be in superposition's of states. In a quantum computer, the fundamental unit of information is called a quantum bit or qubit, which is not binary but quaternary in nature. This qubit property arises as a direct consequence of its adherence to the laws of quantum mechanics which differ radically from the laws of classical physics. A qubit can exist not only in a state corresponding to the logical state 0 or 1 as in a classical bit, but also in states corresponding to a blend or superposition of these classical states. In other words, a qubit can exist as a 0, a 1, or simultaneously as both 0 and 1, with a numerical coefficient representing the probability for each state, which is shown in "Figure 1".

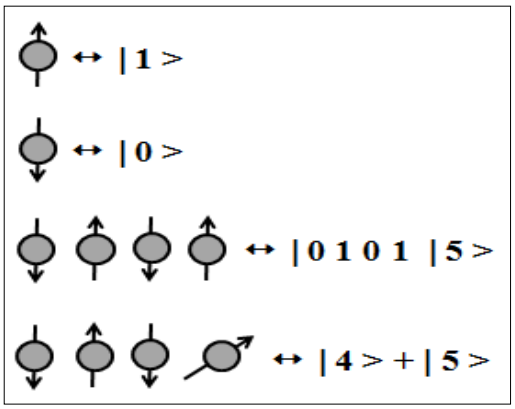

Figure 1.Qubits can be in a superposition all the classically allowed states [1]

This concept sounds exactly contrary to what our common sense would suggest as our real world is governed by the concepts of classical physics. But quantum computers are the one that are more concerned with the atomic level of the concepts.
"Figure 2" explains everything in a more elaborate manner. Here a light source emits a photon along a path towards a half-silvered mirror. This mirror splits the light, reflecting half vertically toward detector **A** and transmitting half toward detector **B**. A photon, however, is a single quantized packet of light and cannot be split, so it is detected with equal probability at either detector **A** or **B**.

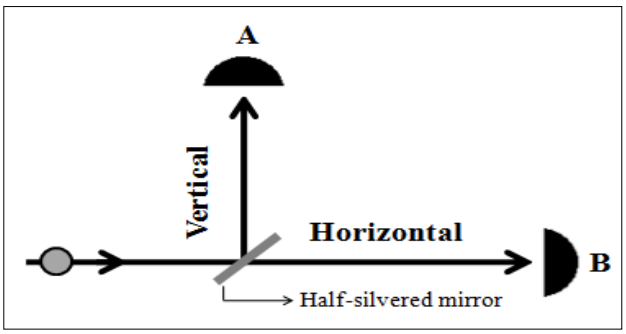

Figure 2. Photon movement in either of one direction [1]

The photon randomly leaves the mirror in either the vertical or horizontal direction. However, quantum mechanics predicts that the photon actually travels both paths simultaneously. This is more clearly demonstrated in "Figure 3".

In "Figure 2", where a photon is fired at a half-silvered mirror, it can be shown that the photon does not actually split by verifying that if one detector registers a signal, then no other detector does. With this piece of information, one might think that any given photon travels vertically or horizontally, randomly choosing between the two paths. However, quantum mechanics predicts that the photon actually travels both paths simultaneously, collapsing down to one path only upon measurement. This effect is known as single-particle interference, which is shown in "Figure 3".

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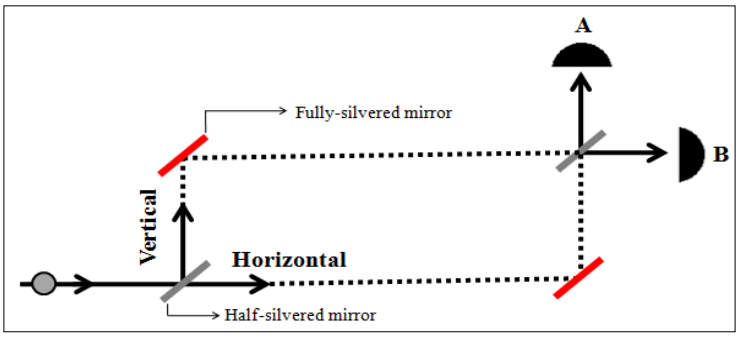

Figure 3. Photon movement in both of the directions [1]

In "Figure 3" the photon first encounters a half-silvered mirror, then a fully silvered mirror, and finally another half-silvered mirror before reaching a detector A or B, where each half-silvered mirror introduces the probability of the photon traveling down one path or the other. Once a photon strikes the mirror along either of the two paths after the first beam splitter, the arrangement is identical to that in "Figure 2", and so one might hypothesize that the photon will reach either detector A or detector B with equal probability. However, experiment shows that in reality this arrangement causes detector A to register 100% of the time, and never at detector B. And that is a big question to answer. If a single photon travels vertically and strikes the mirror, then, by comparison to the experiment in "Figure 2", there should be an equal probability that the photon will strike either detector A or detector B. The same thing happens for a photon traveling down the horizontal path. However, the actual result is drastically different.

The only conceivable conclusion is therefore that the photon somehow traveled both paths simultaneously; creating interference at the point of intersection that destroyed the possibility of the signal reaching detector B. This is known as quantum interference and results from the superposition of the possible photon states, or potential paths. When only a single photon is emitted, it appears as though an identical photon exists and travels the 'path not taken', only detectable by the interference it causes with the original photon when their paths come together again. If, for example, either of the paths are blocked with an absorbing screen, then detector B begins registering hits again just as in "Figure 2". This unique characteristic, among others, makes the current research in quantum computing not merely a continuation of today's idea of a computer, but rather an entirely new branch of thought. And it is because quantum computers harness these special characteristics that give them the potential to be incredibly powerful computational devices.

III QUANTUM COMPUTING: POTENTIAL AND POWER

A classical computer has a memory made up of bits, where each bit represents either a one (1) or a zero (0). A quantum computer [2, 3, 8] maintains a sequence of qubits. A single qubit can represent a one, a zero, or any quantum superposition of these two qubit states; moreover, a pair of qubits can be in any quantum superposition of 4 states, and three qubits in any superposition of 8. In general, a quantum computer with n qubits can be in an arbitrary superposition of up to 2n different states simultaneously; this compares to a normal computer that can only be in one of these 2n states at any one time. In other words, classical computers have their information encoded in a series of bits, and these bits are manipulated via Boolean logic gates arranged in succession to produce an end result. Similarly, a quantum computer manipulates qubits by executing a series of quantum gates, each a unitary transformation acting on a single qubit or pair of qubits. A quantum computer can perform a complicated unitary transformation to a set of qubits in some initial state by applying these gates in succession.
The qubitscan then be measured, with this measurement serving as the final computational result. We can conclude that a classical computer can simulatethe functioning of a quantum computer by taking into account the similarity that both possess in the end result calculation procedure.

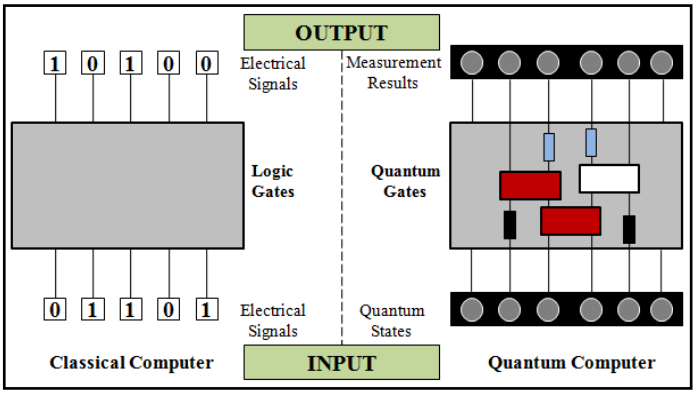

Figure 4. Gate comparison between Classical and Quantum Computer [1]

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Then the question that arises is that, if the traditional computer can do everything that a quantum computer can do, and then what lead to the evolution of the latter one. And the answer that follows is that although a classical computer can theoretically simulate a quantum computer, it is incredibly inefficient, so much so that a classical computer is effectively incapable of performing many tasks that a quantum computer could perform with ease. The simulation of a quantum computer on a classical one is a computationally hard problem because the correlations among quantum bits are qualitatively different from correlations among classical bits, as first explained by John Bell.

The first one to recognize the potential in quantum superposition for solving such problems much faster was Richard Feynman . For example, a system of 500 qubits, which is impossible to simulate classically, represents a quantum superposition of as many as 2500 states. Each state would be classically equivalent to a single list of 500 1's and 0's. Any quantum operation on that system for example a particular pulse of radio waves, whose action might be to execute a controlled NOT operation on the 100th and 101st qubits would simultaneously operate on all 2500 states. Thus in a time period of like 1 second , a quantum operation could compute not just on one machine state, as serial computers do, but on 2500 machine states at once.

Peter Shor, who was a researcher and computer scientist at AT&T's Bell Laboratories in New Jersey, provided such an application by devising the first quantum computer algorithm. Integer factorization is believed to be computationally infeasible with an ordinary computer for large integers if they are the product of few prime numbers (e.g., products of two 300-digit primes). By comparison, a quantum computer could efficiently solve this problem using Shor's algorithm to find its factors. This ability would allow a quantum computer to decrypt many of the cryptographic systems in use today, in the sense that there would be a polynomial time (in the number of digits of the integer) algorithm for solving the problem. In particular, most of the popular public key ciphers are based on the difficulty of factoring integers or the discrete logarithm problem, which can both be solved by Shor's algorithm. Shor's algorithm harnesses the power of quantum superposition to rapidly factor very large numbers (on the order ~10200 digits and greater) in a matter of seconds. The premier application of a quantum computer capable of implementing this algorithm lies in the field of encryption, where one common (and best) encryption code, known as RSA, relies heavily on the difficulty of factoring very large composite numbers into their primes. A computer which can do this easily is naturally of great interest to numerous government agencies that use RSA.
Encryption, however, is only one application of a quantum computer. In addition, Shor has put together a toolbox of mathematical operations that can only be performed on a quantum computer, many of which he used in his factorization algorithm. Furthermore, Feynman asserted that a quantum computer could function as a kind of simulator for quantum physics, potentially opening the doors to many discoveries in the field. Today the functionality of the quantum computers is just a theoretical concept, but with the full-fledged advent of it will lead to the inventions of more new and interesting applications in the near future.

IV HISTORY OF QUANTUM COMPUTING [9]

The idea of a computational device based on quantum mechanics was first explored in the 1970's and early 1980's by physicists and computer scientists such as Charles H. Bennett of the IBM Thomas J. Watson Research Center, Paul A. Benioff of Argonne National Laboratory in Illinois, David Deutsch of the University of Oxford, and the late Richard P. Feynman of the California Institute of Technology (Caltech). The idea emerged when scientists were pondering the fundamental limits of computation. They understood that if technology continued to abide by Moore's Law, then the continually shrinking size of circuitry packed onto silicon chips would eventually reach a point where individual elements would be no larger than a few atoms. Here a problem arose because at the atomic scale the physical laws that govern the behavior and properties of the circuit are inherently quantum mechanical in nature, not classical. Then raised the question of whether a new kind of computer could be devised based on the principles of quantum physics.

Feynman was among the first to attempt to provide an answer to this question by producing an abstract model in 1982 that showed how a quantum system could be used to do computations. He also explained how such a machine would be able to act as a simulator for quantum physics. In other words, a physicist would have the ability to carry out experiments in quantum physics inside a quantum mechanical computer.

Later, in 1985, Deutsch realized that Feynman's assertion could eventually lead to a general purpose quantum computer and published a crucial theoretical paper showing that any physical process, in principle, could be modeled perfectly by a quantum computer. Thus, a quantum computer would have capabilities far beyond those of any traditional classical computer. After Deutsch published this paper, the search began to find interesting applications for such a machine.

Unfortunately, all that could be found were a few rather contrived mathematical problems, until Shor circulated in 1994 a preprint of a paper in which he set out a method for using quantum computers to crack an important problem in number theory, namely factorization. He showed how an ensemble of mathematical operations, designed specifically for a quantum computer, could be organized to enable a such a machine to factor huge numbers extremely rapidly, much faster than is possible on conventional computers. With this breakthrough, quantum computing transformed from a mere academic curiosity directly into a national and world interest.

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V RESEARCH AND OBSTACLES [2, 3]

Significant advancements are made in the field of quantum information processing since its conception, including the building of two-qubit and three-qubit quantum computers capable of some simple arithmetic and data sorting. But there are still a certain number of factors that hinder in the advancement of this modern day world technology in competing with the then digital computers. Among these difficulties, error correction, decoherence, and hardware architecture are probably the most important. Errors are the ones that need to be corrected but what the kind of errors that is needed to primarily find out. So errors that need to be corrected out first are the ones that arise as a direct result of decoherence, or the tendency of a quantum computer to decay from a given quantum state into an incoherent state as it interacts, or entangles, with the state of the environment. These interactions between the environment and qubits are sort of impossible to avoid, and thus induce the breakdown of information stored in the quantum computer, and thus errors in computation. Before any quantum computer will be capable of solving hard problems, research must devise a way to maintain decoherence and other potential sources of error at an acceptable level. In the year 1995 the theoretical concept of error correction in quantum computation was first proposed and ever since then the practical developments in the same has been successfully carried out.

Small scale quantum computers have been built and the prospects of large quantum computers are in the verge of development. Probably the most important idea in this field is the application of error correction in phase coherence as a means to extract information and reduce error in a quantum system without actually measuring that system.

In 1998, researches at Los Alamos National Laboratory and MIT led by Raymond Laflamme managed to spread a single bit of quantum information (qubit) across three nuclear spins in each molecule of a liquid solution of alanine or trichloroethylene molecules. They accomplished this using the techniques of nuclear magnetic resonance (NMR). The experiment was significant because spreading out the information actually made it harder to corrupt. According to the theory of Quantum mechanics, the direct measure of the state of a qubit invariably destroys the superposition of states in which it exists, forcing it to become either a 0 or 1. The technique of spreading out the information allows researchers to utilize the property of entanglement to study the interactions between states as an indirect method for analyzing the quantum information. Rather than a direct measurement, the group compared the spins to see if any new differences arose between them without learning the information itself. This technique gave them the ability to detect and fix errors in a qubit'sphase coherence, and thus maintain a higher level of coherence in the quantum system. This milestone has provided argument against skeptics, and hope for believers. Currently, research in quantum error correction continues with groups at Caltech (Preskill, Kimble), Microsoft, Los Alamos, and elsewhere.

At this point, only a few of the benefits of quantum computation and quantum computers are readily obvious, but before more possibilities are uncovered theory must be put to the test. In order to do this, devices capable of quantum computation must be constructed. Quantum computing hardware is, however, still in its infancy. As a result of several significant experiments, nuclear magnetic resonance (NMR) has become themostpopular component in quantum hardware architecture. Only withinthe pastyear,a group from Los Alamos National Laboratoryand MITconstructed the first experimental demonstrations of a quantum computer using nuclear magnetic resonance (NMR) technology. Currently, research is underway to discover methods for battling the destructive effects of decoherence, to develop optimal hardware architecture for designing and building a quantum computer, and to further uncover quantum algorithms to utilize the immense computing power available in these devices. Naturally this pursuit is intimately related to quantum error correction codes and quantum algorithms, so a number of groups are doing simultaneous research in a number of these fields. To date, designs have involved ion traps, cavity quantum electrodynamics (QED), and NMR. Though these devices have had mild success in performing interesting experiments, the technologies each have serious limitations. Ion trap computers are limited in speed by the vibration frequency of the modes in the trap. NMR devices have an exponential attenuation of signal to noise as the number of qubits in a system increases. Cavity QED is slightly more promising; however, it still has only been demonstrated with a few qubits. Seth Lloyd of MIT is currently a prominent researcher in quantum hardware. The future of quantum computer hardware architecture is likely to be very different from what we know today; however, the current research has helped to provide insight as to what obstacles the future will hold for these devices.

VI APPLICATIONS OF SOCIAL NETWORKING

In the arena of computation and processing of data in many applications, data structure and graphs are becoming increasingly important in modeling sophisticated structures and the process of their interactions. In many cases, Graph theoretic representation of social network attributes for knowledge extraction seems to be suitable in terms of reducing complexities [4]. Further, in this direction, mining frequent sub-graph patterns for further characterization, discrimination, classification, and cluster analysis becomes an important task [7]. Graph representation that link many nodes together through respective edges, is used to model different kinds of networks such as telecommunication networks, computer networks, web and special community networks and so on [5, 6]. When such networks have been studied elaborately in the context of social networks; their analysis is known as social network analysis. Further, the processing becomes complex when the social network consisting of information in form of a relational database such that objects are semantically linked across multiple relations. Mining of such a relational database often requires mining across multiple interconnected relations, which is complex and demands for better computation facilities in terms of hardware and compatible software for reducing time complexities and increase accuracy.

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As the social networking data is exponentially increasing with the use of network by thousands of new users daily soon the size of data will be so huge that the classical computation facilities will unable to compute them with ease and speed in acceptable time. As earlier discussed, such situation can be handled with ease and efficient with fast computing devices which we can propose here under the concept of quantum computing. As this quantum computing is motivated as much by trying to clarify the mysterious nature of quantum physics as by trying to create novel and super powerful computers. Thus happening of it will become easy for computing and processing very large volume of data in large social network with efficient and accuracy. Apart from social network analysis, many other scientific and commercial applications need patterns that are complicated than frequent item-sets and sequential patterns. Such sophisticated patterns go beyond sets and sequences, towards tree, lattices, graphs, networks, and other complex structures, will find quantum computing environment as a suitable platform from execution.

VII FUTURE WORK

Today the theory of quantum computers and quantum information are at its developing phase. All the obstacles that can affect the growth of quantum computers are dealt with, so that the high speed computations which the quantum computer performs with ease are recognized as well as made popular worldwide. Finding out of errors and thereby devising out mechanisms for correcting the same have gained importance lately that eventually lead to the building up of more robust computers. Hardware's utilized in the building of quantum computers are simplified to a significant extent but still they need to be more developed for computing on some of the complex algorithms like Shor's algorithm and other quantum algorithms. It will not be wrong for us to say that in the near future a day will definitely come when the digital computers will be soon replaced by the fastest quantum computers.

VIII CONCLUSIONS

The basic idea of quantum computing has derived from basic principle of quantum mechanics. This paper gives an overview of quantum computing. It is obvious that quantum computing will be a far better choice than traditional computing devices for complex and large data compilation with time constrains. Hence, an application having huge data set with a complex mapping in between the data will be an appropriate example for being getting executed in quantum computing environment. Social network handle enormous volume of data and with passing of each day thousands of new entrants are joining the social sites, increasing the size of data. To handle data of such size efficiently and fast, we have proposed the use of quantum computing for complex computing with time limitation. Initial part of the paper highlights issues related to quantum computing and then it proposes a scenario for implementing social networking analysis through quantum computing environment with appropriate advantages.

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Service Quality and Behavioural Intention In Hotel Industry: A Path Model Analysis

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Abstract- *Hotel Industry is a highly competitive industry especially after the introduction of globalization. The success of service providers in the industry rest on their level of understanding and delivery of services to their customers. The service quality is the non-price weapon at the hands of the service providers. Hence, the present study focuses on the study of linkage between the service qualities and behavioral intention among the guests in the hotel industry. The study was conducted among the guests stayed at corporate hotels at Kanniyakumari, Rameshwaram and Madurai. The study concluded that the value added service quality have a significant impact on behavioral intention among the guests especially through the core, special service quality and overall customers satisfaction.*

Key words: Service quality; Behavioral Intention; Path Analysis; Structural Equation Model.

I INTRODUCTION

Tourism is a highly competitive industry, and tourism factor can no longer compete on the basis of cost alone. Quality is a key element for the competitiveness of the tourism industry. The World Tourism Organization (WTO, 2003), has designed six standards for tourist product or service. One of the important aspects in the tourism industry is the hotel industry since it provides accommodation and foods to the tourists. (Gaurav et al., 2010). In order to attract new customers and retain their existing customers in the hotel industry, effective policies of customer's satisfaction and loyalty is highly essential (Tse, 2001). The service quality offered by the hotels is playing an important role in the determination of the customer's satisfaction in hotel industry (Kim and Cha, 2002). These qualities included safety and security, hygiene, accessibility, transparency, authenticity and harmony (Sharma and Upadhyaya, 2009). The policies improving the quality of tourism services should be matched with the features of destination and customers' expectations (Domini, 2010).

In a service industry priding itself in its superlative quality of personal touch; naturally the hotels pay a lot of attention to relationship marketing and customer relationship management. Apart from tangibles, delicious food and beverages, communication, price fairness, customers orientation etc. the essence of service in hotels comes from warmth and friendly nature of them. The flexibility, going the extra mile, making impossible things possible, consistency in the delivery of service, personalized service, anticipating guest needs and the sweet smile of the guest relations executive, the timely greeting of the guard and the doorman, the empathy of the front office assistants are the important pre requisites for the sources of the hotels. Those who provide customers with quality services can have a stronger competitive position in today's dynamic market place (Stuant and Tax, 1996; Wong et al., 1999).

The relationship qualities in hotels are having a positive impact on customer retention (De Wulf et al. 2001; Verhoef, 2003). Kin et al., (2006) was one of the first studies to examine predictors and art comes of relationship quality within the hotel industry. Budhwar (2005) identified the service quality in hotel is one of the success factors for hotel. Syed et al., (2006) identified the factors leading to

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customers satisfaction in hotel industry namely responsiveness of frontline employees, price, food quality and appearance of hotel. The service providers those who provide customers with quality services can have a stronger competitive position in today's dynamic market place (Kit et al.,2001). The hotel industry is a demanding sector that stresses the provision of high-level customer's service and continuous quality improvement. There has been a pressing need to encourage local consumption and attract the arrival of visitors. In this context, this paper discusses the identification of quality attributes in hotel industry and its consequences.

Conceptual Framework of the Study

Service Quality Factors in Hotel Industry Operations

Terziovski and Dean (1998) defined quality as the fitness to use and conformance to specification and requirements. Parasuraman et al., (1990) identified five dimensions of service quality encompasses tangibles, reliability, responsiveness, assurance and empathy. Gronroos (1990) argues there are six elements in service quality as professionalism and skills, attitudes and behaviour; accessibility and flexibility, reliability and worthiness; recovery; and reputation and credibility. Shock and stefaneli (1992) advocated four marketing mix considerations for the design and planning of hotel services. Darley and Gilbert (1985) suggested that the physical dimension of a business can also influence the degree of success of a business like hotel. The product offering by the hotel plays a determinant role in the service quality of hotel industry. Monroe (1989) identified that the price of the items on the menu can also greatly influencecustomers because price has the capability of attracting or repelling them, especially since price functions as an indicator of quality (Leuis and Shoemapher, 1997). Grewalv et al. (1998) indicated that the price offering for the hotel needs to be in accord with what the market expects to pay by avoiding negative deviation.

Kin et al. (2006) examined predictors and outcomes of relationship quality with the hotel industry. The measurement developed by him includes:

a) **Physical Environment:** "Stevens et al., 1995." "Garbarino and Johnson, 1999"
b) **Food Quality:** "Mattila, 2001" "MacLaurin and Mac Laurin (2000)"
c) **Customer Orientation:** "Fornell et al., 1996""Gustafsson et al., 2005"and "Bore and Johnson, (2000)"
d) **Communication Level:** "Scanlan and McPhail, 2000" "Jeyacharan et al., (2005)"and "(Parsons, 2002)."
e) **Relationship Benefits:** "Reynolds and Beally, 1999" "Gurinner et al., (1998)"
f) **Price Fairness:** "Kin et al., 2006". "Oh (2000)" "Rarraweera and Neely (2003)"

In the present study, the included service quality variables related to the hotel have been identified with the help of above said conceptual framework. In total, 32 variables related to service quality in hotel industry have been noticed and summarized in table 1.

TABLE 1

Variables in Service Quality in Hotels (SQH)

Sl.No	Variables in SQH	Sl.No	Variables in SQH
1.	Visually attractive building exteriors	17.	Knowledgeable staffs
2.	Reasonable food prices	18.	Information on innovative services
3.	Friendly service by the staffs	19.	Tasty food
4.	Parking area	20.	Information about new events
5.	Consistent communication through news letters or direct mail	21.	Personal relationship
6.	Discount offer	22.	Clear and elegant dining equipment
7.	Consistent quality of food and beverage	23.	Special treatments
8.	Special deals	24.	Tele marketing services
9.	Attracting dining area	25.	Confidence of the staffs
10.	Reasonable beverages prices	26.	Rational calculation of the prices
11.	Staffs always willing to help	27.	Appearance of food
12.	Easy to move around in their	28.	Recognition of the staff
13.	Special discounts	29.	Information about special promotion programmes
14.	Mass media advertisement	30.	Understands the specific needs of the staff
15.	Appropriate illumination	31.	Details on pricing
16.	Appropriate price charge	32.	Personal care on individual needs

Overall Customers Satisfaction: "Stevens et al., 1995", "Syed and Cardoym, 2006", "Sheetal and Verma, 2004"

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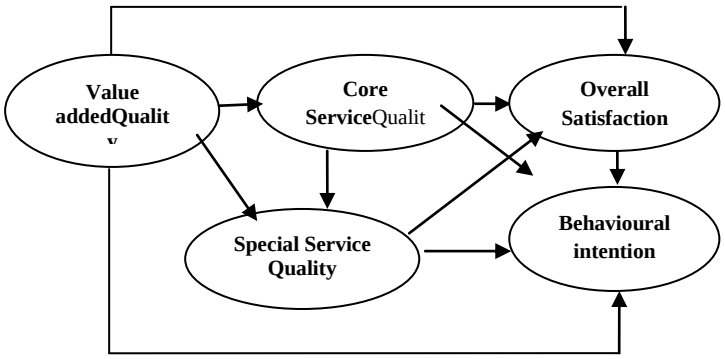
Behavioural Intention: "(Heller et al., 2003)", "(Petrick, 2004)","(Tian et al., 2002)".

Literature Reviews: "Kin and Cha (2002)","Clark and Wood (1999)""Gustafsson et al., (2005)", "Parsons (2002)", "Bhattachariya and Friedman (2001)"

Related Reviews: "(Crompton and Willson, 2002)","Yan and Uysal (2005)","(Balogu, 2001; Mazanec, 2000; and Lee et al., 1997)""Murphy et al., (2000)", "Oh (2000)" and "Morasis and Norman (2001)"

FIGURE 1
Conceptual Model



Objectives of the Study

Based on the proposed research model, the objectives of the present study are:

i) To identify the important service quality factors, its outcomes and its validity; and

ii) To measure the casual path relationship between the service qualities and behavioral intention among the guests in hotel industry.

Hypotheses

Based on the above said objectives, the following hypotheses are generated:

H_1: The higher perception on value added quality, the higher the core service quality among the guests.

H_2: The higher perception on value added quality, the higher the tour service quality among the guests.

H_3: The more perception on value added quality, the higher overall satisfaction among guests.

H_4: The higher perception on value added quality, the higher behavioral intention among guests.

H_5: The higher perception on value added quality, the higher perception on service quality.

H_6: The more perception on core service quality in hotels, the more overall satisfaction among the tourists.

H_7: The higher perception on core service quality in hotels, the higher behavioral intention among the guests.

H_8: The more perception on special service quality in hotels, the higher overall satisfaction among the guests.

H_9: The higher perception on special service quality in hotels, the more behavioral intention among the guests and

H_{10}: The higher the overall satisfaction. the more behavioral intention among the guests.

Study Site and Sample

The important tourist's centers at South Tamil Nadu namely Kanniyakumari, Rameswaram and Madurai were purposively selected as the study sites. The data for this study were collected by a well-designed interview schedule which is developed in English only. The sample size of the study was determined with the help of n =

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In the present study, the sample size came to 588. It was equally divided into three important tourist centers. A total of 196 guists stayed at corporate hotels at each centers were included as the sample of the present study. The interview schedules were used by the investigators. The interviews were conducted at major hotels in the above said three tourists centers.

Interview Schedule Design and Research Variables

The interview schedule was divided into two important parts. The first part covers the background of the guests. Whereas the second part includes the variables in service qualities in hotel industry overall satisfaction and behavioral intention of the guests. The variables are measured at five point scale. A pre-test was conducted among 20 each guests at Kanniyakumari, Rameswaram and Madurai centers. Based on the feedback, the final draft was designed to collect the data.

Data Analysis

The data analysis was conducted in two stages. Firstly, the EFA [Exploratory Factor Analysis] was used to identify the important service quality factors in hotel industry. Secondly, Confirmatory Factor Analysis was administered to test the reliability and validityof variables included in each concept of the study. At the third stage, the relationship between various service quality factors, overall satisfaction and behavioral intention among the guests .ere empirically tested by using structural equation modeling (SEM). LISREL-8 procedure (Joreskog and Sorbom, 1996) and the Maximum Likelihood (ML) method of estimation were adopted (Yoon, et al., 2001). Out 588 interview schedules, the fully usable schedules are 239 only which shows the yielding rate of 40.65 per cent to the total of 588 guests.

Service Quality Factors in Hotel Industries

The score of thirty two variables in service quality of hotels are included for Exploratory Factor Analysis (EFA). Initially, the test of validity of data for factor analysis have been examined with the help of Kaiser-Meyer-Ohlin (KMO) measure of sampling adequacy and Bartletts test of sphericity. The acceptance criterion of KMO measure and Bartletts test of sphericity are 0.5 and significance of chi-square less than or equal to 5 per cent level Fabrigar et al., (1999). The variables which are having the factor loading of less than 0.5 in all extracted factors and the variables which are having higher factor loading in more than one factors have been excluded from EFA. The factor which is having a lesser Eigen value of 1.0 is also excluded from the extracted factors (Charles, 2008). Since the test of validity of data for factor analysis is satisfied, the EFA have been executed. The EFA results in three service quality factors which together explain 68.20 per cent variance. The number of variables in each factor, its reliability co-efficient, eigen value and per cent of variation explained is summarized in Table 3.

TABLE 3
Service Quality Factors in Hotel Industry

Sl. No	Service Quality factors	Number of variables	Reliability Co-efficient	Eigen value	Prevent of variation explained	Cumulative percent of variation explained
1	Core Service quality	8	0.7843	5.1445	22.37	22.37
2	Value added Service	8	0.8139	4.8029	20.28	43.25
3	Special Service quality	7	0.7602	4.7346	20.59	63.84
KMO measure of sampling adequacy : 0.7674				Bartletts test of sphericity : Chi-square value : 89.08*		

Significant at zero per cent level.

The important service quality factors is core service quality since its Eigen value and the per cent of variation explained is 5.1445 and 22.37 per cent respectively. It consists of 8 variables with the reliability co-efficient of 0.7843. The second and third service factors in hotels are value added service quality and special service quality since it's Eigen values are 4.8029 and 4.7346 respectively. The per cent of variation explained by these two factors are 20.88 and 20.59 per cent respectively. All the narrated three important service quality factors explain the variables in service quality to an extent of 63.84 per cent. The last two factors consist of 8 and 7 variables with the reliability co-efficient of 0.8139 and 0.7602 respectively.

Reliability and Validity of Variables in the Concepts

In total, there are five concepts used in the study.These are three service quality factors, customers' satisfaction and behavioural intention among customers in hotel industry. The score of the variables in five concepts included in the present study are taken for Confirmatory Factor Analysis in order to examine its reliability and validity. The overall reliability has been tested with the help of cronbach alpha. The standardized factor loading of the variables in all five concepts are greater than 0.60 which shows the content validity of the concepts (Anderson and Gelling. 1988). The significance of 'V statistics of the standardised factor loading of the variables

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in all concepts reveals the convergent validity (Bollen and Long, 1993). It is also supported by the composite reliability and average variance extracted since these are greater than 0.50 and 50.00 per cent respectively. The cronbach alpha is greater than 0.60 (Nunnally, 1978). The analysis reveals the reliability and validity of variables in all the concepts included for the study.

Customers view on Important Concepts in Hotel Industry

In total, five important concepts have included for examining the linkage between service quality and behaviour intention among the guests in hotel industry. These are core science quality, value added service quality, and special service quality. Overall satisfaction and behavioural intention. The level of perception on the above five concepts have been derived by the mean score of all variables in each concept. The standard deviation and the inter correlation between the perception on each concept have been computed and presented in Table 5.

TABLE 5

Customers' view on the Concepts in the Present Study

Sl.No	Concepts	Mean	Standard Deviation	Inter Correlation among				
				1	2	3	4	5
1.	Core Service quality	3.5157	0.4786		0.3969*	0.2965*	0.3118*	0.2744*
2.	Value added service quality	3.9708	0.5217			0.3242*	0.3646*	0.2903*
3.	Special Service quality	3.4865	0.4903				0.3969*	0.3011*
4.	Customer satisfaction	3.2241	0.4886					0.3842*
5.	Behavioural intention	2.8969	0.3967					

*Significant at five per cent level.

The highly perceived concept by the guests is value added service quality and core service quality since its mean score are 3.9708 and 3.5157 respectively. The higher consistency in the perception on concepts is identified in the case of behavioural intention since its standard deviation is only 0.3967. The inter correlation between the perception on all five concepts included in the study are positive and significant at five per cent level. The average variance extracted by each pair of the concepts included in the present study is greater than its square of correlation co-efficient between them which reveals the discriminant validity among the concepts (KashyapandBojanic, 2000).

Testing of Conceptual Model

The proposed conceptual model in Figure 1 was tested by using five constructs namely: destination image, core service quality, tour servqual, overall satisfaction and behavioural intention. The SEM analysis was used to examine the relationship between the each of constructs as hypothesized. The result of SEM is presented in Figure 2. The fit indices of the model are summarized in Table 6.

TABLE 6

Goodness of Fit Indices of Model

Sl.No	Particulars	Criteria	Indicators
I	**Chi-square test**		
	Chi-square test	P<.05	P=.0134
II	**Fit indices**		
	GFI	>0.90	0.9318
	AGFI	>0.90	0.9573
	PGFI	>0.50	0.7391
	NFI	>0.90	0.9796
	NNFI	>0.90	0.9583
III	**Alternative indices**		
	CFI	>0.95	0.9891
	RMSEA	<0.05	0.0196
	RMR	<0.05	0.0245

The overall model indicates that the chi-square value is significant at two per cent level. Hence it is within the limit of the event (p<.05) recommended by Hair et al., (1998). Furthermore, other indicators of goodness of fit are GFI=0.9218, RMSEA = 0.0196: RMR = 0.0245, NFI = 0.9796; NNFI = 0.9583; CFI = 0.9891; AGFI = 0.9473, PGFI = 0.6391 and NNFI = 0.9583. All these fit indices are satisfying the criteria established for the fitness of model (Hair et al., 1998). It also reveals that the hypothesized model fits the empirical data well.

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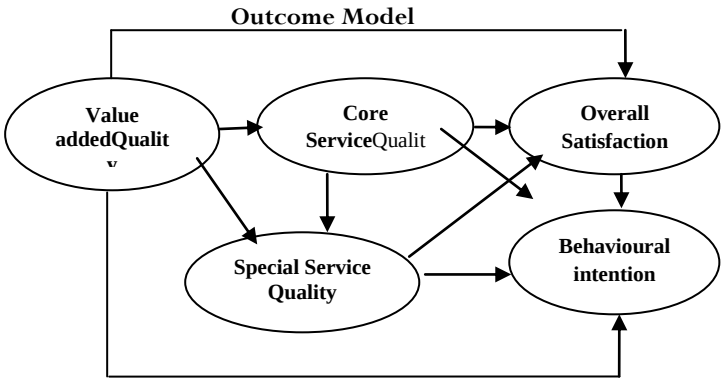
Result of SEM Model

The results of SEM model are presented in Figure 2. **FIGURE 2**



The value added service quality has a significant positive impact on core service quality (β = 0.8586*), thus supporting H_1. Due to their insignificances on structural co-efficients, however, the hypotheses of value added service quality has no positive effect on special service quality (H_2), overall satisfaction (H_3) and behavioural intention (H_4) are not supported since their [βeta values are not significant at five per cent level (β_2=0.0485; β_3=0.1109; and β_4 = 0.1017). The core service quality, as hypothesized, has a significant positive impact on special service quality (β_5 = 0.8507*), thus supporting H_5. Nonetheless, it does not have a significant impact on overall satisfaction and behavioural intention (β_6=0.1811; β_7=0.1382) respectively. In addition, the special service quality has a significantly positive effect on overall satisfaction (β_8=0.7542*), supporting H_8 while it does not appear to have a significant effect on behavioural intention (β_9=0.1203), not supporting H_9. Finally, the overall satisfaction has a significantly a positive effect on behavioural intentions (β_{10}=0.1886), supporting H_{10}). From the results, it is inferred that, an evident path is seen. The appeared path is: value added service quality Core service quality Special Service Quality ---, Overall satisfaction Behavioural intention. Note that the value added service quality does not directly but does indirectly influence the behavioural intention through the core and special service quality and overall satisfaction. This findings confirms the findings of Caruana et al., (2000); and Ching and Dung (2007).

II CONCLUSIONS

The empirical results of this study provide tenable evidence that the proposed structural equation model designed to consider the linkage between value added service quality and behavioural intention though the core, special service quality and overall satisfaction is acceptable. The major findings of the study reveal that there is no direct significant linkage between value added service quality and behavioural intention which replicates the findings of Dick and Basu (1994); and Flavian et al., (2001). At the same time, the significant positive of effect the construct is seen on the subsequent constructs developed in all stages of the path resembles the findings of Iwasaki and Havitz, (1998); Turner and Reisinger (2001).

The major findings of this study have significant managerial implications for policy makers. First of all the path analysis reveals that there is no significant effect of value added, core and special service quality on the behavioural intention but there is a significant impact of valued added science quality on core service quality, core service quality on overall satisfaction and overall satisfaction on behavioural intention. It indicates that the policy makers should understand the logic linkage between the constructs developed in the present study. It is not enough to concentrate only on value added service quality but also the core and special service quality. All these qualities should be focused on the guests satisfaction i.e., customer orientation. It is the only possibility to generate favourable behavioural intention among the guests.

The findings of the study reveal the flow of the critical path in between valued added service quality and behaviour intention. These are: value added service quality →Core service quality→ special service quality →overall satisfaction → behavioral intention. This critical path produces the better result than any other paths. The policy maker are advised to implement their developmental strategies on the basis of the critical path confirmed by the empirical study.

Directions for Future Research

The findings reported in the present study offer several suggestions for future research. First, research is needed to identity. Apart from this, the other dimensions like technology and information system quality in hotel industry may be added to examine the service

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quality in hotel industry may be added to examine the service quality in hotel industry. Secondly, the future study may focus on the usefulness of segmenting customers on the basis of their profile. It will be worth while exploring. A future research aimed at the level of perception and expectation on service quality in hotel industry on the basis of customers' demographics which will be valuable from a service providers view point. Thirdly, a discriminant analysis may be conducted on various types of customers regarding their attitude towards hotel industry in future research work. Researcher could cover more service categories and with large data base in future. The problems in maintaining the service quality in hotel industry alone may be focused in near future as a separate research work. Finally, the scope of the study may be extended to various tourists centers in India.

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Energy Conservation in Wireless Sensor Networks by Differentiated Data Delivery

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Abstract-*In wireless sensor networks (WSNs), packet loss occurs due to congestion. It reduces the lifetime of WSNs due to energy consumed by these transmissions. Successful event detection in Wireless Sensor Networks (WSN) requires reliability and timeliness. When an event occurs, the base station (BS) is particularly interested about reliable and timely collection of data sent by the nodes close to the event, and the data sent by other nodes have little importance. Data generated in wireless sensor networks may not all be alike: some data may be more important than others and hence may have different delivery requirements. We address differentiated data delivery in the presence of congestion in wireless sensor networks. Congestion-Aware Routing (CAR), discovers the congested zone of the network that exists between high-priority data sources and the data sink and, using simple forwarding rules, dedicates this portion of the network to forwarding primarily high-priority traffic.Fair Share rate is calculated in Fairness aware congestion control to improve the energy conservation in WSN. The Fair share rate is allotted to all nodes in the network to achieve reliability and timeliness.*

Keywords: Congestion control, Wireless Sensor Networks, Congestion Aware Routing(CAR), High Priority (HP) , Low Priority (LP).

I INTRODUCTION

WIRELESS SENSOR NETWORKS (WSNs) consists of a large number of sensor nodes. WSNs are undoubtedly one of the largest growing types of networks today. They are fast becoming one of the largest growing types of networks today and, as such, have attracted quite a bit of research interest. They are used in many aspects of our lives including environmental analysis and monitoring, battlefield surveillance and management, emergency response, medical monitoring and inventory management. Their reliability, cost effectiveness, ease of deployment and ability to operate in an unattended environment, among other positive characteristics, make sensor networks the leading choice of networks for these applications [3].

A wireless network normally consists of a large number of distributed nodes that organize themselves in an ad-hoc fashion. Each node has one or more sensors embedded processors and low power radios which are normally battery operated. Unlike other wireless networks, it is generally difficult or impractical to charge/replace exhausted batteries. The primary objective in wireless sensor networks design is maximizing node/network lifetime, leaving the other performance metrics as secondary objectives. Various factors like concurrent transmissions, buffer overflows and dynamically time varying wireless channel condition lead to the concept of Congestion.

It causes many folds of drawbacks:

(A) Increase energy dissipation rates of sensor nodes,
(B) Causes a lot of packet loss, which in turn diminish the network throughput
(C) Hinders fair event detections and reliable data transmissions.

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II RELATED WORKS

The event driven nature of wireless sensor network which leads to congestion in the network. To deal with congestion in wireless sensor networks, many congestion mitigation, congestion control and reliable transmission have been proposed these mechanism have been have been categorized into three groups such as:

- End to end reliability without congestion control (RMTS).
- Centralized congestion control scheme (ESRT).
- Distributed congestion control scheme (FUSION).

A. RMST: Reliable multi segment transport.

The reliable multi segment transport (RMST) provides end to end reliability without any congestion control. Using these mechanism packet loss which occur during transmission of packets from source node to sink node are recovered hop by hop using cache which are present in the intermediate node[16].

In RMTS packets which are lost are detected using a timer both in cached and un-cached mode, a "watchdog timer" is initiated for each and every node along the path from source to destination/sink. The watchdog timer detects gaps within the cache and send a negative acknowledge (NACK) to its neighboring node along the path towards source, the intermediate node which detect these negative acknowledge (NACK) identifies the request for lost packet and retransmits the packet to the requested node.

B. ESRT: Event to sink reliable transport protocol.

In event to sink reliable transport protocol the rate at which each sensor node transmits is centrally computed, the base or sink node which calculates the transmission rate based on the number of sensor readings received by which the ESRT provides end to end reliability in wireless sensor networks [17].

There are two events related to ESRT

The observed event reliability (r):-the observed event reliability indicates the number of data packets received in decision interval and it is indicated using (r).

The desired event reliability (R):-the desired event reliability indicates the number of data packets required detecting a particular event and it is indicated using (R).

If r>R then a particular event is detected.
Else-if r<R then appropriate actions are taken to detect the event.

In Event to sink reliable transport protocol the network can either be a low reliable state or high reliable state. Depending on the current state si and the initial reporting frequency, the ESRT calculates the update reporting frequency which is broadcasted to the source node in order to detect the possible event.

C. Fusion.

The Fusion is a distributed congestion control scheme which is based on queue length to measure the level of congestion. Fusion is a combination of three congestion control techniques namely

- Hop by hop flow control.
- Source rate limiting scheme.
- Prioritized MAC layer.

The hop by hop flow control consists of two parts congestion detection and congestion mitigation. In congestion detection can be performed using two methods queue occupancy and channel sampling.The rate limiting scheme is a more general approach that better handles variable rates would nodes required to propagate. Each sensor node listens to the traffic its parent forward the total no of source routing through the parent, then use a token bucket scheme to regulate each sensor nodes sending rate A sensor accumulates one token every time it hears its parent forward N packets, up to a maximum number of tokens.

III METHODOLOGY USED

A. Design of Congestion-Aware Routing (CAR)

CAR is a network-layer solution to provide differentiated service in congested sensor networks. CAR also prevents severe degradation of service to Low Priority(LP) data by utilizing uncongested parts of the network. An important event occurs in one portion of the sensor field, which we call the critical area. There is a data processing centre for collecting sensitive information from the critical area.

The area that contains the shortest paths from the critical area to the sink as the conzone.

The CAR protocol design has two phases

(1)Design of conzone and

(2)Routing packets inside and outside the conzone.

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CAR provides differentiated routing based on priority of the nodes. The combination of these functions segments the network into on-conzone and off-conzone nodes. Only High Priority(HP) traffic is routed by on-conzone nodes. Note that the protocol specifically accommodates LP traffic, albeit with less efficient routes than HP traffic. For the purposes of this discussion, we assume that there is one HP sink and a contiguous part of the network (critical area) that generates HP data in the presence of network wide background LP traffic.

Therefore, even when the rate of HP data is relatively low, the background noise created by LP traffic will create a conzone that spans the network from the critical area to the sink. Due to this congestion, service provided to HP data may degrade, and nodes within this area may die sooner than others, leading to only suboptimal paths being available for HP data, or a network partition may result, isolating the sink from the critical area.

B. FAIRNESS AWARE CONGESTION CONTROL – (FACC)

To avoid transmissions of unnecessary packets that will otherwise cause a waste of bandwidth and energy, the sending rate of each flow should be adjusted to an appropriate level as early as possible. It is desirable to adjust the sending rate of each flow at the nodes that are close to source nodes[3]. On the other hand, in WSNs, the nodes that are close to the sink forward more traffic than other intermediate nodes. Thus, their resource and energy are more precious. To adjust the sending rate of each flow as early as possible and save the scarce resource at the nodes close to the sink at the same time, we categorize all intermediate sensor nodes into near-source nodes and near-sink

We introduce two concepts, i.e., near-source nodes and near-sink nodes. Just as their names imply, near-source nodes are those nodes close to source nodes, and near-sink nodes are those nodes close to the sink. We use the optional field as our specific label field for the purpose of differentiation. Every source node sets its label field (e.g., label = k) for every packet. This label indicates how far away this packet is from the sensing field. Every forwarding node updates the label field by subtracting one (label = label −1) when it receives a packet until the label field equals zero. During a fixed interval, every intermediate node calculates the ratio Rp as

$$\text{Rp} = \frac{\#\ \text{of packets (label} > 0)}{\#\ \text{of total passing packets}}$$

Intuitively, the larger Rp is, the closer the node is to the source nodes. Therefore, the intermediate node is a near-source node if Rp is no less than a threshold Tp (e.g., 90%). Otherwise, the intermediate node is a near-sink node. In WSNs, a flow usually traverses a few hops from its source to the sink. The number of hops can be determined by routing protocols and may be dynamic. The intermediate nodes in the path will cooperate with each other to transmit the packet to the sink.

Steps Involved in the Near Source Node Process:

- Estimation of the Available Bandwidth
- Computation of the Flow Arrival Rate
- Estimation of the Number of Active Flows
- Fair-Resource Allocation

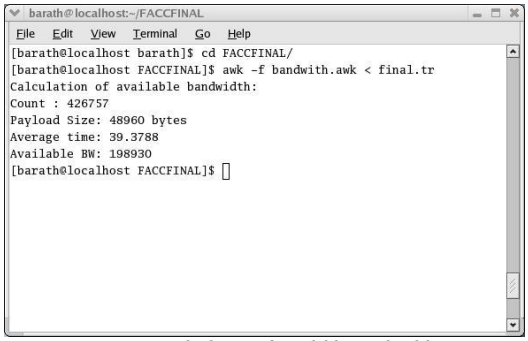

Figure 1. Calculation of Available Bandwidth

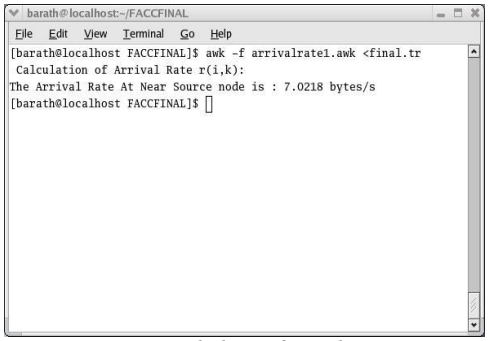

Figure 2. Calculation of Arrival Rate

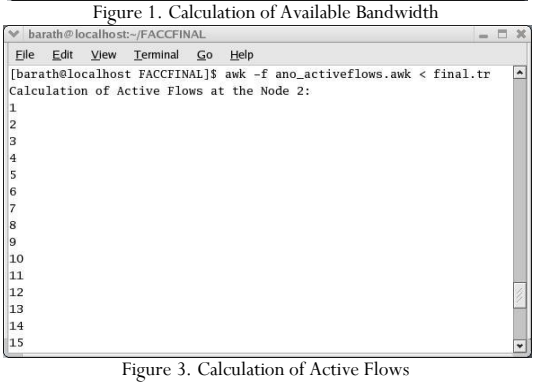

Figure 3. Calculation of Active Flows

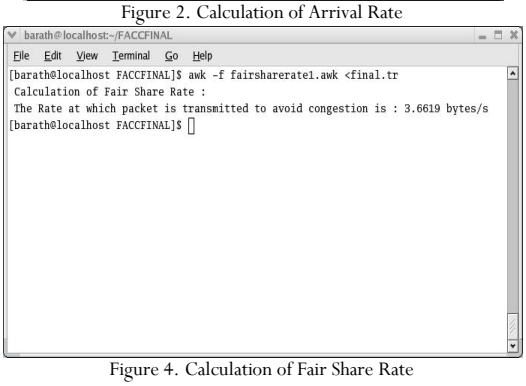

Figure 4. Calculation of Fair Share Rate

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The available bandwidth of each node, which is denoted by BWa, can be estimated as

$$BWa = \begin{cases} 0, & cb \geq thb \\ \frac{BW(thb-cb)data}{Ts}, & cb < thb \end{cases}$$

Where BW is the transmission rate in bits per second for the DATA packet, and Ts is the average time of a successful transmission at the MAC layer.cb is the channel busy ratio, thb is the threshold value fixed at the optimized rate. At each nearsource sensor node, we use exponential averaging, to estimate the rate of a flow. Let T(i,k) be the arrival time of the kth packet of flow i and l be the packet length. The estimated rate of flow i, i.e., R(i,k), is updated when the kth packet is received as

$$R(i,k)=1-[\ e^{\wedge}-(T(i,k)/K)l/T(i,k)\ ]+[\ e^{\wedge}-(T(i,k)/K)*(R(i,k-1)\ ]$$

Where (T(i,k) = tki − tk−1) i is the interpacket arrival time, and K is a constant.. For WSNs, all sensors generate or relay packets. Flows terminate only at the sink. Since the channel is shared by both incoming and outgoing traffic, the number of flows J should be different from the real number of flows. Thus, J can be estimated as

$$J = \begin{cases} 2N+1, & \text{If a flow is originated} \\ 2N, & \text{If not} \end{cases}$$

The fair share rate allocation F(t) is computed as $F(t)= (thb/cb) \times (S/J)$ and it is allocated to all the sensor nodes in the network. Since both the incoming and outgoing traffic of each node consume the same shared channel resource, S should include the total traffic load (in bytes). A fair share of available bandwidth is provided to the sensor node according to its generating rate, which in turn is used for congestion control in Wireless Sensor Networks.

IV COMPARISON OF PARAMETERS

A. Throughput:

In communication networks, throughput or network throughput is the average rate of successful message delivery over a communication channel. The throughput is usually measured in bits per second (bit/s or bps), and sometimes in data packets per second or data packets per time slot.

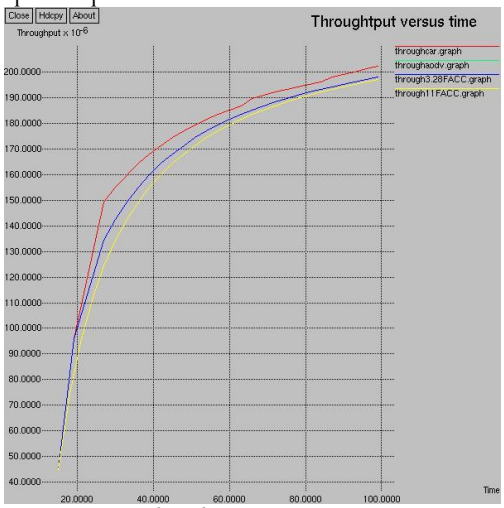

Figure 5. Throughput Comparison

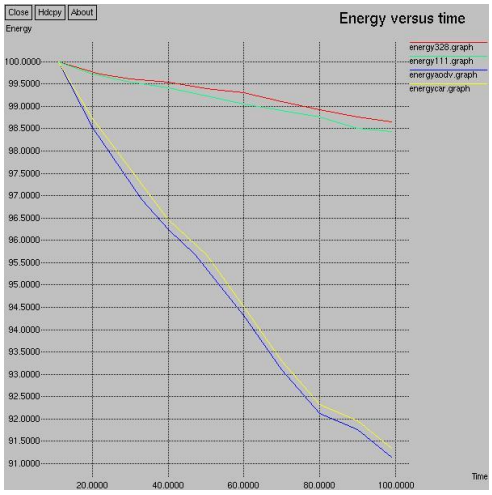

Figure 6. Energy Conservation Comparison

The Throughput of CAR is always high when compared to that other schemes as seen in figure 5. The FACC also has a better throughput when the Fair share rate is allocated.CAR provides a much better throughput because HP Packets are routed through the conzonewhereas LP packets are routed away from the conzone.

B.Energy Conservation:

The Energy plot shown in figure 6 clearly reveals that that the enhancement technique FACC provides more energy conservation. In Wireless Sensor Networks Energy Conservation is the main constraint. Though the Throughput and other factors are better in CAR ,the Energy conservation is poor compared to FACC.

TABLE I
ENERGY CONSERVATION IN VARIOUS METHODS

Method Involved	Energy Conservation
AODV	91.14%
CAR	91.37%
FACC at Normal Rate	98.22%
FACC at Fair Share Rate	98.64%

With the use of FACC in CAR, the Energy can be conserved. Table I Lists out the percentage of energy conservation in various methods.With the allocation of Fair Share Rate it can be seen that the energy conservation is higher when compared to the previous techniques.

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V CONCLUSION

Data delivery issues are addressed in the presence of congestion in wireless sensor networks. CAR increases the fraction of HP data delivery and decreases delay and jitter for such delivery while using energy more uniformly in the deployment. CAR and its variants appear suitable to real-time data delivery. This can be further improved if we bring in conzone discovery process and cost efficient routing.

To achieve an approximately fair bandwidth share, fairness-aware congestion control (FACC) can be used. It allocates an efficient rate based on available bandwidth and data rate generated by each node. FACC is much efficient as a fair rate is calculated and allocated. It minimizes the packet drop and increases the throughput of the network. Thus FACC efficiently utilizes the available bandwidth by allocating it to the nodes which is based on their data generation rate.

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Performance Analysis Ofmulti Channel Adc Using Mts Algorithm

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Abstract- *The Proposed system uses a multi-channel low power Digital rampanalog-to-digital converter (ADC). A Metastable-then-set (MTS) algorithm is proposed to eliminate the Metastabilty problem and its effects on power consumption and performance also have been measured. A prototype ADC was implemented in 0.13-nm CMOS technology and operated under a 1.2 V supply. At a sampling rate of 20 MS/s.The measured total power dissipation of a single channel ADC is 475 μW. The proposed flag synchronization technique minimizes the crosstalk among the channel.The VLSI implementation was done using Xilinx and Multisim Simulator.*

KeyWords: Digital Ramp ADC, low Power, Multi channel, Metastable-then-set (MTS)

I INTRODUCTION

As advanced CMOS technologies enhance the operational speed of microelectronics, successive approximation register (SAR) analog-todigital converters (ADCs) have recently become a very popular ADC architecture, having a low power characteristic and utilizing new design techniques [1]–[7]. With this trend, recently reported SAR ADCs cover a wide range of performances (see Fig. 1) from low frequencyapplications such as wireless sensor networks (Group A) [5] to gigahertz applications including optical communications (Group C) [4].Most ADC applications today can be divided into four broad market segments: Data Acquisition, Precision Industrial Measurement, Voiceband and Audio, and High Speed ("High Speed" implying sampling rates greater than approximately 10MSPS—although this line of demarcation is somewhat arbitrary. For instance, a 2MSPS sampling rate certainly qualifies as "high speed" for an 18-bit SAR ADC). A very large percentage of these applications can be filled with either the Successive Approximation (SAR), Sigma-Delta (Σ-Δ), or Pipelined ADC. A basic understanding of the three most popular ADC architectures is therefore valuable in selecting the proper ADC for a given application.

A. Basics Of SARADC

Comparing to other SARADCit seems allowing the lowest-power consumption. This architecture has the advantage to be very simple; it implements the binary search algorithm. Power dissipation scales with the sample rate, unlike flash ADCs that usually have constant power dissipation versus sample rate. This is especially useful in low-power applications. Moreover SAR ADC does not contain an operational amplifier; that are generally power-hungry, it needs just one comparator that consume much less power than operational amplifiers.

SAR ADC has four mains building blocks(Figure 1.1):

- Sample-and-Hold Stage (S/H)
- Digital-to-Analog Converter (DAC)

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- Comparator
- Successive Approximation Register (SAR)

The basic functionality of a SAR ADC is very simple (Figure 1.1). The analog input voltage V_{IN} is sampled by the Track & Hold block. To implement the binary search algorithm, the N-bit register is first set to mid scale setting the MSB to '1' and all other bits to '0'. This forces the DAC output, V_{DAC}, to be half of the reference voltage, $V_{REF}/2$. V_{IN} is then compared with V_{DAC}, if V_{IN} is greater than V_{DAC}, the comparator output is logic 1 and the MSB of the N-bit register remains at 1. The basic functionality of a SAR ADC is very simple (Figure 1.1). The analog input voltage V_{IN} is sampled by the Track & Hold block. To implement the binary search algorithm, the N-bit register is first set to mid scale setting the MSB to '1' and all other bits to '0'. Conversely, if V_{IN} is less than V_{DAC} the comparator output is logic 0 and the MSB of the register is cleared to 0. The SAR control logic then moves to the next bit down, forces that bit high, and does another comparison. The sequence continues all the way down to the LSB. Once this is done, the conversion is completed, and the N-bit digital word is available in the register.bits to '0'. This forces the DAC output, V_{DAC}, to be half of the reference voltage, $V_{REF}/2$. V_{IN} is then compared with V_{DAC}.

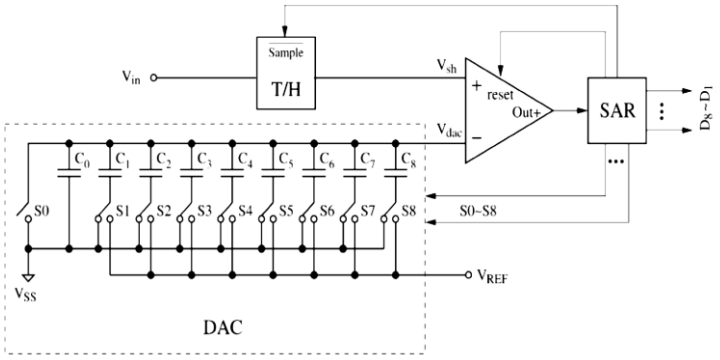

Figure 1.1Simplified N-bit SAR ADC architecture

B. Theory OfMetastability

Metastability is a problem that occurs inall latching comparators when the input is near the comparator decision point.The problem occurs when the comparator takes more time to switch to a valid output state than is available in the sample interval.Otherwise Metastability in digital systems occurs when two asynchronous signals combine in such a way that their resulting output goes to an indeterminate state.

II BLOCK DIAGRAM

A.MTS Algorithm

The self-triggering operation of ASAR ADCs removes the need for a high speedinternal clock and speeds up the total conversion . However, when the input to the comparator is very small, the latching operation suffers from metastability and conversion takes an unusuallylong time. Figure 2.1 (a) depicts a simple block diagram of a typical ASAR ADC with several important waveforms [Figure 2.1(b)]. Except for the first latching command , all the following latching operations are self-conducted by sensing the comparator output with an XOR function. The XOR sets the signal to notify the bit-decision completion when the output is regenerated. The time for the following operations such as digital-to-analog converter (DAC) settling is then defined by with fixed pulse width (flag Ext).After the MSB decision is completed, the MSB-1 bit decision takes place and it takes much longer time than others decisions due to theMetastability(VDAC≈VSH).The remaining LSBs are sequentially decided to be zeros by following the conventional SAR algorithm. In order to guarantee that the conversion is finished in a given time, the metastability problem must be resolved. Unlike other designs that try to conduct all the decision cycles or assign unresolved codes after conversion , the proposed metastable-then-set (MTS) algorithm sets unresolved codes on chip and completes the conversion when metastability is detected. By doing this, the MTS algorithm prevents the metastability from reducing the conversionspeed and eliminates unnecessary decision cycles. Figure 2.2 shows the modified block diagram of the ASAR ADC with a metastability detector (MD) for implementation of the MTS algorithm [see Figure 2.2(a)] and its waveforms [see Figure 2.2(b)]. Tmeta from the ASAR logic rises.

B. MTSImplementation

In order to validate the MTS algorithm at a prototype level, an MD block was designed with the operational principlewith the operational principle shown in Fig.2.3.Tmeta with a constant pulse width of tMTS is replaced by a ramp signal (ramp) for test

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purposes. The ramp signal rises with latch if the ramp reaches a decision threshold (VTH_meta) before the latching is complete (falling of latch signal), i.e., before the flag appears, then the situation is considered to be metastable and the meta signal turns on. Thus, the time when VTH_meta meets is defined as tMTS. The ramp signal is reset when the flag (in normal conversion) or meta (in metastable status) appears. tMTS is a key variable to control .and it is adjusted externally by changing the slope of the ramp . By increasing the slope of the ramp under a fixed VTHreduces and α increases.

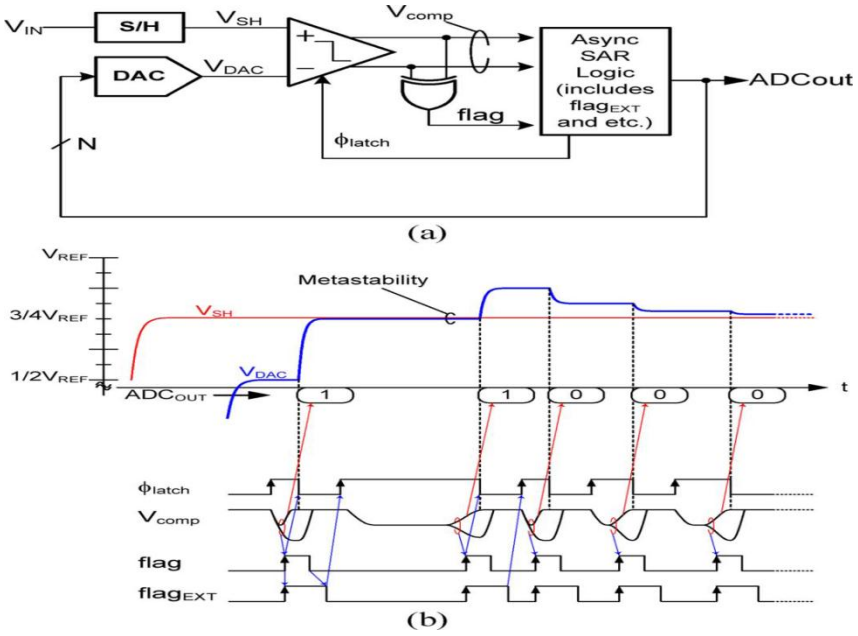

Figure 2.4(a)showsthe hardware implementation of the MD explained above. The ramp generator has a simple integrator composed of a current source (I MD) and a capacitor (C MD). At the rising edge of , the integrator begins to charge CMD. Integration finishes either when flag =1 (decision completion) or when metastabilityis detected (when node *A* reaches the logic threshold of the following inverter,inv 1 Here, the logic threshold of inv 1 plays the role of VTH_meta in Fig 2.3. and the value is approximately half the supply voltage. When metastability is detected, a latch composed of inv1 and inv2 holds the meta =1 until the next input is sampled. The amount of IMD is controlled externally to control the slope of the ramp. Figure 2.4 (b) shows the simulation waveforms of the MD in Figure 2.4 (a) for two cases: (upper waveform) without and (lower waveform) with metastability occurrence.

C. Drawbacks of Existing Method

1) Require N iterations required
2) DAC settling and accuracy limitperformance
3) Only two channels are implemented
4) Processing time is high due to more hardware complexity
5)Sampling rate is less

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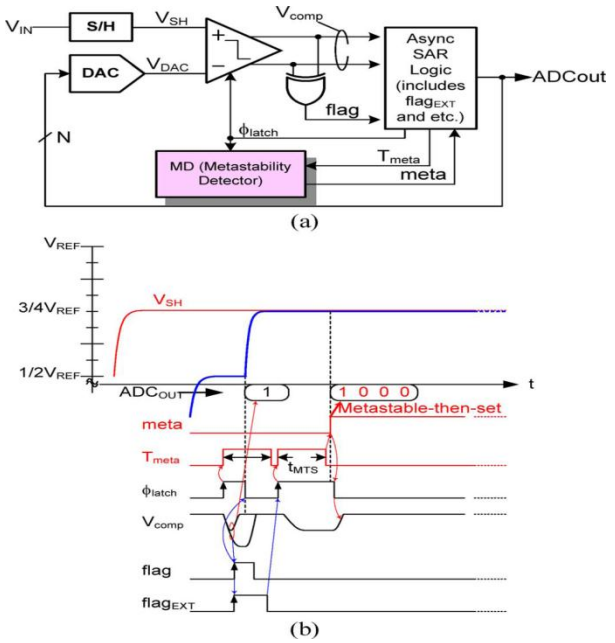

Figure 2.2 (a) Modified asynchronous SAR ADC for the MTS algorithm and (b)its timing diagram

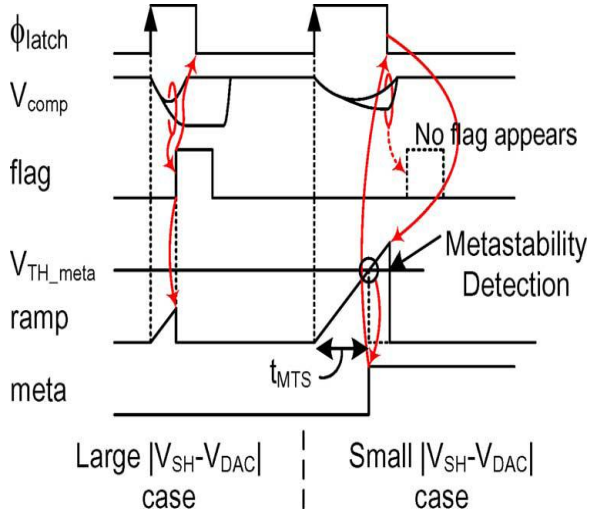

Figure 2.3 MTS implementation-based Rampgeneration for testability

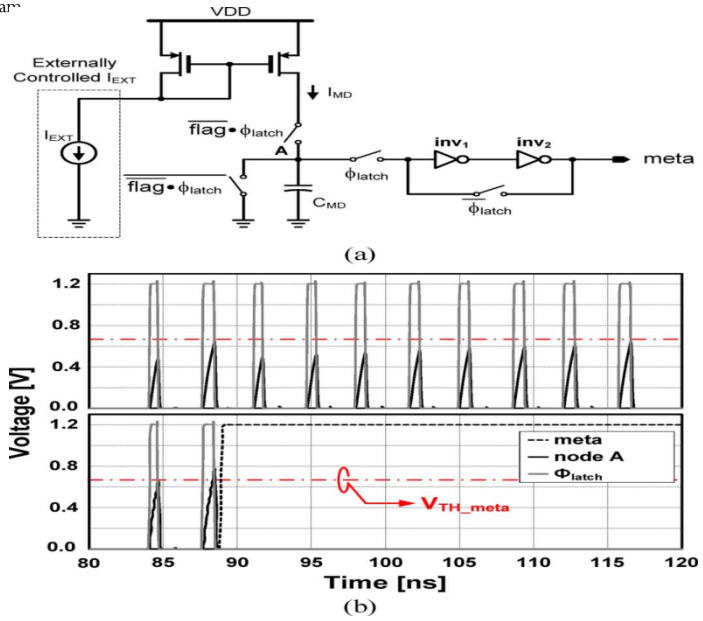

Figure 2.4(a) Hardware implementation of metastabledetector and (b) its simulation result:

III. PROPOSEDMODEL

A.Operationof Digital Ramp ADC

Figure 3.1 Also known as the stair step -ramp, or simply counter A/D converter, this is also fairly easy to understand but it is unfortunately suffers from several limitations. The basic idea is to connect the output of a free-running binary counter to the input of a DAC, then compare the analog output of the DAC with the analog input signal to be digitized and use the comparator's output to tell the counter when to stop counting and reset. The following schematicshows the basic idea: As the counter counts up with each clock pulse, the DAC outputs a slightly higher (more positive) voltage. This voltage is compared against the input voltage by the comparator. If the input voltage is greater than the

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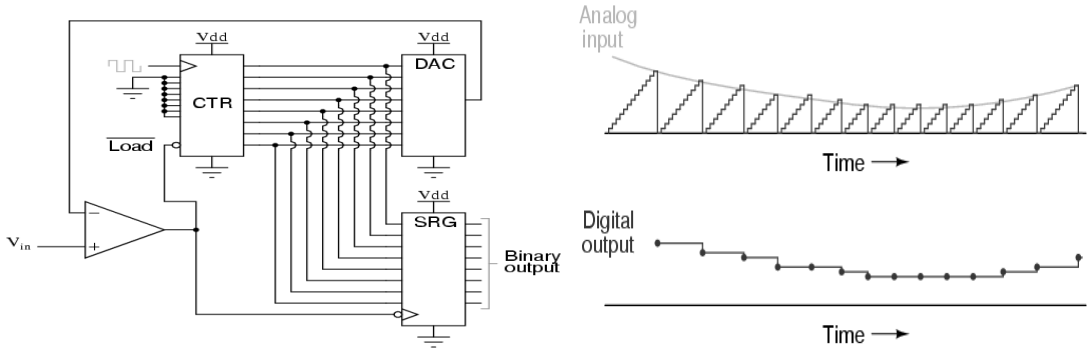


Figure 3.1 Digital Ramp ADCFigure 3.2 Digital Ramp ADC wave form

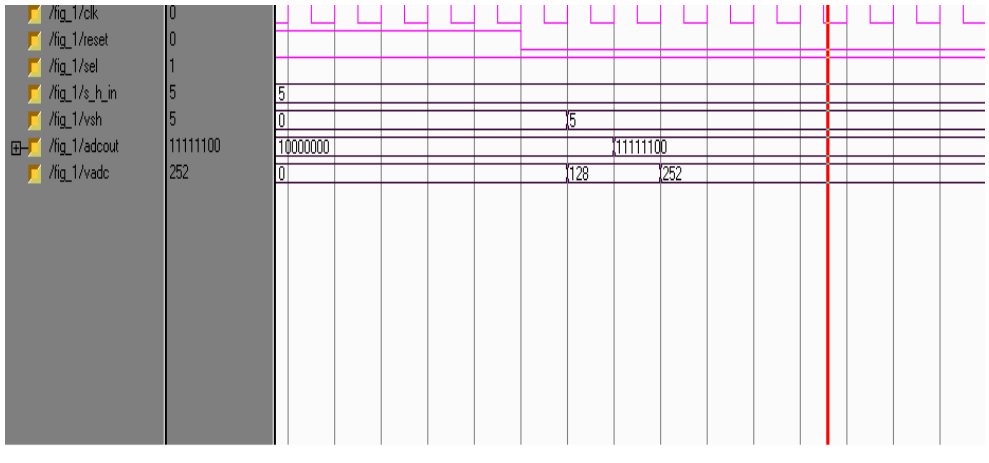
DAC output, the comparator's output will be high and the counter will continue counting normally. Eventually, though, the DAC output will exceed the input voltage, causing the comparator's output to go low. This will cause two things to happen: first, the high-to-low transition of the comparator's output will cause the shift register to "load" whatever binary count is being output by the counter, thus updating the ADC circuit's output; secondly, the counter will receive a low signal on the active-low LOAD input, causing it to reset to 00000000 on the next clock pulse. From the figure (3.2)The effect of this circuit is to produce a DAC output that ramps up to whatever level the analog input signal is at, output the binary number corresponding to that level, and start over again.

B. Methodology Used

A Metastable-then-set (MTS) algorithm is proposed to eliminate the Metastability problem in the multi-channel Digital ramp type analog-to-digital converter (ADC). and its effects on power consumption and performance also have been measured. The flag synchronization technique minimizes the crosstalk among the channels.A prototype ADC was implemented in 0.13-nm CMOS technology and operated under a 1.2 V supply. At a sampling rate of 20 MS/s. The measured total power dissipation of a single channel ADC is 475 µW.

IV RESULT AND PARAMETERSMEASUREMENT

A.Simulation Results



Fiure 4.1 Logical Output Waveform for asynchronous SARADC

WITH METASTABILITY WITHOUT METASTABILITY

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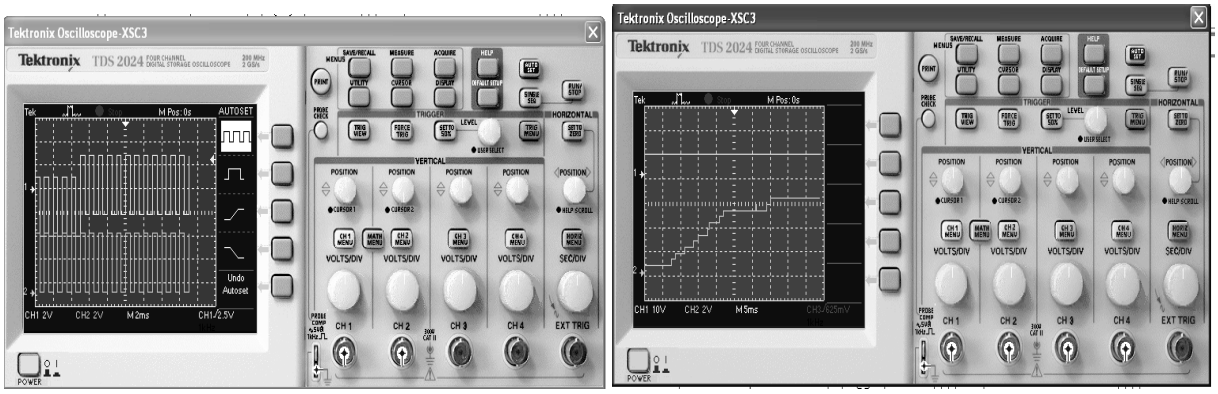

B. Parameters Measured

The proposed VLSI architecture of Digital Ramp ADC was implemented using VHDL.

TABLE I :Parameters Value

Process	CMOS 0.13 µm	
Active Area	500 x 1550 µm2	
Sampling Rate	17.5 MS/ s	
Power consumption (Single channel)	Analog	66 µW @ 1.2 V
	Digital	372 µW @ 1.2 V
	DAC Switching	132 µW @ 1.2 V
	Total	570 µW @ 1.2 V
Effective number of bits	8.3 bits	

V CONCLUSION

This paper investigates the potential usage of an ASAR ADC for a dual-channel ADC with solutions for metastability and crosstalk. The MTS algorithm not only solves the metastability problem but also showspossible power savings. The flag synchronization technique reduces the crosstalk between two channels and makes it possible to share a common reference for better dynamic performance.

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A Study about Water Resource Management

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ABSTRACT - *Water is the important aspect of life. It maintains the balance thorough out the world. So many professionals and experts are expressed their varying opinions about management of water. But also, there is always a need of more ideas to manage. This Paper examines the importance of managing water for usage.*

KEYWORDS-Water, Resources, Manage

I INTRODUCTION

Water is a fluid which makes the world's lakes, rain and oceans. It is the major component of the fluids of living things. Water is the source of water resources. The water can be used in the areas of agriculture, household, industrial and environmental surroundings. The majority of human needs fresh water. In Earth, 97% of water can be salt and only 3% is fresh. The freshwater is found mainly as groundwater, with only a small fractional part presents above ground or in the air. Every person needs water is a essential part of life to survive. By managing the resources effectively, increases its growth level for future needs.

OBJECTIVES

1. To use the precious water resource effectively.

2. To manage the available resources for future needs.

3. To avoid facing the problems of scarcity in future.

LITERATURE REVIEW

Barry Buzan, a leading scholar in broaden the meaning of security within the field of international relations, noted three components. These are idea, physical base and institutional expression. Significantly, the physical base of the state is also the area in which states share the most similarities in relation to security (Buzan, 1991:91). The threats to the physical base of the state are common in all types of state, due to the similarity in the physical objects involved (Buzan, 1991:91), so such threats from the logical focus of either inter-state cooperation or conflict. Water is within the scope of Buzan's thinking as it is an important natural resource on which stable economic development is based, forming a fundamental component of the "physical base" of the state.

Ohlsson (1995a:4) contends that globally the point has been reached where water scarcity is increasingly being perceived as an imminent threat to development. Other commentators take this further by calling water scarcity the ultimate limit to development,

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prosperity, health and even national security (Falkenmark et al., 1990; Myers, 1989; Myers, 1993).

II SOURCES

SURFACE WATER

Surface water includes that lakes, rivers, etc.

GROUND WATER

Sub surface water can be said as ground water. Long years ago we had the plenty of source of water. But nowadays human makes the water polluted to unusable.

ICEBERGS

Some type of icebergs can be coming into category of water.

DESALINATION

Desalination is the process which converting salt into pure water. Only limited amount of people get benefit from this process. It is expensive. It can be used for household and industrial process.

IN AGRICULTURE

Agriculture is the largest user of the world's freshwater resources. They are utilizing 70% resources. As the world's population increase and uses more food, industries and urban areas expanding, needs a share of pure fresh water. Water scarcity is an important issue. A survey is handled that if enough water we had to provide food for increasing people in future means it doesn't lead to positive. It can suffer from the issue of water scarcity. To avoid a global water crisis, farmers will have to strive to increase productivity to meet growing demands for food, irrigation is possible in agriculture to managing these source. While industry and cities find ways to use water more efficiently with their knowledge.

ENVIRONMENT

Environment water use is also a very small but growing percentage. Environmental water may include water stored in impoundments and released for environmental purposes. But more often is water retained in waterways through limitation. Human makes all the water resources polluted to make the world for facing the problem of scarcity. Environmental water can be saved in some special places and areas. People should get awareness about the managing resources of water will help to use the resources in future.

HOUSEHOLD

It is estimated that 8% of worldwide water use is for household purposes. These include drinking bathing, washing and cooking. For this, humans wasted a lot of water based on this. Drinking water is essential for human to survive in this world. A person should know the estimation to handle the water that is of sufficiently high quality so that it can be consumed or used .In most developed countries, the water supplied to households, commerce and industry is all of drinking water even though only a very small proportion is used in food.

INDUSTRIAL USAGE

It is estimated that 22% of water is used in industry. Major users include hydroelectric thermo electric power plants, which use water for cooling, ore and oil refineries, which use water in chemical processes. Taken of water can be very high for certain industries, but consumption is much lower than agriculture.

Water is used in renewable power. The industry uses a lot of water than agriculture, but it sactually doesn't need. Hydroelectric power derives energy from the force of water flowing downhill, driving a turbine connected to a generator. This hydroelectricity is a low-cost, non-polluting, renewable energy source. Hydroelectric power plants need the creation of a large artificial lake part. Evaporation from this lake is higher than river due to the larger surface area. The process of

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driving water through pipes also briefly removes this water outside, creating withdraw of water. The impact of this withdrawal based on design of power plant.

Water is main source used in many large scale industrial processes, such as thermoelectric power production, fertilizer production etc. Discharge of unwanted water from industrial uses is pollution. Pollution includes discharged wastes and increased water temperature. Industry needs pure water for many applications and utilizes a variety of purification techniques both in water supply and discharge. Water manageable is main thing in every category in usage of present as well as future. In industry, using cooling system to manage water resources is possible.

III CONCLUSION

One of the big realizing concern for our water resources in the future is the sustainability of the present and even future allocation of water resources. As water faces the problem of scarcity the importance of how it is managed can be realized nowadays. A need for environment and human is unavoidable one .To create the balance between water resources is important. It's a challenge nowadays to continue adapting to the present and future allocation of water resources for the world. Technologies have much improvising the world to higher range. On the other side, humans are wasted a natural resources and doesn't able to manage. It is truly a disappointed one. The impacts of climate also make the management actions to difficult. The newer technologies can be used in the field of managing water resources can lead a world ahead.

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A Study about Waste Management

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Abstract- *There is a need to manage the wastes in every field. The remaining unwanted material from a output which has no marketable value is consider as a waste. Wastes are includes the various types such as soil, industrial waste etc. Waste has been a major environmental issue everywhere in the world. Besides the waste we are created at home, school and other public places, hospitals, industries, farms and other sources. Effects of waste if not managed wisely we may face the problem of affecting our health, socio economic problems, climate and marine environment.*

Keywords: Disposal, maintenance, waste.

I INTRODUCTION

Everyone creates waste. Some people are having conscious about environment and create very little. All over the world, people handle their waste differently. Some common methods of managing their waste include landfilling, recycling and composting. Other type of peoples strongly undergoes on waste reduction and prevention/control aimed at reducing the production of waste.

Literature review

Laboratory of Heat Transfer and Environmental Engineering, Department of Mechanical Engineering, Aristotle University, Thessaloniki, Thessaloniki, Greece. School of Economics & Business Administration, International Hellenic University, Thermi, Greece. Hellenic Waste-to-Energy Research and Technology Council SYNERGIA, Athens, Greece Ch. Achillas, Laboratory of Heat Transfer and Environmental Engineering, Department of Mechanical Engineering, Aristotle University, Thessaloniki, Box 483, 54124 Thessaloniki, Greece.

Need of Waste Management

In some specific part, waste emits methane gas for landfills. It can be hazardous to health. Wastes buried in landfills also polluted the ground water. Sometimes, it leads pollution and threat to health. Waste causes resource depletion. It mainly involving threats to biodiversity, deforestation, pollution, and other environmental problems. Not only is the gas creating harm to people health. Many harmful things such as toxins are included. So, there is always a need of managing wastes to protect the earth.

Objectives of Waste Management

1) To re-use the materials for further process.
2) To protect the nature that not leads to pollution.
3) To utilize the resources effectively by increasing growth.

Types of Waste

Wastes can be specified into different types. They are listed as:

1) Liquid
2) Solid
3) Recyclables

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4) Hazardous and
5) Organic

Liquid type
Waste can be in form of non-solid. Some solid waste can also be converted to a liquid waste in the part of disposal. Examples are including washing water from homes, liquids used for cleaning in industries and waste detergents.
Solid type
Solid waste can be in any garbage that we make in our homes and other places. These include old car tires, old newspapers and even food wastes etc.
Hazardous type
Hazardous wastes are harmful type. These wastes are harmful to the people health. Such waste could be easily catch fire and *poisonous to human and animals.* Ex: fire extinguishers.
Organic type
Organic wastes are plants or animals sources. Commonly, they include food waste, fruit and vegetable peels; flower trimmings etc.it is easily convert waste into compost and use them in their gardens.
Recycling
Recycling is processing used materials into new, useful products. Aluminum products (like soda, milk and tomato cans), Plastics (grocery shopping bags, plastic bottles), Glass products (like wine and beer bottles, broken glass), Paper products (used envelopes, newspapers and magazines, cardboard boxes) can be recycled and fall into this category.
Sources of wastes
1) Household
2) Fisheries
3) Commerce and industry
4) Agriculture

Methods of waste management
To manage the wastes, efficient methods of disposal can be useful to protect from harmful.
Landfill
The Landfill is the most popular used method of waste disposal. The process of waste disposal is burying the waste in the land. Landfills are found in all areas. There is a process used that eliminates the odors and dangers of waste before it is placed into the ground.
Combustion
Combustion is disposal method in which municipal solid wastes are burned at high temperatures. It can be convert them into gaseous products. The advantage of this type is that it reduces the volume of waste to 20 to 30 percent of the original volume, decreases the space they take up and reduce the stress on landfills.
Recycling
Recovery is the process of taking discarded items for a specific that can be useful. These discarded items are then processed to extract the unwanted to useful one. It is the process of converting waste products into new products to prevent energy. It is the essential of Reduce, Reuse and Recycle waste hierarchy. The idea behind recycling is to decrease the energy usage reduce air and water pollution, preserve natural resources for future usage.

II CONCLUSION

Waste management can be concluded to the solution: we can manage by recycling and waste reduction. Waste reduction and recycling activities means reduced materials sent to the landfills. By using gas and other forms of pollutant will be reduced by a large percentage. Recycling products are available large in usage products. And this helps in the conservation of natural resources. There is a great need in understanding the importance of waste management to succeed in our efforts and being a healthy world.

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Enhancement Of Energy Efficient Data Gathering Scheme In Wsn Based On Correlation Techniques

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Abstract-*Data gathering in WSN is should be efficient and adaptable. Adaptability and less efficiency are the major problems associated with existing CS(Compressed Sensing) based data gathering schemes. And also there is no possibility to replace empty columns by data's at the receiver end. The proposed EEDG (Energy Efficient Data Gathering) scheme required only partial readings that are compressed readings at the transmitter side. With the help of matrix technique (Low rank and short term stability) all data's are recovered at the receiver end. Due to fewer data transmission less energy is needed for this data gathering scheme. In this proposed matrix based data gathering scheme achieves low power consumption and increase the life span of the sensor networks.*

Keywords: CDG, EDCA, CS, Centralized Exact, CAG

I INTRODUCTION

Wireless sensing element networks (WSNs) area unit expected to be utilized in several applications like fire detection and surroundings observation. Data gathering is one of the classical issues to be tackled in WSNs. Typically, a data gathering sensing element network consists of a sink and plenty of sensing element nodes. The sink is a entryway to attach the sensing element network and therefore the net. Over the net, users will question the network by causation associate inquiry packet to the sink. Once receiving a user question, the sink forwards it to the sensing element nodes. After the responses from the sensing element nodes, the sink sends the corresponding results back to the user. Potency and adaptableness are two important problems in data gathering.

With the normal knowledge gathering approach [1], the sink receives one knowledge packet from every sensing element node within the typical state of affairs mentioned antecedently, resulting increases data traffic. This decision approach is called Centralized Exact in that paper. Because the sensing element nodes area unit typically battery powered, the intensity of data traffic encompasses a serious impact on the life of WSNs. If the quantity of the ensuing traffic may be reduced, the life of the full network is considerably prolonged. Recently, Compressive Data Gathering (CDG), a progressive knowledge gathering algorithmic rule supported compressive sensing (CS), has been projected to increase the lifespan of WSNs during this manner [4]. Utilizing the meagerness of sensing element readings, CDG only desires fewer knowledge packets than Centralized exact at a high level of accuracy. Energy Efficient Data Gathering (EEDG) makes use of each the low-rank and short term stability options to cut back the quantity of traffic and improve the amount of recovery accuracy using matrix completion. Compared with CDG, EEDG has more elastic since it's freelance of specific device networks.

II RELATED WORKS

In data gathering sensor networks, network information suppression and compression are the main ways to scale back the number of data traffic, ultimately resulting in low power consumption and long time period. The abstraction and temporal correlation of sensor

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reading are the inspiration of the present data suppression and compression techniques.
Ancient supply secret writing was associated with degree network data compression methodology that took advantage of the abstraction correlation on the secret writing aspect [5] - [7]. To attain the most effective compression performance, it always needs the coordination of sensor nodes. Clustered Aggregation (CAG) methodology that divided a detector network into clusters in line with detector readings [5]. With the clusters, just one reading per cluster was forwarded to the sink and also the overall error remains but a predefined threshold. However, ancient supply secret writing has many limitations. However, the joint improvement of compression and routing has been tested to be NP-hard [7].

Distributed source coding (DSC) used to scale back the complexness at the sensor nodes and built use of the special correlation at the sink [8]. The Slepian-Wolf theorem in [9] indicated that once readings are encoded singly, the ensuing compression was as economical because in ancient compression once the readings were encoded conjointly, as long because the singly encoded messages were decoded conjointly. Despite the numerous improvements, DSC still has some serious issues. Initially, DSC algorithms typically cause complexity in time and area. Secondly, DSC worked well once the correlation among neighboring sensors didn't amendment over time. Compressive Sensing (CS) used for locating thin solutions to underdetermined linear systems [10]. Over the past years, a range of CS-based strategies were devised to solve the info gathering drawback in WSNs [11].

III METHODOLOGY

A. System Description

In WSN several users wish to inquire the information of the full network. When receiving the inquiry request of a user, the sink node can forward this request to the full network, and therefore the network can reply to the user through the sink node. during this work, we have a tendency to suppose that WSN has established a routing protocol, as an example, the foremost often used tree based mostly protocol. Packet loss happens once data packets travel across the sensing element network to the sink node. While not loss of generality, we have a tendency to assume all the measurements non heritable by sensing element nodes are positive real numbers.

B.EEDG Methodology

In our analysis, we have a tendency to think about a device network consisting of N nodes. Every node is allotted associate degree whole number ID, n, which is within the vary of one to N. we have a tendency to assume that each and every readings generated by device nodes are positive real numbers. We have a tendency to additionally assume that point is split into equal-sized time slots. With the Centralized actual rule, throughout whenever slot, each device node probes the environment and forwards the reading to the sink through a multi-hop path. As a result, N readings will be collected at the sink for every time interval. For T time slots, N × T readings will be gathered. These readings will be organized into associate degree N × T matrix X ($X \in R^{N\times T}$).

In EEDG every sensing element node solely forwards its readings to the sink consistent with a predetermined chance (i.e., a preset sampling ratio). As a result, only a fraction of the readings from every node area unit transmitted to the sink, resulting in a range of various edges like reduced traffic and prolonged life. Of course, this conjointly leaves some entries in X empty. In our analysis, once associate degree entry in X is missing, we have a tendency to use zero as a placeholder to switch the entry. Additionally, we have a tendency to use B to denote this changed matrix. Note that B is that the matrix accessible at the sink once EEDG is employed to gather the readings. Moreover, we have a tendency to outline a special N × T matrix,

$$Q(n,t) = \begin{cases} 0, & if\ X(n,t) is\ unavailable \\ 1, & Otherwise \end{cases} \quad (1)$$

Herezis the sequence number of the time slot

$$B = X. * Q \quad (2)$$

Here * represents a scalar product (or dot product).

$$B(n,t)=X(n,t)Q(n,t). \quad (3)$$

Using the matrix completion technique impressed by compressive sensing, STCDG makes an attempt to recover the missing entries expeditiously.

Namely, EEDG tries to use the unfinished data matrix B to get associate approximation matrix, X , each entry of that is sufficiently near the corresponding entryin X quantitatively.

C.Low Rank And Short Term Stability

If the matrix possess low rank, then we use SVD(Singular Value Decomposition) for the given matrix. The SVD function is given by

$$S = US'V^T \quad (4)$$

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Here U,V are the unitary matrix and S is the N×T diagonal matrix and whose diagonal elements are in the Decreasing order $(D_1, D_2 \dots \dots \dots D_n)$. where $D_1, D_2 \dots \dots \dots D_n$ are singular values.

For check X that has a good low rank matrix, we apply nuclear norm function as,

$$g(d) = \frac{\sum_{i=1}^{d} D_i}{\|X\|_*} (5)$$

Arranged accordingly to the rank gives,

$$g(d) = \frac{\sum_{i=1}^{d} D_i}{\sum_{r=1}^{r} D_i} (6)$$

Where$\|X\|_*$is the nuclear norm.

We found top singular values through nuclear norm. Short term stability of X denotes the gap between each pair of the adjacent readings for every sensor.The gap is denoted as

$$\text{gap(n, t)} = (\text{X(n, t)} - \text{X(n, t} - 1)) \quad (7)$$

where$1 \leq \text{n} \leq \text{N}$ and$2 \leq \text{t} \leq \text{T}$.

Each adjacent pair is equal to:

$$dif(n,t) = ((X(n,t+1 - X(n,t)) - (X(n,t) - (X(n,t-1))$$

$$= X(n,t+1) + X(n,t-1) - 2.X(n,t)$$

Where$1 \leq n \leq N \; and \; 2 \leq t \leq T-1$

The normalized difference for each entry in X is given b

$$h(n,t) = \frac{|dif(n,t|}{mean\ gap} \quad (8)$$

i) Low Rank

In low rank matrix that uses, subset of entries we recover the datum. The recovery problem is given bellow,

$$minimize\ rank(X) \qquad subject\ to\ A(X) (9)$$

Rank(X) denotes rank of matrix A. C is the transformed matrix. This rank minimization is not practical because of NP-hard. The time complexity is double the exponential function of matrix dimension. So we change the above problem Equation (10) into a nuclear norm minimization problem as,

$$minimize\ \|X\|_*$$
$$subject\ to\ X.*\ M = C\ (10)$$

The matrix X whose rank r satisfy $X = LR^T$, where $L = N \times r \; and \; R = T \times r$ matrix. We have more than one pair of L and R. So it meet the following condition

$$minimize\ \|L\|^2_F + \|R\|^2_F$$
$$subject\ to\ (LR^T).*\ M = C (11)$$

But it may not holds good. That's why we introduce one regularization parameter Z that can be tuned between the collected data and achieved low rank

$$minimize\ \left\|(LR^{T}).*\ Q - C\right\|^2_F + z(\|L\|^2_F + \|R\|^2_F) \qquad (12)$$

ii) Short term stability

The gathered data's are formed in N×T manner that possess short term stability. To minimize further recovery errors, consider another condition for short term stability.

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$$\left\|(LR^T)K^T\right\|^2_F \quad (13)$$

At last we get the short term stability condition as bellow,

$$minimize\ \left\|(LR^T).*\ Q - C\right\|^2_F + z\left(\|L\|^2_F + \|R\|^2_F\right) + \eta\left(\left\|(LR^T)K^T\right\|^2_F\right) \quad (14)$$

Here η is the turning parameter and K is the topelitz matrix. The structure of the topelitz matrix is given where the diagonal elements are gives as ones. The upper diagonal elements are '-2' and lower diagonal elements are '1'.

$$K = \begin{bmatrix} 1 & -2 & 1 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{bmatrix} \quad (15)$$

Timing parameter Z and η is used as a tradeoff among the optimization of targets. We make weight of "1" to the first term in equation (10) and set Z=η=0.1. Using least square method, the final solution can be obtained. First we set L and R initial values in a random manner. After which we fix an L and R value and make another one optimization value. If we do the above step then the problem is converted into standard linear least square problem. At last we swap the roles of L and R.

iii) Empty columns

The sensor node sends the data according to preset probability. If the sampling rate is low, empty columns will be presented, due to which entire column in the matrix C will become empty. Assume C has K empty columns, then C has T-K non empty columns. When k=0 the matrix generated is N×(T-K) that is denoted as c'.The recovered data matrix is known as X'.

When N rows and (T-K) columns. After that we generate N×T matrix(X'') that has K empty columns and T-K non empty columns. At last we use short term stability feature for filling empty columns in X''.This problem has solved by semi definite programming (SDP).

$$minimize\ \|X - X''\|^2_F + \|XS^T\|^2_F \quad (16)$$

Finally we form recovered matrix "X''. the data's in "X'' should replace by corresponding entries in C to reduce the recovery error. This is done by using following approximation matrix Y

$$Y = X'' - X'''.*\ M + C \quad (17)$$

VSIMULATION RESULTS

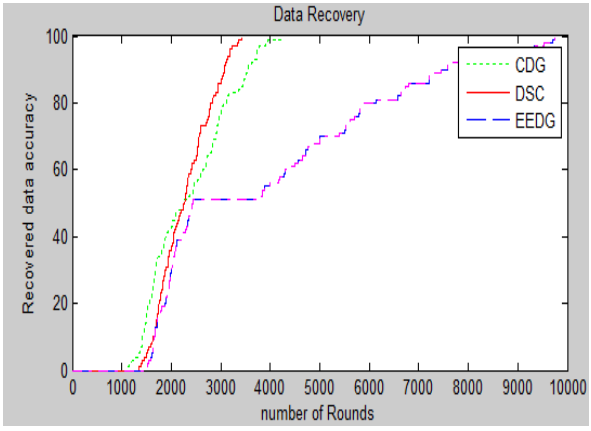

Fig1 Recovered Data Scheme

Figure 1 show the data recovered at sensor node. This data is compressed 1:15 ratio. So that 15% of data only transmitted. This reduces the energy consumption of the node and improves the networks lifetime. The removed data during the compression process has been recovered at receiver end using matrix technique.

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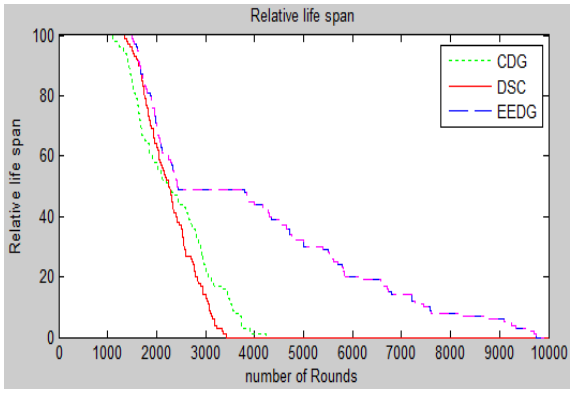

Fig 2 Relative Life Span

In Figure 2 shows the life span of various data gathering schemes. In EEDG required only partial readings to be transferred. The rest of the time sensor networks are in ideal state. So the life span of the network is high compared with other data gathering schemes.

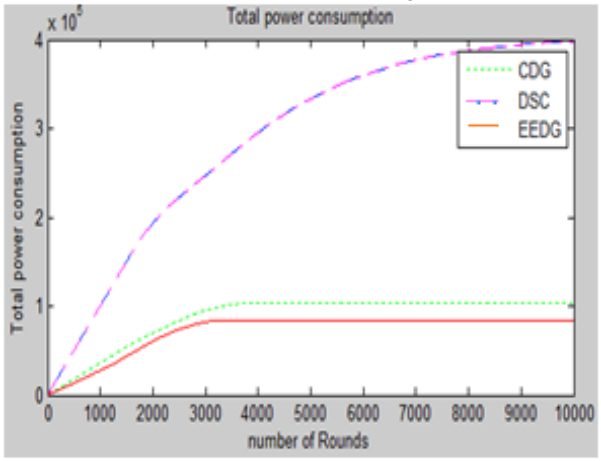

Fig 3 Total Power Consumption

Fig 3 shows that the energy efficiency of EEDG method has been compared with other data gathering schemes such as CDG and EDCA over 10000 rounds of data collection and found to be comparatively efficient.This method consumes lesser energy throughout the time period .the energy reduction is because of less number of transmission.

VI CONCLUSION

The Energy Efficient Data gathering for WSN conserves more than 50% of energy. These schemes achieved the longer lifespan and accuracy. Due to its generality the Energy Efficient Data Reconstruction based on matrix for WSN work can be applied for variety of data gathering applications without many overheads. Here only less transmission are taken into account for transmitter side so minimum energy was needed for this data gathering scheme. The life span also prolonged in this data gathering scheme. The EEDG achieved low energy consumption and increased the lifespan of the sensor network.

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Classification Of Surface Roughness Of End Milled 6061 Aluminum Alloy Components: Data Mining Approach

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Abstract-*Automatic classification of surface roughness of machined surface finds its application in product quality. Machine vision is used in the automatic classification of surface roughness of the end milled components. Machine learning approach to machine vision system helps in classifying image features of machined surface. The steps involved in this approach are component machining, surface roughness measurement, Image acquisition, Image preprocessing, feature extraction and classification. There are various data classifier are available in the literature, however the selection of best classifier yield higher classification accuracy. In this article, images of various cutting conditions such as speed, feed and depth of cut were acquired, preprocessed and features are extracted. The features were classified using C4.5 algorithm and Naïve Bayes algorithm and compared. The study result shows that C4.5 algorithm performs better.*

Keywords: Machine Vision, Data Mining, Feature Extraction, Image processing, Classifier, Surface roughness

I INTRODUCTION

Automation becomes a vital role in the manufacturing environment to sustain in the competitive market. Automation can be employed at various levels right from selection of raw material to the packaging of final product. In the process of automation, machine learning approach helps in imparting human intelligence to machines. The machine vision system is one of the solutions for automation of inspection process. The Machine vision system employs one of the following approaches namely pixel –based approach and feature-based approach. The image characteristics are derived from pixel values directly. However it requires high tuning and effort in deriving the characteristics of the image. The feature-based approach utilizes features extracted from the images for training a classifier and thus designing visual classification of surface roughness system.

Literature addresses many industrial situations namely detecting defective products [1]. The pixel- based approach is used for machine vision application to detect multiple defects such as scratches, scraps and bubbles occurring in glass and plastic production process [2]. The Machine vision system is employed in tool condition monitoring [3-5]. The above listed articles are based on pixel- based approach developed automated visual inspection system which are time consuming and trial and error basis. These drawbacks were overcome by feature-based approach with machine learning algorithms.

Literature study shows, there are various image features could be extracted under statistics and spatial frequency domain. Histogram features are extracted from surface images are used to classify the defects like deep scratch and Minor scratch [6]. Tamura features such as coarseness, contrast, directionality, line likeliness, roughness and regularity are used to classify rock images by Probabilistic Latent semantic analysis and sum of square difference classifier [7]. The spectrum parameter major peak frequency, standard deviation of gray level and the arithmetic average of the gray level were used to correlate between vision roughness and stylus roughness [8]. Gray Level Co-occurrence Matrix (GLCM) texture features were used to determine the suitable features for surface roughness quantification [9]. RMS features of the Acoustic Emission Signals with wavelet transform were used in classifying the grinding wheel wear with help of

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data mining classification technique called C4.5 algorithm [10]. The performance analysis on the classification algorithms was done on the data set with known class labels [11-12]. Decision tree based classification was performed in the prediction of surface roughness of laser polished components [13].

In this study, an attempt is made to use C 4.5 algorithm and Naïve Bayes algorithm in combination with GLCM features of the machined surface images for classifying surface roughness values. A CCD camera captures the image of the 6061 Aluminum alloy surface after end milling operation. The images are then sent for image preprocessing in order to obtain useful image data without the influence of noise. The GLCM Texture features are then extracted for various machined surface images. Surface roughness measurement was carried out to label classes. From the literature, the major problem here is to select the right feature- classifier combination. The main contribution of this article is of two phases. First, GLCM features were used for feature selection and classification using Machine learning C 4.5 algorithm. Then, in the second phase, Classification was performed using Naïve Bayes algorithm. The performance analysis of both algorithms was studied and reported.

II THE EXPERIMENTAL SETUP

The Experimental setup is designed for capturing surface images of 6061 aluminum alloy component prepared by end milling operation. The experimental setup used for this study was as shown in the fig .1 The arrangement consists of a CCD camera with zoom lens, a CPU with suitable software to capture and store the image.

A. Component preparation

6061 Aluminum alloy part of dimensions of 50mm x 50mm x 25 mm is machined using conventional vertical milling machine. HSS ϕ12mm twist fluted end milling cutter is used as cutting tool. Machining the aluminum alloy part was carried out at various level of cutting conditions. The following cutting conditions are chosen for this study;
Speed, Feed and Depth of cut.Table 1. Show the level of various cutting conditions. 27 experiments were conducted by changing the cutting conditions in each level.

TABLE I
LEVELS OF CUTTING CONDITIONS

Input Parameters	Level		
	A	B	C
Speed (rpm)	120	240	360
Feed (mm/rev)	0.1	0.2	0.3
Depth of cut(mm)	0.6	0.9	1.2

B. Surface Roughness Measurement

The surface roughness of the machined parts is measured using the conventional stylus instrument. A Taylor- Hobson surtronic 3 + instrument was used in our work to measure the average roughness value (Ra) .The cut off length was fixed as 0.8mm for measuring the surface roughness. The measured surface roughness values are tabulated in the Table 3. In order to accomplish training phase, surface roughness values are classified as in Table 2.

TABLE II
CLASS LABELS

Class	Symbol	Surface Roughness Range(μm)
Very Very Low	vvl	0.5-1.0
Very Low	vl	1.01-1.5
Low	l	1.51-2.0
Medium	m	2.01-2.5
High	h	2.51-3.0
Medium high	mh	3.01-3.5
Very High	vh	3.51-4.0
Very Very High	vvh	4.01-4.5

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C. Image Acquisition and Image preprocessing

The machine Vision system consists of a WATEC 902B monochrome CCD camera, frame grabber and interface software. A "Navistar 9000 series "zoom lens was attached with the camera for better magnification. The machined samples were kept stationary under the camera keeping position and zoom level unchanged. The surface images are captured and stored in the computer system. The image preprocessing was carried out in MATLAB R2009b software. The following steps have been carried out for the image pre-processing. They are; Morphological opening with 3x3 masks, Image Subtraction and Contrast Adjustment.

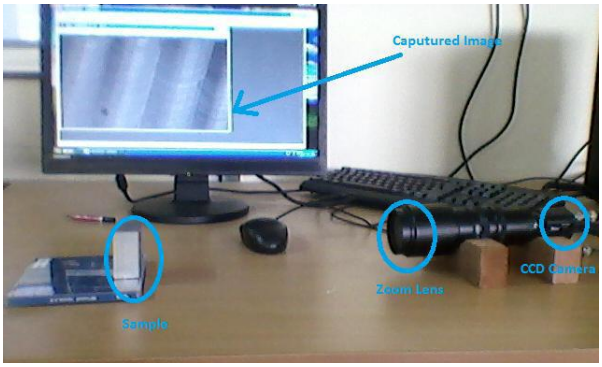

Figure 1 Experimental set up

III FEATURE EXTRACTION

Feature Extraction is the computation of specific measures that define the signal. The image features are taken from samples at different cutting conditions become input to the classifier in this study. The features are application dependent and one has to choose a good set of features for better classification. This process is called feature extraction.

A. Grey Level Co-occurrence Matrix (GLCM)

Texture analysis is the quantification technique that uses an image for extracting texture properties. It is the basically applied to image processing operations such as classification, segmentation and synthesis of textured images. Grey Level Co-occurrence Matrix is one of the famous methods in texture analysis. The Grey level Co-Occurrence matrix is based on the estimation of second order joint conditional probability density functions. The probability describes how often one gray tone will appear in a specified spatial relationship to another gray tone on the image. GLCM is a matrix S that contains the relative frequencies with two pixels: one with gray level value i and the other with gray level j-separated by distance d at a certain angle θ occurring in the image. Given an image window W(x, y, c), for each discrete values of d and θ, the GLCM matrix S(i, j, d, θ) is defined as follows. An entry in the matrix S gives the number of times that gray level i is oriented with respect to gray level j such that W(x1, y1)=i and W(x2, y2)=j, then (x2,y2)=(x1,y1)+(d cosθ + d sinθ). We used d={5 10 15 20}and θ={0° 45° 90° 135°}.There are four GLCM texture features are extracted, they are Contrast, Correlation, Energy and Homogeneity. Table. 3 depict the extracted features and its class.

TABLE III
SAMPLE TRAINING DATA SET

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Run No:	Contrast	Correlation	Energy	Homogeneity	Surface Roughness (Ra) µm	Class label
1	3.9631	-0.0182	0.2055	0.6282	4.36	vvh
2	7.9721	-0.0041	0.1292	0.5392	3.28	mh
3	4.1442	0.0486	0.2007	0.6219	2.56	h
4	6.8816	0.1624	0.1822	0.607	2.72	h
5	5.9173	0.1022	0.199	0.62	1.16	vl
6	5.1407	0.0848	0.2063	0.6244	3.44	mh
7	6.2108	0.0836	0.2087	0.6174	3.4	mh
8	4.4348	0.0418	0.2376	0.6435	1.23	vl
9	5.9383	0.0263	0.1788	0.5976	1.1	vl
10	6.8869	-0.0076	0.1361	0.552	2.96	h
11	8.5669	-0.0144	0.1166	0.5227	2.56	h
12	6.2499	0.0246	0.1781	0.5945	2.58	h
13	6.2145	0.0206	0.1764	0.5778	3.32	mh
14	6.1398	0.0312	0.1618	0.5817	2.16	mh
15	8.004	0.6116	0.2044	0.7081	1.32	vl
16	6.1389	0.0118	0.2072	0.612	4.32	vvh
17	4.6432	0.7705	0.2218	0.7541	3.84	vh
18	5.5766	0.0359	0.2409	0.6511	3.88	vh
19	6.5538	0.6689	0.204	0.7158	3.56	vh
20	7.8645	-0.0193	0.1366	0.5488	2.6	h
21	6.9891	0.0337	0.1494	0.5629	1.96	l
22	5.4459	-0.0486	0.1905	0.5961	1.2	vl
23	7.9747	0.0061	0.1466	0.5568	1.14	vl
24	8.8893	-0.027	0.1483	0.5504	1.84	l
25	8.6527	-0.0072	0.1524	0.562	1.068	vl
26	8.8993	-0.0354	0.1515	0.5526	1.72	l
27	8.5457	0.0149	0.1466	0.5521	0.888	vvl

IV DATA MINING

A. Decision Tree

Decision tree is one of the data mining techniques used in the industry to retrieve valuable knowledge from the available data set including surface roughness data. Decision tree used in this article in the classification of surface roughness data for future events. A standard tree induced with C5.0 (or possibly ID3 or C4.5) consists of a number of branches, one root, a number of nodes and a number of leaves. One branch is a chain of nodes from root to a leaf, and each node involves one attribute. The occurrence of an attribute in a tree provides the information about the importance of the associated attribute. A WEKA implementation of C4.5 algorithm" J48 algorithm" is a widely used in constructing decision trees. Decision tree algorithm (C4.5) has two phases: building and pruning.

B. Naïve Bayes Classifier

The Naïve Bayes algorithm is a classification algorithm based on Bayes rule that assumes Y is the function of n conditionally independent attributes X1, . . .,Xn. This assumption dramatically simplifies the representation of P(X|Y),and the problem of estimating it from the training data. The minimum number of objects was used to classification surface roughness data set. V RESULTS AND DISCUSSION In this article, decision tree algorithm was used. The input of the decision tree is set of GLCM features. The output of the algorithm is a decision tree as shown in fig. 2. In order to avoid over fitting of data and higher percentage classification accuracy, a set of experiments were done to model the classifier. Fig.3 shows the relationship between number of objects and classification accuracy. The number of objects required to form a class was varied from 1 to 324 with a step of 27. The corresponding classification accuracies were plotted. It is observed that 135 objects classification model has highest percentage classification accuracy. Since minimum number of objects are required to form class so that it has minimum branching. Hence, it is logical to choose 135 objects model to classify test dataset. The model was designed keeping confidence factor with default value(0.25) as the confidence factor does not influence the classification accuracy[6].The classification result of C4.5 algorithm is also depicted in the form of confusion matrix as shown in fig. 3. Fig.4 shows the confusion matrix of the classification of GLCM features for surface roughness classifications using Naïve Bayes algorithm. On observing confusion matrix of decision tree, misclassification among classes was high in Naïve Bayes compared to decision tree. Decision tree classification technique found to have correctly classified instances with respect

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to each class except for high(h), medium high(mh) and very low(vl) classes. Naïve Bayes classification technique found to have misclassification among almost all the classes.

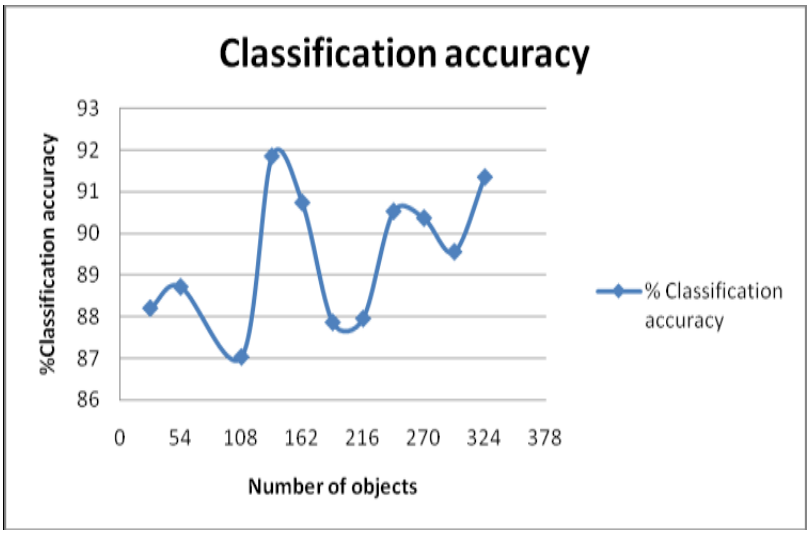

Figure 2 Number of objects vs %classification accuracy of decision tree

V CONCLUSION

This article deals with machining learning approach for automatic classification of surface roughness of end milled Aluminum alloy samples from its image features. There are eight different classes were considered. Set of GLCM features have been extracted and used as input for decision tree and Naïve Bayes classifiers. From the results and discussions, one can conclude that decision tree classification using J48 algorithm can effectively applied for practical applications of classification of end milled Aluminum alloys. Also, It is understood from the confusion matrix, J48 algorithm classifies the given data set better than Naïve Bayes algorithm.

a	b	c	d	e	f	g	<-- classified as
9	0	0	0	1	0	0	a = vvh
0	23	1	1	0	0	0	b = mh
1	2	26	0	1	0	0	c = h
1	1	0	33	0	0	0	d = vl
0	0	0	1	14	0	0	e = vh
0	0	1	0	0	14	0	f = l
0	0	0	0	0	0	5	g = vvl

a	b	c	d	e	f	g	<-- classified as
4	1	0	4	0	1	0	a = vvh
7	7	1	4	1	5	0	b = mh
1	9	6	9	0	5	0	c = h
2	2	1	17	3	10	0	d = vl
2	1	1	9	2	0	0	e = vh
0	0	0	2	0	13	0	f = l
0	0	0	0	0	0	5	g = vvl

Figure 3 Confusion matrix of decision tree Figure 4 Confusion matrix of Naïve Bayes Classifier

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A Study On Computer Based Monitoring SystemFor Hazardous Area Safety Measurement UsingVirtual Instrumentation

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Abstract-Today there is a great challenge in the development of industrial hazardous safety monitoring for the application of gas leaks, fire, smoke, radiation etc. In all related fields of investigation, a key matter is the need flexible and practical virtual instruments, a way to easily expose the multi- sensors to the hazardous levels in risk concentration. The implementation of wireless sensor network provides an alternative solution by deploying a larger number of disposable sensor nodes. The Sensor data may consist of industrial environmental parameters like critical temperature, gas leakage, radiation, fire, smoke and the dynamic variations of these physical quantities. This software platform is in the terms of virtual instruments developed under Lab VIEW programming environment and integrated with computer controlled system.

Keywords: computer control, hazardous environment, Lab VIEW, virtual instrumentation, wireless sensor network.

I INTRODUCTION

Industrial safety is one of the major issues in hazardous environment, specially industries like fireworks, chemical, foundry and manufacturing etc. In hazardous environment, safety is a very important factor. To avoid any types of unwanted phenomena all hazardous area follows some basic preventative measure and phenomena. Communication is the factor for any industry today to monitor different parameters and take necessary actions accordingly to avoid any type of hazards. To avoid health injury and material loss, protection system as well as faithful communication system is necessary inside and outside the industry. To increase both safety and productivity, a reliable communication must be established between workers and a fixed base station. The wired communication system is not effective. The reliability and long life of conventional communications systems in harsh hazardous environments has always been a problem. Inside the industry due to uncomfortable situation the installation cost as well as maintenance cost is high for wired communication networks. It is very difficult to install the wired communication system it again inside industry after a landslide or damage due to some reason. Due to maintenance activity, if by any means some workers trapped, to maintain the continuity of the communication system is very much important to know the actual position and condition of the trapped workers. To monitor multi parameters during this condition it is very much necessary to maintain the communication system as usual. Accordingly, development of safety monitoring system to accurately detect temperature, radiation, flammable and poisonous gas and fire and smoke on real-time has significant meaning to safety and rescue of disaster.

Hazardous area safety monitoring system based on wireless sensor network can effectively and accurately reflect dynamic situation monitored with help of computer based virtual instrumentation techniques .So, wireless communication is the essentially need today for the fast, accurate, flexible safety monitoring and control process in hazardous environment.

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There are different other research ideas proposed by different people on wireless communication based safety monitoring only environmental monitoring with few parameters with single wireless sensor node. For the successfully wireless data transmission has been increased interest in the Zigbee standard, in particular for an agent based wireless local positioning system with Zigbee technology is implemented, mainly for factory level applications. A cost effective Zigbee based wireless safety monitoring system with early-warning intelligence on temperature, radiation, flammable and poisonous gas and fire and smoke in hazardous area. With virtual instrumentation software, the safety system is obtained. With the test, the accident in the hazardous area can be found before the damage occurs. The industrial accident and environmental pollution is reduced more. The system can also provide a friendly human-machine interface. Additionally, it is convenient for the system maintenance and function expansion

II SYSTEM ARCHITECTURE

Based on requirements above, system architecture of the wireless sensor network for hazardous environmental monitoring is designed as Figure 1. The sensor network consists of a set of sensor nodes across the hazardous area, as ink node and a base station. Sensor nodes are designed to sense gas leaks, radiation, critical temperature, fire and smoke across the hazards field in this application. All infield sensory data are wirelessly transmitted into a sink node, which then sends them to the base station for data storing and analyzing using Zigbee protocol communications.

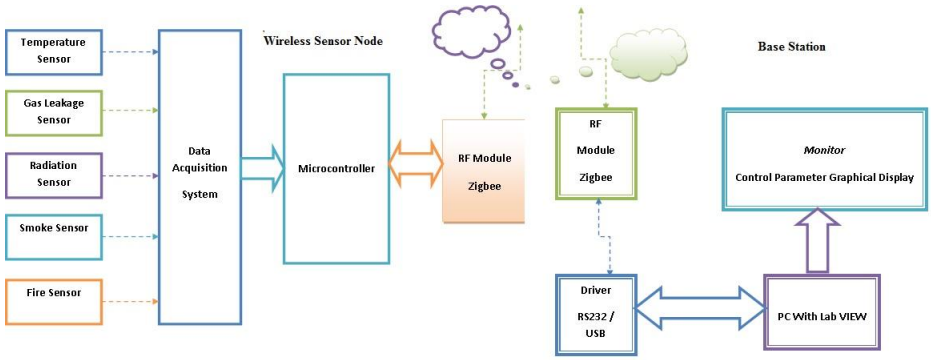
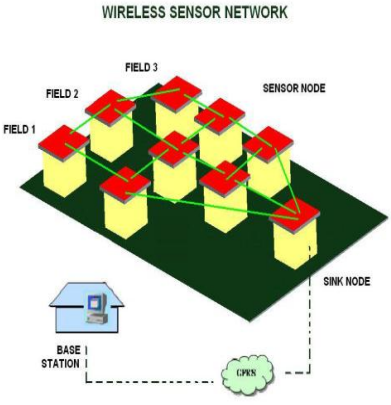


Figure 1: System Architecture

This research paper discusses the method of hazards safety monitoring system based on Zigbee communication with help of microcontroller MPS480 and RF module CC2500 apply SPI to implement the wireless exchange of information. The NS2 (Network Simulator) network simulation tool is used to test experiments. The paper reviews different aspects of Zigbee networks standard: protocol versions, network architecture routing and security. Ideas for improvement of Zigbee protocol are proposed, such as applying an additional routing algorithm compatible with the existing versions of Zigbee standard. Suggestions for improving Zigbee security architecture are also made. The research article explains the various problems encountered in surface mining and underground mining. Author has also mentioned on the efficient use of GPS in surface mining with the uses of RFID in underground mine and is elaborated in detail. The use of mobile objects in mine is also mentioned with the advantages Sensor node is developed based on the MSP430FG4618/F2013 module, an IEEE 802.15.4/Zigbee wireless microcontroller, which could provide a wide range of low cost solution for wireless sensor network applications.



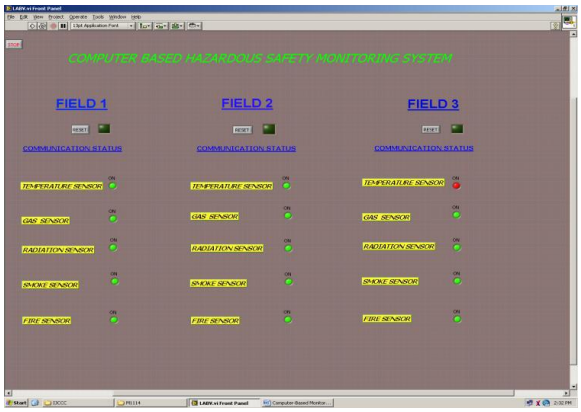


Figure 2: Wireless sensor Networks (WSN) Figure 3: Virtual Control using Lab VIEW

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A. Sink node

Sink node for aggregating and delivering sensor data of the whole network is designed based on CC2500, an embedded MPS480 controller module in order to meet future high-performance requirements. Sink node would be improved to connect weather sensors to monitor the local micrometeorological information in future design.

B. Network Protocol

In Zigbee network, there are three types node: coordinator, router and end device. All Zigbee networks must have one coordinator, which can select the frequency channel, start network, and allow other nodes to join it and other service. An end device and router are used to send and receive messages. Differently, a router can relay messages and allow the child nodes to connect to it. In our application, the network structure is designed cluster tree topology, which consists of a coordinator and a set of routers and end devices. A few sensor nodes are defined as the routers, while other sensor nodes are defined as end devices. In the future the sensor nodes acting as end devices would be powered by batteries instead of solar panels in order to optimize the design and reduce the cost.

C. Base Station

Base station is a host computer interfaced into RF Zigbee module with lab VIEW graphical programming. The management software running on the computer is designed to receive data real time from the sink node based on C/S model, through lab VIEW devolved virtual control system in computer shown in figure 3.The lab VIEW software has main functions as following.□ Data receiving As the server, listen the port and receive the data after accepting the authorized connection request. And then decode binary data string to obtain parameters according to custom defined data protocol.

- **Data storing:** Store and manage the data of in-field wireless sensor network based on the database. All the data are stored in table fields according to the sensing time and the sensor type.
- **Data analysis against time:** Read data from database table file and generate curves against time of all nodes for data analysis based on these sensor readings.

III SOFTWARE DESIGN AND IMPLEMENTATION

The system mainly consists of field sensors collection part and wireless communication module. The sensor collection part is mainly responsible for gathering the critical temperature, gas leakage, radiation, fire and smoke output acquisition from the internal and external industrial environment. The acquired signal after signal considering, compensation, the I-V circuit conversion, signal amplification and a series of operations will be sent directly to the communication module. Wireless communication module is responsible for sending the real-time data collected in the front of the sensor to Zigbee coordinator and then Zigbee coordinator deals with the data correspondingly, and the data is transmitted by Zigbee coordinator to host computer for display and wireless monitoring status on virtual environment using Lab VIEW software.

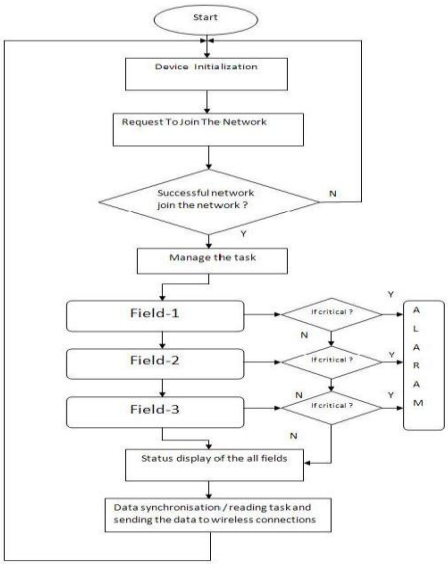

Figure 4: Software control using flow chart

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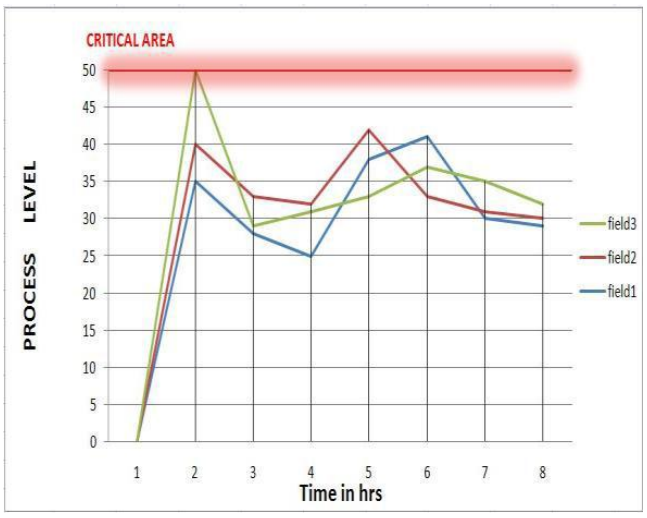
Software is the heart of the monitoring system, and hardware circuit can realize its function smoothly only under the correct guidance of the software. This system uses LabVIEW as development environment. The protocol stack achieves Zigbee alliance reference platform level, and is already widely adopted by global Zigbee developers at present. By testing the system's overall layout, it is known that the sensor module and coordinator module play a main role. Finally the information is transmitted from the coordinator to the control center and received and displayed by the computer in real time. The software control is shown in figure 3 processes defines the initialization of the devices in the system and sends the request to the coordinator to join the network. If the network joined successfully then it will go to the managing task in the system, if it is not success then it will again go to the device initialization and runs again. After the managing task, the three fields available in the system is requested and check the status of the each sensors and the status of the each fields are checked if these fields have any critical status such as the smoke, temperature, radiation etc then immediately the signal was send to alarm indication for safety. If there is no critical status, normally the field result is displayed and the data is synchronized and send to the wired and wireless connections in the network. Then it is again taken to the initial stage, this will repeat for every few seconds.

IV SIMULATION RESULT AND DISCUSSION

A. Performance Analysis

The critical temperature, gas leaks, radiation, fire and smoke conditions were recorded eight hours for the duration of experiment. A significant variation of the inside and outside industrial environment has been observed compared to critical measurement as shown in Figure 5. However, no significant trends have been observed for status. Then simulated values to reach critical observation to verify in during different times.



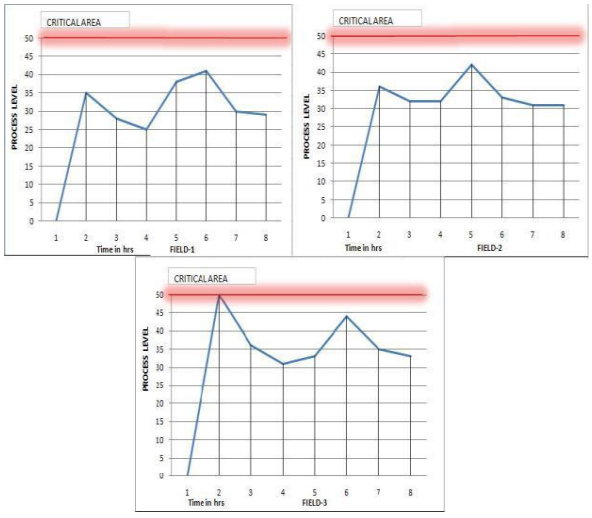


Figure 5: Performance analysis of critical field sensors Figure 6: Field Sensors critical analysis

A. Field Measurements Results

The three felid sensors were observed and exposed to the target analyses prior to deployment. The observed data of the field sensors are shown in figure 6. This indicates that the critical values are required to ensure that the parameter levels are reduced to a comfortable level. There is no significant influence of risk and critical changes. Safety and security trends are almost consistent throughout the experiments as shown in Figure 6.

V CONCLUSION

Traditional safety system can be effectively replaced by the wireless sensor network and virtual instrumentation system proposed in the paper. A larger industrial area and more hazardous area are now can be covered and potential accidents can be controlled efficiently. The system combined the low power; low cost Zigbee based high frequency wireless data transmission technology with computer controlled system. The sensor and Zigbee module can be preferably installed over the critical hazardous factors. Proper monitoring and conversation is possible between the work station and central station. In modern industry, virtual instrumentation based computer controlled system brings huge benefits to the regional economy. However, preparing for hazardous area safety is a critical factor for success. Through advanced technology, wireless sensors network with Zigbee communication based disaster prevention system offers the suitable features with the best stability and performance to help the hazardous safety to monitor all situations around its industrial

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environment. The system also can be easily extended with Zigbee wireless image transmission facility in future; it will improve scalability of hazardous environment and extend accurate position of industrial safety.

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Adoption of Six Sigma Methodology in Reduction of Needle Stick Injuries

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ABSTRACT-*Background: This study focuses on reduction of needle stick injuries in Indraprstha Apollo Hospitals, Delhi. It helped the hospital to understand the difficulties faced by employees and patients while using the needle / sharp objects. Objective: To identify the root causes of needle stick injuries and eliminate them by adopting six sigma methodologies. Results: It was observed that the number of injuries was aimed to reduce it by 50% during the study period. Through appropriate interventions, it was reduced to 20% in three months. Conclusion: By adoption of six sigma approach, there was a significant improvement in awareness levels among the nursing staff which reduced the number of injuries, thereby saving huge costs. Also, the injuries in housekeeping department were reduced to 58% in 2 months.*

KEYWORDS: Needle Stick Injuries; Lean Six Sigma; Lean Six Sigma in Hospitals; Waste management in hospitalsGratitude: Ms. PritindraSachdeva, Manager- Quality and Quality team, Indraprastha Apollo Hospitals, Delhi

I INTRODUCTION

Six Sigma has been widely used in many sectors throughout the world. In general, Six Sigma deals with the fact that the process and product variation is usually a strong factor affecting manufacturing lead times, product and process costs, process yields, product quality, and, ultimately, customer satisfaction (Goh T.N et al., 2006). (Linderman et al., 2003) define Six Sigma as 'an organized and systematic method for strategic process improvement and new product and service development that relies on statistical methods and the scientific method to make dramatic reductions in customer defined defect rates'. The main focus of Six Sigma is to reduce potential variability from processes and products by using a continuous improvement methodology that has the following stages: Define Measure, Analyze, Improve, and Control (DMAIC).

Many hospitals are showing interest in adopting six sigma concepts for addressing various issues such as reduction of medication errors, reduction of discharge turnaround time, etc. Since, needle stick injuries increase the risk towards employee health and safety as well as adds to the cost towards adverse events which in turn affects the patient satisfaction, a project was taken to identify the root causes of such injuries and a specialized team was formed to address this life threatening issue.

II LITERATURE REVIEW

A comprehensive literature review was conducted to understand the difficulties faced by various staff in handling needles and sharp objects; how six sigma has been deployed to address clinical issues in healthcare industry and also about the significance of employee health and safety in any organization. A healthcare customer is a consumer but not a payer. As a result, a healthcare organization may not be rewarded financially for its quality and innovative technology (Lin Guo and Selena, 2012). In July 2000, Mount Carmel Health (Columbus, Ohio) became the first healthcare organization to implement Six Sigma (Lin Guo and Selena, 2012).

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Needle stick Injury (NSI) is defined as a percutaneous piercing wound typically set by a needle point. It may also occur due to sharp instruments or objects which may result in exposure to blood or other body fluids. They are the most common occupational hazard in healthcare sector (UK Essays, 2013). Exposure to blood borne pathogens from sharps injuries continues to pose a significant risk to healthcare workers (J. C. Trim, et.al, 2003). A study conducted at the University of Virginia discusses the retrospective survey analysis among medical students in various departments (Caroline Shen, et. al, 1999). One of the most important occupational risks to healthcare workers is exposure is to blood-borne viruses. A study examined nurses' perceptions of risk of contracting infection following single or multiple exposure to blood or body fluids. The findings of this study suggest that nurses would benefit from education regarding infection from blood-borne viruses (C Leliopoulou, et. al, 1999).

From the literature review, it was well understood that six sigma was not only used in financial and waste reduction cases, but also remains successful in addressing issues related to operational, clinical, service excellence and safety.

III PURPOSE OF STUDY

The main focus of the study is to bring down the number of NSI by studying the underlying causes contributing to such injuries and come out with feasible solutions and to create awareness among nurses with direct impact on housekeeping department. In this study, nearly 1300 nurses across the hospital were targeted to ensure compliance for safe handling of sharp objects.
Thought Leader: Capt. Usha Banerjee, Group Director of Nursing

IV OBJECTIVES OF STUDY

a. To bring down the NSI by 50% during the study period
b. To reduce the cost incurred by the hospital per NSI
c. To improve staff awareness by 85% by conducting various training sessions / campaigns
d. To practice a continuum for the improvements

Define Phase:

A. Project charter:

Nurses being the largest population in an organization accounts for a vast occupational safety hazard. As they are the direct point of contact to the patients and an active channel of care, the community deserves a safe and healthy environment at work.

For every NSI, each nursing staff exposed gets a Tetanus Toxoid. They also undergo several investigations such as AntiHCV, HbStitre, HbSAg and HIV ELISA. In addition, samples from the known patient source are also sent for investigations. Hence, there is a paramount need of recognizing the underlying causes associated and the safe approaches to cut down the number of such incidences.

B. Voice of the Customer (VOC):

Several interactive sessions and group discussions were conducted to capture the voice of the employees. They were questioned on certain experiences post injury, psychological and clinical consequences faced by them, working conditions during needle use, training status of the staff, mode of injury and usage of personal protective equipment's. In order to enhance employee safety, a study was taken and customized six sigma tools were applied.

C. Defining customers and their requirements (CTQs):

The voice of the employees was used to identify the key issues in the process and then was translated into Critical to Quality (CTQ) needs.
1. Control - High (Proper training, monitoring can appropriately address issues related to NSI)
2. Impact - Very High
3. Quantitative Business Specification (CTQ) - Decreasing NSI and associated cost

Table 1: SIPOC Diagram

SUPPLIER	INPUT	PROCESS	OUTPUT	CUSTOMER
Patient	Usage of Needle and Sharps	Refer Figure 1	Safe Procedures	Employee
Employee			Enhanced Employee Safety	
			Cost Savings	
			Improved awareness	

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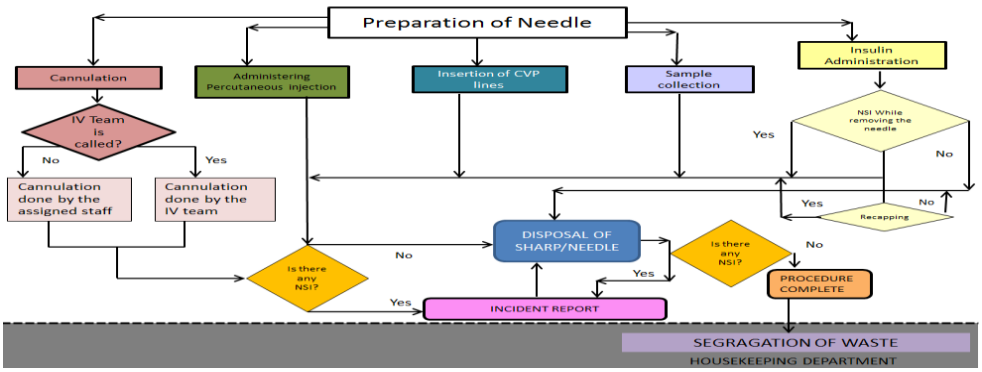

Fig. 1: NSI Process MapFig. 1: NSI Process Map

Measure Phase:

Source of Data: The details on NSI were obtained either from staff clinic or nursing quality dashboard. All the incidents of NSI were taken into consideration to study the causes and effects of the same. The overall distribution of NSI across various services is shown in figure 2.

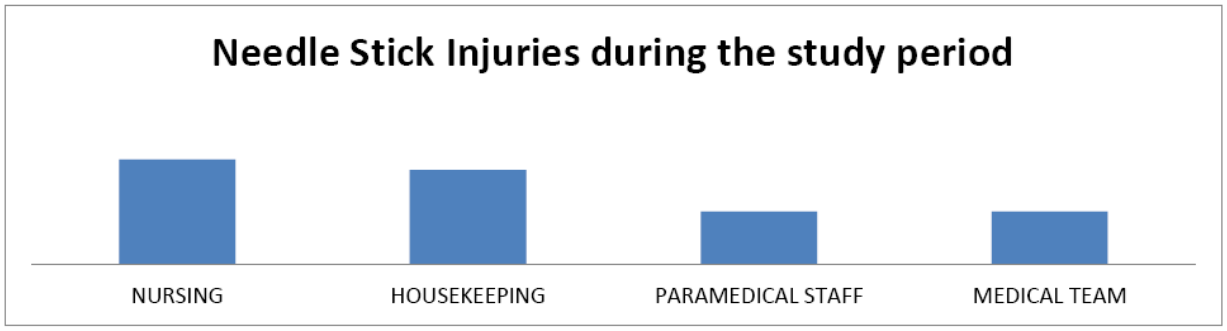

Fig. 2: Distribution of Needle Stick Injuries for given period of time

Analysis Phase:

Unit in charges, nursing supervisors, staff clinic, quality officers, housekeeping staff / employees and management consultant formed an ad hoc group and brainstorming sessions were conducted to discuss the reasons of NSI.Figure 3 shows the fishbone diagram which enumerates the causes of NSI.

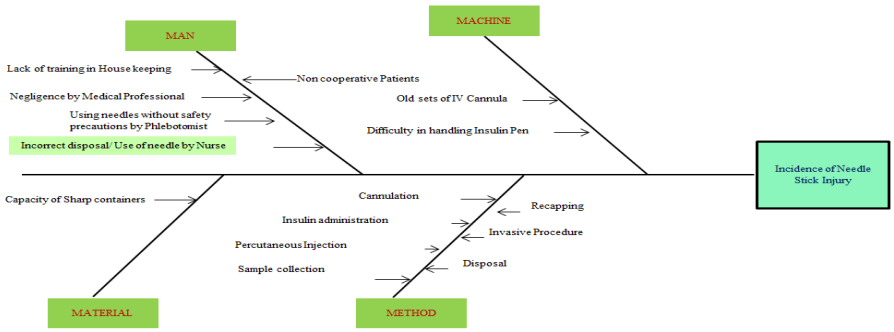

Fig. 3: Fishbone Diagram

A detailed analysis for each category was performed addressing each of the causes. Product validation of insulin pens was done by the research team from registered staff nurses. Figure 4 shows the pare to analysis to quantify the frequency of the causes.

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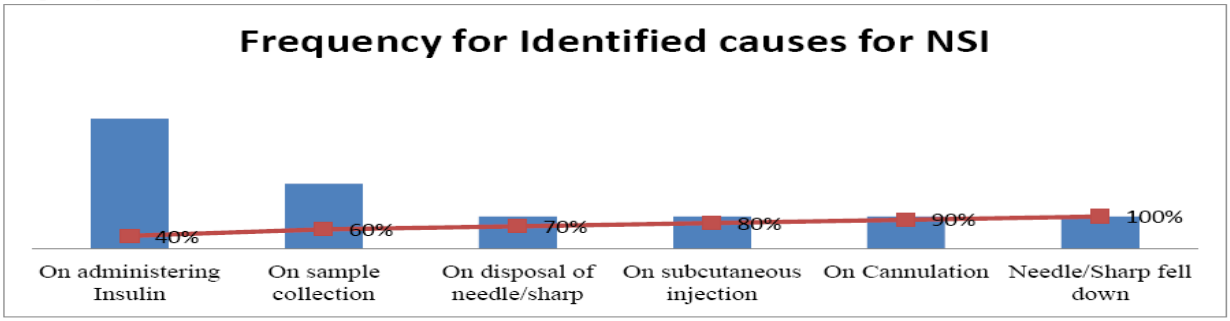

Fig. 4: Pareto Diagram

A scatter plot was used to find out the relationship between the experience of the staff and the number of incidents occurred. It was observed that there was a strong negative correlation of 0.867. Due to high attrition among the staff, as new recruits with less experience were assigned for direct patient care, specific training sessions on waste management, proper handling of sharps were planned for them.

Improvement Phase:

The following causes for NSI were identified and several improvement strategies were implemented.

a. Error in waste management practices
b. Behavioral patterns of patients
c. Recapping
d. Incorrect disposal methods
e. Lack of concentration
f. Difficulty in removing novo fine needle post insulin use

Some of the solutions implemented were:

1. Demonstrative sessions for the nurses on correct techniques of handling insulin pens. This helped to reduce the number of NSI caused while removing the needles fixed in the insulin pen.
2. Sessions on waste management and safe use of sharps and needles were incorporated in the training curriculum and post training competencies were checked for all the staff as shown in figure 5.
3. NSI posters were distributed in all the units highlighting the dos and don'ts.
4. Periodic campaigns on awareness of NSI and infection control were organized across the hospital.
5. Regular follow up with the staff clinic was done to have an authenticated NSI data.
6. Effective communication to the patients explaining the consequences of NSI and their role in employee safety.
7. Adhering to the staff-to-patient ratio for all the patient care set-ups. (Wards and ICUs)

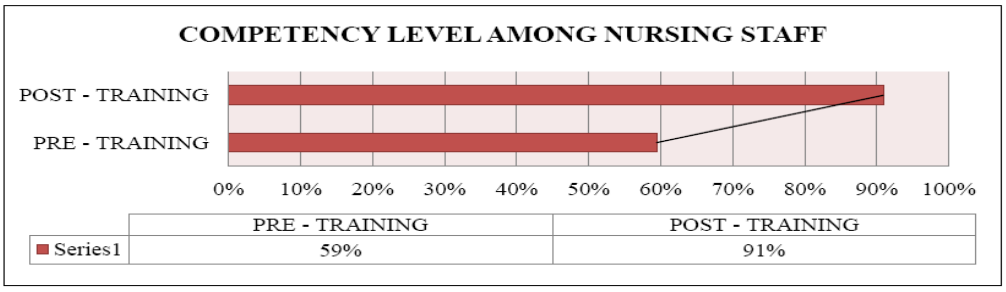

Fig. 5: Competency level among nursing staff

Control Phase:

The data was continuously monitored in this phase and a control plan was developed. Figure 6 shows certain instructions that were followed to prevent NSI and also the steps taken into consideration upon occurrence of any incident.

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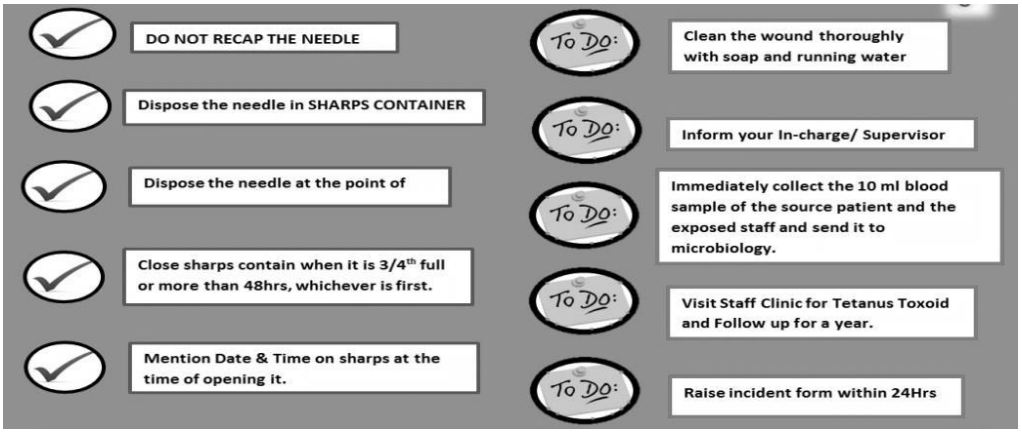

Fig. 6: Safety Tips on Needle Stick Injuries

V RESULTS AND DISCUSSION

By adoption of six sigma approach, there was a reduction in the NSI by 20%. Also, owing to repeated training sessions and periodic competency checks, there was increase in the awareness and knowledge of the nurses by 32%. As a result of awareness, there was 100% reporting of the incidences the same day. This also resulted in timely prophylaxis of the NSI which minimized the transmission of severe blood borne infections. With the reduction in the number of NSI, the cost savings achieved was increased up to 20%.
In order to maintain the confidentiality of the data, the hospital details were not disclosed for the study. Further, it has been planned to use the updated cannulas and sharp containers for safe handling and disposal of the needles. This will also show an impact on housekeeping department who play a major role in waste segregation.

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Experiential Marketing: Analysis of Customer Attitude and Purchase Behaviour in Telecom Sector

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Abstract-*In the present competitive market environment, each and every product has to have an extensive competitive advantage. To acquire new business and to retain the existing customers, lot of innovative approaches has to be carried out. In such conditions, marketing in-tangible products like telecom services attract furthermore stiff competitions. To differentiate a specific brand from the remaining available in the market, traditional marketing strategies which focus on price or quality of the service could not be sufficient. Hence modern management researches advocate focusing on the emotions of the customer. If the customer has experienced the quality of the service in real time even before availing the service, there are considerable chances that the attitude of the customer is lifted up towards the service and the purchase behavior is improved. This study explores the experiential marketing approach of the public sector telecommunication company, BSNL and examines whether the customer attitude and purchase behavior of the enterprise customers were improved subsequently. For the study, provision of Internet Leased Line services as a free trial to the enterprise customers and the availability of "3G Experience Centers" in BSNL premises are the services taken into account. A survey is conducted with respect to these two BSNL enterprise services and the detailed analysis is presented based on both quantitative and qualitative approaches. Quantitative techniques are performed by means of survey questionnaires given to the enterprise customers and qualitative techniques are carried out by direct interviews with the customer relationship managers from BSNL who are the in-charges of the experience delivery to the customers. Findings show that the effect of experiential marketing has positive impact towards the customer attitude and their purchase behavior. This study add values to the need of experience marketing in the telecommunication sector and provides pragmatic confirmation to the consequence of experience marketing on customer building and business promotions.*

Keywords: BSNL, Customer Attitude, Purchase Behaviour, Experiential Marketing, Relationship Marketing, Service Marketing, Telecom sector

I INTRODUCTION

For an effective business communication, customer satisfaction is the ultimate requirement to be fulfilled. The Customer Relation Management (CRM) plays the key role in the business communication [8]. CRM can be assumed as pyramid with five vital building blocks of successful business establishment [1]. Various strategies need to be formulated to establish and maintain a business. Based on the strategic plans, the valuable information about the customer in the form of data is collected. The data collected has to be integrated and analyzed for further processing. Promotional activities and Marketing attributes have to be framed and relevant and appropriate marketing techniques are designed to reach the customers. By means of the marketing procedures, the customer starts experiencing the products being promoted. The satisfaction level of the customer is determined by the customer attitude and the experience. The successful business model can be framed based on these five layered pyramid structure as shown in Figure. 1.

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Figure.1. Customer Relation Management – Pyramid

For such successful business model, the marketing techniques have to be constantly renewed and innovative concepts have to be introduced periodically by the marketer. In the ever growing marketing trends, the new practice is the elevation of experiential marketing. In the promising experiential economy, the traditional marketing and business methods does not have much hold in the customer satisfaction [2]. Traditional marketing strategies concentrate on the price and the quality of the products whereas the experiential marketing involves customer experiences as the major source of promotion [3] [12]. The flavor of the real time experience of the product shall be available to the customer even before the actual purchase. When a need for the particular product or service arises to the customer, the attitude tends to inclined towards the product and the positive attitude outlook happens to the customer [3] [4]. Experiential creative is nothing but creating a shopping environment to the customer and include them in the process of decision making [9][14]. Functional and emotional aspects of the products are analyzed in the experiential marketing and there by the attitude and the purchase behaviour is persuaded towards the decision making process [1] [5][13].

Customer experience has multi-dimensional values. A particular event or occurrence endured by a person shall be termed as experience. This experience shall be generated by a relationship of the person, in particular a customer with a product or a service, a company or a firm which causes a valid response. This practice is purely straight forward and is the indicator for the attitude of the customer with respect to the particular product or service [6]. The customer experience may be analyzed based on affective, conative or cognitive natures [7][10].

By analyzing the intangible services like telecommunication products, the measurement of customer attitude and the purchase behaviour process through the experiential marketing attracts greater concentration [11]. The decision making process through the influence of experiential marketing for the enterprise telecom services, Internet Leased Line (ILL) services and the 3G experience Centre services provided by the Indian public sector telecommunication company Bharat Sanchar Nigam Limited (BSNL) are studied using the quantitative and the qualitative measures [13][14][15].

A. Objectives of the Study

1. To examine the influence of Experiential Marketing with Customer Attitude, Experiential Value and Customer Purchase behavior
2. To establish the effect of Experiential Marketing in the Customer Decision Making Process

II CONCEPTUAL FRAMEWORK FOR EXPERIENTIAL MARKETING

The conceptual framework for the experiential marketing is shown in Figure. 2. The various components involved in the framework are experiential marketing, experiential values, customer attitude, purchase behaviour and the decision making process. The relationship and the sequences of the process involved are explained with respect to the individual modules. The overall conceptual framework can be briefly reviewed as follows: The process of promoting services through experiential marketing based on the primary experience value influences the attitude and there by the purchase behaviour of the customer which will have the consequent effect in the decision making process of the customer.

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Figure.2. Experiential Marketing – Conceptual Framework

A. Experiential Marketing

There are various means and measures followed by the sellers to market their products and services and attract the customers. Traditional methods of marketing focused on the price and the quality assurance given by the marketers. In modern markets with the exposure of internet and other exposures, the customers are already enriched with lot of information about the products and services even before the actual purchase. In such conditions, the marketers have to introduce innovative strategies in their marketing approach to attract the customer and turn the attitude in a positive direction. Once the customer is inclined towards the purchase of the product, then his decision making with respect to the purchase will most likely to be in favourable position. Experiential Marketing is a concept of introducing the customer to the live experience of using the product or service at the time of enquiry stage itself. It can be stated as an interface between the customer, marketer, product and experience. Unlike the traditional marketing techniques, the customer will have a real time exposure towards the product in experiential marketing and thereby the attitude and the purchase behaviour of the customer are likely to be favourable. The development of experiential marketing has opened new doors for the business opportunities and building strong business relationship between the marketers and customers. In experiential marketing, the focus is customer centric in contrast to the product centric approach in traditional marketing. The significant idea in experiential marketing is to involve the customers in the decision making process. The primary features involved in the experiential marketing are either emotional, sensorial, existence or relational. The experiential marketing has to be framed in such a way that the customer has to relate their experience in the trial with the real time usage of the service. Experiential marketing is the framework which involves the relationship between the marketer, customer, product and the experience as shown in Figure. 3.

Figure.3. Experiential Marketing Interface

B. Experience Value

Experiential value is determined by the various factors including appeal, interaction, live demo and opinion based on the experiences they feel while evaluating the service prior to the actual purchase. Based on these experiential values, the customer may develop a positive attitude towards the service.

C. Customer Attitude

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Customer Attitude is defined as the assertiveness of the customer towards the particular product or service. It may either be converged positively towards the product or be diverged negatively from the product. There are three attributes assigned to the attitude of the customer, namely cognitive, affective and conative. Cognitive attitude is defined as the customer's belief and knowledge about the service. Affective attitude is classified as the emotional feelings of the customer towards the service. Conative attitude is nothing but the influence and the behaviour of the customer based on the service.

D. Purchase Behaviour Process

In the modern approach of marketing, the marketers are interested in establishing a cordial business relationship with the customer. Purchase behaviour is the process of engagement by the customer while searching, choosing, procuring, utilizing, assessing and deciding about the products and services in order to satisfy their needs and desires as listed in Figure. 4.

E. Decision Making Process

Decision making is the ultimate process in the framework. The decision of the customer will be influenced by the customer attitude and purchase behaviour process through experiential marketing and experiential value as mentioned in Figure. 5. There are four steps involved in the decision making process. Initially the problem identification, second the information search, third the alternative evaluation and finally the purchase decision. Problem identification is arisen from the need and the requirement of the customer. Information search is done by the customer to meet out the exact and necessary requirements of the customer. Alternative evaluation is the comparison of various products and services based on the quality, availability, performance and service support and evaluation based on the experience trial. Purchase decision is the process of finalization to purchase a product based on the above three criteria.

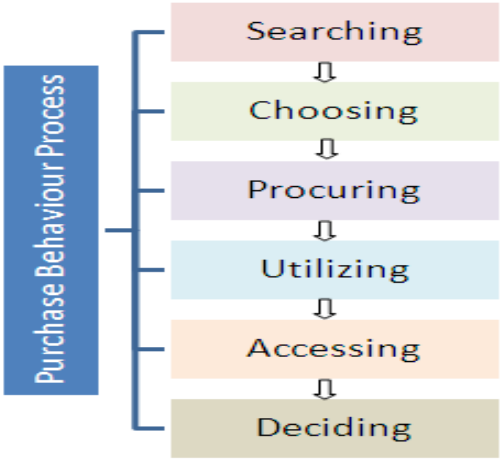

Figure.4. Purchase Behaviour Process

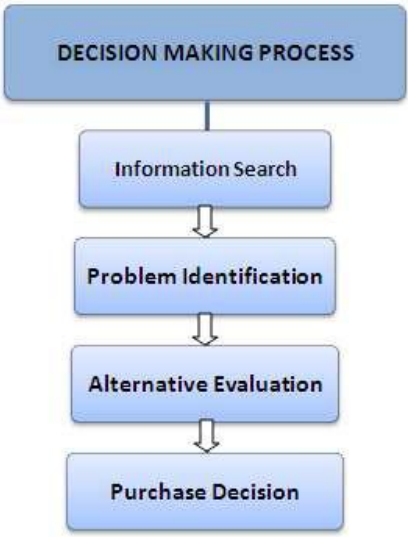

Figure.5. Decision Making Process

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III PROBLEM STATEMENT

With the introduction of New Telecom Policy and the entry of private players in the Telecommunication sector, Bharat Sanchar Nigam Limited, the public sector telecommunication company fully owned by Government of India faces a stiff competition. Traditional marketing methods are no longer sufficient to win the customer and acclaim their purchase behavior. In order to regain the market position, BSNL has to come up with innovative marketing strategies to attract the customers. To bring up the customer experience value, two innovative steps are proposed by BSNL Management. 1. Providing Free Demos of Dedicated Internet Leased Line (ILL) Services to the corporate customers and 2. Introduction of 3G Experience Zones in the customer service centers. Corporate customers who are having the idea of availing such services can have the real time experience even before actually availing the services.

IV RESEARCH DESIGN

There are two methods for undergoing the research, the quantitative analysis and qualitative analysis. Quantitative analysis is the collection of numerical data through standard questionnaire. Multiple attributes are analyzed through the mathematical calculation. Qualitative analysis shall be done based on a direct interview. It does not depend on the numerical count. The analysis considers attitude, feelings and behavior of the people being interviewed. In this research, both the qualitative and quantitative analysis is carried out. Our experimental analysis is to test whether the provision of experiential marketing, i.e. Free Demo of ILL services and Establishment of 3G experience centers has induced the attitude of the customer positively, has influenced the experiential value and has motivated their purchase behaviour. The overall idea of the study is to establish a relationship model to have positive impact of Experiential Marketing in the Customer Decision Making Process.

A. Methodology

A real time survey was conducted with the sample of 100 respondents to establish the relationship of experiential marketing with customer attitude, experiential value and purchase behaviour. The cumulative results will give the relationship of experiential marketing with the customer decision making process. For Internet Leased Line Services, the survey was conducted among the corporate customer after giving the demo for the period of 7 days. For 3G experiences, the survey was conducted among the visitors of customer service center randomly after giving free browsing facility for 1 hour in the 3G experience zone located along with the customer service center.

B. Data Interpretation and Analysis

After the descriptive statistical analysis, the following results are visualized. With respect to the ILL demo, it is found that the respondents are overall satisfied and are positively motivated towards purchasing the service. The alarming parameter is the service center support which has to be given further priority to retain the potential customers. The detailed representation of various parameters, viz. Bandwidth Availability, Using Multiple Services, Service Availability and Service Centre Support are tabulated separately in Table 1 and Figure 6.With respect to the 3G experience, it is found the respondents are overall satisfied with the experiential marketing. The customers have positive inclination in the decision making process after their experience demo. Here also, the alarming factor is that the customer is mostly dissatisfied with the customer care. The Attitude of the customer center staff should to be tuned towards the customer relation management and thus good relationship can be maintained between the staff and the customers. The detailed representation of various parameters like 3GExperience Zone Infrastructure, Service Availability, Browsing / Downloading Speed and Customer Care are tabulated separately in Table 2 and Figure 7.

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Table 1: Overview of Satisfaction of the customers about ILL Demo

Parameters	Highly Satisfied	Satisfied	No Opinion	Dissatisfied	Highly Dissatisfied
Bandwidth Availability	26	49	8	11	6
Using Multiple Services	45	34	4	7	10
Service Availability	68	25	1	6	0
Service Centre Support	18	25	17	27	13
Overall Satisfaction Level	51	34	4	7	4

Table 2: Overview of Satisfaction of the customers about 3G Experience Center

Parameters	Highly Satisfied	Satisfied	No Opinion	Dissatisfied	Highly Dissatisfied
3G Experience Zone Infrastructure	57	24	2	11	6
Service Availability	44	33	6	7	10
Browsing / Downloading Speed	34	46	2	9	9
Customer Care	16	16	10	36	22
Overall Satisfaction Level	46	36	4	8	6

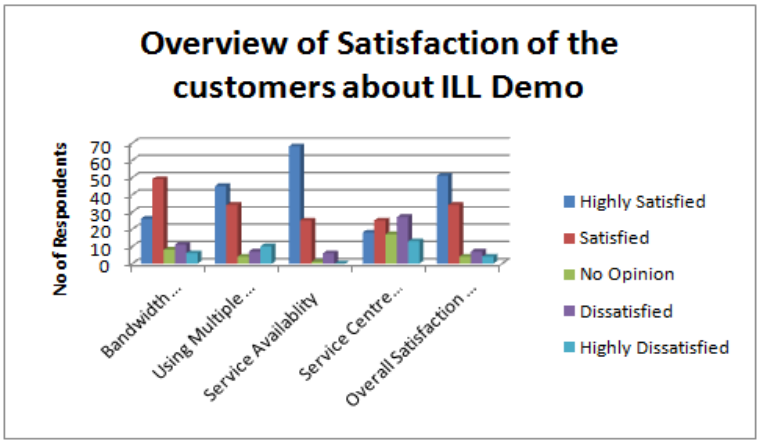

Figure 6: Customer Satisfaction Overview about ILL demo

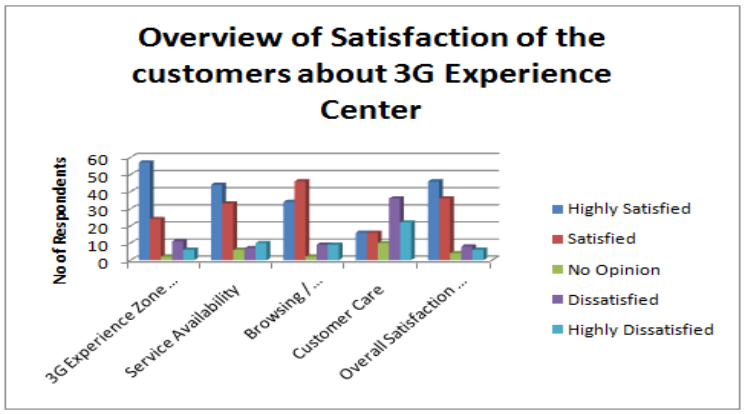

Figure 7: Customer Satisfaction Overview about 3G Experience Center

V CONCLUSION

From the study, the overall relationship between the experiential marketing and the factors such as customer attitude, experiential value and purchase behaviour with respect to purchase of Internet Leased Line services and 3GMobile Services from BSNL is studied. The experimental analysis shows that the influence of Experiential Marketing towards these factors is positive and hence the Customer Decision Making Process is improved. Studies also reveal the necessity for improving the customer service center facility and customer care of BSNL to attract more potential customers and to retain them in long run. BSNL Management shall put up more efforts to provide extension experiential marketing which is found to be an effective tool in the modern day marketing strategies. The study can be extended for other corporate services like provision of ISDN PRI with free EPABX, providing Mobile Closed User Group Services, Provision of Centrex / Voice CUG facility etc. Also, the scope of the study is among the BSNL customers of Madurai Telecom District and the same can be extended for other areas and also for other service providers.

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Studies On The Effect Of Different Nose Radius In Micro Turning Of Stainless Steel 316l

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Abstract-*This paper presents the effect of different tool nose radii of 0.03, 0.1, 0.2 and 0.4 mm on tool wear, surface roughness, chip morphology, signals acquired from different sensor such as Acoustic Emission (AE), accelerometer and cutting force dynamometer in micro turning of stainless steel (SS 316L). Experiments have been carried out with coated tungsten carbide insert up to 60 minutes. Measurements and the signals are analysed for every 1st minute and 10th minute. It is observed that tool wear and chip width is found to be increasing, while Ra is found to be following non-uniform trend with increase in the nose radius. From the AE and vibration signal analysis, it is found that the dominant frequency of the signals increases with increase in the nose radius. Among the cutting forces, the tangential force (Fy) is found to be more sensitive to the tool wear status compared to that of the thrust force (Fx) and feed force (Fz). This study will be useful for the manufacturers to monitor the condition of the tool online while micro turning of SS 316L.*

Keywords: Micro turning, Stainless steel SS 316L, Nose radius, Acoustic Emission, Accelerometer, Cutting force dynamometer, Tool Wear, Surface Roughness, Chip morphology.

I INTRODUCTION

Tool based micromachining is one of the emerging micromachining methods. It is the mechanical cutting of features with cutting edge/edges less than 1 mm and regardless of the size of the components manufactured [1], [2]. Tool based micromachining processes are broadly classified as micro turning, micro milling and micro drilling. Micro turning is used to produce micro components such as microelectrodes, micro shafts, etc, for different applications. It is the scaled down version of conventional turning process operating on a micro scale level of machining parameters [3], [4]. It is used to manufacture 3D micro-components with high aspect ratio and high geometric complexity, which are widely used in different fields such as auto motives, biotechnology, health care, communication, security, defence, etc [5], [6], [7]. Micro turning is normally carried out with a cutting insert of lesser nose radius. Difficulties in micro turning process include large cutting forces, vibrations due to size effects, minimum chip thickness, etc [8]. Hence, it difficult to detect tool wear, damages to the cutting edges etc, especially in the micromachining environment, which results in poor dimensional accuracy and surface quality [9]. Therefore, tool condition monitoring (TCM) in tool based micro machining processes is necessary. TCM is an in-process (online) method which detects the tool condition during the machining process and informs about the status of the tool. Few researchers incorporated sensors for TCM studies such as acoustic emission (AE), accelerometer, cutting force dynamometer, temperature, current, torque, strain, power, etc. to monitor the tool condition in macro-regime machining process [10], [11]. Few researchers have used different sensors in tool based micromachining process [12], [13], [14]. However, they have not studied the effect of nose radius during micro turning.

Literature surveys related to micro turning are briefly presented here. Rahman et al [15] carried out experiments on brass by varying the depth of cut, feed rate and spindle speed. It was found that depth of cut is the most influential cutting parameter in micro turning. At low depth of cut conditions, thrust force was the dominating force due to the plastic deformation, while larger depth of cut, tangential force is found to be much higher than that of thrust force. Patil et al [16] conducted some metallurgical studies such as grain

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size and density in the micro turned surface. They have observed that slight deviation in the micro structure leads to poor machinability. Mahajan et al [17] investigated macro-regime diamond turning of Oxygen Fuel High Conductivity Copper (OHFC). The effects of micro turning process parameters such as spindle speed, feed, and depth of cut and tool nose radius on surface roughness are studied. They have achieved Nano-meter level surface roughness values and also observed that tool nose radius is dominating than the parameters. Jagdesh and Samuel [18] studied the effect of micro turning on the surface roughness and cutting forces while machining titanium alloy. They have observed that cutting force is decreased with the increase in the cutting speed. They have concluded that the surface roughness is mainly influenced by the nose radius and the uncut chip thickness. Gopikrishnan et al [19] have investigated micro turning of aluminium alloy (AA 6061) using multiple sensors. They have observed that Ra, chip width and cutting forces were increased with increase in the tool wear. Tangential force is found to be more dominant than the thrust and feed force. From the signal analysis, they have observed that during machining with good tool condition, the dominant frequency of the AE and vibration signals are found to be 81 kHz-110 kHz and 2.07 kHz-3.84 kHz respectively, whereas with the worn out tool the dominant frequencies are shifted to higher levels. From the literature review, to the author's knowledge, it is observed that there were only few attempts have been made by researchers to study the effect of nose radius in macro-regime turning and no attempt has been made in micro turning. Therefore, in this work, an attempt has been made to study the effect of different nose radius during micro turning of SS 316L using multiple sensors approach.

II EXPERIMENTAL DETAILS

The experiments were carried out with multi process micro machine tool DT110 with a speed range of up to 5000 rpm (Figure 1). Micro turning is carried out up to 60 minutes at a speed of 47 m/min, feed of 20 m/rev and depth of cut of 50 m. The levels of these parameters are selected based on the preliminary experiments carried out by Response Surface Methodology (RSM). The cutting tool used in this study is the Sumitomo make triangular shaped multi-coated tungsten carbide insert with 0.03, 0.1, 0.2 and 0.4 mm nose radius. The cutting tool inserts are clamped to the tool shank which is mounted on the tool post. Work piece material is stainless steel SS 316L (Composition: C 0.03%, Mn 2%, Si 0.75%, S 0.03%, P 0.045%, Ni 10%, Cr 18%, N 0.10% and rest Fe), which is mostly used in the medical applications for cardiovascular, otorhinology, etc. [20]. SS 316L is in the form of a cylindrical rod with an initial diameter of 6 mm and machining length of 20 mm. Tool wear is measured by the non-contact video measuring system (VMS). Due to the low depth of cut, the nose wear is found to be more dominant than flank wear. The nose wear is measured from the tip of the top surface of the tool to the damaged portion in the nose edge of the tool. Ra is measured with the contact surface roughness tester. Chip width is measured using the non-contact VMS. Chip morphology studies are carried out by collecting the chips at regular intervals (every 1st minute and 10 minutes).

AE Signals are collected using AE, accelerometer and cutting force dynamometer. AE sensor (Make: Kistler,Model: 8152) is used to collect AE signals with a frequency range of 30 to 900 kHz. A compatible coupler (Make: Kistler, Type: 5125B) is used to amplify the AE signals obtained from the AE sensor. Thereafter, the amplified AE signals are converted into digital signals by using the BNC-2110 connector through the DAQ card. The sampling frequency of the AE signal is 2 MHz. Piezoelectric accelerometer (Make: Kistler, Model: 8702B) is used to collect the vibration signals with a frequency range from 1 to 10 kHz. A compatible coupler (Make: Kistler, Type: 5110) is used to amplify the vibration signals obtained from the accelerometer. The sampling rate of the vibration signal is250 kHz (250,000 samples per second). The data collected from the AE and accelerometer are transferred to the PC and then analysed off-line in the time domain and frequency domain at regular interval of time (10 minutes), to derive the necessary information about the condition of the tool. Two lakh data points are recorded for each machining trial. Out of which first 65536 data points were selected for the time domain analysis and first 2048 data points were selected for the dominant frequency analysis using MATLAB (R2010a). Piezoelectric cutting force dynamometer (Make: Kistler, Model: 9256C2) is used to collect the different forces arises during machining such as thrust force (Fx), tangential force (Fy) and feed force (Fz) with the sampling rate of 1000 Hz. The cutting force dynamometer is connected to a charge amplifier, which in turn connected to a PC for acquiring the data using data acquisition system with suitable software.

III RESULT AND DISCUSSION

The following sections deals of with the analysis of the effect of nose radius on tool wear, Ra, chip width, signals from AE, accelerometer and cutting force dynamometer.

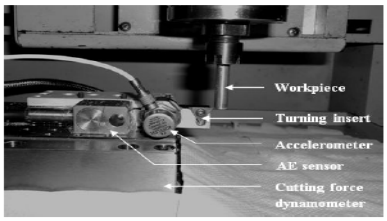

Figure 1. Photograph of the experimental setup

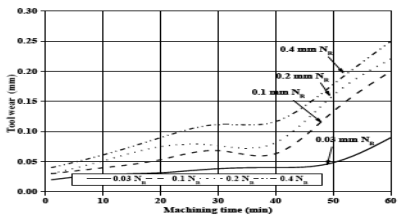

Figure 2. Tool wear with respect to machining time

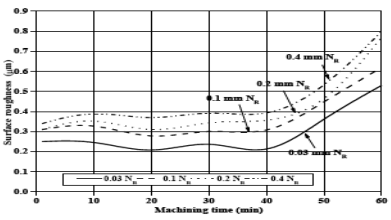

Figure 3. Surface roughness with respect to machining time

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A. Analysis of Tool wear, Ra and Chip width

From Figure 2, it is found that the tool wear is increasing with the increase in the nose radius and is proportional to the machining time up to 40th minute and thereafter an accelerated trend is observed. From Figure 3, it is observed that the Ra is increasing and decreasing with machining time up to 40th minute and afterwards it increases steeply. This is due to the effect of accelerated wear of the tool. Figure 3 also shows with the increase in the nose radius the surface roughness is also found to be increasing after 40th minute. This may be due to the increased tool-work piece contact area during machining. Chip width is also found to be increasing with the increase in the nose radius. Chip morphological studies indicate that, short ribbon (favourable) type of chips are observed while machining with 0.03 nose radius, a combination of loose arc (favourable) and short ribbon (favourable) type chips are observed while machining with 0.1 nose radius, loose arc and ear (favourable) type chips are observed while machining with 0.2 and 0.4 nose radius.

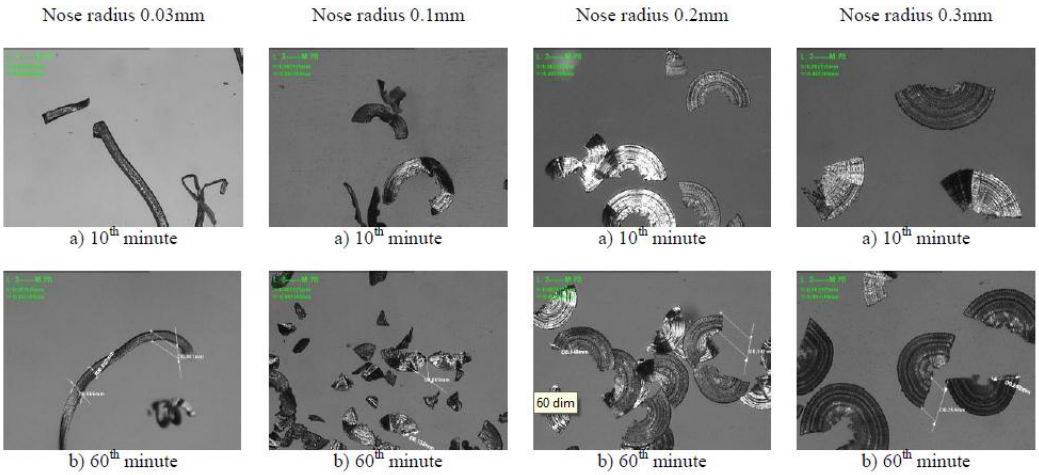

Figure 4 Chip images at different nose radius

B. Analysis of Sensor Signals

The acquired AE and vibration signals are analysed in the frequency domain. Power spectral density represents the energy distribution of the signal over the frequency domain. Table 1 shows the power spectral density of the AE and vibration signals with different nose radius up to maximum machining time (60th minute). Figure 5 and 6 show the power spectra of the AE and vibration signals respectively of 0.03mm nose radius.

TABLE I
EXPERIMENTAL RESULTS

Ex. No.	Machining time (min)	AE frequency (kHz)				Vibration frequency (kHz)			
		Nose radius				Nose radius			
		0.03 mm	0.1 mm	0.2 mm	0.4 mm	0.03 mm	0.1 mm	0.2 mm	0.4 mm
1	1	130	125	129	215	1.46	1.65	2.07	5.13
2	10	132	141	139	269	1.52	1.70	2.14	5.19
3	20	184	154	142	269	1.52	1.70	2.26	5.31
4	30	184	215	182	293	1.58	1.92	3.23	5.31
5	40	268	269	269	293	1.58	1.92	3.36	5.68
6	50	292	292	293	480	1.70	3.05	3.92	6.23
7	60	292	292	293	480	1.77	3.17	4.05	6.65

From Table 1 and Figure 5, it is observed that the dominant frequency of the AE signal lies between 130 kHz-292 kHz for 0.03 nose radius, 128 kHz-292 kHz for 0.1 nose radius, 129 kHz-293 kHz for 0.2 nose radius and 215 kHz-480 kHz for 0.4 nose radius. In the case of vibration signal from Figure 7, it is observed that the dominant frequency of the vibration signal is found to be between 1.4 kHz-1.7 kHz for 0.03 nose radius, 1.6 kHz-3.17 kHz for 0.1 nose radius, 2.1 kHz-4.05 kHz for 0.2 nose radius and 5.1 kHz-6.7 kHz for 0.4 nose radius from 1st minute to the 60th minute. From Table 1, Figure 5 and Figure 6, indicates that the dominant frequency of the AE and vibration signal are found to be increasing with increase in the nose radius and also increases with the machining time. The dominant frequency of the AE and vibration signal increases linearly up to 40th minute and from 41st minute a sudden shift in the dominant frequency to higher level is observed. This indicates distinct accelerated wear region.

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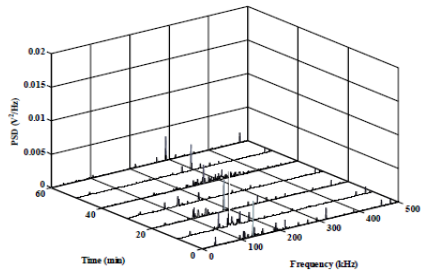

Figure 5. Spectra of the AE Signal (nose radius 0.03 mm)

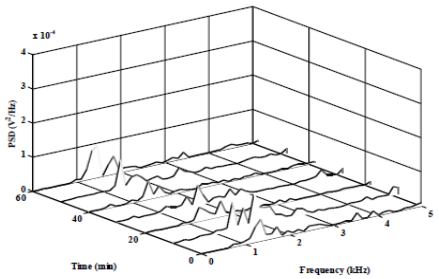

Figure 6. Spectra of the vibration signal (nose radius 0.03 mm)

Figure 7, 8 and 9 shows the thrust force, tangential force and feed force with respect to machining time. From Figure7, 8 and 9, it is observed that the cutting forces are increasing linearly with the increase in the nose radius. Among the three forces, the tangential force (Fy) is found to be more sensitive to the tool wear status compared to that of the thrust force (Fx) and feed force (Fz). This may be due to the resultant force acting towards the thrust direction. In the case of feed force, it is observed that with 0.03mm nose radius is found to be higher order than that of the feed force observed with 0.1, 0.2 and 0.4mm nose radius. In the case of thrust and tangential force, 0.4mm nose radius of for ceare found to be higher compare to the feed force with 0.03, 0.1 and 0.2mm nose radius.

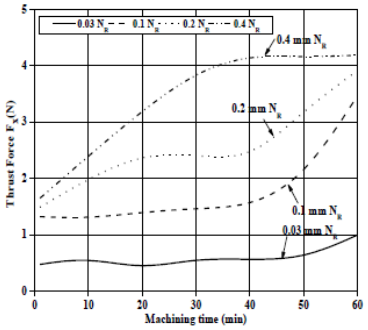

Figure 7. Thrust force (F_X) with respect to machining time

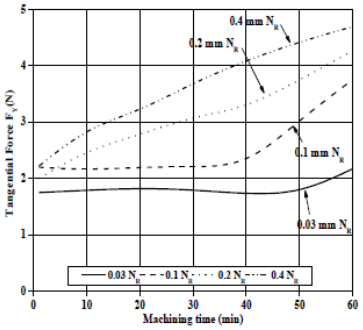

Figure 8. Tangential force (F_Y) with respect to machining time

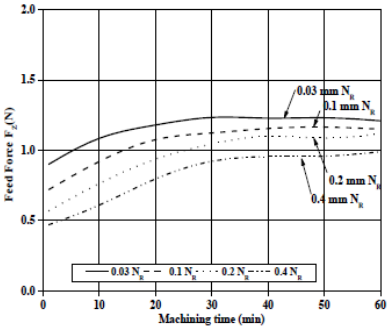

Figure 9. Feed force (F_Z) with respect to machining time

IV CONCLUSION

In this work, analysis of tool wear, Ra, chip width, AE, vibration signals and cutting forces, were carried out to investigate the effect of nose radius in micro turning of stainless steel SS 316L. The tool wears and chip width shows uniform trend, while Ra follows non-uniform trend with machining time. Chip morphological studies indicate that short ribbon type of chips are observed with 0.03 nose radius, combination of loose arc and short ribbon are observed with 0.1 nose radius, while loose arc and ear type chips are observed with 0.2 and 0.4 nose radius. From the signal analysis, the dominant frequency of the AE signal for good tool is found to be between 130 kHz-184 kHz for 0.03 nose radius, 128 kHz-214 kHz for 0.1 nose radius, 129 kHz-182 kHz for 0.2 nose radius and 215 kHz-292 kHz for 0.4 nose radius, while the dominant frequency of the vibration signal for good tool are found to be between 1.4 kHz-1.6 kHz for 0.03 nose radius, 1.6 kHz-1.9 kHz for 0.1 nose radius, 2.1 kHz-3.2 kHz for 0.2 nose radius and 5.1 kHz-5.3 kHz for 0.4 nose radius. Among the three forces, the tangential force (Fy) is found to be more sensitive compared to the thrust force (Fx) and feed force (Fz).

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Digital Multiplier to Multiply Special Integers using ancient Vedic Mathematics

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Abstract-*Multiplier is the basic key of most of the high performance and complex systems like Digital Signal Processors, Microprocessors, and Filters etc. Multiplier design using ancient Vedic mathematics is recent trends of the designers. Recently proposed digital multiplier using the popular sutra "Ekanyunena Purvena" of Vedic mathematics has been analysed in this paper in details. This article clearly demonstrates the detailed architectural diagram, and simulation report of the digital multiplier. The proposed design has been compared with others multipliers and better one has been proposed.*

Keywords: Digital Multiplier, Vedic Mathematics, Ekanyunena Purvena

I INTRODUCTION

The key hardware blocks of almost every high performance systems like digital signal processor, FIR filters, and microprocessors is a multiplier. System performance is greatly influenced by the efficiency of its multiplier. The high speed, simple multiplier design using ancient Vedic mathematics is a recent trend in engineering. The ancient Vedic mathematics has been imported from four Vedas. The word 'Vedic' comes from them other word 'Veda', means collections of knowledge. Jagadguru Shankaracharya Bharati Krsna Teerthaji Maharaja(1884-1960) reconstructed Vedic mathematics from Vedas [1]. It is based on sixteen formulae (sutras). One of the popular sutra in Vedic mathematics is "Ekanyunena Purvena". The recently proposed digital multiplier [2] using Vedic mathematics is the experimental object in this paper. It is a great competitor of popular existing multipliers[3]-[11] like Array multiplier [4], Urdhava multiplier [5], and ROM based multiplier [6]. The detailed architectural design, simulation report, comparison with exiting work, and future scopes of newly proposed digital multiplier [2]are successfully presented in this article. This paper has been arranged as follows. Section II introduces Vedic mathematics, whereas next section discusses about existing works and clearly mentioned about recently proposed digital multiplier [2]. Section IV gives the detailed architectural design of proposed work. The simulation report is attached in section V. Section VI compares the proposed work with existing works. Section VII concludes the work and discusses about future scope.

II VEDIC MATHEMATICS

Vedic mathematics is the part of 'Sthapatya-veda' which is also part of four 'Vedas'. The 'Sthapatya-veda' is an Upa-Veda (supplement) of 'Atharva-veda'. The Vedic mathematics was reconstructed by Shankaracharya BharatiKrishna Teerthaji Maharaja (1884-1960) [1]. After continuous research and development in 'Atharva-veda',swamiji developed 16 formulae and 13 sub-formulae also termed as Sutras and Upa-sutras respectively. The main plat form of ancient mathematical system is nothing but the 16 Vedic formulae, which shows the simple and logical ways of solving problem. The natural ways and the simplicity of solving any type mathematical problems of each mathematical domain increase the acceptance and beauty of Vedic mathematics. Among the all sutras, "Ekanyunena Purvena",

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is very famous. This sutra says the procedure of multiplications as 'One less than the previous' or 'One less than the one before'. This sutra is nothing but a remark of "Nikhilam Navatashcaramam Dashatah". This sutra is used to multiply one integer by 9 or array of 9. The procedure of multiplication using "Ekanyunena Purvena" is discussed step by step below:

a. Left hand side digit is multiplicand. Deduct 1 from the left hand side digit or deduct 1 from multiplicand. It produces present left hand side digit.
b. The right hand side digit is multiplier. Make the difference between the multiplier and present left hand side digit.
c. Just write the two numbers side by side.

Let us discuss with some examples.

Example 1: 5x 9
L.H.S=5(Multiplicand) & R. H. S. = 9(Multiplier)
Step (a) gives 5 – 1 =4 (Present L.H.S. Digit)
Step (b) gives 9 – 4 = 5(Present R.H.S. Digit)
Step (c) The answer is: 45

Example 2: 11 x 99
L.H.S=11(Multiplicand) & R. H. S. = 99(Multiplier)
Step (a) gives 11 – 1 = 10(Present L.H.S. Digit)
Step (b) gives 99 – 10 = 89 (Present R.H.S. Digit)
Step (c) The answer is: 1089

Example 3: 125 x 999
L.H.S=125(Multiplicand) & R. H. S. = 999(Multiplier)
Step (a) gives 125 – 1 = 124 (Present L.H.S. Digit)
Step (b) gives 999 – 124 = 875 (Present R.H.S. Digit)
Step (c) The answer is: 124875

III EXISTING WORK

There are many conventional design techniques of multiplier like array multiplier [4], Urtharba multiplier[5], ROM based multiplier [6] etc., but the newly proposed design techniques is novel. This paper elaborated the design idea of recently proposed Vedic multiplier [2]. This is very helpful for multiplication where the multiplicand is any integer and multiplier is 9 or array of 9 (as for example 99,999,999 etc.). Simple algorithm, flow chart, core architecture, mathematical expression etc. already exists for newly proposed multiplier.

IV PROPOSED WORK

Newly proposed digital multiplier [2] concept has been elaborated in this paper. The detailed architecture, simulation report, RTL schematic, Logic schematic, Device utilization summary, comparison with existing multipliers in terms of delay and simplicity with future scopes have been proposed in this article. The detailed architecture for 4 bits digit is shown in Fig. 1, where A is multiplicand and B is multiplier. The leftmost subtractor subtracts '0001' from 'A'. The right most subtractor subtracts the subtractor1's output from 'B'. The results of two multipliers fed into array of resistors as shown in Fig. 1. The resistors save the results and give the output. The proposed multiplier's architecture is tested and verified using the tool 'Xilinx ISE14.2' [12]. The RTL schematic diagram of proposed digital multiplier circuit looks like the Fig. 2. The Expanded RTL schematic of this Vedic multiplier is shown in Fig. 3. The multiplier architecture using block diagram is shown in Fig. 4. The technological schematic of the multiplier in Xilinx ISE14.2 is shown in Fig. 5.

V SIMULATION REPORT

The proposed multiplier has been tested and verified in Xilinx ISE14.2 software tool. The snap shot for multiplicand and multiplier, with result shown in Fig. 6; hence it indicates that the multiplier has been run successfully. Fig. 7 shows the details project status report of the multiplier during the simulation.

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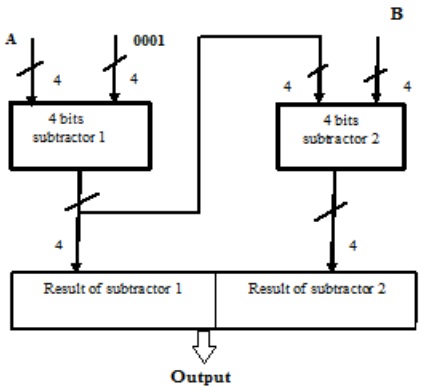

Figure 1. Architecture of multiplier for 4 bits

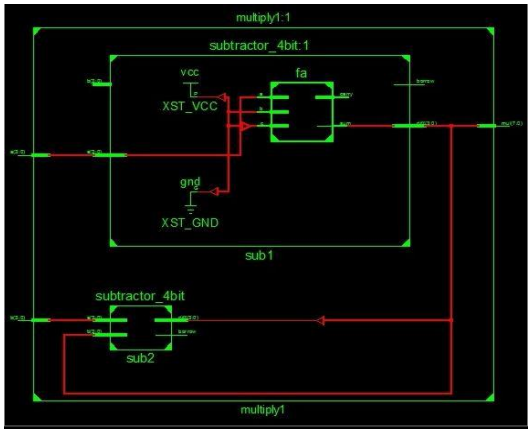

Figure 2. RTL schematic diagram of proposed multiplier

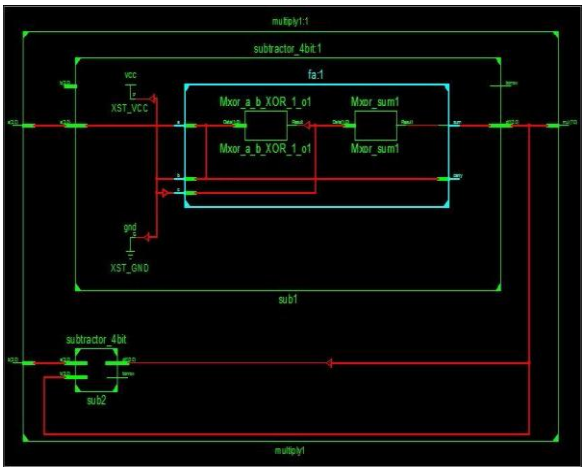

Figure 3.Expanded RTL schematic of multiplier

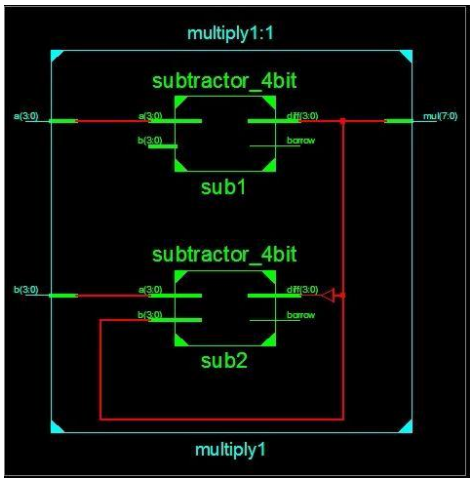

Figure 4. Block diagram of proposed multiplier

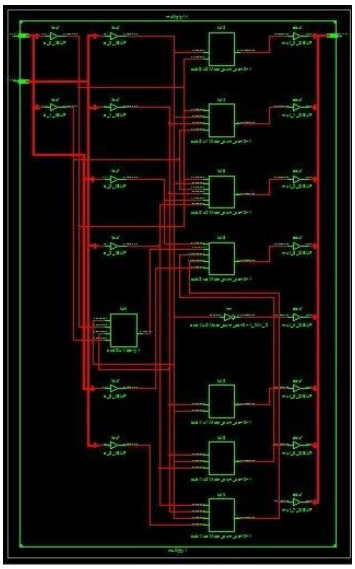

Figure 5. Technological Schematic diagram

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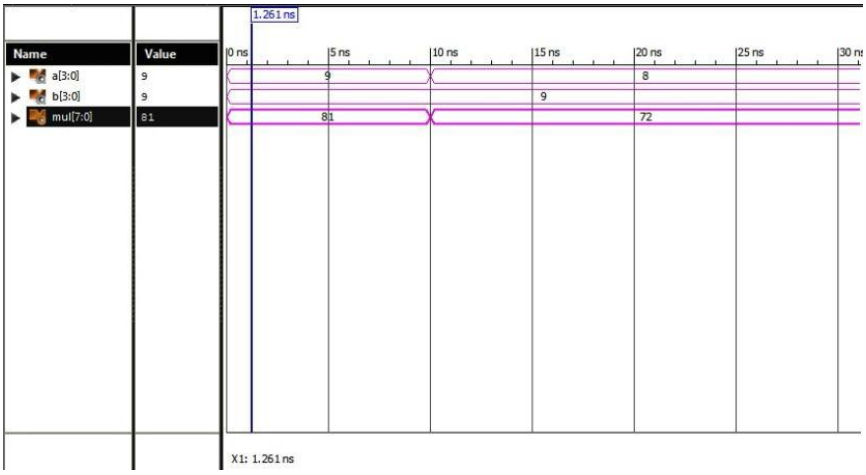

Figure 6. Simulation report

Multiplier 4bit Project Status (02/02/2015 - 23:03:15)			
Project File:	multiplier1.xise	**Parser Errors:**	No Errors
Module Name:	subtractor_4bit	**Implementation State:**	Translated
Target Device:	xc6vcx75t-2ff484	• **Errors:**	No Errors
Product Version:	ISE 14.2	• **Warnings:**	No Warnings
Design Goal:	Balanced	• **Routing Results:**	
Design Strategy:	Xilinx Default (unlocked)	• **Timing Constraints:**	
Environment:	System Settings	• **Final Timing Score:**	

Figure 7. Project status report of proposed multiplier

VI COMPARISON WITH EXISTING WORK

The design approach of Vedic multiplier using the sutra "Ekanyunena Purvena" has been done successfully in this paper. The architecture of multiplier design has been simulated nicely. Simulation result has been seen and the calculated delay from the simulation result has been compared to other existing techniques. The device utilization summary and comparative delay study of different multipliers with respect to proposed multiplier has been shown in Fig. 8 and Fig. 9 respectively.

Device Utilization Summary (estimated values)			
Logic Utilization	**Used**	**Available**	**Utilization**
Number of Slice LUTs	6	46560	0%
Number of fully used LUT-FF pairs	0	6	0%
Number of bonded IOBs	13	240	5%

Figure 8. Device utilization summary

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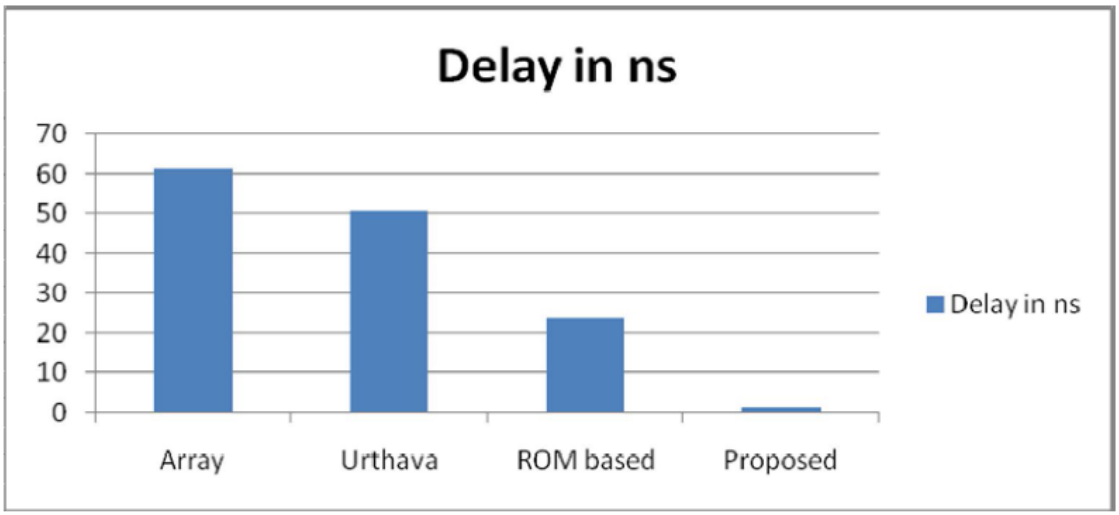

Figure 9. Bar graph of delays of different multiplier

VII CONCLUSION AND FUTURE SCOPE

In this paper the approach has been simulated using the popular tool Xilinx ISE14.2 and the speed &performance of the circuit has been tested as well. This design indicates a high efficient design approach of Vedic multiplier. The computational path delay for 4×4 bit Vedic digital multiplier is 1.605 ns. It is observed that this multiplier is much more simple and efficient than others multiplier. The natural and quick method of Vedic multiplication makes this method easier. The simplicity & novelty of this work differentiate it from the other approaches. The hardware implementation is necessary for real time application. In future the approach may be used in the other sutras or sub sutras of Vedic mathematics to design the quick multiplier. The digital design may be transferred to VLSI technology for better performance.

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Examining the Role Of Organization In Providing Healthy Work Life Balance And Its Impact On Psychological Outcomes

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ABSTRACT-*There is a growing awareness in today's workplaces that employees do not give up their lives just because they work for an organization. Work and life remain the two most important domains in the life of an employed individual. The challenge of balancing work and non-work demands is one of today's central concerns for both individuals and organizations. The initiative made by the organisation for the healthy work life balance of employee will make the employee to concentrate and reproduce more in the work. The aim of this study is to explore the relationship between organizational work life balance initiative and the employee's healthy work-life balance. The work-life balances in the relationship between support and employee outcomes (job satisfaction, organizational commitment and turnover intention) were examined. Three hundred questioners were distributed to the faculty members of engineering colleges in India. After eliminating the invalid questionnaires, 241 valid questionnaires were used for further analysis. The study exhibits the significant relationship between the organizational initiative and work life balance. The study also reveals some interesting association between work life balance and organizational commitment, job satisfaction, turnover intention among faculty.*

KEY WORDS: Organizational Initiative, Work life balance, Faculty, India

I INTRODUCTION

Work-life balance is an important and critical issue in the 21st century. The term work-life balance was first used in the United States in 1986 to help explain the trend of people spending more time on work-related tasks, while allocating less time to other aspects of their lives. The human resource practitioners only recently began to see WLB as a business issue that has benefits for both employees and employers (Clutter buck, 2003).work-life balance' has been widely discussed but it has not been clearly defined. There are numerous WLB definitions, with some focusing in the role of the individual in balancing work and non-work commitments and responsibilities (De Cieri et al., 2005; Smith &Gardner, 2007). Karakas and Lee, (2004) explained work life balance issues as spending good time with family members, getting free time to be able to relax for emotional wellbeing and health of family members , having good communication and support from the fellow colleagues, obtaining high quality child care and education; and being satisfied with the workload. Work-life balance is the degree to which an individual can simultaneously balance the emotional, behavioral and time demands of both paid work, family and personal duties (Hill, et al., 2001).

According to (Maxwell, 2005) Organizational Initiation is an important aspect in the success of employee's attaining work-life balance;

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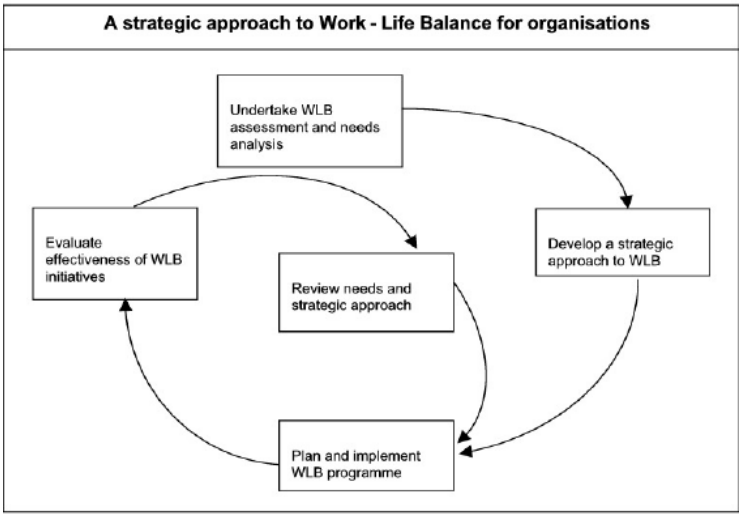
if the culture does not support it employees will not feel comfortable utilizing the programs. Recent studies support the view that workplace cultures and initiatives which openly address and support work and family issues may result in valued organizational outcomes such as organizational commitment and lower turnover intentions (Brough, O'Driscoll, &Kalliath, 2005; Thompson, Beauvais, &Lyness. 1999). Many studies suggested that organizations could enhance productivity, reduce employees' stress level, absenteeism, annual medical expense such as health care and medical insurance by applying work-life balance policies efficiently (Smith & Gardner, 2007; Pine,1994).So the organization should be very careful in analysing the need, implementation of policies and analyzing the feedback. The following figure represent that how the work life balance program can be implemented effectively in an organization.



II THEORETICAL FRAMEWORK

Resource Variables are the Resources that an employee may be able to access the resources in the workplace provided by the organization (organizational WLB initiative) which contribute to the situation and associated with the occurrence of mediators (work-life balance), which then contribute more or less to the appearance of criterion variables (job satisfaction, organisational commitment, turnover intention).

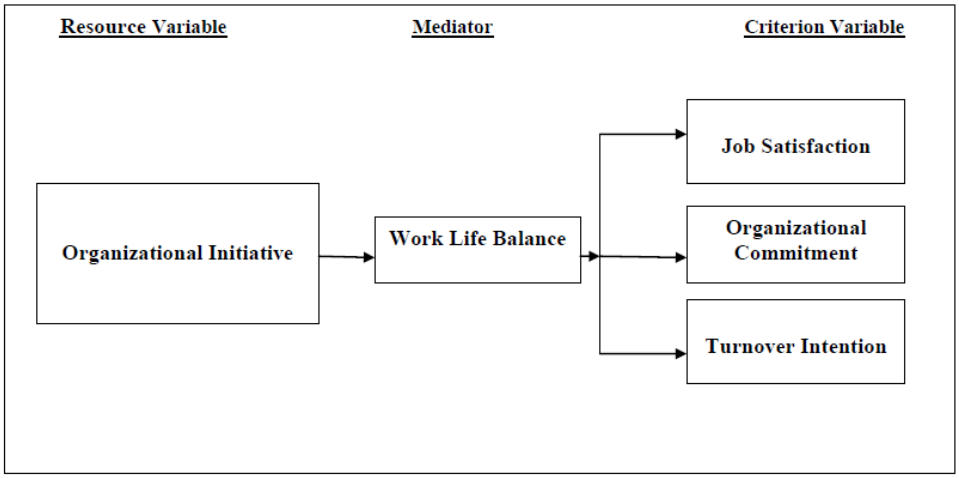


Figure 1: Theoretical Model

III REVIEW OF LITERATURE AND HYPOTHESIS DEVELOPMENT

3.1 Organizational WLB Initiative and Work Life Balance:

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Organizational culture can also create a drive for higher performance standards. Organizational culture relates "the assumptions, values, attitudes, and beliefs that are shared among significant groups within an organization" (van Beek &Gerritsen, 2010).Organizational culture gives employees identification and direction (Martel, 2002). There are many benefits associated with a strong organizational culture. They include: attract and retain star performers, guide and inspire employee decisions, provide fixed points of reference and stability, a more personal connection with employees, align employees with diverse interests around shared goals and export what the organization stands for (Rosenthan & Massarech, 2003). It has been suggested that work life balance programs cannot yield expected results unless the organizational culture supports use of work-life balance programs (Porter &Ayman, 2010). Wang (2004) suggested two main points that would encourage an organisation to adapt work-life balance policies: 1) at an organizational level, applying policies would increase productivity and earn a good business reputation; 2) at an individual level, motivation would increase employees' organizational commitment and loyalty, and help them deal with work-life balance related needs in terms of achieving better performance at work. In sum, the awareness, availabilities and usage of the organizational WLB policy is expected to relate to a better balance between employees' work and non-work domains. Generally, research on organizational support showed that employees believed their organization valued their contribution and cares about their wellbeing (Eisenberger, Huntington, Huchinson, &sowa, 1986). The studies suggested that an organization's culture can inhibit the implementation, availability, and the usage of the work-life balance policy. Allen (1999) suggested that employees might face negative consequences such as being regarded as less committed to the organization if they visibly show interest in family or personal life. Thomas and Ganster (1995) found that employees whose supervisors supported their efforts to balance work and family were less likely to experience work–family conflict. Supervisor support is as important as having a supportive work-life organizational culture. Thompson et al (1999) found that perceptions of a supportive work-family culture were related to employees' use of work-life balance policies. They also found that supervisor support was the strongest predictor of work-life balance policy use. They stated that the supervisor is a key role of influencing employee's decisions in using the work-life balance policy because they may encourage or discourage employees from using the policy. Furthermore, they may undermine employees' effort to achieve a better balance between two domains by reinforcing the cultural norms that go against taking advantage of those policies.

H1: Organizational Initiative Culture positively affects the Work Life Balance of the employee.

3.2 Work Life Balance and Job Satisfaction:

Job satisfaction is defined as „the extent to which people like (satisfaction) or dislike dissatisfaction) in their jobs' (Spector, 1997). Locke and Lathan (1976) defined job satisfaction as pleasurable or positive emotional state resulting from the appraisal of one's jobor job experience. Job satisfaction is a result of employees' perception of how well their job provides those things that are viewed as important. Quality of work life carries different interpretations for different employees in an organization. The relationship between working time (fewer working hours) and job satisfaction is ambiguous, though job satisfaction is positively related to working time flexibility for maintaining a reasonable work-life balance The balance work life score provides an organization with a productive and innovative employee (Greenhaus, 2003) the disparity in the work life balance tends to develop depressed and dissatisfied staff (Kofodimos, 1993). It is believed that balancing a successful career with a personal or family life can be challenging and impact on a person's satisfaction in their work and personal life's roles (Broers, 2005).

H2: Employee Work Life Balance positively affects the Job Satisfaction of the employee

3.3 Organizational commitment and work life balance

Organizational commitment is one of the organizational concepts that have widely been examined in administrative literature due to its importance for organizational performance and effectiveness. Organizational commitment is seen as the degree to which an employee is Loyal to their organization. It is characterized by acceptance of the organization's values; willingness to do exert effort on behalf of the organization; and desire to remain an employee of the organization. The study by (Siegel, 2005) was based on the hypothesis that low levels of work-life conflict and high levels of procedural fairness result in employee outcome favourability - which interact to influence organisational commitment. The results found that higher levels of work-life conflict do not necessarily lead to a decreased organisational commitment and that procedural fairness is a mitigating factor. Messersmith's (2007) article summarises the body of research on the work-life conflict experienced by IT professionals and finds that work-life conflict is negatively correlated to organisational commitment. Within the Australian construction industry a survey amongst females found that whilst career and work environment were important predictors of organisational commitment, family variables, such as number of dependent children, failed

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to relate (Lingard and Lin, 2004). It should be noted that organisational commitment is a dynamic that is changing as work is no longer necessarily a major source of one's identity (Bauman, 2005:27). Guest (2002) investigates the intentions of the new generation of workers, who supposedly place greater importance on achieving a work-life balance than previous generations. He reasons that these workers are less willing to display commitment to the organisation due to the unstable employment market and trend towards high employee turnover (Guest, 2002).

H3: Employee Work Life Balance positively affects the Organizational Commitment of the employee

3.4 Turnover intention and Work Life Balance

Boyar, Maertz, Pearson and Keough (2003) found both work-to-life and life-to-work conflict positively related to turnover intentions while of the two work-to-life conflict had a stronger relationship to turnover intention. Allen and colleagues (2000) found a moderate relationship between work-life conflict and turnover intentions. Most findings have fairly consistently indicated that greater levels of work-life conflict are associated with greater intentions to leave the organization (Greenhaus, Collins, Singh, & Parasuraman, 1997; Lyness & Thompson, 1997; Netemeyer et al., 1996). Furthermore, Greenhaus and colleagues (1997) examined actual turnover and reported that increased work-life conflict was related to actual turnover behaviours.

H4: Employee Work Life Balance positively affects the Turnover Intention of the employee

IV METHODOLOGY

4.1 Research Strategy:

The academic lifestyle featured by the unique opportunities to teach, undergo research, and work in an environment devoted to discovery, learning, and sharing is the reason that many faculties pursue academic careers. But in the case of higher education in India particularly Technical education is facing the crisis; it is pulling on with half the teacher strength it requires. The country faced a shortage of more than 3, 00, 000 teachers in its institutions of higher learning. In engineering education alone, the shortage is more than 1, 50,000. Many reasons have been found out for this issue, the important among these is the poor work life balance of the faculty.

Having considered the above, the study was conducted in the Technical Educational institutions in India which comprises of Technical University, Government colleges, Government aided colleges and Private technical Institution (As agreed upon with the institutions, the names of those specific institutions are disguised).The study was conducted for the period of eight months (Sep 2013 to Feb 2014), from the total of 300 sample 241response were considered relevant to the research. Convenient sampling technique is used for collecting data.

4.2 Measuring of Variables:

The organizational initiative instruments were measured using a 5 item scale anchored with "strongly disagree" (1) and "strongly agree" (7). Five items was selected for this research, child care information/referral service, elder information/referral service, flexitime, paid maternity leave and work/family balance training. Each item was accompanied by three following questions: (1) Does your organization provide the following Policies? (2) Is it available to you? (3) Do you use it? The scale indicated good reliability with a cronbachalpha of .90. The 4-item work-life balance scale developed by Brough, Timms and Bauld(2009) was used to assess employees experience in balance between their work and non-work life. They were "I currently have a good balance between the time I spend at work and the time I have available for non-work activity", "I have difficulty balancing my work and non-work activity", "I feel that the balance between my work demands and non-work activity is currently about right" and "Overall, I believe that my work and non-work activity are balanced". Scale shows the good reliability with cronbach alpha .88.A five item scaledeveloped by Canmann, Fichman, Jenkins and Klesh (1983) was used to measure overall job satisfaction .The scale was measured on a 7 -point Likert scale where (7) equalled strongly agree and (1) equalled strongly disagree. An example of an item from this scale was "I don't like my job", "Satisfied with the work". The scale indicated good reliability with a cronbachalpha of .84 the organizational commitment scale Developed by Meyer and Allen (1997)were measured using a 5 item scale anchored with "strongly disagree" (1) and "strongly agree" (7). Sample items include: "feel good to work with this organization," "feel more loyal" "I owe a great deal to my Organization" "I would feel guilty

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if I left my organization now. The scale indicated good reliability with a coronach alpha of .88.Turnover intention Developed by Colarelli (1984) was measured using 3 item scale. The items that defined Turnover Intention are "If I had my own way I will be in this job one year from now", "I frequently think of quitting my job", "I am planning to search for a new job in the next six months". Scale shows the good reliability with coronach alpha .82

V ANALYSIS

The demographical representation of faculty has been provided in Table 1. Men were overrepresented, making up 51% of the sample, women with 48%. 69% of the despondence were married, 31% of them were unmarried. As per the guidelines of All India Council for Technical Education, Three levels of hierarchy is considered for the study.50% of the sample belongs to the rank of Assistant Professor,28% of Associate professor and 21% of professor. On Year of Experience, 40% of faculties have less than five years of experience,18% of faculties with 5-10 years of experience,19% of faculties with 10-15 years of experience,13%of faculties with 15-20 years of experience,7% of faculties with above 20 years of experience The mean and standard deviations and correlation of the study constructs are listed in Table2. The correlations between constructs in each hypothesis showed statistical support at the1% significant level, Organizational initiative and employee work life balance (r=.46, ρ< .01),Employee work life balance and job satisfaction (r =.45, . ρ<01), Employee work life balance and organisational commitment (r=.47, . ρ<.01), Employee work life balance and Turn over intention (r =.21, . ρ<.01).

Measurement model developed by (HU & Bentler, 1998, 1999) is used to find the overall a high degree of good fit to the data, =428.39, df = 216, / df = 1.52, RMSEA = .044,Comparative fit index (CFI) = .92 and normed-fit index (NFI) = .81. As shown in figure 3 all measurement items significantly loaded on their corresponding constructs at the alpha level of .001. Cronbach alpha value of each measurement scale surpassed the minimum requirement of .70.

The relationships between variables in the proposed model were tested by using a structural equation model. Results of maximum likelihood estimation provided an adequate fit to the data, =430.12, df = 239, / df = 1.92, RMSEA = .064, CFI = .93 and NFI = 86.Thehypothesis testing results are summarized in Table 3.Hypothesis H1 exhibits that the organisational initiative culture of academic institution has a positive influence on faculties work life balance (t =3.39, ρ<.05); thus H1 is supported. Hypothesis H2 coined that faculty work life balance has a positive influence on job satisfaction (t =6.43, ρ<.01); hence H2 is supported. Hypothesis H3 hypothesized a relationship between employee work life balance and organisational commitment (t =1.69, ρ<.05); Thus H3is supported. Hypothesis H4predicted that faculty work life balances has positive effect on employee turnover intention. This prediction was Not supported (t =-1.17, ρ<.05); hence, H4 is not supported.

Demographical factors	Number of Respondence	Percentage of Respondence
Gender		
Male	124	**51.45%**
Female	117	**48.54%**
Marital Status		
Married	168	**69.70%**
Unmarried	73	**30.29%**
Rank		
Assistant Professor	121	**50.21%**
Associate Professor	68	**28.22%**
Professor	52	**21.57%**
Year of Experience		
Below 5 years	97	**40.24%**
5-10 years	48	**19.92%**
10-15 years	45	**18.67%**
15-20 years	32	**13.28%**
Above 20 years	19	**7.88**

Table 1: Gender, Marital Status, Rank, Year of Experience Distribution

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Variables	Mean	Standard Deviation	1	2	3	4	5
Organizational Initiative	4.09	1.49	-				
Work Life Balance	4.54	.79	.46**	-			
Employee Job Satisfaction	4.62	.87	.53**	.45**	-		
Organisational Commitment	4.18	1.03	.36**	.47**	.32**	-	
Turnover Intention	4.23	1.06	.24**	.21**	.25**	.38**	-

**ρ<.01

Table 2: Mean, Standard Deviation and Correlation

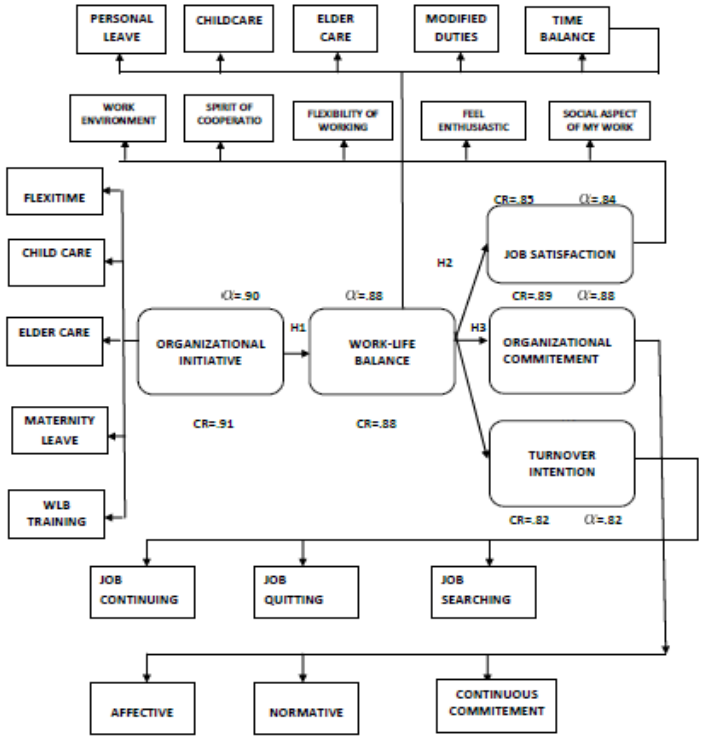

Figure 3: Measurement Model of Variables

Hypothesis	t-value	Result
H1(Organizational Initiative Culture positively affects the Work Life Balance of the employee.)	3.39*	**Supported**
H2(Employee Work Life Balance positively affects the Job Satisfaction of the employee)	6.43**	**Highly Supported**
H3 (Employee Work Life Balance positively affects the Organizational Commitment of the employee)	1.69***	**Supported**
H4(Employee Work Life Balance positively affects the Turnover Intention of the employee)	-1.17	**Not Supported**

*ρ<.05, **ρ<.01, ***ρ<.001

Table 3: Hypothesis Testing

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VI DISCUSSION AND CONCLUSION:

The present study focused on employees' work-life balance from organizational aspect. The proposed model provides an outlook for better work life balance of employees in technical institution. The present results partly supported the hypotheses in that work-life balance was found to be significantly related to organizational commitment, turnover intention and job satisfaction. This may suggest that employees who achieved a good balance between their work and life are more likely to have satisfaction, less intention to leave and will be more committed to their organization. The employees would achieve a better balance if they were aware of and took advantage of the WLB initiative offered by organization, employees would achieve better job satisfaction, be more committed to their organization, and have lower intentions to leave the job. The Present finding is similar to that of the findings by (Landauer,1997) stated that employees who are aware of or actually using the WLB policy the organization provided would have increased commitment to the organization and lower intention to leave the job. There exist several well researched barriers to implementing work life balance initiatives in organisations. The three most commonly reported are that the initiatives cost too much money to set up and implement, that it is too complicated to set systems in place for the initiatives to be used most efficiently, and that certain types of work require all employees to be in the office at once with face time being highly valued in some organisations. (Department of Labour, 2006) reported some barriers of implementing more flexible work practices for employees includes communication problems between employees and management and the difficulty of allowing flexible work approach practices because of the nature of the work taking place. There is also the fear that if initiatives are set up, employees will abuse them either through dishonesty, taking advantage of the flexible work options and/or not appreciating these benefits. More explicit barriers to employees of using flexible working practices within organisations include a failure by management to support usage of policies (Rhoades & Eisenberger, 2002), inconsistent access to initiatives for different staff members and failure to make clear the existence of such practices (Friedman & Greenhaus, 2000).

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Automatic Number Plate Recognition

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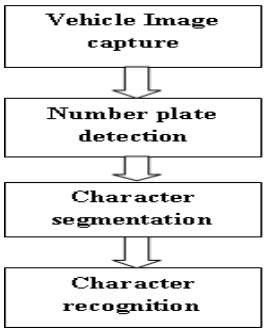
Abstract- *The main focus in this research paper is to experiment deeply with, and find alternative solutions to the image segmentation and character recognition problems within the License Plate Recognition framework. Three main stages are identified in such applications. First, it is necessary to locate and extract the license plate region from a larger scene image. Second, having a license plate region to work with, the alphanumeric characters in the plate need to be extracted from the background. Third, deliver them to an character system (BOX APPROACH)for recognition. In order to identify a vehicle by reading its license plate successfully, it is obviously necessary to locate the plate in the scene image provided by some acquisition system (e.g. video or still camera). Locating the region of interest helps in dramatically reducing both the computational expense and algorithm complexity. For example, a currently common1024x768 resolution image contains a total of 786,432pixels, while the region of interest (in this case a license plate) may account for only 10% of the image area. Also, the input to the following segmentation and recognition stages is simplified, resulting in easier algorithm design and shorter computation times. The paper mainly work with the standard license plates but the techniques, algorithms and parameters that is be used can be adjusted easily for any similar number plates even with other alpha-numeric set.*

I INTRODUCTION

The Automatic number plate recognition (ANPR) is amassing surveillance method that uses optical character recognition on images to read the license plates on vehicles. They can use existing closed-circuit television or road-rule enforcement cameras, or ones specifically designed for the task. They are used by various police forces and as a method of electronic toll collection on pay-per-use roads and monitoring traffic activity, such as red light adherence in an intersection. ANPR can be used to store the images captured by the cameras as well as the text from the license plate, with some configurable to store a photograph of the driver. Systems commonly use infrared lighting to allow the camera to take the picture at any time of the day. A powerful flash is included in at least one version of the intersection- monitoring cameras, serving both to illuminate the picture and to make the offender aware of his or her mistake. ANPR technology tends to be region-specific, owing to plate variation from place to place. The objective is to successfully locate standard number plate, segment characters and recognize them given a car image. The system must deal with different angles, distances, scales, resolutions and illumination conditions.

II PROPOSED MODEL



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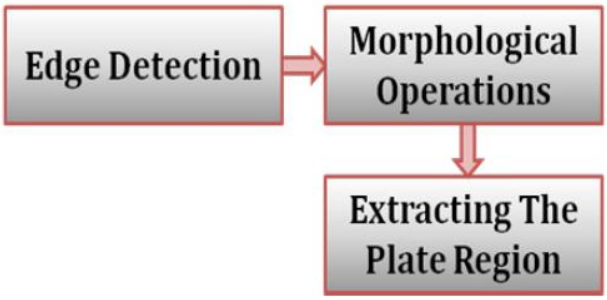
The process of automatic number plate recognition consists of four main stages:

a) Pre-processing
b) License plate localization
c) Character segmentation
d) Character recognition

1. Pre-processing:

As mentioned before, the system of automatic number plate recognition faces many challenges. So, this step is essential to enhance the input image and making it more suitable for the next processing steps. The first step done in the pre-processing is to apply minimum filter to the image in order to enhance the dark values in the image by increasing their area. This is mainly done to make the characters and the plate edges bold, and to remove the effect of the light diagonal strips that appear in the characters and edges of the license plates. This process is followed by increasing saturation of the image to increase the separation between colours. Then the image is converted to grayscale. Then increasing the image contrast to separate the background from highlights.

2. License Plate Localization:



In this stage, the location of the license plate is identified and the output of this stage will be a sub-image that contains only the license plate. This is done in two main steps.
(i) Locating a large bounding rectangle over the license plate.
(ii) Determining the exact location of the license plate.

3.Character Segmentation:

This stage is meant for segmentation of the characters from the plate. The output of this stage is a set of monochrome images for each candidate character in plate. The first step in this stage is to convert the plate image to a binary image. This is done using adaptive threshold with a window of size 11 (This is selected using trial and error). Then a process of noise removal is applied. This is done by getting the connected components from the binary image based on the 8-neighbourhood using flood fill. For every component, we decide if it's a noise or not based on the aspect ratio of the component and based on the number of pixels in that component. This is based on the fact that the characters of the plate have a certain range of aspect ratio and a certain range of number of pixels. After removing the noise components a maximum filter is applied to make the effect of thinning the characters to make sure that no two components are merged. This is followed by a horizontal paperion, to detect the boundaries between the characters to be able to cut them individually. The peaks in this paperion correspond to the gaps between the characters. So, we get all of these peaks and a rejection process is applied also, since a true plate has a fixed range of gaps between characters. So, any plate that has number of peaks that do not fit in that range, will be rejected. Also, there is a powerful rejection measure; it is the variance of the characters width (the variance of the spaces between peaks). After this the characters are cut according to the peaks of the previous paperion. Then another set of measures are computed to reject the false characters that may still exist after the noise removal operation. These measures are aspect ratio, deviation from average height test, deviation from average contrast, deviation from average brightness, deviation from hue, deviation from average saturation. After rejecting false characters, if the number of characters is not located in a predefined range, then the plate is rejected. Otherwise, the processing is continued and for every character a copy of its corresponding location in the grayscale is got. The gray level histogram is computed for the sub-image of each character, This gray level histogram will have a

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standard shape which is one peak at the dark values (this corresponds to the character's pixels) and another peak at the bright values (this corresponds to the background) and some small values between them. So, this gray level image is converted to binary using the following procedure. First, we find two peaks in the histogram then we find the minimum value in between, this will be the value of the threshold (thus, every pixel that has a gray level value less than the mentioned value, will be converted to black, every other value will be converted to white). This way for converting the grayscale image that contains only a character to binary one proved to be effective. At this point we have a set of binary images each contains one character and this is the output of this stage and the input to the next.

4. Character Recognition:

The goal of this stage is to recognize and classify the binary images that contain characters received from the previous one. After this stage every character must have a label and an error factor, and this error factor if greater than a predefined value will be used to reject false characters accidently passed from the previous steps. For the sake of classification, some features must be collected from the characters. The feature we work with in this system is the chain code of the contour of the image after dividing it into four tracks then into four sectors. Also we used a feed forward artificial neural network trained with back propagation with sigmoid activation function and the ANN is trained on the chain code feature of the optimal characters images. The neural network has 4X4X8=128input neuron, it also has 37 output neurons corresponds to the Arabic alpha-numeric set of characters except zero, it also ceil (37+128)/2) =83 hidden neurons. So, for every character we get the chain code feature and do a feed forward on the trained FFNN (Feed Forward Neural Network) then the class the corresponds to the neuron with the maximum value will the predicted class of that character. If the error exceeds a predefined value then the character is considered a false one and rejected. The plate is known to have a fixed range of characters that may appear in it, so if the total number of passed characters does not match this range, then the plate is rejected. Otherwise, the license plate number is found.

III CONCLUSION

The objective of this paper is to study and resolve algorithmic and mathematical aspects of the automatic number plate recognition systems, such as problematic of machine vision, pattern recognition, OCR and neural networks. The problematic has been divided into several chapters, according to a logical sequence of the individual recognition steps. Even though there is a strong succession of algorithms applied during the recognition process, chapters can be studied independently. ANPR solution has been tested on static snapshots of vehicles, which has been divided into several sets according to difficultness. Sets of blurry and skewed snapshots give worse recognition rates than a set of snapshots which has been captured clearly. The objective of the tests was not to find a one hundred present recognizable set of snapshots, but to test the invariance of the algorithms on random snapshots systematically classified to the sets according to their properties.

FUTURE WORK

ANPR can be further exploited for vehicle owner identification, vehicle model identification traffic control, vehicle speed control and vehicle location tracking. It can be further extended as multilingual ANPR to identify the language of characters automatically based on the training data It can provide various benefits like traffic safety enforcement, security- in case of suspicious activity by vehicle, easy to use, immediate information availability as compare to searching vehicle owner registration details manually and cost effective for any country For low resolution images some improvement algorithms like super resolution of images should be focused. Most of the ANPR focus on processing one vehicle number plate but in real-time there can be more than one vehicle number plates while the images are being captured. In multiple vehicle number plate images are considered for ANPR while in most of other systems offline images of vehicle, taken from online database are given as input to ANPR. To segment multiple vehicle number plates a coarse-to-fine strategy could be helpful.

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Performance Evaluation of Alternative file systems over HDFS

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Abstract-*In the last decade or so there has been an increased use and growth of social media, unconventional web technologies, computers and mobile applications, which have all encouraged development of various database models. Recent datasets are extremely costly and unpractical to administer with SQL databases due to lack of structure, high scalability, and elasticity that is needed. The No SQL data stores such as Mongo DB and Cassandra provide a desirable platform for fast and efficient data queries. With the introduction of the "Big Data" the size and structure of data have become highly dynamic and complex. This paper exhibits evaluation of the Cassandra a No SQL database when used in conjunction with the Hadoop Map Reduce engine, also the Ceph File system developed by Data Stax and the Lustre File system which all can be used as an alternative to HDFS (Hadoop Distributed File System). We provide a brief overview of MapReduce and Hadoop and then show some of the shortcomings of Hadoop + HDFS. Ceph maximizes the separation between data and metadata management by replacing allocation tables with a pseudo-random data distribution function. Also we have evaluated theoretical and actual performance of Lustre and HDFS for a variety of workloads in both traditional and Map/Reduce-based applications.*

Keywords: Hadoop, Bigdata, Ceph file system, HDFS. Cassandra, luster file system

I INTRODUCTION

With the outbreak of "Big Data" the complexity, size and nature of data has become unpredictable and unimaginable. In one day on a social media millions of data are getting uploaded as well as used. Since the data is constantly being modified through social media, newsfeeds, and scientific sensor input, then the requirements for the storage models also have the necessity changes. However the MapReduce model has evolved as the paradigm of choice for "Big Data" processing. The Map/Reduce is a distributed computational algorithm designed by Google which is used for a wide variety of large-scale jobs. The Hadoop Distributed File System (HDFS) is one which defines HDFS as the primary storage system used by Hadoop applications. HDFS creates multiple replicas of data blocks and distributes them on compute nodes throughout a cluster to enable reliable and extremely rapid computations. Hadoop utilizes a scale-out architecture that is configured as a cluster. As the process starts, it cites the states and data in Hadoop it is broken down into blocks and spread throughout a cluster. As soon as it happens the MapReduce tasks can be carried out on the smaller subsets of data that may make up a very large dataset overall which accomplishes the type of scalability needed for big data processing.

The studies with performance in mind and the applicability of the MapReduce model to No SQL DB, such as Mongo DB [16] and Cassandra, have been lacking. Since the data now-a-days increasingly produced from various sources are increasingly unstructured while they continually growing in size with user interaction and so it is important to evaluate the No SQL model when used with the MapReduce processing algorithm. In this paper, we analyse the performance when using Cassandra as the data store and Apache Hadoop for processing [17]. Cassandra is an open source non-relational, column oriented distributed database for storing large amounts of unstructured data.

The centralization that is inherent in the client/server model has proved to be a significant obstacle to scalable performance. Recently

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distributed file systems have adopted architectures based on object-based storage, in which conventional hard disks are replaced with intelligent object storage devices (OSD). It replaces the traditional block-level interface with one in which clients can read or write byte ranges to much larger named objects, distributing low-level block allocation decisions to the devices themselves. Clients mostly interact with a metadata server (MDS) to perform metadata operations while communicating directly with OSDs to perform file significantly improving overall scalability. Ceph is a distributed file system that provides excellent performance and reliability [1]. The architecture is based on that systems at the petabyte scale are inherently dynamically. It decouples the data and metadata operations by eliminating file allocation tables and replacing them with generating functions. This allows them to leverage the intelligence present in OSDs to distribute the complexity surrounding data access, update serialization, replication and reliability, failure detection, and recovery. Ceph file system makes use of highly adaptive distributed metadata cluster architecture that dramatically improves the scalability of metadata access. Lustre is a client/server based cluster file system where data are stored on Object Storage Servers (OSSs) and metadata are stored on Metadata Servers (MDSs). It is designed for large-scale computing. Lustre is optimized to operate efficiently on many types of high-end network fabrics by taking advantage of RDMA where available. In Lustre files are broken into stripes, which are typically stored on multiple Object Storage Targets (OSTs), allowing parallel read and writes access to different parts of the file. Lustre is POSIX-compliant and mounted remotely similar to NFS [2]

II BACKGROUND UNDERSTANDING

1. Map Reduce and HDFS

The Map Reduce algorithm defines splitting a data set to process in parallel over a cluster. Whereas inputs, scheduling, parallelization and machine failures are handled by the framework itself and monitored by a node called the master [5]. It splits the parallel execution into two phases: map and reduce where the Map processes a key and produces a set of intermediate key/value pairs. The reduce phase uses the intermediate results to construct the final output. Hadoop is the most popular open source implementation of the model. It consists of two core components namely The Hadoop Map Reduce Framework and the Hadoop Distributed File System [6]. Hadoop MapReduce consists of a Job Tracker that runs on the master node and Task Trackers running on each of machine. Job Tracker is responsible for determining job specifications, submitting the user job to the cluster and monitoring workers and the job status [7]. Task Trackers execute the user specified map or reduce tasks. It relies on HDFS for data distribution and input management which automatically breaks data into chunks and spreads them on the cluster where the nodes hosting the input splits and replicas are called Data Nodes [8]. Each and every Task Tacker processes the input chunk hosted by the local Data Node that is done to leverage data locality. The input splits are replicated among the Data Nodes based on a user set replication-factor. This design prevents data loss and helps with fault tolerance in case of node failures.

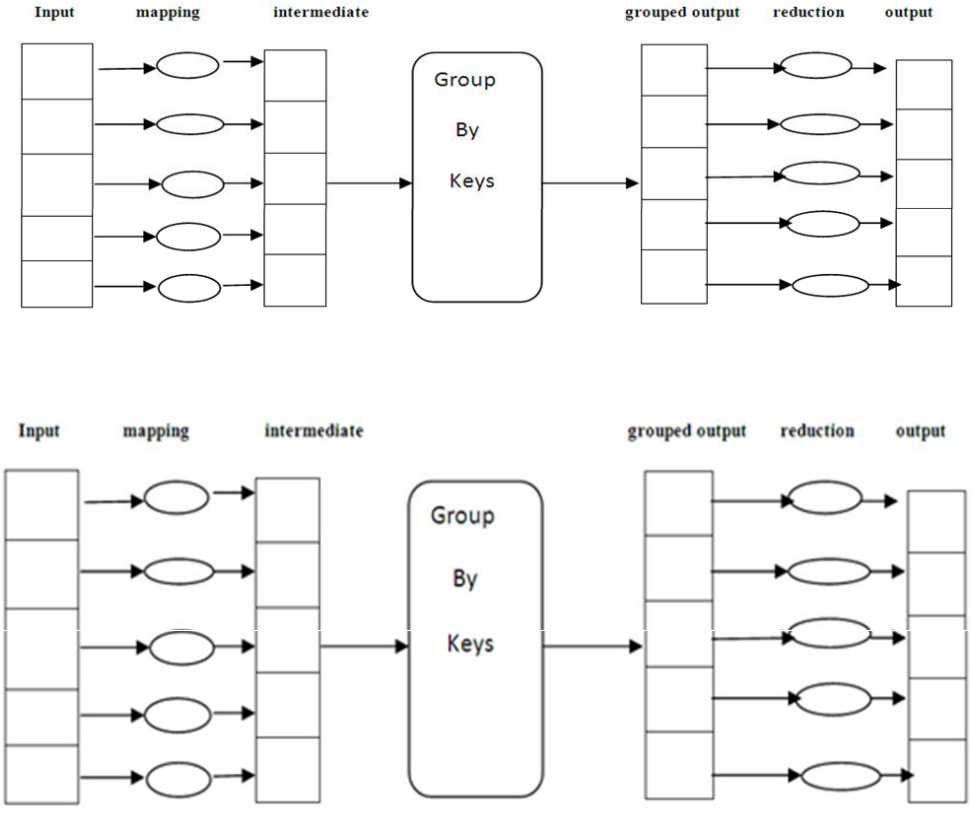

Figure 1: Parallel Execution of Map Reduce

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2. Cassandra

Cassandra was developed by Facebook which is an open source, non-relational, column oriented, distributed database, developed for storing large amounts of unstructured data over commodity servers. It is a peer-supermodel which makes it not only tolerant against single points of failure but also easily horizontally scalable. A cluster in Cassandra can be expanded on demand by simply starting new servers which only know the address of the node to contact for getting the start-up information [17].The column is the lowest/smallest increment of data. The tuple contains a name, a value and a timestamp. The interface definition of a Column:

```
struct Col {
1: bin name,
2: bin value,
3: i64 time_stamp,
}
```

2.1 Data Model

Figure 2 shows the column oriented data model of Cassandra. Here a column is the smallest component of data and it is a tuple of name, value and time stamp. They are used for conflict resolution as 1ultiple versions of the same record may be present. The Columns associated with a certain key can be depicted as a row which does not have a pre-determined structure as each of them may contain several columns. A column family is a collection of rows similar to a table in a relational database. Here the Column families are stored in separate files which are then sorted by row key order. The placement of rows on the nodes of a Cassandra cluster depends on the row key and the partitioning strategy. The Key spaces are containers for column families just as databases have tables in RDBMSs

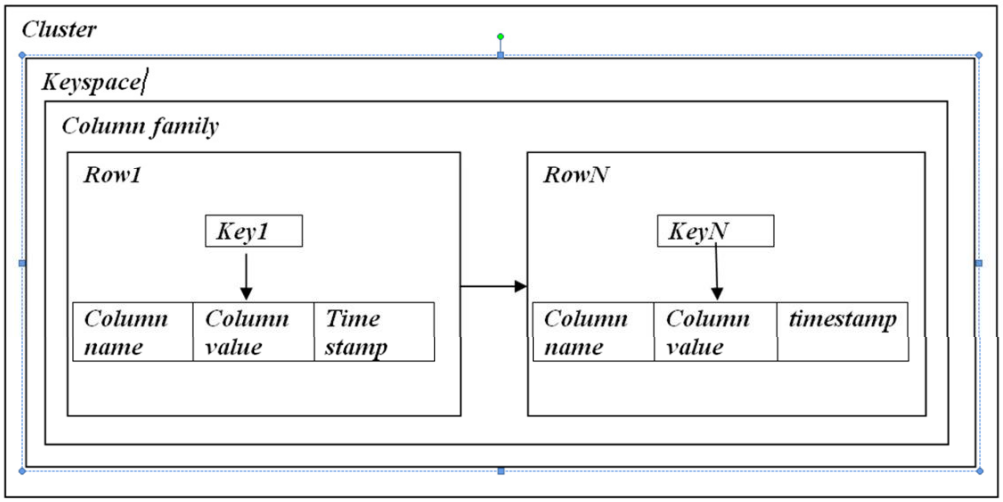

Figure 2:Heirarchy of Cassandra Model

Representation of the row key -> column families ->column structure is

```
{
"mcv":
{"allusers":
{"eAddress"
{"name":"eAddress", "value":"koo@bar.com"},
"webSite":
{"name":"web","value":"http://bar.com"}
},
"Stat":
{
"visits":{"name":"visits","value":"123"}
}
},
"u2":{
"allusers":{
"elAddress":
{"name":"eAddress","value":"u2@bar.com"},
"twitter":{"name":"twitter","value":"u2"}
}
```

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}
}

Now the key "mcv" identifies data in two different column families namely "all users" and "Stat". Thus does not show that data from these column families is related. The semantics of having data for the same key in two different column families is entirely up to the application. Also note that within the "Users" column family, "mcv" and "us2"have different column names defined. This is perfectly valid in Cassandra

2.2 Reliability and consistency

Cassandra has automatic replication to duplicate records throughout the cluster by a user set replication-factor which ensures that failing nodes do not result in data loss. Cassandra also offers configurable consistency which provides the flexibility to consciously make trade-offs between latency and consistency.

2.3 Partitioning of data

Cassandra provides two main partitioning strategies namely RandomPartitioner and ByteOrderedPartitioner. The RandomPartitionr is the default strategy and it is used in most cases which makes use of consistent hashing to evenly distribute rows across the cluster. The hashing algorithm is used to create an md5 hash value of row key. All Cassandra node has a token value that specifies the range of keys for which they are responsible. Based on the hash and range tokens a row is stationed in the cluster. Distributing the records evenly throughout the cluster balances the load by spreading out client requests.

2.4 Read and Write Operation

The client can contact any Cassandra node for any operation. The nodes are connected to each other to serves as a coordinator. Thus the coordinator forwards the client request to the replica nodes owning the data being claimed. For all write request first a commit log entry is created then mutated columns are written to an in-memory structure called Memtable where upon reaching its size limit is committed to disk as a new SS Table. Each of this operation is executed as a background process. A write request is sent to all replica nodes but the consistency levelis determined by how many of them have to wait for a write transaction to be considered completed. When a read request is given the coordinator contacts the replica nodes specified by the consistency level

2.5 Support of Hadoop:

Cassandra and Hadoop integration is important as it provides data management and real-time analysis along with complex data intensive processing. The Hadoop-Cassandra cluster the Cassandra servers are overlapped with Hadoop TaskTrackers and DataNodes to ensure data locality so that each TaskTracker processes the data that is stored in the local Cassandra node. The DataNodes are required because Hadoop needs HDFS for copying the dependency jars, static and intermediary data [18].

3. Ceph:

The Ceph file system has three main components namely the client, a cluster of OSDs and a metadata server cluster the client at each instance of which exposes a near-POSIX file system interface to a host or process. A cluster of OSDs which collectively stores all data and metadataserver cluster manages the namespace while coordinating security, consistency and coherence of applications and to improve system performance [3, 4].The primary goals of the architecture are scalability performance and reliability. Our target workload may include such extreme cases as tens or hundreds of thousands of hosts concurrently reading from or writing to the same file or creating files in the same directory. In such situations the distributed file system workloads are inherently dynamic with significant variation in data and metadata access as active applications and data sets changeover time. Ceph addresses this issue of scalability by simultaneously achieving high performance, reliability and availability via three fundamental design features namely decoupled data and metadata, dynamic distributed metadata management, and reliable autonomic distributed object storage [9].

3.1 Data and Metadata Decoupled

Ceph increases the separation of file metadata management from the storage of file data. Metadata operations are collectively managed by a metadata server cluster while clients interact directly with OSDs to perform file I/O operations. Object-based storage has long promised to improve the scalability of file systems by delegating low-level block allocation decisions to individual devices. But object based file systems replace long per-file blacklists with shorter object lists which eliminate allocation lists entirely and the file data is striped onto predictably named objects through a special-purpose data distribution function called CRUSH which assigns objects to storage devices.

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3.2 Distributed Metadata Management Dynamically

Since file system metadata operations make up as much as half of typical file system workloads effective metadata management is critical to overall system performance. Ceph utilizes a novel metadata cluster architecture based on Dynamic Sub tree Partitioning that distributes responsibility for managing the file system directory hierarchy among tens or even hundreds of MDSs. A specific partition preserves locality in each MDS's workload providing efficient updates and aggressive prefetching to improve performance for common workloads allowing Ceph to effectively utilize available MDS resources under any workload and achieve near linear scaling in the number of MDSs.

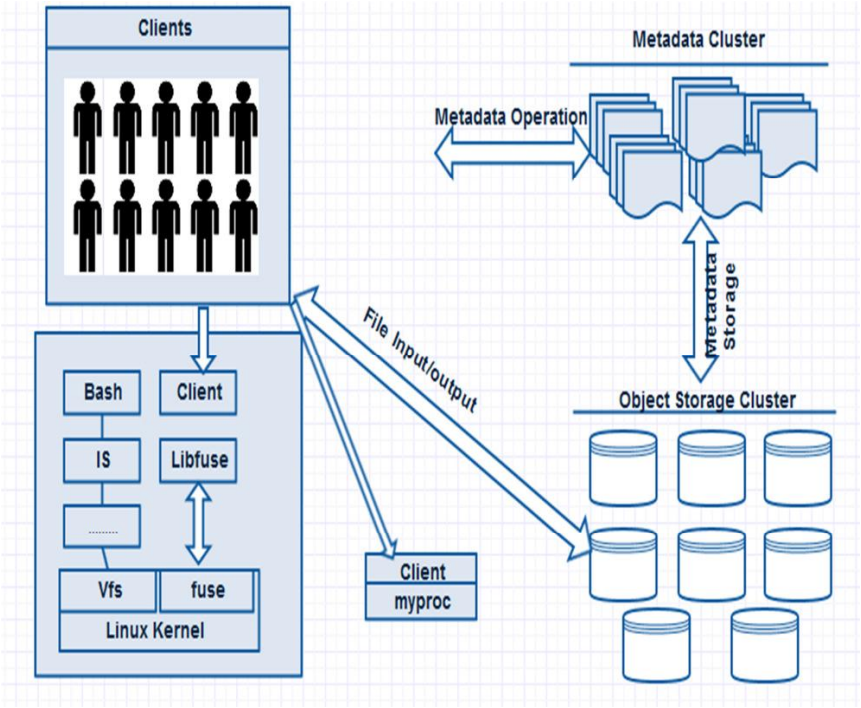

Figure 3: System Architecture

3.3 Reliable Distributed Object Storage

Many large systems are composed of many thousands of devices that are inherently dynamic. Ceph delegates responsibility for data migration, replication, failure detection and failure recovery to the cluster of OSDs that store the data. The OSDs collectively provide a single logical object store to clients and metadata servers.

4. Lustre

The use of clustered file systems as a backend for Hadoop storage improves performance of distributed file systems such as Lustre, Ceph, PVFS and GPFS with Hadoop has been compared to that of HDFS. With various optimizations and tuning efforts, a clustered file system can reach parity with HDFS. However, a consistent limitation in the studies of HDFS and non-HDFS performance with Hadoop is that they used the network infrastructure to which Hadoop is limited. In HPC environments where much faster network interconnects are available significantly better clustered file system performance with Hadoop is possible.

III PERFORMANCE EVALUVATION

A. Efficiencies of alternative file systems:

1. Cassandra: The objective is to offer easy Hadoop integration for Cassandra users. In HDFS Name Node service, that tracks each files metadata and block locations, is replaced with the "I node" columnfamily. Web applications that rely on fast data access NoSQL

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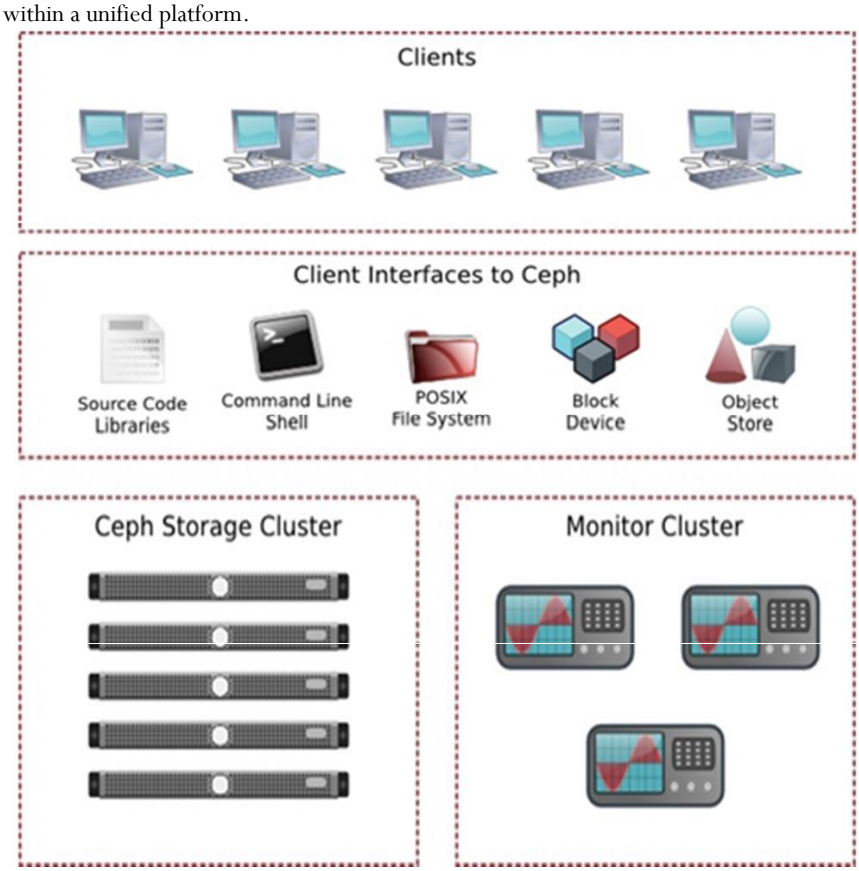
key-value store. Hadoop has fast access to data streaming into Cassandra from web users. T hemain design goals for the Cassandra File System were to first, simplify the operational overhead of Hadoop by removing the single points of failure int he HadoopNameNode.

2. Ceph:

They uniquely deliver object, block, and file storage in one unified system. Its features are a high- performance parallel file system that makes it a candidate to replace hadoop. Ceph asa "fully open source, distributed object store, network block device, and POSIX-compatible distributed file system designed for reliability, performance, and scalability." It's uniqueness comes in part because Ceph does all these things within a unified platform.



B. Conjunction of Hadoop with Alternative systems:

1. Cassandra with HDFS: With the conjunction of MapReduce and Cassandra the Hadoop was used with 3 different configurations:

- Hadoop-native, HDFS for input and output placement.
- Hadoop-Cassandra-FS, reads the input from Cassandra and writes the output to a FS shared by the workers.
- Hadoop-Cassandra-Cassandra reads input from Cassandra and writes output back to Cassandra.

Figure 4 shows the performance for 3 different Hadoopsetups under three different workloads which are classified in three different cases based on the input size to output size ratio. Figure 4a shows the case where the input dataset is significantly larger than the output. Like altering satellite image data by removing undesired areas to create high value images. The images are collected in a Cassandra cluster to provide search and query capabilities. In Figure4a we show that while HadoopCassandra-Cassandra is 1.1times slower than Hadoop-native at processing 4 million input records it gets only 1.8 times slower for 64 million. When increase the input 16 times does not lead to as big a performance difference.

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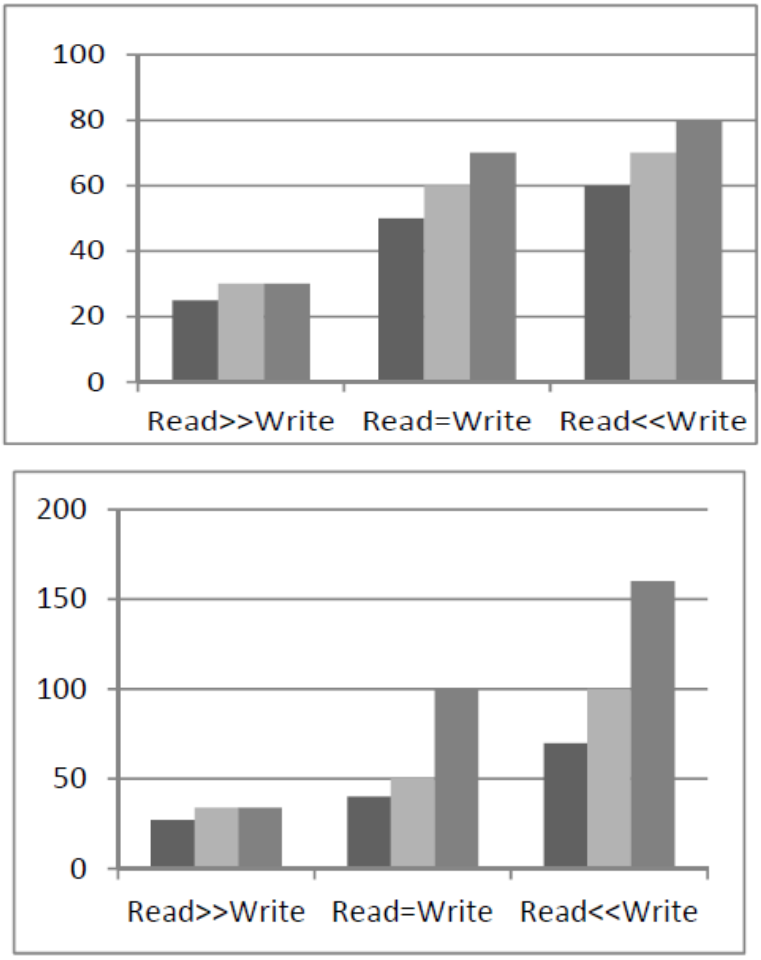

Figure 4: Hadoop with and without Cassandra under three different workloads

Hadoop-Cassandra-Cassandra and Hadoop-Cassandra-FS display very similar output where the write location does not have a considerable effect on performance. Therefore, each of the setups completes output writing in under 1.2seconds. But Hadoop reads 4 million records from HDFS1.3 times faster than it does from Cassandra; it is only 2.1times faster for 64 million. Thus shows that increasing the read size dramatically does not affect Hadoop-Cassandra performance to a great deal which is desirable for processing expeditiously dilating datasets. In Figure 4b,we use a workload where the output size is very close to, if not the same as, the input size thus Figure 4b shows that Hadoop-native is 1.2 to 1.4 times faster than Hadoop-Cassandra-FS and 1.9 to 2.9 times from Hadoop-Cassandra-Cassandra[17].

In the MapReduce computation is moved to the data which means each worker node processes the data split they own. Here data is split and distributed evenly among the Data Nodes and each Task Tracker processes the data from the local Data Node. By using Cassandra with Hadoopleaves the distribution of data to the partitioning strategy set for the input and output column families within Cassandra. The Random Partitioner will evenly split thedata among the nodes. This means that with RandomPartitioner each Hadoop worker has local access toalmost the same amount of data. Whereas the ByteOrderedPartitioner causes the data splits to be collected on a small set of nodes.WithHadoop-Cassandra-Cassandra using RandomPartitioner versus Byte Ordered Partitioner. It shows that using RandomPartitioner is 1.2 times faster for 4 million records while it is 3 times for 32 million. Even the performance also hangs dramatically with growth of the the data size as more data movement is required to complete the MapReduce job. Efficient MapReduce performance, it is crucial for the underlying data storage to distribute data evenly and allow for data locality. Distributed storage systems like HDFS store data in multiple nodes to avoid data loss in case of node failures.The data is replicated by user set replication factor andeach replica is placed on a different node. By using Cassandra with Hadoop, HDFS does not have any control of data replication. Therefore, if the data is not replicated through Cassandra itself node failures would result in data.

Figure 5 shows the performance of CPU and memory intensive jobs with Hadoop and Cassandra. Apart from it data intensive, the application memory and CPU demands are also shown to affect performance in various MapReduce implementations [18]. In most MapReduce applications it is observed that the output is significantly smaller than the input, since the output being small makes the write time negligible and consequently Hadoop-Cassandra-Cassandra and HadoopCassandra-FS display similar times. In Figure 5(a) HadoopCassandra-Cassandraunder CPU intensive workload shows closer times to Hadoop-native for each data point shown hereHadoopnativeis only up to 1.1 times faster.

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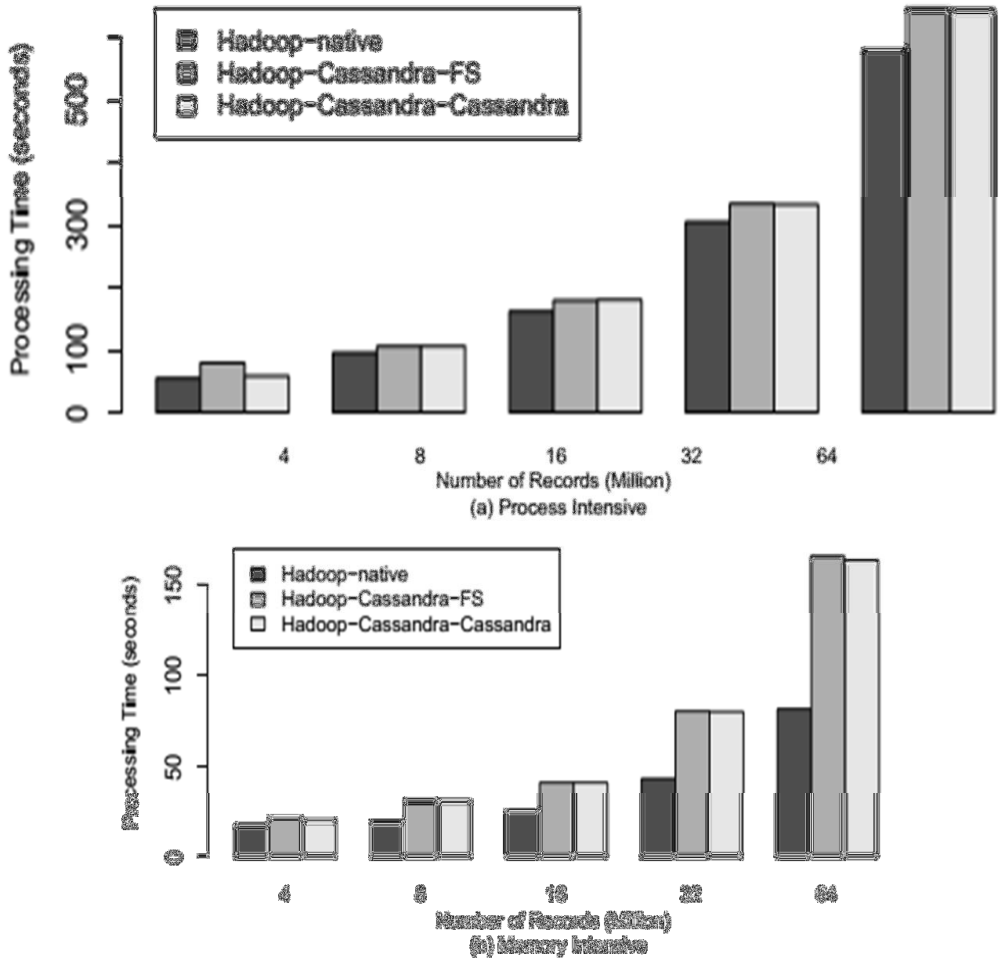

Figure 5: Running Hadoop with different setups for processing intensive operation

Thus shows tha the processing of map and reduce operations takes up most of the total job time and input/output locations changes only a little. In Figure 5(b)Hadoop-native performs 1.7 times faster than Hadoop-Cassandra-Cassandra for 4 million input records and thisratio reaches 2 as data increases to 64 million. In a Hadoop-Cassandra-Cassandra setup each worker node runs a Cassandra server in addition to a TaskTracker and DataNode. Cassandra servers have their own memory load on the worker machines because there are in-memory structures like Me tables and other cached data .Only for4 million input records Hadoop native is 1.7, and for 64million it is 2 times faster than Hadoop-Cassandra-Cassandra. Cassandra memory footprint is more affected by the number of column families than the data size in one of them and contributes to the overall slower performance[18].

A. Lustre in on juntion with HDFS:

According to the tasks-assigned strategy Hadoop cannot make task data local. For example when node1 (rack 2)requests a task, but all tasks pre-assign to this node has finished, then JobTracker will give node1 a task preassigned to other nodes in rack 2. In this situation, node1will run a few tasks whose data is not local. This breaks the Hadoop principle that Moving Computation is Cheaper than Moving Data. This generates a huge net I/O when these kinds of tasks have huge inputs.Hadoop+HDFS storage strategy of temporary or intermediate data is not good for high computational complexity applications which generate big and increasing MapTask outputs. Reduce node need to use HTTP to shuffle all related big MapTask outputs before real task begins, which will generate lots of net I/O and merge/spilloperation and also take up mass resources. Even worse, thebursting shuffle stage will make memory exhausted and make kernel kill some key threads according to java's wasteful memory usage, this will make the cluster unbalance and instable. HDFS cannot be used as a normal file system, which makes it difficult to extend. HDFS is time consuming for small files.

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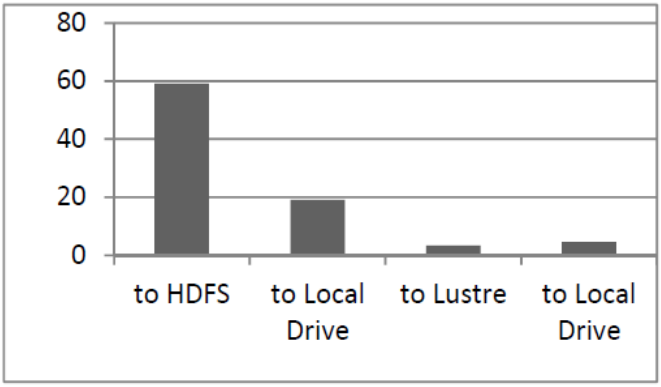

Figure 6: time to transfer 1gb file from local disk

We compare the differences of HDFS and Lustre in each stage. Map input: read/write

1. With block's location information
    a. HDFS: streaming read in each task, most locally, rare remotely network I/O.
    b. Lustre: read in parallel in each task from Lustre client.
2. Without block's location information.
    a. HDFS: streaming read in each task, most locally, rare remotely network I/O.
    b. Lustre: reads in parallel each task from Lustre client, less network I/O than the first one because of location information. Map output: read/write.
    c. HDFS: writes on local Linux file system, not HDFS.
    d. Lustre: writes on Lustre

A record emitted from a map will be serialized into a buffer and metadata will be stored into accounting buffers. When either the serialization buffer or the metadata exceed a threshold, the contents of the buffers will be sorted and written to disk in the background while the map continues to output records. If either buffer fills completely while the spill is in progress the map thread will block

IV CONCLUSION

In this paper we have paired Cassandra with Apache Hadoop and showed the performance gains and pitfalls of using the two together. Also we have determined what NoSQL platform might be suitable for Hadoop coupling where first we show a range of features conducive to efficient performance with the MapReduce model. Increasing the replication-factor on Cassandra does not affect Hadoopturn around time leveraging range scans reduces read repair calls on replicas; immunizing Hadoopfrom replication related performance degradation. Replacing HDFS with Lustre as the underlying file system for Hadoop compute clusters in HPC environments can the oretically result in significant improvements in system performance and cluster efficiency or potentially offer a lower overall system cost. Relative performance is expected to vary significantly based on a particular task's input/output pattern; we highly recommend prototyping the performance for a cluster's anticipated tasks before selecting a backend file system. Ceph addresses three critical challenges of storage systems scalability, performance, and reliability by occupying a unique point in the design space.

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Integrated eGov mechanism for Remote VISA Issuance by the Embassy and Consular

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Abstract – *eGov Mechanism for Visa is an information validation and Visa processing mechanism using an IT and Communication infrastructure. Issuance of VISA by the consular and embassy is among the top 100 risky jobs. This has a very serious impact on the relationship between countries and among the standard forum of United Nations. The complex process need adequate data input from various sources. The integration of those data is the core value of this paper which needs the global impact for successful implementation. The statistical analyses of UN reports say that there are huge quanta of people who overstay or attempt VISA Run. This could create adverse effects in a nation's economy and security policies. However, this crisis can be averted through digitization and eGov mechanism in Visa Issuance, this feat can be achieved through the means of Global data and information verification process associated with multilingual data validation system. EU has already adopted VIS a form cross continental information interchange process during their Schengen Visa issuance. Application of such a system has proven to have reduced Visa run to a large extent. Globally such an eGoverning mechanism can further increase the efficiency of the system and be beneficial in multiple ways to the nations.*

Key words used: VISA Issue, VISA Verification, History, Travel History.

I INTRODUCTION

The globalization mechanism has now encouraged people to travel across nations just with a handheld booklet, Passport. This beneficiary method is progressing at a hyper rate that in the recent times one can travel from a country to another, with very limited to no preplanning. But this process as beneficiary as it's also has a huge scale adverse effect which is failure of some travelers to return to their home country using various reasons both actual and faux, studies point out illegal residents are more prone to be involved in criminal activities in their host nation. Also it is very difficult for the embassy and consular (VISA) providers to check if the applicant has pending cases or judge ment. People cross the border to escape from the checks and never return causing a huge loss for the other Government, and hence this paper describes connecting the Passport Control and Legal System with Global VISA processing to avoid issuance of VISA for Criminal and Legal imposters.

II RELATED WORKS

For decades the VISA Issuance Process was kept confidential and even was a nightmare for the tourists who wished to explore other countries. But the present environment has created a structure that travelling across the borders was not such difficult enough. The United Nations Migration council in 1982 declared the Justice for the Alien and the adequacy of the consular establishment enabling the VISA System.

The United Nations Migration Council has declared the Restrictive Employment immigration policies which clearly quote the

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effectiveness and implications of sending people from ASEAN Countries. According to the statistics released by the United Nations in 2010, it quotes that 13% of the people who travel in Tourist VISA to other countries fail to return back to their nation post their validity of VISA. And 6% of the total people who travel in Tourist VISA with criminal backgrounds departing from their home country to evade the law. Data from which an estimation of the policies is made in this paper consists primarily of government or scholarly publications that appear occasionally, and newspaper reports compiled by various institutions. Three main sources have been used. The first one is a compilation of news items by the Center for Immigration Studies (CIS) in Washington, D.C. sent on a weekly basis to interested recipients. The second is a monthly newsletter published by the University of California at Davis. The third is a bi-monthly newsletter from the Scalabrini Migration Center in the Philippines on Asian Migration News (AMN).

III EXISTING SYSTEM

The European Union has the VIS Program which enables to share almost 97% of the data among the European Countries to avoid VISA Fraud and VISA Trading. The Visa Information System (VIS) started operating on 11 October 2011. It connects consulates in non-EU countries and all external border crossing points of Schengen States with a central database. VIS processes data related to applications for short-stay visas in the Schengen Area. Visa applicants will enjoy faster procedures thanks to the use of biometrics, which will also facilitate the identification of visa holders. Now, VIS is being used for all Schengen state visas.

Very similarly we have APC (Automated Passport Control) mechanism in the US Passport Control section. This is an initiative by the CBP Team which stands responsible for Customs and Border Protection. This APC has the ability to handle International Visitors and expedite the eligibility of Visa Free Entrance and Verification Checks. The usage of APC gives the visitors a faster processing, low congestion and shortest processing time. This APC not only speeds the processing, but also saves the environment by skipping the Customs Declaration forms and Arrival Card / Departure cards. Travelers may be prompted to scan their passport, smile for a photograph and scan the barcode of their flight boarding pass. Need to validate the information displayed in the screen before moving ahead. This simplifies the process around the manual grounds of checking information by the Passport Control Officer.

IV VIS WORKING PROCESS

The VIS allows the states of Schengen to share the information and particulars about an individual among the other states. The VIS uses a centralized IT and communication infrastructure to get connected with other states across the Schengen countries and consulates in non-EU countries specifically the border crossing points across the Schengen. The system basically uses the Fingerprint identification system to identify and match the records. These facilities in easiest identification of the rightful holder of the VISA; and accurate validation of the information provided by the holder. This fights against the VISA Abuses and VISA Trading. And, this protects the travelers enhancing the security.

The competent authorities at the Border Control and other agencies may consult with the VIS for purpose of examining the applications and issuing the VISA or entry into the state. The authorities responsible for carrying out checks at external borders and within the national territories have access to search the VIS for the purpose of verifying the identity of the person, the authenticity of the visa or whether the person meets the requirements for entering, staying in or residing within the national territories.

Asylum authorities only have access to search the VIS for the purpose of determining the EU State responsible for the examination of an asylum application.In specific cases, national authorities and Europol may request access to data entered into the VIS for the purposes of preventing, detecting and investigating terrorist and criminal offences.

V PROPOSED SYSTEM

When the EU is able to club the VIS enabling the quicker issuance of VISA validating all the synchronized information, why not the other countries is going to the right question of the hour. The system is all about creating the IT infrastructure and communication infrastructure capable of verifying the information globally amongst all the countries with the ability of multilingual information validation process.

The applicant may be asked to input few mandate information like the option of choosing the country for his/her studies or employment or tourist visit. Basic inking about the country and his financial positions could be given with high weightage. For tourist VISA considering the weightage and risk factors the system needs to be designed such that it offers, 15 days valid VISA, 30 days valid VISA, 90 days valid VISA and Airline Ticket based VISA and more in the line flexible enough understanding the risk ability of the destination country.

At the macro level it is similar to the existing system it validates the validity and genuineness of the Passport and other supporting documents including Financial Reports, social ties, economic ties and other ties in line with the policy of the destination country.

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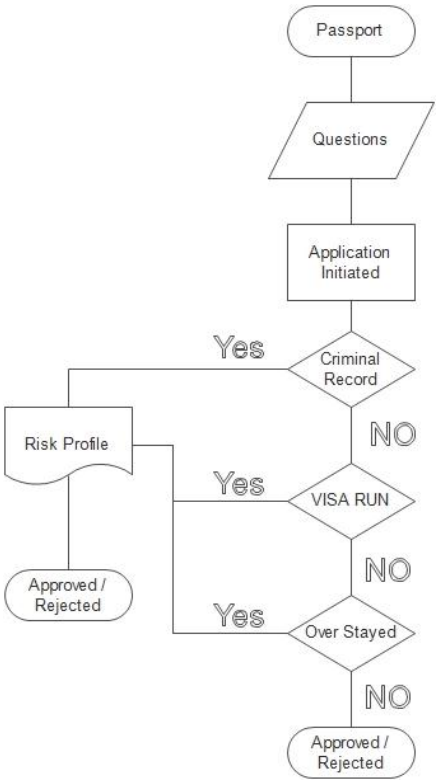

Flow Chart:1 Process of Decision Making

VI IN DETAIL

The complex process by each and every embassy is that to check that applicant has been convicted or found guilty of any civil or criminal activities. The secondary question comes before issuing the VISA would be to check if the applicant has ever overstayed or violated / breached the decorum of any country over his travel period. And finally the last question would be his ability to cover the expenses during his travel based on his or her financial positions. Further after receiving the satisfactory responses for all the above questions a VISA is either granted or rejected.

VII IMPLEMENTATION TRIAL

The implementation part is underway and the following pictorial moves gives the basic idea about what the system is all about. Figure 1 gives the information for the login process controlled by secure authentication system.

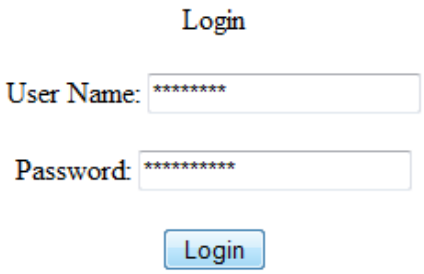

Figure 1- Login System

Post login the embassy or the consul or VISA Officer will key in the passport number and country of issuance. On the validation of information, the travel history of the applicant will be visible into the asylum's screen to make the decision quicker and better. The decision panel application will be HTML5 application which fetches the data records easily over mobile and tablets.

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Figure 2 - Passport Verification Login

When the passport information is inputted across the issuing country will be displayed. This uses the ISO code of country representation. The first two letter code represents the Country in which the passport was issued. The last character of the digital passport is the Check Sum value of the passport holder.

The decision panel displays the particulars of the passport which is connected with the Judicial System of the country which the passport is associated with. The below screenshot gives the decision panel of the VISA Issuance System which defines the probability of the best issuance with Frequency of the Travel and Criminal cases associated with him. The age defines the recently passed age as per the passport. Criminal Records are fetched from the Judicial System of the Government Database. The frequency is based on the stamp-in and stamp-out of applicant at the airports and border check-points. It calculates all the travel and defines a point based system to define the Over Stays, Criminal Activity in which applicant has involved in other countries and so on. These factors are internally managed and travel remarks are updated. The system then generates its decision over the application. Of course, there is no mandate for the consul or VISA Officer to act according to the system, with the decision abilities of the self, he or she can have the decision. Some complex cases like way long back the criminal records might have existed, the RIGHT TO BE FORGOTTEN rule can also be implemented.

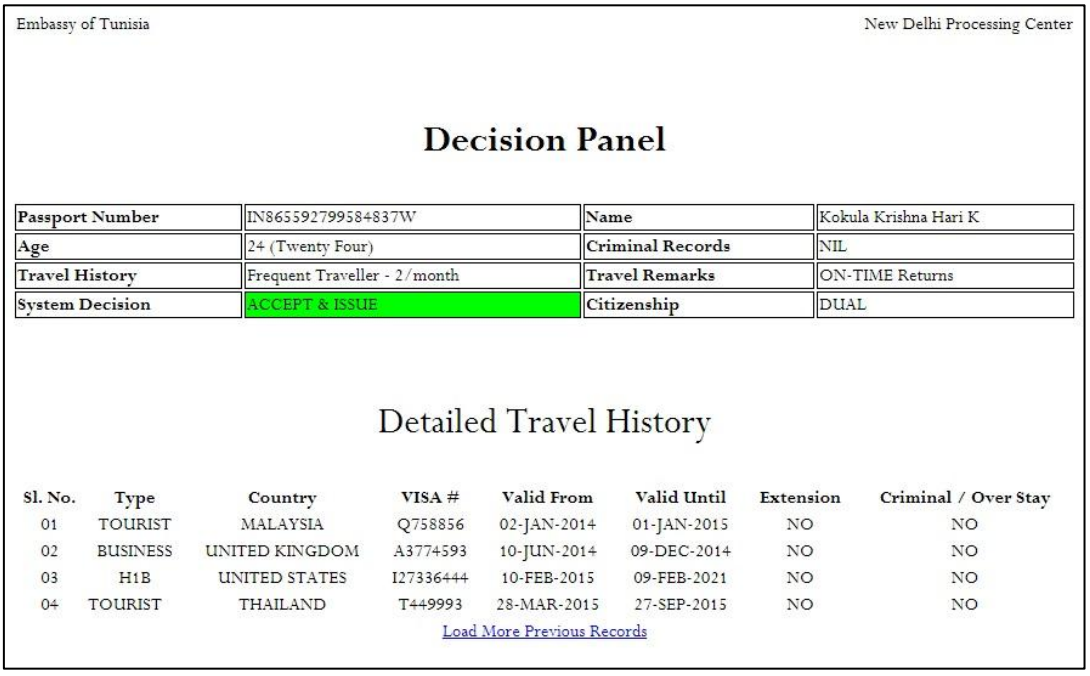

Figure 3 - Application Decision Panel with Travel History

The decision panel also has the ability to display the detailed travel history and detailed criminal activity of the applicant. The above image displays the last 4 travel VISA issued to the applicant. The VO can even expand this list. If the case, the applicant would have had some criminal records or passport revoking under the laws, the same will also be displayed here.

VIII CHALLENGES

The implementation phase of this Integrated Mechanism would be a great challenge mainly because of synchronization of data among various governmental agencies and governments. Every Agency and Government is highly considering the value of data and privacy of each and every citizen of their fellow country. This is the major and only flaw in all the phases of this Integrated eGov mechanism for Remote VISA Issuance by the Embassy and Consular article.

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IX FUTURE WORK

The process of integration doesn't have a limitation. The next process would be integrating the Polis Records including petty offenses and other civil disputes. The algorithm would be strengthened to explore the vitality of the petty offenses and civil disputes while making a final decision over the issuance of VISA. Additionally, the financial monitoring would also be incorporated through the service banks in each and every country which could be eradication of Lodgment of Money into the accounts at the last moment. As of now the final module which needs to be appended amongst the others quoted above is the tax payer system.

X CONCLUSION

In the closing remarks, the implementation of this integrated egovernance mechanism will surely help in limiting the total number of expatriate illegally overstaying and attempting to perform the VISA RUN. Thus helping to maintain the country's deliverability and other opportunities for the legal citizens, globally in all the countries. This could also foster the relationship among the countries.

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A New Method for General Solution Of System Of Higher-Order Linear Differential Equations

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Abstract: *This paper presents a new method for solving system of higher-order linear differential equations (HLDEs) with constant coefficients; however the same idea can be extended to variable coefficients. Using the basic concept of inverse of matrix and variation of parameters, we develop a new method to solve system of HLDEs. Proposed method works for any right hand side function, so-called vector forcing function f (x) of given system of HLDEs. Selected examples are presented using proposed method to show the efficiency.*

Key words: Systems of higher-order linear differential equations, Variation of parameters, Inverse of matrix, General solution.

I INTRODUCTION

The systems of higher-order linear differential equations (HLDEs) have been vigorously pursued by many researchers and engineers and developed many different method to solve the system, for example, see [1-10]. Naturally, the systems of HLDEs arise in many applications of nuclear reactors, multi-body systems, vibrating wires in magnetic fields, models of electrical circuits, mechanical systems, robotic modeling, and diffusion processes etc.

We consider the following type of systems of n linear differential equations of order $m > 0$,

$$A_m \frac{d^m}{dx^m}u(x) + \cdots + A_1 \frac{d}{dx}u(x) + A_0 u(x) = f(x), \tag{1}$$

where, for $i = 0, \ldots, n$, A_i are coefficient matrices of order $n \times n$, $f(x) = (f_1(x), \ldots, f_n(x))^T$ and $u(x) = (u_1(x), \ldots, u_n(x))^T$ are an n-dimensional vector forcing function and unknown vector respectively. If the lading coefficient A_m is non-singular, then the system of HLDEs (1) is called as of *first kind*, otherwise it is called *second kind*. In this paper, we present a new method to solve the system (1) of first kind with constant coefficients; however the same idea can be extended to variable coefficients. For obtaining the general solution of given system, we use the basic concepts of inverse of matrix and variation of parameters formula.

Rest of the paper is organized as follows: In Section II, we present the proposed method to solve system of HLDEs and selected examples are presented in Section III to show the efficiency of proposed method.

II A NEW METHOD FOR SYSTEM OF HIGHER-ORDER LINEAR DIFFERENTIAL EQUATIONS

Recall the system of HLDEs given in Section I

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$$L(u(x)) = A_m \frac{d^m}{dx^m}u(x) + \cdots + A_1 \frac{d}{dx}u(x) + A_0 u(x) = f(x), \tag{2}$$

where $L = A_m \frac{d^m}{dx^m} + \cdots + A_1 \frac{d}{dx} + A_0$, is $n \times n$ matrix differential operator. Now the following theorem presents the algorithm to compute the general solution of system (2), with given set of fundamental system of determinant of matrix differential operator *L*.

Theorem 1: Given a fundamental system $\{v_1(x), \ldots, v_{mn}(x)\}$, of $T = \det(L)$, then the system of higher-order LDEs

$$A_m \frac{d^m}{dx^m}u(x) + \cdots + A_1 \frac{d}{dx}u(x) + A_0 u(x) = f(x), \tag{3}$$

has following solution

$$u(x) = \begin{pmatrix} \sum_{i=1}^{n} (-1)^{i+1} \det(L_i^1) \sum_{j=1}^{mn} v_j(x) \int \frac{\det(W_j) f_i(x)}{\det(W)} dx \\ \vdots \\ \sum_{i=1}^{n} (-1)^{i+n} \det(L_i^n) \sum_{j=1}^{mn} v_j(x) \int \frac{\det(W_j) f_i(x)}{\det(W)} dx \end{pmatrix} \tag{4}$$

where *W* is the Wronskian matrix of $\{v_1(x), \ldots, v_{mn}(x)\}$ and W_i obtained from *W* by replacing the *i*-th column by *mn*-th unit vector; and $\det(L_i^k)$ denotes the determinant of *L* after removing *i*-row and *k*-th column.

Proof: Since the leading coefficient A_m of system (3) is non-singular matrix, the inverse of *L* exists with det(*L*) = *T* as scalar differential operator of order *mn*. If $\{v_1(x), \ldots, v_{mn}(x)\}$ is fundamental system of *T*. Now the solution of system (3) can be obtained as $u(x) = Adj(L)y(x)$, where $y(x) = (y_1(x), \ldots, y_n(x))^T$ is solution obtained from $Ty_i(x) = f_i(x)$ computed using the classical formulation variation of parameters as follows. The scalar differential equation $Ty(x) = f(x)$ can be reformulated as system of first order linear differential equation, say $\tilde{y}'(x) = M\tilde{y}(x) + \tilde{f}(x)$, where *M* is companion matrix. Now the solution of first order system is obtained as $\tilde{y}(x) = W \int W^{-1} \tilde{f}(x)\, dx$ and the solution $Ty(x) = f(x)$ is the first row of $\tilde{y}(x)$.

The solution (4) satisfies given system of HLDEs, as follows:

$$L(u(x)) = L\left(\begin{pmatrix} \sum_{i=1}^{n} (-1)^{i+1} \det(L_i^1) \sum_{j=1}^{mn} v_j(x) \int \frac{\det(W_j) f_i(x)}{\det(W)} dx \\ \vdots \\ \sum_{i=1}^{n} (-1)^{i+n} \det(L_i^n) \sum_{j=1}^{mn} v_j(x) \int \frac{\det(W_j) f_i(x)}{\det(W)} dx \end{pmatrix} \right)$$

$$= L\left(\begin{pmatrix} (-1)^{1+1} \det(L_1^1) & \cdots & (-1)^{1+n} \det(L_1^n) \\ \vdots & \ddots & \vdots \\ (-1)^{n+1} \det(L_n^1) & \cdots & (-1)^{n+n} \det(L_n^n) \end{pmatrix} \begin{pmatrix} \sum_{j=1}^{mn} v_j(x) \int \frac{\det(W_j) f_1(x)}{\det(W)} dx \\ \vdots \\ \sum_{j=1}^{mn} v_j(x) \int \frac{\det(W_j) f_n(x)}{\det(W)} dx \end{pmatrix} \right)$$

$$= (f_1, \ldots, f_n)^T = f$$

Therefore, the solution (4) is general solution system (3).

In following section, we present selected numerical examples (system of HLDEs with constant coefficients and variable coefficients) using proposed method presented in Theorem 1.

III NUMERICAL EXAMPLES

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In this section, we present couple of examples for system of linear differential equations with constant coefficients (Example 1) and variable coefficients (Example 2) respectively, to show the efficiency of proposed method in Theorem 1.

Example 1: Consider the following system of linear differential equations of order two with constant coefficients

$$\begin{aligned} &\frac{d^2}{dx^2}u_1(x)+u_1(x)-2u_2(x)=\sin(x),\\ &\frac{d^2}{dx^2}u_2(x)-\frac{d}{dx}u_2(x)=e^{-3x}. \end{aligned} \tag{5}$$

The system (5) can be written in matrix notations as $L(u(x))=f(x)$, with $L=A_2\frac{d^2}{dx^2}+A_1\frac{d}{dx}+A_0$, where

$$A_2=\begin{pmatrix}1&0\\0&1\end{pmatrix}, A_1=\begin{pmatrix}0&0\\0&-1\end{pmatrix}, A_0=\begin{pmatrix}1&-2\\0&0\end{pmatrix} \text{ and } u(x)=\begin{pmatrix}u_1(x)\\u_2(x)\end{pmatrix}, f(x)=\begin{pmatrix}\sin(x)\\e^{-3x}\end{pmatrix}.$$

If we denote $D=\frac{d}{dx}$, then $L=\begin{pmatrix}D^2+1&-2\\0&D^2-D\end{pmatrix}$. Following procedure in Theorem 1, we have

$$Ty(x)=D^4y(x)-D^3y(x)+D^2y(x)-Dy(x)=f(x),$$

here $y(x)=(y_1(x),y_2(x))^T$. Now from Theorem 1, we have the general solution of given system (5) as follows

$$u(x)=\begin{pmatrix}u_1(x)\\u_2(x)\end{pmatrix}=\begin{pmatrix}c_1\cos(x)+c_2\sin(x)-\frac{x}{2}\cos(x)+2c_3+c_4e^x+\frac{1}{60}e^{-3x}\\c_3+c_4e^x+\frac{1}{12}e^{-3x}\end{pmatrix},$$

where c_1,c_2,c_3 and c_4 are arbitrary constants.

Example 2: Consider the following system of linear differential equations of order one with variable coefficients

$$\begin{aligned} &\frac{d}{dx}u_1(x)-x\frac{d}{dx}u_2(x)+u_1(x)-(1+x)u_2=0,\\ &\frac{d}{dx}u_2(x)+u_2(x)=e^{2x}. \end{aligned} \tag{6}$$

The matrix representation of system (5) is $L(u(x))=A_1\frac{d}{dx}u(x)+A_0u(x)=f(x)$, where

$$A_1=\begin{pmatrix}1&-x\\0&1\end{pmatrix}, A_0=\begin{pmatrix}1&-1-x\\0&1\end{pmatrix} \text{ and } u(x)=\begin{pmatrix}u_1(x)\\u_2(x)\end{pmatrix}, f(x)=\begin{pmatrix}0\\e^{2x}\end{pmatrix}.$$

Matrix differential operator $L=\begin{pmatrix}D+1&-xD-1-x\\0&D+1\end{pmatrix}$, where $D=\frac{d}{dx}$. Following Theorem 1, we have the general solution of given system (6) as follows

$$u(x)=\begin{pmatrix}u_1(x)\\u_2(x)\end{pmatrix}=\begin{pmatrix}c_1e^{-x}+2c_2xe^{-x}+c_2e^{-x}+\frac{x}{3}e^{2x}+\frac{1}{9}e^{2x}\\c_2e^{-x}+\frac{1}{3}e^{2x}\end{pmatrix},$$

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where c_1 and c_2 are arbitrary constants.

IV CONCLUSION

In this paper, we have presented a new method for solving system of higher order linear differential equations. This proposed method works for any vector forcing function of given system of HLDEs. The proposed method is developed using the basic concept of inverse of matrix and variation of parameters. Couple of examples (systems with constants coefficients and variable coefficients) are presented using proposed method to show the efficiency.

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SERVQUAL in Life Insurance Service-A Study on LIC of India in Tamil Nadu

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Abstract- *In the event of severe competitions in the Insurance sector, in India, an attempt has been made to analyze the SERVQUAL of Life Insurance Corporation of India, a public enterprises, through the perceptions of insured in Ramanathapuram District, Southern Part of Tamil Nadu. This study presents mainly the reviews and the concepts. However, to establish the construct validity of the SEVQUAL model with reference to the insured in the study area, confirmatory factor analysis was done.*

Key Words: SERVQUAL, Insurance, Insurer, Insured, Premium, Customer Service, Customer Expectation, Customer Value, and Customer Satisfaction.

I INTRODUCTION

Insurance industry plays strategically an important role contributing to the economic development of the country besides sharing the responsibility of funding major projects of the Central and State Governments. In this study, Life Insurance industry, particularly the Life Insurance Corporation of India (LIC) the public sector organization has been taken. The service quality of the organization is considered to be pivotal in influencing and attracting more customers which helps develop the organization to face the competition from the private sectors who have recently entered in this business. The researchers have selected the Ramanathapuram District in Southern Tamilnadu. The district being the backward in industrial and socio-economic development, it may the fittest one to measure the SERVQUAL of LIC of India, the lapses or lacking of services, if any, to take the strategically good decisions to improve the business by filling up the gaps. In this study SERVQUAL model (Parasuraman et al., 1985) was used. Even though this study is mainly on theoretical one, primary data were collected and the construct validity was established through confirmatory factor analysis.

Objectives

1. To test the SERVQUAL model among insured in Ramanathapuram district, Tamilnadu, India.
2. To prioritize the critical factors according to the geographical area.
3. To prepare bibliography of latest studies related to SERVQUAL in Life Insurance industry.

REVIEWS

Service Quality in Life Insurance Industry

Sachdev and Verma (2004) attempted to explore the relative importance of service quality dimensions in Banking, Insurance, Fast food, and Beauty salon. The study results suggested that in all areas under study, the dimensions; tangibility, reliability,

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responsiveness, assurance, and empathy are important and there is no significant difference among sectors in the ranking of the dimensions.

Barkur et al.,(2007) identified past experience, personal needs, external communication, word of mouth, and active clients were the key parameters of Service Quality.

Sandhu and Bala (2011) concluded that the three factors namely, proficiency; physical and ethical excellence; and functionality have significant impact on the overall service quality of Life Insurance Corporation of India.

Mittal et al.,(2013) observed that the perceived service quality of Life insurance services is a multi-dimensional second-order construct consisting of the primary dimensions of service delivery; Sales, Agent Quality, Tangibles and Value of Core Service. Reza; Pashaie et al., (2013) attempted to evaluate service quality in insurance industry based of customer and personnel view in Kavsar insurance institute, Iran. The study utilized the survey approach. The sample consisted of 319 respondents. The results showed huge gap for reliability, responsiveness and empathy in which reliability showed highest gap between customers' perception and expectation. This research illustrated that reliability emerged as the most critical determinant of SERVQUAL measure of service quality.

Guru Murthy and Chilar Mohamed (2013) studied the level of service quality of Life Insurance Corporation of India with special reference to Chennai District with seven dimensions namely, assurance, personalized financial planning, competence, corporate image, tangibles, technology and ethics.Rajamani (2013) assessed the Service Quality in Insurance Sector in Virudhunagar district, Tamil Nadu through a SEM approach. The result of the assessment revealed that customers rated 'reliability' as the most important dimension. Pramod Kumara Singhal (2013) studied the service quality in Insurance sector taking private companies of Haryana State. This study was based on the SERVQUAL model covering 500 customers of private insurance companies of 7 districts of Haryana. The study concluded that the people are still carrying a negative impression towards the private insurance companies. Urban Sebjan and Polona Tominc (2014) studied the relationships among components of Insurance Companies and Services' Quality through SEM approach. The sample size was 200 Slovenian users of insurance services. The results indicated that higher perceived innovation of insurance company was associated with higher perceived reputation of insurance company. Shamsher Singh et al., (2014) studied the customer perception towards Service Quality of Life Insurance Companies in Delhi NCR Region. The primary data was collected from 139 respondents of Delhi NCR Region. The factor analysis and correlation were used to find the perception of the customers. The study has found that there were four major factors which influence customer perception of service quality namely, responsiveness and assurance, convenience, tangibility and empathy. Only age of respondents have been found to be significantly related with the customer perception and other demographic factors had no significant impact.

Kuldheep Chaudhary et al., (2014) examined the Expected and Perceived Service Quality in Life Insurance Corporation of India. The findings suggested that there exist a significant negative gap in service quality expected and perceived by the customers of the selected company.Arul and Kannan (2014) conducted a research study to understand the Policyholders' preconception towards Service Quality of Life Insurance Companies in Tamilnadu. The study identified eight service quality factors such as Employee Competence, Credibility, Timeliness and Promptness, Convenience, Accessibility, Communication, Customer Orientation, and Responsiveness. The analyses revealed that the demographical variables of the respondents and the eight service quality factors were significantly related.

Prakash and Sugumaran (2014) assessed the perception and expectations of customers in Servqual parameters with reference to Life Insurance Companies in Chennai, India. The sample size of the study was 150. They have used stratified random sampling technique. The factors which are significant are Communications, Competence, Reliability, Security and Courtesy and the expectation levels of these dimensions are significantly higher.

Concerning the definition of the term

Parasuraman et al. (1988) defined perceived service quality as "global judgment, or attitude, relating to the superiority of the service".

Brown and Swartz (1989) drew some distinctions between different views on service quality, drawing from the work of Gronroos (1983) and Lehtinen and Lehtinen (1982) concerning the dimensions of service quality. "What" the service delivers is evaluated after performance (Brown and Swartz, 1989, p.190). This dimension is called outcome quality by Parasuraman et al. (1985), technical quality by Gronroos (1983), and physical quality by Lehtinen and Lehtinen (1982). "How" the service is delivered is evaluated during delivery ((Brown and Swartz, 1989,p. 190). This dimension is called process quality by Parasuraman et al. (1985), functional quality by Gronroos (1983), and interactive quality by Lehtinen and Lehtinen (1982)

On SERVQUAL Model

Carman (1990) was the first to criticize the perceptions-minus-expectations operationalization of SERVQUAL. His criticisms were based on theoretical considerations rather than empirical evidence, which supported the SERVQUAL measure. He attempted to

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answer these criticisms from within the framework of the original service quality model with important extensions to the SERVQUAL measure.

Cronin and Taylor (1992) also criticized the perceptions-minus-expectations operationalization of SERVQUAL. They argued that the theoretical considerations' evidence suggests that the underlying service quality model developed by Parasuraman et al. (1985) is flawed. Therefore, using their own service quality model, they developed an alternative measurement scale based on service performance (or perceptions) rather than perceptions minus expectations. They tested this alternative scale empirically, along with the SERVQUAL scale, in four previously untested service settings and argued that the results proved the superiority of their performance-based measures of service quality.

Specifically, Cronin and Taylor (1992) tested the ability of their performance-only measurement scale, SERVPERF (1) compared to SERVQUAL (2).

Service quality = (perceptions) (1)

Service quality = (perceptions - expectations (P - E)) (2)

Construct Validity

The construct validity of the instrument in the light of profile insured in Ramanathapuram district, in Tamil Nadu was tested by using confirmatory factor analysis.

In the present study, the confirmatory factor analysis method with Orthogonal Varimax Rotation is used to identify the significant set of quality system factors.

The Rotated Factor Matrix for the variables relating to service quality of the selected life Insurance companies included in the study as perceived by the insured's of these Insurance companies is given in Table 1.

Table 1 gives the loadings received by the factors under F1, F2, F3, F4 and F5 for life insurance LIC of India.

TABLE 1. ROTATED FACTOR MATRIX

Questions	Factor 3	Factor 2	Factor 1	Factor 4	Factor 5
Modern looking equipment	0.77801	0.01960	0.05848	0.10619	0.02542
Visually appealing physical facilities	0.75157	0.09122	0.20815	0.09246	0.09497
Visually appealing materials	0.56960	0.07885	0.15548	0.53233	0.02564
Neat in appearance	0.53421	0.00265	0.09146	0.09282	0.54141
Insurance companies insist on error-free records	0.16835	0.75170	0.04036	0.05635	0.24903
Personnel of insurance company tell insured exactly when services will be performed	0.11472	0.69452	0.31989	0.20425	0.12201
Behaviour of personnel of insurance company instills confidence in insured	0.07326	0.66044	0.20602	0.37191	0.19841
Gives insureds prompt service	0.13506	0.58267	0.53117	0.07027	0.07162
Convenient operating hours	0.32288	0.47175	0.10039	0.03099	0.44841
Personnel of insurance companies always willing to help insured	0.07907	0.12551	0.70945	0.03875	0.19648
Gives personal attention	0.17319	0.17996	0.63257	0.00007	0.22101
When insureds have a problem, the insurance company shows a sincere interest in solving it	0.20242	0.27823	0.59410	0.14595	0.10099
Never be too busy to respond to insured's requests	0.10331	0.00100	0.57110	0.26607	0.06062
Insurance companies have insured's best interest at heart	0.09707	0.09285	0.53242	0.38666	0.15447
Gives individual attention	0.29840	0.21691	0.46772	0.20396	0.31817

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Insureds feel safe in dealing with the insurance company	0.17766	0.32569	0.00026	0.59455	0.09638
Promises to do something by a certain time, and does so	0.06669	0.10709	0.39060	0.53059	0.25166
Financially stable	0.07012	0.50252	0.13551	0.52301	0.17350
Personnel of insurance companies have knowledge to answer the insured's questions	0.14108	0.25019	0.22361	0.39311	0.19288
Consistently counteous with the insured	0.05647	0.08219	0.18906	0.36541	0.64364
Understand insured's specific needs	0.07981	0.41433	0.45517	0.20959	0.49391
Gets things right the first time	0.04327	0.24567	0.33973	0.23581	0.41879
Eigen value	1.33999	2.00043	6.74001	1.01647	0.96736
Percentage of variance	6.1	9.1	30.6	4.6	4.4
Cumulative %	45.8	39.7	30.6	50.4	54.8

Factor Analysis exhibits the rotated factor loadings for the 22 statements (variables) of quality of service rendered by LIC. It is clear from the table 2 that all the twenty two statements have been extracted into five critical factors namely F1, F2, F3, F4 and F5. The factors identified with new names which influence the quality of service rendered by the life insurance companies are; Individualized attention, Performance, Tangibles, Trust Worthiness, and Courtesy.

1. **Derivation of Revised dimension clusters using factor analysis**

The result of the factor analysis throws a new dimension by way of the variables moving one dimension to another.

Table 2, shows the revised dimension clusters using factor analysis. This table compares and projects the difference between standard SERVQUAL dimensions and factor extracted through factor analysis.

TABLE 2. REVISED DIMENSION CLUSTERS USING FACTOR ANALYSIS

SERVQUAL standard dimension		Factor extracted from primary data	
Questions	**Dimen-sions / critical factors**	**Question**	**Dimensions / critical factors**
1. Modern looking equipment 2. Usually appealing physical facilities 3. Neat in appearance 4. Visually appealing Materials	Tangibles	1. Modern looking equipment 2. Usually appealing physical facilities 3. Neat in appearance 4. Visually appealing materials	Tangibles
5.Promises to do something by a certain time and does so 6. Sincere interest in solving the insured's problems 7. Gets things right the first time 8. Financially stable 9. Error free records	Reliability	6. Sincere interest in solving the insured's problems 12. Willing to help you 13. Never be too late to carry out insured's requests 18. Gives insured individual attention 20. Personnel gives personal attention 21. Insurance company has insured's best interest at heart	Individua-lized attention
10. Tell exactly when services will be performed 11. Gives insured prompt services 12. Willing to help you 13. Never be too late to carry out insured's requests	Responsive-ness	9. Error free records 10. Tell exactly when services will be performed 11. Gives insured prompt services 14. Instils confidence in insured 19. Convenient operating hours	Performance
14. Instils confidence in insured	Assurance	5. Promises to do something	Trust worthi-

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15. Feel safe in dealings with the insurance company 16. Consistently courteous with insured 17. Personnel have knowledge to answer the insured's questions		by a certain time and does so 8. Financially stable 15. Feel safe in dealings with the insurance company 17. Personnel have knowledge to answer the insured's questions	ness
18. Gives insured individual attention 19. Convenient operating hours 20. Personnel gives personal attention 21. Insurance company has insured's best interest at heart 22. Understand the specific needs of the insured	Empathy	7. Gets things right the first time 16. Consistently courteous with insured 22. Understand the specific needs of the insured	Courtesy

II CONCLUSION

In this study, the loadings of the 22 variables were higher than 0.5 and hence the construct validity was established. However, the variables under the original SERVQUAL instrument were transformed and grouped under five dimensions namely, Individualized attention, Performance, Tangibles, Trust Worthiness, and Courtesy.

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A Study On Origin And Growth Of Self Help Groups In India

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ABSTRACT: *Self-Help Groups are formed for the women's socio-economic empowerment. In this paper the author tried to identify the origin and growth of self-help groups in India.*

Key words: self-help Group, empowerment, India.

I INTRODUCTION

In this rapidly shrinking world, development in micro credit is worth taking note of micro finance. It has been documented that nearly 53 developing countries have taken to micro credit on large scale. Specialized banks like RBI and BDB of Indonesia and Grameen Bank of Bangladesh have taken up the task of reaching out to the poor in a profitable manner, showing that the banking with poor is sustainable. It is therefore, relevant to take note of the most important events.

In India, Self-help Groups (SHGs) first emerged by Mysore Resettlement and Area Development Agencies (MYRADA) in 1985. In 1986-87 there were some 300 SHGs in MYRADA's projects. Many had emerged from the breakdown of the large co-operatives organized by MYRADA. In these areas, number of members asked MYRADA to revive the credit system. They usually came in groups of 15-20. When reminded of the loans they had taken out from the co-operative, they offered to return them to MYRADA, but not to the co-operative, which in their experience was dominated by few individuals. MYRADA staff suggested that they return the money to themselves – in other words to the members who had come in a group to present their case to MYRADA. After some hesitation, they decided to continue meeting in these smaller groups.

MYRADA staff realized that they would need training: how to organize a meeting, set an agenda, keep minutes, books and the like. Efforts were made to train the members systematically. It was emerged that the members were linked together by a degree of affinity based on relationships of trust and support; they were also often homogeneous in terms of income or of occupation (for example, agricultural labourers), but not always. Caste and creed played a role, but in several groups affinity relationships and economic homogeneity were stronger; as a result, several groups included different castes and creeds[1].

From the time that the first SHGs emerged in 1985 to the inclusion of the SHG strategy in the annual plan for 2000/01 (Government of India, 2000), several important steps were taken by the National Bank for Agriculture and Rural Development (NABARD), the Reserve Bank of India (RBI) and leading NGOs, as well as by multilateral agencies, particularly International Fund for Agricultural Development (IFAD). The SHG strategy is an important component of the Government's overall thrust to mitigate poverty and has been included in every annual plan since 2000. This period of 20 years can be divided broadly into two phases

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II ORIGIN OF SHGs

PHASE I: FROM 1987- 1992

During this phase – largely omitted in recent studies – NABARD focused on supporting NGO initiatives to promote SHGs and an analyzing their potential and performance. In 1987, NABARD first put funds into the SHG/SAG movement (in response to a proposal from MYRADA submitted in 1986). In 1987, it provided MYRADA with a grant of 1 million Indian rupees to enable it to invest resources to identify affinity groups, build their capacity and match their savings after a period of 3-6 months. The grant was based on MYRADA's experience in promoting SHGs since 1985 and the initiative of the NABARD chairperson at that time, Shri P.R. Nayak.

As a result of the feedback from this initiative, in 1989, NABARD launched an action research project in which similar grants were provided to other NGOs. After an analysis of this action research, and owing to the efforts of successive NABARD chairpersons and senior management, in 1990, RBI accepted the SHG strategy as an alternative credit model. NABARD (1992) issued guidelines to provide the framework for a strategy that would allow banks to lend directly to SHGs. Based on these initial experiences, the SHG-Bank Linkage Programme was launched in 1992 (this second phase is described in Section III). Since then – and on the basis of its extensive network of officers – NABARD has promoted and monitored the SHG programme, provided funds for capacity building and innovation, and helped change policy to create an enabling environment.

The Tamil Nadu Women's Empowerment Project, an IFAD-supported project implemented through the Tamil Nadu Women's Development Corporation, was the first project in the country, in about 1990, to incorporate the SHG concept into a state sponsored programme. MYRADA was asked to play a lead role, for which it agreed to do in Dharmapuri District. This was a year or more before the launch of the SHG-Bank Linkage Programme. The empowerment of women was sought through SHG strengthening, with capacity-building modules, and through the provision of credit for income-generating activities.

Although an enabling policy framework was not yet in place for the SHG-Bank Linkage Programme, RBI nevertheless decided to extend credit to the groups, with some modifications in the design and paperwork. As a result, this became the first state supported project to initiate the SHG-bank linkage strategy. This experience also contributed to the initiatives undertaken by NABARD to shape policy on micro finance models, which resulted in the launching of the SHG-Bank Linkage Programme through a pilot project[2].

PHASE II SHG –BANK LINKAGE PROGRAMME:

The programme began in 1992 with a two-year pilot project to link 500 SHGs. It was indeed the pilot plan of the SHG-Bank Linkage Programme, although not of the SHG movement, with which NABARD had already been involved since 1987. Without that 1987 investment, the SHG movement would not have had official recognition and ownership. The SHG-Bank Linkage Programme was slow to take off, but has been speeding along since 1999. It has received unstinting support from RBI, the central and several state governments of India – notably Tamil Nadu, Andhra Pradesh, Maharashtra and Karnataka – and thousands of NGOs and the banking sector, as well as multilateral agencies, notably IFAD.

Although the data are difficult to verify, reports indicate that as of March 2006 there were about three million SHGs in India. Of these, about 1.6 million are linked to banks. NABARD (2005) provides data on the SHG-Bank Linkage Programme. It is an official publication into which NABARD has invested much work and care and it will be used as a reliable source of information, with the following clarifications. The report provides information only on the 1.6 million SHGs linked to banks. Its data only cover cases in which refinancing is requested by the banks. The report also focuses, understandably, on the financial management of SHGs.

However, SHGs are also an instrument for the empowerment of poor and marginalized sectors. They have proved to be an effective instrument for changing oppressive relationships in the home (gender-and tradition-related) and in society. This is especially true for those relationships arising from caste, class and political power, which have made it difficult for poor people to build a sustainable base for their livelihoods and to grow holistically.

Owing to this social impact, MYRADA has pointed out that the SHG movement does not focus on the provision of credit; rather it focuses on the management of savings and credit. It is the experience of managing finance that gives poor people the confidence and skill to initiate and manage change in society. The SHG movement arises from the belief that it is not enough to teach people to catch fish when they cannot reach the river. There are hurdles in their way (class, caste and political) that the SHGs have been able to overcome. NABARD has also financed case studies focusing on these social issues and on the changes that SHGs have been able to initiate.

The SHG-Bank Linkage Programme is the major component of the SHG movement for which official data are available. Such data give a reliable overview of the progress of the movement in India. One can assume that the majority of well-functioning SHGs have been advanced loans by banks; however, this may not be the case in parts of the country in which banks have been slow to initiate the linkage. By March 2005, the programme had provided credit to 1 618 456 SHGs with a membership of over 24 million poor families or about 120 million poor people, making it the largest microfinance initiative in the world. There are, however, many more SHGs in India than those to which the banks have advanced loans. Many banks have lent to SHGs, but have not asked for NABARD refinancing

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because they have ample of funds or can mobilize funds at lower rates of interest. Hence these linkages are not reflected in NABARD's data.

Many of the SHGs that are functioning well have not approached banks for their own reasons – some, for example, have adequate savings and grants provided by NGOs to meet their requirements. In some areas, banks are located too far away from the SHGs. Some of SHGs are too young to access bank loans, while others are functioning poorly and are thus ineligible. Hence the number of SHGs is greater than that reported in the NABARD document: other reports indicate that they number some 3 million, including the good, the average and the bad[3].

III ROLE OF INTERNATIONAL FUND FOR AGRICULTURE DEVELOPMENT (IFAD) IN PROMOTING SHG MOVEMENT IN INDIA:

IFAD's first project in which the SHG strategy was promoted was in Tamil Nadu in 1990. When the project began in the Dharmapuri District of Tamil Nadu, where MYRADA was already involved in 200 villages, the SHG movement had not gained momentum. NGOs and banks were still being trained and many bankers were skeptical. Dharmapuri project played a critical role at this time. IFAD invested in training and mentoring of SHGs, building their institutional capacity, which was a new dimension in project design. A sum of Rs.8000-10000 was spent for each SHG.

NABARD's initiative to persuade banks to adopt this model drew several lessons from Dharmapuri, which provided a field experience with which to convince banks that this may not be just another 'scheme'. In fact, the first training for bankers organized and funded by NABARD was held in the MYRADA training centre in Dharmapuri. Thus the IFAD project helped mainstream SHG strategy in a state-sponsored programme. After the Tamil Nadu project proved a success, IFAD expanded into other states.

GROWTH OF SHGs IN INDIA:

Formal financial institutions in the country have been playing a leading role in the microfinance programme for more than two decades now. They have joined hands proactively with informal delivery channels to give microfinance sector for the necessary momentum. During the current year too, microfinance has registered an impressive expansion at the grass root level. The year 2007-08 that the data are presented on progress in microfinance sector on the basis of returns furnished directly to NABARD by commercial Banks (CBs). Regional Rural Banks (RRBs) and Co-operative Banks operating in the country. The report includes the information related to savings of Self Help Groups (SHGs) with banks as on 31 March 2008, loans disbursed by banks to SHGs during the year 2007-08 and outstanding loans of SHGs with the banking system.

NABARD has been instrumental in facilitating various activities in microfinance sector, involving all possible partners in the area. NABARD has been encouraging voluntary agencies, bankers, and socially spirited individuals, other formal and informal entities and also government functionaries to promote and nurture self-help group. The focus was on training and capacity building of partners, promotional grant assistance to Self Help Promoting Institutions (SHPIs), Revolving Fund Assistance (RFA) to Micro Finance Institutions (MFIs), and provision of refinance against bank loans provided by various banks for microfinance activities including SHGs.

SELF HELP GROUPS IN TAMILNADU

Tamil Nadu multifarious attempts are being made by the Government as well as Non-Government agencies to promote, Self Help Groups serious and intensive efforts are being taken by NABARD in promoting capacity building of NGOs. Encouraging and supporting innovations like SHG federations, NGO networking, replication of Bangladesh Grameen Bank model Community development societies approach based on the experience in kerala credit union, RRB as Self Help Promoting Institutions and other local initiatives based on sound principles of Micro finance. Geographically Tamil Nadu has 385 Blocks with 12619 panchayat, 611 Town panchayat 102 municipalities and 6 corporations covered by SHGs.. The number of SHGs formed up to 31 March 2008, 613035 and their savings Rs. 51051.59 lakhs and number of SHGs Bank linkage 476060 and Bank Loan disbursed Rs.4802.92 crores.

SHG-BANK LINKAGE PROGRAMME IN TAMILNADU:

The details progress in SHG Bank linkage programme in Tamilnadu of progress from 2000-2008 the last eight years is depicted in the following Table no: 1

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TABLE 1
PROGRESS IN SHG-BANK LINKAGE PROGRAME IN TAMILNADU

(Amount Rs. in crores)

Year	New SHGs	Bank loan Disbursed (Rs)	Cumulative No of SHGs	Cumulative bank loan disbursed (Rs)
2004-2005	16676	51.07	28590	84.14
2005-2006	34594	120.34	63184	204.53
2006-2007	36000	225.00	99184	429.53
2007-2008	52002	509.48	151186	939.01
2008-2009	68983	757.32	220169	1696.33
2010-2011	95108	1050.93	315277	2747.27
2012-2013	87699	1098.44	402976	3845.72
2013-2014	73084	957.20	476060	4802.92

Source: NABARD Annual report 2013-14

Tamilnadu is ranked second in the country, after Andhra Pradesh in SHG-Bank linkage programme. A wide network of NGOs encouraging support of banks, support of Government agencies and the like, helped wide spread expansion of the programme in Tamilnadu. During 2007-08, 73084 new SHGs were credit linked to banks in the state involving bank loans to the tuine of Rs. 957.20 crores. As on 31 March 2008, cumulative number of SHGs credit linked in the the state stood at 476060 and the cumulative bank loans disbursed aggregated to Rs. 4802.92 crores.

SAVINGS PERFORMANCE OF SHG WITH COMMERCIAL BANKS IN TAMILNADU:

During the year 2007-08, both public sectors, private sector CBs 22 banks participated in the SHG-Banks savings. The details of Commercial bank-wise number of SHGs and SHG savings in Tamilnadu are presented in the table 2.

Table 2
Commercial Bank-wise-SHGs Savings in Tamilnadu

(Amount Rs in lakhs)

S. No	Name of the Bank	Cumulative up to 31st march 2014.		Percentage	
		No of SHGs	Savings Amount (Rs)	No of SHGs	Savings
1	Allahabad Bank	131	5.16	0.029	0.01
2	Andhra Bank	557	76.01	0.13	0.19
3	Bank of Baroda	5979	146.01	1.34	0.37
4	Bank of India	10110	453.15	2.27	1.16
5	Bank of Maharashtra	558	33.15	0.125	0.08
6	Canara Bank	73293	1991.11	16.43	5.08
7	Central Bank of India	10834	796.15	2.43	2.03
8	Corporation Bank	2202	92.17	0.49	0.24
9	Dena Bank	927	8.90	0.20	0.02
10	Indian Bank	81171	8117.10	18.20	20.69
11	Indian Overseas Bank	64257	10708.78	14.41	27.30
12	O BC	134	6.84	0.03	0.02
13	Punjab National Bank	7539	207.51	1.69	0.53
14	State Bank of India	142697	15023.14	32	38.30
15	Syndicate Bank	11091	294.03	2.49	0.75
16	UCO Bank	1917	121.13	0.43	0.30

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17	Union Bank of India	10234	267.03	2.30	0.68
18	Vijaya Bank	740	63.05	0.17	0.16
19	Bank of Hyderabad	-	-	-	-
20	HDFC Bank	14880	393.64	3.34	1.00
21	Tamilnadu merchant Bank	6648	414.36	1.49	1.09
22	Karur vysya bank	-	-	-	-
	Total	**445899**	**39218.42**	**100**	**100**

Source: NABARD Annual Report 2013-14

As found in the table the percentage number of SHGs and savings amount Allahabad bank, Oriental Bank of commerce Andhra Bank, Vijaya Bank is very low level of SHGs and savings State Bank of India very highest (142697 SHGs) 32 percent of number of SHGs and 38.30 percent of savings out of total number of groups and savings in Tamilnadu. SBI Banks linked SHGs and savings ranks first followed by Indian Bank 81171 SHGs and their 8117.10 lakhs in savings, Indian overseas Banks 64257 SHGs and 10708.78 lakhs in savings and Canara Banks 73293 SHGs and 1991.11 lakhs in savings.

MAHALIR THITTAM:

Mahalir Thittam is a socio-economic empowerment programme for women implemented by Tamil Nadu Corporation for Development of Women Ltd. Mahalir Thittam is based on Self Help Group (SHG) approach and is implemented in partnership with Non-Governmental Organizations (NGOs) and Community based organizations. The SHG approach was started in a small way in Dharmapuri district in the year 1989 with the assistance of International Fund for Agricultural Development (IFAD). Later the scheme was extended to the erstwhile Salem and South Arcot districts in the year 1991-1992 and further extended to Madurai and Ramanathapuram in the year 1992-93. Following the success of the IFAD project, Mahalir Thittam project was launched with State Government funding from 1997-1998 and was progressively introduced in all districts of the State. Today the SHG movement is a very vibrant movement spread across all districts of the State with nearly 59,00,000 women as members. As on 31.3.2009, there are 3,91,311 SHGs with a total savings of Rs.2062.04 crores.

Mahalir Thittam is implemented in partnership with NGOs who help in formation of SHGs, provide training and monitor them. The NGOs are given funds for providing the above services. Interested NGOs are affiliated as partners with Mahalir Thittam if they satisfy the norms for affiliation.

The hallmark of the SHGs promoted by Mahalir Thittam is the systematic training provided to the SHG members and the office bearers. This capacity building brings about qualitative changes in the attitude of the women and promotes cohesion and effective functioning of the group.

All the SHG members are imparted in training in 4 modules for 4 days to orient them to the SHG concept. The office bearers of the SHGs (Animator and Representative) are given training in 3 modules for 6 days. This training enhances the leadership quality, building team spirit and capacity to maintain books of accounts. In addition, SHG members who are interested in starting economic activities or develop skills to get self-employment are provided skill training. The skill training includes a 5 day capsule on entrepreneurial development. In order to bring about synergy and better coordination in implementation of SHG programmes, TNCDW which was under the administrative control of Social Welfare Department was brought under the administrative control of Rural Development and Panchayat Raj Department.

IV CONCLUSION

SHGs developed in Bangladesh in 1972, have spread throughout the world. In India, the idea of the development of SHG was conceived by the NABARD with launching of the SHGs and the Bank linkage programme in the year 1992. Now not only financial institutions, but the Government also has recognized that the concept of SHGs has the alternative effective credit delivery mechanism. The RBI has also framed in order to support initiatives taken by the NABARD. Apart from the NABARD, Other Organizations like the Rashtria Mahila Kosh (RMK) and various trusts also play an important role, in the development of the SHGs.

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Big Data On Terrorist Attacks: An Analysis Using The Ensemble Classifier Approach

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ABSTRACT - *Terrorism has virtually invaded our day to day lives. We can't imagine of passing a day without a terrorist attack in any part of the country that has brought in irreparable loss to mankind and also invaluable material destruction. The knowledge and information we collect about the terrorists' operations are highly voluminous and is increasingly becoming multidimensional, thereby pushing the analysis of Big Data into new frontiers. This data when combined with counter-intelligence inputs brings in a new perspective on the efforts to combat terrorism. As new terror outfits spring up consistently, applying suitable data mining techniques on such Big Data has a great impact on the counter terrorism measures and understanding the pattern of attacks. In this research we have analyzed the performance of classifiers like decision tree and ensemble classifier on the Global Terrorism Database and the results have shown that the ensemble method outperforms for the given dataset.*

Keywords: Big Data, Global Terrorism Database, Decision Tree, Ensemble, Weka

I INTRODUCTION

Today we live in this era of Big Data where the amount of information gathered and stored on data storage systems are several trillion times more than the population of the World. In fact every one of us have several zetta bytes of data about our own individual information from birth to death that includes telephone call records, emails, messages conveyed on various social messaging platforms, CCTV footages, financial transactions etc., In this age of Information Technology, we leave a footstep of data wherever we move and it is inseparable like our own shadows. This Big Data when used effectively and efficiently holds the key for several unanswerable questions, pattern recognitions and predictions.

With the effect of Terrorism and its frequent threats on us we have been forced to live in an environment which resembles our age old days of forest life, fearing and fighting with wild animals for our mere existence. History repeats again only with new flavors and colors and nothing has changed considerably. But today we are equipped with modern weaponry to fight back than that of the stone tools we used long back. Forget the weapons of steel. We have something that is much stronger than that of all, which is Big Data. This structured data when designed to form conceptual frameworks can reveal us several hidden phenomena and can guide with intuitionistic relations. One such dataset is the Global Terrorism Database [1] referred as GTD, which is an open source collection of terrorism events across the globe from 1970s to 2013. This unclassified database is a comprehensive collection of over 125,000 terrorist attacks with detailed records mentioning the country, type of attacks, targets – civilian, military, business, weapon type etc.,.We have utilized the Global Terrorism Database for this research and have focused on the extraction of information using decision tree and ensemble classifier. The experimental results show that the ensemble classifier can identify the incident types with better accuracy than that of the decision tree classifier.

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II RELATED WORK

Nitin et al. [2] have used the J48 Decision tree algorithm in the classification of criminal records and predicting a crime suspect and for overall analysis of crime data. The data pertaining to various types of crime like traffic violations, theft, fraud, drug offenses etc., were collected by field work. The results of the J48 algorithm are then verified with the correctly classified instances, FP rate, TP rate, confusion matrix, recall, MCC and F_Measure. The classification method would then suggest about the suspect is innocent or not. An email dataset was used by Sarwat Nizamani [3] for detecting email with suspicious content. Their research has focused on the evaluation of machine learning algorithms such as decision tree (ID3), logistic regression, Naïve Bayes (NB) and Support Vector Machine (SVM). The findings prove that the decision tree algorithm (ID3) did well when compared with that of the other classifiers. Upon application of suitable feature selection strategy, an increase in performance was witnessed by the logistic regression algorithm along with the decision tree algorithm. Terror incidents in India was analysed by Borooah et al. [4] used the GTD database to analyse the fatality rates during 1998-2004. Their research separates the influence on the number of attack type and attack group and used the Atkinson's concept of equality-adjusted income to terrorism to arrive at the concept of equality-adjusted deaths from terrorist incidents.

The impact of terrorism on investor's sentiment related to Hospitality stock was studied by Chang et al. [5], and their research has proved that the there was a fall of 10 to 15 percent every year due to terrorist attacks. However once the threat of terror has been withdrawn or subdued the markets recovered after the initial negative reaction and yield better returns up to four times more than the average event and this research used the GTD database to arrive at a logical conclusion. A method to segregate the GTD database by transnational and domestic incidents was devised by Enders et al. [6]. They analysed the impact of transnational terrorism and found that it had a greater negative impact on the economic growth of a country than that of domestic terrorism. The results have shown that cross correlation exists between the domestic and the transnational terrorist events. The findings also suggested that the domestic terrorism can expand to transnational terrorism and hence the target countries cannot turn a blind eye to domestic terrorism in neighboring countries and may have to put an end to the homegrown terrorism.

Young et al. in their research work Veto Players and Terror [7] used the Tsbelis's veto player's theory to analyse why certain democratic countries foster terrorism and a majority of other countries are curbing it effectively. When the terror outfits wanted for a shift in the government policies, then more number of veto players will lead into a deadlock which will tend to generate more number of terror events. The results discussed that with the inability of the societal actors to change the policies of the government through non-violent and institutional participation, the homegrown terrorism cannot be tackled. Nizamani et al. [8] have extensively analyzed the news summaries from the global terrorism dataset using machine learning techniques. They have adopted different learning algorithms including Naive Bayes, decision tree and support vector machine. The findings suggest that the decision tree learning algorithm has high accuracy for detecting the type of the terror incidents. Though the SVM attained high accuracy, the longer execution time is encountered when the dataset is large. The Bayes scored a faster running time at the cost of lower accuracy.

In this research we used the GTD database which holds the comprehensive collection of all terrorist events occurred across the globe between 1978 and 2013 and we propose to extract useful information from this dataset and experimentally prove that the classification techniques like decision tree and ensemble classifier can learn from the dataset to detect the attack_type in the given GTD. The next section gives a detailed insight into the classification algorithms.

III CLASSIFICATION ALGORITHMS

3.1 Decision Tree

The decision tree algorithm generates the tree structure by considering the values of one attribute at a time. Initially the algorithm sorts the dataset based on the value of the attribute. Then it proceeds further looking for the regions that possess single class and identifies them as leaves. For the rest of the regions that contain more number of classes, the decision tree choose another attribute and the branching process is continued till the all the leaves have been identified or there is no attribute capable of producing one or more leaves.

3.2 Ensemble Classifier

Ensemble learning techniques have been shown to increase machine learning accuracy by combining arrays of specialized learners. These specialized learners are trained as separate classifiers using various subsets of the training data and then combined to form a network of learners that has a higher accuracy than any single component. Ensemble techniques increase classification accuracy with the trade-off of increasing computation time. Training a large number of learners can be time-consuming, especially when the dimensionality of the training data is high. Ensemble approaches are best suited to domains where computational complexity is relatively unimportant or where the highest possible classification accuracy is desired.

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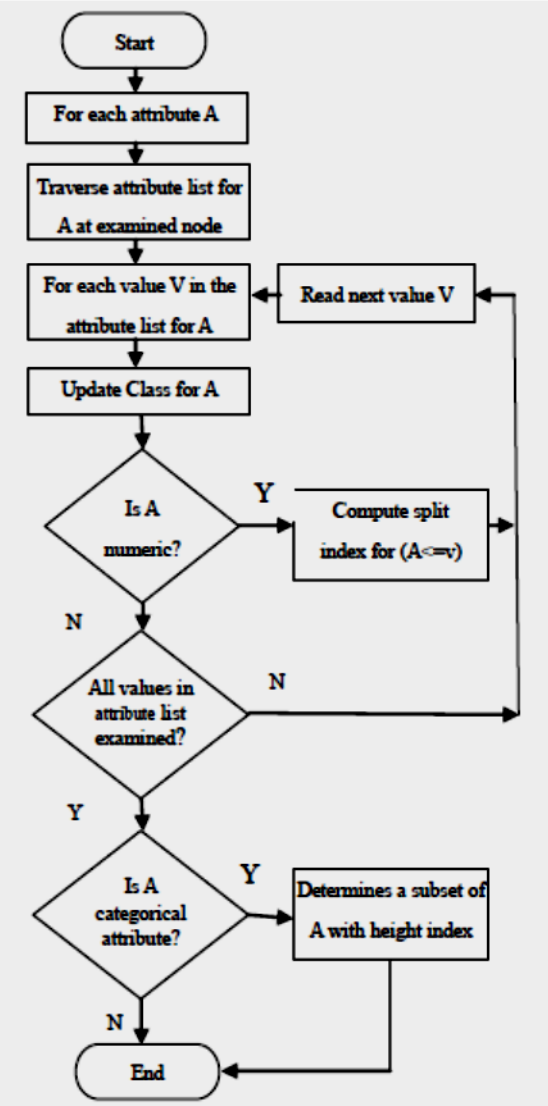

Fig.1. Flow Chart for Decision Tree

Input: Training sets $T=(x_i,y_i)$,i=1 to n: Integer n (iteration number).

Output: Classifier H(x).

For each iteration i= 1 to n

{

Select a subset T_i, of size N form the original training examples T.

The size of T_i is the same with the T where some instances may not appear in T_i, while other appear more than ones.

Generate a classifier $H_i(x)$ from the T_i

}

Fig.2. Pseudocode for bagging

IV PREPROCESSING OF DATA

In this research we used the Global Terrorism Database created by the START: A Center of Excellence of the U.S. Department of Homeland Security and University of Maryland containing terrorist attack data from 1970 to 2013. The original dataset is in the Microsoft Excel format and they have been converted into the ARFF format (Attribute Relation File Format) which is accepted by the Weka tool. From the various fields available in the GTD we have used the year of occurrence, month, day, country, city, attack type, target type, terrorist group name, weapon type, hostage situation and ransom were utilized.

V EXPERIMENTAL ANALYSIS

The dataset under study comprised of 125088 records spanning over the years 1970 to 2013. Each terrorist attack instance is mapped with 17 attributes. The month-wise description of datasets pertaining to terrorist attacks is shown in the Table 1, different attack types in Table 2, weapon types in Table 3 and performance classifiers in Table 4. The experiments are conducted using two well acclaimed classification algorithms, viz., Decision tree J48 which is the WEKA's implementation of C4.5 and Ensemble Classifier.

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Nos	Month	Count
1	JAN	10017
2	FEB	9152
3	MAR	10453
4	APR	10401
5	MAY	11451
6	JUN	10541
7	JUL	11127
8	AUG	11005
9	SEP	9822
10	OCT	10999
11	NOV	10565
12	DEC	9554

Table 1. Summary of Month-wise occurrences

Nos	Attack Type	Count
1	Assassination	15740
2	Unknown	6515
3	Kidnapping	59558
4	Armed Assault	7420
5	Hijacking	30100
6	Barricade Incident	472
7	Infrastructure	3896
8	Unarmed Assault	694
9	Bombing Explosion	692

Table 2. Summary of attacktype-wise occurrences

Nos.	Weapon Type	Count
1	UNKNOWN	9570
2	EXPLOSIVES BOMBS DYNAMITES	61155
3	INCENDIARY	8519
4	FIREARMS	42898
5	CHEMICAL	206
6	FAKE WEAPONS	31
7	MELEE	2417
8	SABOTAGE EQUIPMENT	113
9	VEHICLE	58
10	RADIOLOGICAL	13
11	OTHER	72
12	BIOLOGICAL	35

Table 3. Summary of weapon type-wise occurrences

	Decision Tree		Decision Tree Ensemble	
Attack type	Class recall	Class precision	Class recall	Class precision
Assassination	87.50%	76.13%	89.02%	76.24%
Barricade Incident	90.67%	93.15%	92.00%	94.52%
Kidnapping	95.26%	95.93%	95.26%	95.40%
Infrastructure	96.91%	83.93%	97.42%	82.53%

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Unknown	51.03%	83.90%	50.00%	83.62%
Armed Assault	83.33%	71.43%	66.67%	100.00%
Bombing Explosion	55.56%	38.46%	22.22%	66.67%
Unarmed Assault	48.13%	79. 90%	50.00%	82.02%
Hijacking	63.64%	53.85%	63.64%	53.85%

Table 4: Performance of classifiers

Evaluation measures for determining Accuracy, Precision and Recall were done using the following calculation methodologies,

Accuracy = $(T_p+T_n) / (T_p+T_n+F_p+F_n)$

Precision = $T_p / (T_p + F_p)$

Recall = $T_p / (T_p + F_n)$

T_p represents the number of terror incidences correctly classified for a particular class, F_p denotes the number of occurrences which is incorrectly classified as particular class, T_n depicts the number of incidence that were correctly classified as other class and F_n represents the total number of incidents that were incorrectly classified as another class. The bagging model is employed using Weka tool. Decision tree is used as base classifier and number of iterations used is 5.other parameters for meta classifier and base learner use the default values available in the tool. Ten fold cross validation is used. From the results it is evident that, the ensemble method performed well and often outperformed the single model in terms of precision &recall. Thus, a bagging ensemble can be used with the reasonable assumption that it will not affect performance on s datasets. If time and computational resources are not an issue or the highest possible classification accuracy is desired, then the bagging ensemble model seems to be the best choice.

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```
Bagging (prediction model for label attacktype1)
Number of inner models: 10

Embedded model #0:
ishostkid > 0.500
|   property > 0.500
|   |   iyear > 1972.500: 5 {1=0, 6=4, 3=0, 7=1, 2=12, 4=1, 9=1,
8=0, 5=26}
|   |   iyear ≤ 1972.500
|   |   |   iday > 6.500
|   |   |   |   imonth > 5.500: 5 {1=0, 6=2, 3=0, 7=0, 2=0, 4=0,
9=0, 8=0, 5=2}
|   |   |   |   imonth ≤ 5.500: 2 {1=0, 6=0, 3=1, 7=0, 2=2, 4=0,
9=0, 8=0, 5=0}
|   |   |   iday ≤ 6.500: 4 {1=1, 6=0, 3=0, 7=0, 2=0, 4=4, 9=0, 8=0,
5=0}
|   property ≤ 0.500
|   |   weaptype1 > 11
|   |   |   targtype1 > 5
|   |   |   |   targtype1 > 6.500
|   |   |   |   |   iday > 30: 6 {1=0, 6=3, 3=0, 7=0, 2=0, 4=0, 9=1,
8=0, 5=0}
|   |   |   |   |   iday ≤ 30
|   |   |   |   |   |   imonth > 10.500
|   |   |   |   |   |   |   iyear > 1972.500: 4 {1=0, 6=1, 3=0, 7=0,
2=0, 4=1, 9=0, 8=0, 5=0}
|   |   |   |   |   |   |   iyear ≤ 1972.500: 6 {1=0, 6=5, 3=0, 7=0,
2=0, 4=0, 9=0, 8=0, 5=0}
|   |   |   |   |   |   imonth ≤ 10.500: 6 {1=0, 6=67, 3=0, 7=0,
2=0, 4=0, 9=1, 8=0, 5=0}
|   |   |   |   targtype1 ≤ 6.500: 4 {1=0, 6=1, 3=0, 7=0, 2=0, 4=15,
9=0, 8=0, 5=0}
|   |   |   targtype1 ≤ 5: 6 {1=0, 6=125, 3=0, 7=0, 2=0, 4=0, 9=0,
8=0, 5=0}
|   |   weaptype1 ≤ 11
|   |   |   iday > 2.500
|   |   |   |   targtype1 > 6.500
|   |   |   |   |   iyear > 1976.500: 2 {1=0, 6=0, 3=0, 7=0, 2=2,
4=0, 9=0, 8=0, 5=0}
|   |   |   |   |   iyear ≤ 1976.500
|   |   |   |   |   |   weaptype1 > 7: 1 {1=1, 6=1, 3=0, 7=0, 2=0,
4=0, 9=0, 8=0, 5=0}
|   |   |   |   |   |   weaptype1 ≤ 7
|   |   |   |   |   |   |   iday > 27: 6 {1=0, 6=1, 3=0, 7=0, 2=1,
4=0, 9=0, 8=0, 5=0}
|   |   |   |   |   |   |   iday ≤ 27
|   |   |   |   |   |   |   |   imonth > 2.500: 6 {1=0, 6=9, 3=0,
7=0, 2=0, 4=0, 9=0, 8=0, 5=0}
|   |   |   |   |   |   |   |   imonth ≤ 2.500: 2 {1=0, 6=1, 3=0,
7=0, 2=1, 4=0, 9=0, 8=0, 5=0}
|   |   |   |   targtype1 ≤ 6.500
|   |   |   |   |   targtype1 > 5: 4 {1=0, 6=0, 3=0, 7=0, 2=0, 4=14,
```

Fig 3 Decision Tree Ensemble prediction model (WEKA)

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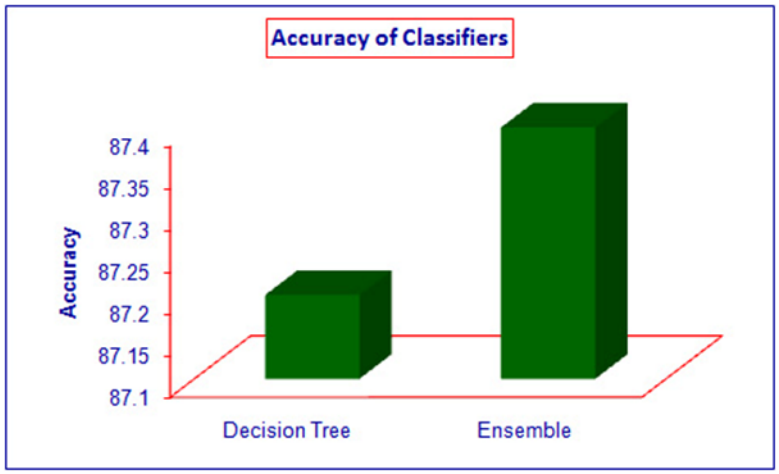

Fig 4. Accuracy of classifiers

VI CONCLUSION AND FUTURE SCOPE

Emerging technology advancements in the Big Data science has opened up new frontiers for research in this arena. However Big the data may look, it is always Small when approached with suitable methods and procedures. It is only in the hands of the researchers for devising tactical strategies to pull out meaning full output from the presented data. Though this research has been limited only decision algorithm and ensemble classifier, this can be extended to incorporate multiple methods or combination of methods. Our future steps include designing a recommender based conceptual framework to analyze the Big Data in real time using Cloud platform.

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Dependability Assurance through Trusted Execution of Boot Processing For Infrastructure Security in Cloud Environment

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Abstract - *Cloud delivers on demand services through virtualized infrastructure; however there are variety of security challenges that suppress the growth of it. One of the key security issues are protecting the virtual machine from threats posed by other Vm's so as to ensure a reliable Infrastructure as a service. So we propose a security model for IaaS wherein the VM's dependability is ensured through trusted computing. The hardware root of trust provided as the secure layer beneath the VM ensures cryptographic encryptions, while our layered software process assess through the behavioral pattern of VM. The configuration of the root of trust is extended to the software by having management and monitoring policy. The behavior model checks for any pattern of SLA breaches and checks to verify it authorization. Thus any misbehaved VM will eventually be trapped, and all it services will be put to anti-trust auditing. Thus our trusted execution assures dependability for Infrastructures in cloud environment.*

Keywords: Virtualization, Trusted Platform Module, Homomorphic Encryption.

I. INTRODUCTION

Processing capacity requirements and storage capacity requirement with respect to computing resources are mandatory and changes by the minute in the IT industry. Due to the macro-economic and micro-economic scenario in the current market, the stress on cutting costs and reducing overhead has been the pressure points for market leaders. This pressure point is being handled by a new technology called as CLOUD Computing. The cloud resources are availed by the end user on demand. This provides the organization to move from CAPEX tradition to OPEX tradition (Cloud & shared infrastructure and pay as you go approach).

Cloud computing environment creation is a process of deploying a set of servers and software networks that utilizes a common and central data storage space and also online access to computer resources. Based on user requirements, the providers can be categorized into infrastructure providers (those who manage platform & resources) and service providers (rent resources to users). The cloud can be categorized into (1) public cloud, which has a 'pay as you' subscription model & pay for only consumed resources and (2) private cloud, which are maintained and controlled by a particular enterprise.

Virtualization is a technique, which splits physical resources to create dedicated individual infrastructures. It is the core fundamental technology that is at the heart of cloud computing. "It is possible to run different operating systems and various applications on multiple platforms on the same server at the same time using virtualization technology. It is primarily meant for private cloud, which provides the client with its own virtualized environment having an advantage of more control and flexibility of handling their own operations.

Infrastructure as a Service (IaaS) is a division of Cloud computing, which contains a third party provider hosting virtualized environments and computing resources like physical hardware, server, storage space, network and software's, through the Internet as a service payable on demand. IaaS provides a generic server with common hardware and software for which the end user owns up

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responsibility for configuring and installation of another operating system (OS), database and other software's. Computational capacity like performance and storage are also provided on a standard basis. IaaS platform generally provide customizable and highly scalable systems and can be scaled on-demand. IaaS also provides dynamic resource allocation for scaling, desktop virtualization and automation of administrative process.

Leading IaaS providers in the industry comprises of Google Computing Engine, Windows Azure, Amazon Web Services, Rackspace Open Cloud and IBM SmartCloud Enterprise.

II. RELATED WORK

Cloud security means a broad set of technologies, policies and controls implemented to protect data, applications and related resources of cloud computing. The following points show the significance of security and privacy concerns that needs to be addressed:

1. Storing the identity of every enterprise to protect the access restrictions to specified resources and information through their own identity management system.
2. The physical security of data centers is more important for provision of professional data centers in the cloud.
3. Personnel security should be adhered to by other activities like conducting background security checks, training programs, disciplinary procedures and employment contracts.
4. The providers should guarantee the availability of service to users so that they can depend on the applications and resources.
5. The providers should ensure safety of cloud resources by encrypting stored data and running scans at regular time intervals in the production environment.

A. Issues in Cloud security

The security issues in cloud computing can be classified into:

(1) Issues faced by providers of cloud services and (2) Issues faced by the end users. To mitigate these issues, the providers must ensure secure access to the resources of their customers while the customers should also participate by following security good practices. When an enterprise hosts its data in the public cloud, the enterprise is risking its confidential business information. The hosted data centers should be thoroughly for suspicious activities. The providers store multiples customer's data on same server in order to cut cost efficiency and maintain efficiency, which might lead to situations in which one customer might have access to other's private data. These issues should be avoided by following proper logical data storage segregation and isolation techniques.

Virtualization adds a new layer between the Hardware and the Operating System. The new "*virtualization layer*" must be properly setup, configured and managed to avoid security incidents. The issue of compromising the virtualization layer (or) the hypervisor is largely theoretical but certain techniques do exist to exploit such scenarios.

B. Issues for Cloud Computing

Software-as-a-service (SaaS) security issues
SaaS offers services on demand so the customers have little control over security in all the three different models of Cloud computing. The adoption of SaaS applications will have direct impact on security incidents & security audits.

Platform-as-a-service (PaaS) security issues
PaaS offers application services without the underlying cost of buying hardware and software components. PaaS cloud application security comprises of (1) Security of Runtime engine / platform (2) Security of applications installed on the platform.

Infrastructure-as-a-service (IaaS) security issues
IaaS offers a host of resources like servers, networks, and other virtualized systems all accessible over the Internet. The only security concern in IaaS is with the security loophole in the VM (virtual machine) monitor. Since all controls are given over to the user, customer has to spend lot of efforts to maintain the environment without any potential security threats / incidents.

Application and Data security
All the cloud applications are delivered through the web browser. The attacks are also being targeted at the web browsers to steal sensitive business information. The data security of the customer organization is the responsibility of the cloud service provider.

Accessibility
Cloud based application provide universal access to them through web browsers and ease of access and usage. However, the same will also introduce host of security risks such as data theft, insecure marketplaces, proximity hacking and inherent vulnerabilities found in device OS.

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Underlying infrastructure security
Underlying infrastructure of PaaS services should be protected by the cloud provider since the developers will not access. Even when they have access, developers cannot ensure the development environment tools offered by PaaS providers are completely safe and secure.

Virtualization
Users can share, copy, migrate and create virtual machines to execute different applications on a cloud resource through virtualization. At the same time, it introduces new venues for security attacks since a flaw in either of the machines (cloud or local) might affect the other as well. Security is a primary challenge in Virtualization because Virtual Machines have physical boundary as well as virtual boundary.

Virtual machine monitor
The hypervisor, also known as Virtual Machine Monitor takes care of the isolation function of virtual machines. In case, of the hypervisor or VMM is compromised, all the VMs are potentially compromised as well.

Shared resource
VMs residing on the same physical server can share resources like processing capacity, storage, input-output modules. Sharing the resources makes each individual VM more vulnerable. For example, a malicious VM can infer some information about other VMs on the same server without the necessity for compromising the VMM or hypervisor. Two VMs can communicate privately bypassing all security rules framed and implemented by VMM.

Public VM image repository
In IaaS environments, a VM image is used to create multiple VMs. These VM images are critical to the overall security of the cloud environment. A user can create their own VM image or use one of these from provider's public repository. In case of an affected VM image having malicious code, malicious users can monitor data flowing through that VM image and record passwords and encrypted data. The IaaS environment is compromised until the infected VM image is cleaned.

Virtual machine rollback
Virtual machines can be reverted back to the last saved restoration point if an error occurs. But the rollback process will restore everything and might expose the VM to already patched security vulnerabilities. For the purpose of rollback, a snapshot ('copy') of the VM needs to be created which will result in the propagation of security vulnerabilities and configuration issues.

Virtual machine life cycle
It is very critical to understand the lifecycle of a VM and its changes while they move through the environment. Virtual machines can be vulnerable even when they are offine.ie. a VM can be instantiated using an image that might have infected code.

Identity and access management guidelines
Cloud Security Alliance (CSA) has issued an Identity and Access Management Guidelines which furnishes a set of recommended best practices to ensure identities and secure access management. This report includes centralized directory maintenance, access level management based on user level roles, role-based access restriction, user access permissions, privileged user and access rights, and access custom reporting.

Fragmentation-redundancy-scattering (FRS) Technique
FRS is a technique used to ensure secure storage of data and also provides tolerance against intrusion attempts. This technique includes splitting the sensitive data into insignificantly small fragments so that a fragment by itself will have no useful information. The fragments are stored in redundant manner across different locations of a distributed system.

Digital signatures
A digital signature is used to sign packets of data to ensure data integrity and security. The RSA algorithm is one of the most popular algorithms used to protect information in cloud based environments.

Homomorphic encryption
The fundamental operations in cloud based processing are (1) Transfer, (2) Store (3) Process. Encryption techniques like hashing, ciphers are employed to secure the data while being transferred or stored in provider's infrastructure. Cloud providers have to de-crypt the encrypted data to enable processing of the same, which heightens security concerns.

Fully homomorphic encryption allows performance of random computation on cipher texts without being decrypted. Current homomorphic encryption techniques support only a limited magnitude of homomorphic operations like addition and multiplication.

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Encryption
Encryption techniques have been employed to secure sensitive data in applications. Transmission or storing encrypted information ensures data security. The fundamental assumption about data security is that those algorithms are uncompromisingly strong. Encryption techniques like AES, MD5 hashing, SHA hashing are implemented. Also, Secure Socket Layer (SSL) technology is used to ensure data security during transmission.

Web application scanners
Web applications are an easy target due to its exposure to everyone including potential attackers. Web application scanner is an application program which scans web application through front end to identify security loopholes and vulnerabilities. Web application re-routes all the passing web traffic through the web application firewall which examines the traffic information for specific threats.

HyperSafe
HyperSafe is an approach that gives hypervisor with integrity of control flow. HyperSafe's target is to secure Type-I hypervisors using two methods: (1) non-bypassable memory lockdown (2) Restricted pointed indexing.

Non-bypassable Memory Lockdown secures write-protected memory pages from being changed.
Restricted pointed Indexing secures data by converting control data into pointer indexes.

Trusted cloud computing platform
TCCP is a technology that makes Cloud providers to offer closed-box execution environments and allow users to decide if the Cloud environment is secure before launching their VMs. The TCCP inserts two fundamental elements: (1) Trusted Virtual Machine Monitor (TVMM) and (2) Trusted Co-Coordinator (TC). The TC manages a list of trusted nodes that runs TVMMs and is maintained by a trusted third-party. The TC engages in the process of launching or migrating a Virtual Machine (VM), which will verify that a VM is running on a Trusted Platform.

Trusted virtual datacenter
Trusted Virtual Datacenter (TVDc) ensures logical data isolation and data integrity in Cloud environments. It combines VMs that have common objectives into workloads called as Trusted Virtual Domains (TVDs). TVDc provides isolation between workloads by implementing hypervisor-based isolation, protected communication channels like VLANs. TVDc ensures integrity by implementing load-time attestation mechanism and to verify the integrity of the system.

Protection aegis for live migration of VMs (PALM)
Protection Aegis for Live Migration (PALM) is a secure live migration framework that preserves integrity and privacy protection during and after the migration. The prototype of the system was created based on Xen and GNU Linux. The results of such an evaluation highlighted that such a technique marginally increases the downtime and migration time due to the encryption and decryption.

VNSS
VNSS is a security framework, which customizes security policies for individual virtual machine and it provides continuous real time protection through Virtual Machine Live Migration. They have implemented a system prototype based on Xen hypervisors using state-ful firewall technologies and user space tools like IP Tables, XM commands program and CONN-TRACK tools. The security policies defined are working throughout live migration phase.

Virtual network security
Virtual Network Security (VNS) presents a virtual network framework that ensures secure communication between Virtual Machines. The VNS framework is based on Xen, which offers two configuration modes for virtual networks. (1) "Bridged" and (2) "Routed". The virtual network model comprises three layers: (1) Routing Layers (2) Firewall (3) Shared Networks. All the above 3 layers can prevent sniffing and spoofing from other VMs in the same physical machine.

III. SECURITY CONSIDERATION FOR IaaS CLOUD

Latest survey and poll results clearly highlight that security will remain a major concern for enterprises to move into Cloud infrastructure. Despite the survey, companies are increasingly implementing Infrastructure as a Service (IaaS) without giving much needed attention to the topic of IaaS security,
According to expert analysts at TechNavio, the worldwide market for IaaS is expected to grow at a Compounded Annual Growth Rate (CAGR) of about 45% between 2012 and 2016. There is a recent survey that highlighted many organizations that have not been practicing due diligence when it comes to selecting cloud providers.

1. Considering the data,
   - Classify the data that will be processed in cloud environment
   - Sensitivity of the data
   - Intellectual Property Value of the data

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- Transaction processing procedures
- Subject to regulations such as Payment Card Industry's Data Security Standard?
- Application of Privacy Restrictions for the data

2. Define the security procedures that are mandatory to secure the information and ensure that the cloud service provider that they are using have those effective procedures in place. This procedure includes both logical and physical access controls.
3. Organizations must consider their rights under the contract with service provider and their right to audit the security controls with service provider.
4. Organizations must protect themselves from rogue cloud usage (employees abusing their service) and redundant cloud providers.

A. Security in Public IaaS Cloud

1. **Secure all devices connected to Open Internet from unauthorized access**
   - Creation of complex and secure password, changing the password at regular intervals and maintaining different password combinations for different types of devices
   - Since server is not located behind a firewall, it allows the user to set up one's own server and networking to configure it to work without external interference.
   - It is generally advisable to have SSH turned off initially. When users boot up, access via remote sharing tools and reset the default passwords before accessing the machine from external network.
   - For a multi – server setup, addition of servers to a VLAN (Virtual LAN), an additional networking card is added to the server.

2. **Securing the data in transmission across the network**
   - One user will not be able to monitor internet traffic of another
   - The user network traffic is separated at Hypervisor level.
   - The probability of Hypervisor getting compromised is high. So, all private traffic routed over a physical network while all traffic between public IP addresses are routed through another separate physical network.

3. **Ensure high quality reliable networking to the Cloud**
   - The multi-tenant public cloud environment will have unpredictable network traffic that can drastically vary on a hourly basis.
   - The responsibility of IaaS is to ensure best quality cloud service round the clock.
   - Round the clock service availability should be ensured through two measures - (1) Pre-cautionary measures and (2) Reactionary measures.
   - With precautionary measures, the balance should always be maintained between preventing abusive usage of network and interfering with genuine customer traffic.

B. Five Essential Considerations for Securing IaaS Cloud

1. Vendor Selection of IaaS Cloud
2. Frequent Application Integration and Vulnerability Scanning
3. Access and Identity Control Management
4. Log Monitoring and Management
5. Data Encryption

C. Other Attacks in cloud infrastructure

- ***Side channel attack***
  - Infrastructure as a Service (IaaS) model in cloud computing offer infrastructures like a collection of multiple computers, virtual machines (VMs) and other resources to the customers to store their application, file, confidential information, documents…etc.
  - It is probable to map the internal cloud infrastructure and identify the location of a target VM, and then instantiate new VMs until one is located as a co-resident with the target VM.
  - After the successfully placement of new VM with targeted VM, the process of extracting the confidential information from the target VM is called as Side Channel Attack.
  - Side channel attack requires two main steps: Placement and Extraction. *Placement* refers to the attacker working to place their malicious VM on the same physical machine. After successful placement of the malicious VM with the target VM, the process to extract the confidential information, file and documents from the target VM is called as *Extraction*.

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- The defense against the vulnerabilities of side channel attack in cloud computing might be mitigated by the combination of firewall and random encryption decryption techniques.

- ***Malware-Injection Attack Solution***
  - When a customer opens an account in the cloud, an image of the customer's VM in the image repository system of the cloud is provided by the provider.
  - The applications run by the customer are considered with high efficiency and integrity. Consideration of the integrity in the hardware level should be taken into account, because it is very difficult for an attacker to intrude in the IaaS level.
  - File Allocation Table (FAT) system architecture is utilized, since its straightforward technique is supported by all existing virtual operating systems. Checking the previous instances that had been already executed from the customer's machine can be put to determine the validity and integrity of the new instance
  - Hypervisor must be deployed at cloud service provider's end for the integrity verification purpose. The Hypervisor will be considered the most secured and sophisticated part of the cloud system whose security cannot be breached by any means.
  - The Hypervisor is responsible for scheduling all the instance services, but before scheduling any of the services, it will check the integrity of the instance from the FAT table of the customers VM.

D. About TPM chip

Trusted Platform Module (TPM) acts as a technology to answer the security based issues in the form of hardware-based, security-related functions. To achieve the security, TPM chip acts as a crypto processor to perform cryptographic actions. The generation and protection of keys is an important task of TPM for E.g., key or crypto operations such as Unique TPM's RSA key for platform authentication are burned into itself make the denial for malicious software to tamper the security of VM. In a boot processing of a system, the boot code which is loaded and stored in TPM, this could be utilized only if exact software was used to boot. The TPM provides additional functionality to enhance the security such as remote attestation and sealed storage,

IV. PROPOSED SYSTEM

The motivational point for virtual machine begins in the thought for making the single operating system to be a version of multiple operating systems by sharing the same resources with each other to possess the feel about compatible working environment to the user. This phenomena of virtualization provided the top for built the era of cloud computing. Virtualization provided a comfortable platform to the cloud services to improvise the utilization of resources and reduce the cost.

But VM is not a remarkable one in various aspects such as security aspects, less efficient than actual machine, unstable performance during multiple VM execution. The various attacks are:

A *VM escape* is designed to compromise the hypervisor of underlying infrastructure while VM hopping is one VM able to get access to another VM through hypervisor vulnerability.

An attacker with *valid VM account* can create a VM image with malicious code like Trojan Horse and host them in the provider's repository.

A *live VM migration* poses the risk of exposing the entire contents of VM files to everyone on the network. An attacker can illegally access data of VM; transfer VM to untrusted host; creating several VMs causing Denial-of-Service (DoS).

An attacker from an infected VM can *spoof / listen to the virtual network* (or) poison the ARP and spoof packets to other VMs.
To achieve the dependability of VM, software assistance is needed for TPM enabled system for avoiding the Malware protections. The assistance use homomorphic encryptions for creating TPM's cryptographic keys improve the security of VM environment and that encrypted key acts as an additional authentication core during the VM hopping. This software provides the additional layer of security that will avoid malicious users to take the entire control of underlying infrastructure if the hypervisor is convinced. This software may acts as a proxy to avoid the illegal data access during the live migration.

IV EXPERIMENTATION AND RESULTS

The basic implementation starts as creating a virtual environment by three virtual machines in an Intel I7 processor system. Installation of CloudSim Simulator creates netbeans environment in that code should be given to simulate the functionality of TPM as software. The TPM functionality is marked as three modules named as

a. cryptographic processor to create the crypto keys using RSA algorithms, SHA-1 Algorithms along with random number generator and encryption-decryption engine,
b. Persistent memory – acts as a place to store the key generated for ownership along with Endorsement Key to identify the unique platform.

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c. Versatile module – consists of registers that store the value needed for integrity, keys generated by RSA for user initialization and attestation environment.

Finally, the functionality of TPM is achieved in a software version of implementation using CloudSim.

V. CONCLUSION

Virtual machine in cloud has greater implications in the success of cloud deployment. Thus our work enables a layered architecture to assure the dependability of cloud's VM. Since VM's are the blackbox of the cloud services, its security should be our highest priority. Hence we presented various security aspects related to VM like Trusted root of execution initiated through hardware boot process using TPM chips and also implementing homomorphic encryptions to safeguard it. Thus our work enhances the security of the IaaS in cloud for a better VM instantiation.

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