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Aims and Scope

The aim of the journal of Operations Management and Information Technology is to provide academically robust papers, research, critical reviews and opinions on the organizational, social and management issues associated with significant information-based technologies. It is designed to be read by academics, scholars, advanced students, reflective practitioners, and those seeking an update on current experience and future prospects in relation to contemporary information and communications technology themes.

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Impact Of Information Technology In Select Banks: A Case Study Of Ranga Reddy District, Telangana State

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ABSTRACT

The information technology has revolutionized various aspects of our life. The worldat large is rapidly changed into the 'Net Age' and Banking industry is the backbone of Indian financial system and it is associated with many challenging goal parallel. The banking industry is redefined and re-engineered with the use of Information Technology (IT) and it is sure that the future of banking will offer more sophisticated services to customers with the continuous products and process of innovations. It means, banks are changed their approaches and ideas from "Conventional Banking to Convenience Banking" and "Mass banking to Class Banking". Hence, In the current Globalized era, support of technology is playing a vital role for the successful functioning of the banking sector. Information technology in banking sector refers to the use of sophisticated information and communication technologies together with computer science to enable banks to offer better services to its customers in a secure, reliable and affordable manner and sustain competitive advantage over other banks. The growth and expansion of Internet and Information Technology in banking services has facilitated to use by customers are ATM, web based Internet banking (E-Banking, Online Banking), Mobile Banking and Electronic Fund Transfers at Point of Sale, Anywhere Branch Banking, cash direct deposit in ATM centres, and branch networking are the facilities that are highly used and offered by all the banks. The present research paper emphasizes the Role and Impact of Information Technology in Indian banking sector.

Keywords: Information Technology, Banking Services, Customer Services, IT facilities in Banking, Banking Industry, E-Banking, Banking Innovations

Introduction

The information technology has revolutionized various aspects of our life. The world at large is rapidly entering into the 'Net Age'. Internet or 'Net' is an interconnection of computer communication networks covering the whole world. The growth and expansion of Internet and Information Technology have facilitated the emergence of E-commerce. The Indian banks have been working in a very comfortable and protected environment. However, The Indian banking sector have been pushed into intense competition due to changed economic policies since 1990. The technology is lifting the competition in the banking sector. Traditional technology of the banks has been used to improve their products and efficiency. Today, technology is not only changing the environment but also the

relationship with customers. The RBI has assigned priority to the up gradation of technological infrastructure in financial system. Technology has opened new product and services, new market and efficient delivery channels for banking industry. IT also provides the framework for banking industry to meet challenges in the present competitive environment. IT enables to cut the cost of global fund transfer.

Information Technology refers to processing, storing and transferring information. It uses computers, electronic devices such as telephones, mobile phones, fax machines etc. and telecommunication network. IT has defined all geographical boundaries. Information Technology enables sophisticated product development, better market infrastructure, implementation of reliable techniques for control of risks and helps the financial intermediaries to reach geographically distant and diversified markets. Internet has significantly influenced delivery channels of the banks. Internet has emerged as an important medium for delivery of banking products and services. Banking industry has been taking advantage of the following Technology Products:

1. Phone banking 2 ATM – Automatic Teller Machines 3. Credit Cards & Debit Card 4. Electronic Fund Transfer – EFT 5. Shared Payment Network System – SPNS 6. Electronic Clearing Service ECS 7. Point of Sale – POS 8. Demat Accounts 9. Electronic Data Interchange 10. E-Cheques 11.Corporate Banking Terminal 12. Mobile Banking. Banks have changed in their operations and moved towards universal banking along with the increased usage of technology and technology- based services offering alternate channels such as smart cards, ATMs, usage of the internet, mobile and social banking.

Banks have started deploying core banking, human resource management (HRM) and enterprise risk (ERP) management and process re-engineering etc to improve on their performance and productivity. Majority of banks are insisting on cashless and paperless payment modes. The followingare the objectives set forth forthe present study.

IMPLEMENTATION OF I.T IN BANKING

The technological evolution of the Indian banking industry has been largely directed by the various committees set up by the RBI and the government of India to review the implementation of technological change.

- The introduction of MICR based cheque processing – a first for the region, during the years 1986-88.
- Arrival of card-based payments- Debit/ Credit card in late 1980s and 90s.
- Introduction of Electronic Clearing Services (ECS) in late 1990s.

- In 1994 RBI constituted a committee for technical up gradation of bank Based on the recommendations of the committee the Institute for Development and Research in Banking Technology (IDRBT) was established in 1996.
- In 1999 the collaborative efforts of IDRBT and RBI developed a satellite based wide area network known as Indian Financial Network (INFINET).The network is restrictive to be used by banks and financial institutions only.
- Introduction of Electronic Fund Transfer (EFT) in early 2000s.
- Introduction of Real Time Gross Settlements (RTGS) in March 2004.
- Introduction of National Electronic Fund Transfer (NEFT) as a replacement to Electronic Fund Transfer/Special Electronic Fund Transfer in 2005/2006.
- Cheque Truncation System (CTS) or Image-based Clearing System (ICS), in India, is a project undertaken by the Reserve Bank of India (RBI) in 2008, forfaster clearing of cheques.

INFORMATION TECHNOLGY – CHALLENGES

- Meet customer expectations on service and facilities offered by the bank
- Customer retention.
- Managing the spread and sustain the operating profit.
- Retaining the current market share in the industry and the improving the same.
- Competition from other players in the banking industry.
- Frequent challenges in technologies used focusing up grades in hardware and software, attending to that implementation issues and timely roll out.
- Managing technology, security and business risks
- System re-engineering to enable. Defined and implemented efficient processes to be able to reap benefits off technology to its fullest potential
- Upgrading the skill of work force spread across the country

REVIEW OF LITERATURE

The following earlier studies on impact of information technology in banking sector whether directly or indirectly related to literature have been reviewed

Narasimhan Committee (1998) -The committee dealt with the issues on technology up gradation and observed that the most of the technology that could be considered suitable for India in some form or the other has been introduced in some diluted form or as a pilot project, but the desired success has not been achieved because of the reasons inter-alia lack of clarity and certainty on legal issues.

Sobol and Cron (2006) "Impact of information Technology on Indian banks", this article has conducted the study to find the relationship between computerization and several measures of overall firm performance. Three performance comparisons are presented: users versus non-users of computers, three levels of usage, and class of computer usage. Results indicate that computerization is related to overall performance. Non-users tend to be small firms with about average overall performance.

Malhotra and Singh (2010) in their research study on Indian banking shows that the private and foreign banks are performing relatively better in offering a diversified range of products and services including e-banking facilities as compared to public sector banks. The experience, size, financing pattern and ownership of the bank were found out to be major factors influencing the extent of e-banking services for urban customers.

KPMG (2011), "Technology enabled transformation in Banking", The Economic Times Banking Technology, Conclave 2011, this article has concluded that banking services will be transformed through the new technology by the year 2015 such as customer friendly products, delivery channel, easy and accessible services and competitive pricing would be driving forces-and technology shall pay a dominant role in all these. Models using mobile devices and efficient payment systems will make banking services more widely available 24 x 7.

M.C.Sharma and Abinav Sharma (2013) "Role of Information Technology in Indian banking Sector" This paper concludes that Indian public sector banks that hold around 75 % of market share do have taken initiative in the field of IT. They are moving towards the centralized database and decentralize decisions making process. They posses enviable quality manpower. Awareness and appreciation of IT are very much there. What is needed is a "big push" the way it was given in the post nationalization period for expansionary activities.

NEED OF THE STUDY

Bank is a financial institution which is engaged in the business of keeping money for saving and checking accounts or for exchange or for issuing loans and credit etc. Now-a-days, banking is not in its traditional way, with new advancement of technology it is focusing on more comfort of customer providing services such as Online banking, Investment banking, Electronic banking, Internet banking, Mobile banking. Researches in this emerging area will be helpful for providing suggestions and recommendations towards the implementation and challenges of Information Technology in Banking Services. Further, this will also assess its impact on consumer awareness and will facilitate a change in customer mindsets and attitudes.

OBJECTIVES OF THE STUDY

1 To review the implementation of IT in Indian Banking industry.

2 To assess various aspects of Information Technology Services provided by Indian banks.

3 To study the role and impact of information technology in satisfying various customer needs in banking services.

4 To explore the challenges in using IT facilities by customers

STATEMENT OF THE PROBLEM

Today Banking Services in the absence of Information Technology (I.T.) difficult to imagine. Keeping in view, Ranga Reddy District, there are more number of public and private sector banks are functioning with I.T. enabled services. Now -a-days banking sector has designed and offered various information technology-oriented financial products and services and in modern era, IT enabled banking service are more convenient than traditional services, but it is not easy to implement because it has some issues related to security, privacy, and customer acceptance. In this study a survey has been conducted to know the perceptions and extent of acceptability of information technology in bank services. It highlights the extent of awareness in society regarding the use of IT in banks. The present study has made a comprehensive research regarding the impact of information technology on the performance of banking sector.

RESEARCH METHODOLOGY

The present research paper is based on the primary as well as secondary data.

Primary data was collected from the bank customers who are residing in Ranga Reddy District, Telangana State. A sample of 120 customers was randomly selected from the banking customers of various bank branches such as State Bank of India, Andhra Bank, ICICI Bank and Axis Bank. The questionnaires were administered among the customers and collected opinions. The relevant data has been grouped and presented in Tables. Statistical tools like Percentages, Chi-Square Test Analysis were used to find out the objectives of the present study.

Secondary data were collected from different journals, magazines, News Papers articles and published data on various issues in the official websites of RBI, IBA Bulletins, and different Public and Private sector banks. Various other studies related to present study have also been referred in this study.

HYPOTHESES:

The relationship between the demographic profile customers and type of service/ frequency of use are tested withchi-square test. In this connection,

Null Hypothesis (H0) states that there is no relationship between demographic profile of customers and type of service / frequency of use.

Alternate Hypothesis (H1) states that there is a significant relationship between demographic profile of customers and type of service / frequency of use.

LIMITATIONS OF THE STUDY:

The research suffers from the followinglimitations:

1. Geographical scope of the study is limited to urban areas only.
2. The sample size forprimary study is 120 customers of the abovesaid banks.
3. There can be many interpretations and explanations to the data collected. This is an empirical study and the research provides the explanation as understood by the researcher only.

With the formulation of the above Objectives and Hypothesis, the following analysis carried out and being presented as follows.

RESULTS & DISCUSSION:

Table - I
Demographic Profile of Respondents

Demographic Variables	Categories	No. of Respondents	Ratio (Percentage)
Gender	Male	94	78
	Female	26	22
Age (in years)	Up to 20	14	12
	20-30	25	21
	30-40	39	32
	40-50	32	27
	60 & above	10	8
Qualification	Up to 12th Standard	18	15
	Graduation	28	23
	Post-Graduation	46	38
	Professionals	28	24
Income (per month)	Below 20,000	17	14
	20,000-40,000	47	39
	30,000-60,000	32	27
	Above 60,000	24	20
Occupation	Business/Professionals	47	39
	Employees	42	35
	Students	19	16
	House wives & Retired	12	10
Familiar Banks	State Bank of India	35	29
	ICICI	35	29
	Andhra Bank	25	21
	Axis Bank	25	21
Type of Account	Savings Bank A/c	61	51
	Current A/c	36	30
	Other Accounts	23	19
Type of Service	Internet Banking	51	42
	Mobile Banking	43	36
	Direct Branch Visit (Traditional Banking)	26	22

Source: Primary Data

Table 1 shows that the demographic profile of the respondents which consists of gender, age, level of education, occupation, Type of Service etc. According to the analysis of the demographic characteristics of the respondent's, majority 32% of the respondents are between the ages of 30 to 40.27% are between the age group of 40 and 50. Within the respondents 78% are male and remaining 22% are female. Regarding the educational level of the respondents, majority of the respondents are post graduation degree holders i.e. 38% and 24% of the respondents are Professionals. Regarding occupational status of the respondents, majorities 39% are business persons and professionals, 35% are employees and 16% are students. The main type of service is that, 42% of the respondents are chosen Internet Banking, 36% are for Mobile Banking, 22% are for Traditional Banking etc.,

Table - II
Frequency of Use of I.T. Services in a month

No. of times used IT services	Frequency	Percentage
Daily	14	12
Weekly	42	35
Monthly	30	25
As and When	34	28
Total	120	100

Source: Primary Data

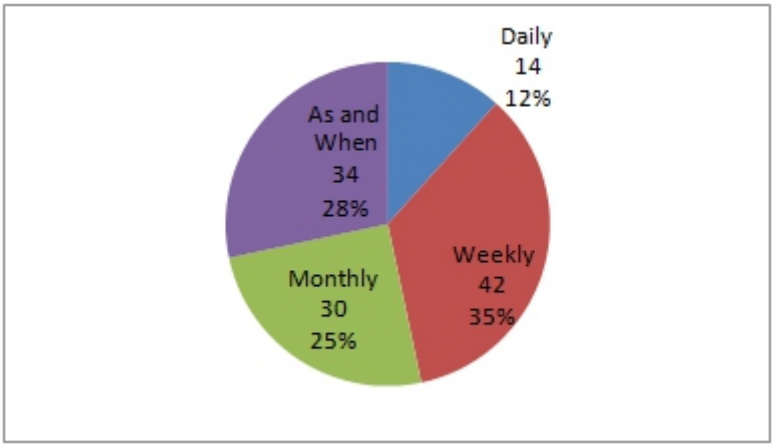

Table 2 shows that 35% of respondents used IT Services Weekly, 28% of respondents chosen As and When, 25% of respondents used IT services once a month, while 12% used IT services chosen Daily. It means all the respondents used IT services that the banks offered to customers but, majority of them used these services weekly and whenever they required. It concludes that it is very convenient to the customer's to conduct transactions.

Table - III
I.T. enabled Banking Services Used by Customers

Services used by customers	Frequency	Percentage
ATM facility (for Direct cash deposit, cash withdrawals, cheque book request, other purposes etc.,)	13	11
Mobile banking	25	21
Internet banking	36	30
Pay by phone system	6	5
Branch Networking / Core banking	8	7
Electronic fund transfer at point of sale (EFTPOS)	16	13
Electronic cheque conversion	5	4
RTGS	11	9

Source: Primary Data

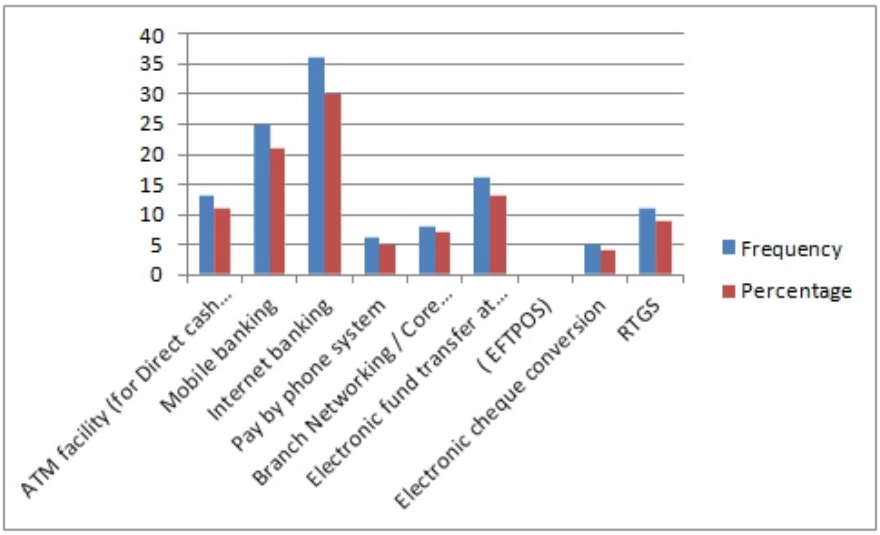

Table 3 and chart depicted that the I.T. enabled banking services used by customers of the selected banks. It shows that majority of the respondents used Internet Banking i.e. 30%, 21% used Mobile Banking, 13% used EFTPOS, 11% used ATM Facilities, 9% used RTGS, 7% used branch networking, 5% used pay by phone system in Descending order of usage. This affirms the responses from the bank that, the above technology facilities are provided by the banks to its customers effectively and efficiently.

Table - IV
Purpose of using IT Services by customers

Purpose/benefit of using IT services	Frequency	Percentage
Convenience, Speed and Easy Accessibility of account	24	20
Proper finance management like check balances, online transfers	35	29
Time Saving	32	27
Add on Services like Recharges for phone, net, dish tv etc.,	29	24
Total	120	100

Source: Primary Data

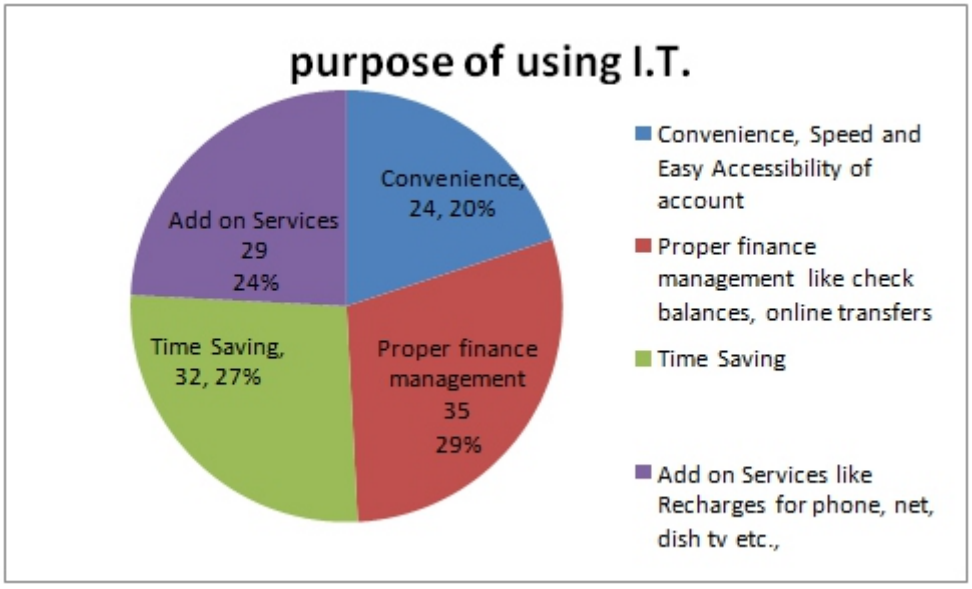

Table 4 shows that purpose of using IT services, majority 29% of respondents opted for check balances and making online transfers/payments; 27% chosen Time Saving; 24% opted Add on Services; and 20% of respondents chosen for Convenience, Speed and Easy Accessibility of account. Hence, it is understood that usage of internet banking comparatively increased in the recent days.

Table - V
Problems or Challenges in Using IT Facilities

Problems in using IT facilities	Frequency	Percentage
Security, Privacy, Trust	23	19
High Charges	13	11
ATM cards sometimes stuck in ATM machine Shortage of cash , Regular Break Downs ATMs out of service problems not possible to withdrew bigger amount	49	41
Low Knowledge of I.T.	35	29
Total	120	100

Source: Primary Data

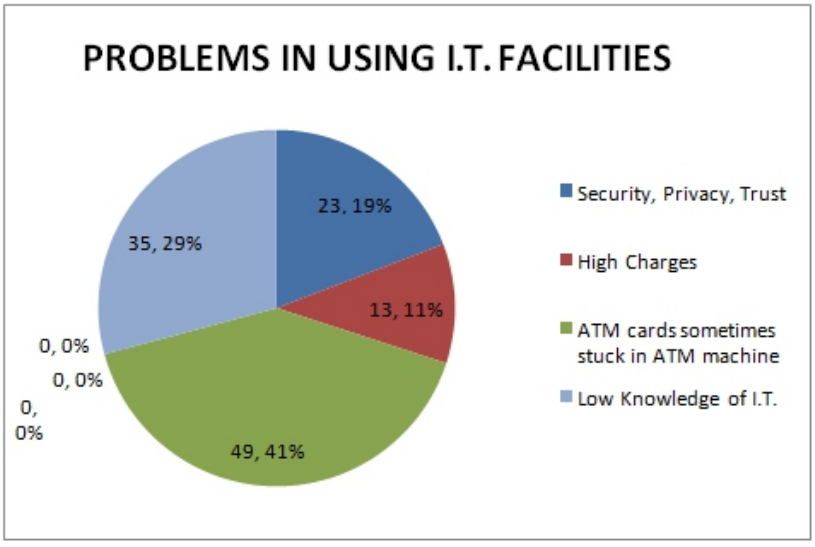

Table 5 shows that, the respondents were asked to list their challenges or problems of using IT facilities in the bank. The following are some of the challenges that respondents accepted as being those they face in using IT services provided by banks. The challenges are: Security, Trust, Privacy, Risk, Limited Skill, Lack of Familiarities, High Charges and Low Knowledge of IT. Overall perception tells us that, IT enabled services are very much helpful to the customers at the same time there are parallel problems; hence those are to be taken care off with regard to 41% indicated in the above table.

Table - VI
I.T. enabled Add on Services and Delivery

Add on Services and Delivery	Frequency	Percentage
24x7 Service access	16	13
Competitive charges	12	10
Service quality improvement	9	7.5
Balance/Statement enquiry	22	19
Online Cheque book request	11	9
Online shoppingprovision	19	16
Standing instructions fulfilment	12	10
Demat services	10	8
Loan applications	9	7.5

Source: Primary Data

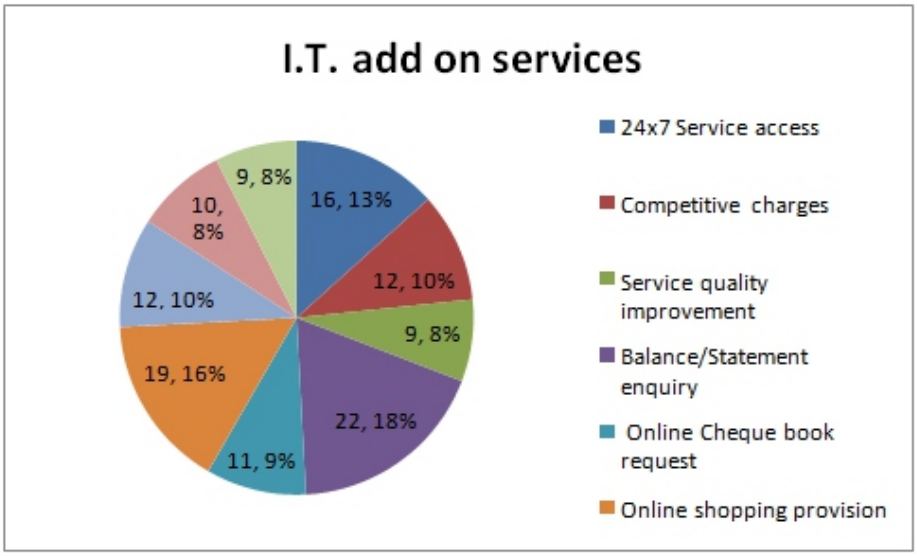

Table VI reveals that Add-on services and delivery have noteworthy influence in accessing services because of implementation of information technology in banks. It explains 19% for Balance Enquiry, 16% for online shopping provision, 13% for Information technology helps to avail 24x7 service access, and remaining cheque book facility, Demat a/c Services, Loan options to the customers. Technology assists to deliver front-office services in an efficient manner; it has been loaded with several components, Speedy service and guidance on service access 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. Hence, it is understood that among all enabled services, the survey reveals that "enquiry of balance" appearing more percentage.

CHI-SQUARE TEST

Hypotheses I:

Ho: There will be no significant difference between gender and usage of type of service. H1: There will be significant difference between gender and usage of type of services.

Table - VII
Gender-Wise Usage of Type of Services

TYPE OF SERVICE	GENDER		TOTAL
	MALE	FEMALE	
Internet Banking	43 (39.95)	8 (11.05)	51
Mobile Banking	37 (33.68)	6 (9.32)	43
Direct Branch Visit (Traditional Banking)	14 (20.37)	12 (5.63)	26
TOTAL	94	26	120

Source: Primary Data

Note: Figures in parenthesis are Expected Frequencies

Calculated Value	Degree of Freedom	Level of Significance	Table Value
10.995	2	5	5.991

The above Table shows that the calculated value is more than table value .Hence Null hypothesis is rejected. Alternate Hypothesis is accepted. So there is a significant difference between gender and usage of type of services. Hence, it is increasing that women users are to be increased by giving awareness.

HYPOTHESIS - II:

Ho: There will be no significant difference between Occupationand usage of type of service. H1: There will be significant difference between Occupationand usage of type of services.

Table - VIII
Type of Services used by Occupation-Wise

Type of Services	OCCUPATIONAL STATUS				TOTAL
	Business & Professionals	Employees	Students	House Wives and Retired	
Internet Banking	25 (19.98)	17 (17.85)	4 (8.1)	5 (5.1)	51
Mobile Banking	13 (16.84)	19 (15.05)	6 (6.81)	5 (4.3)	43
Direct Branch Visit (Traditional Banking)	9 (10.18)	6 (9.1)	9 (4.11)	2 (2.56)	26
TOTAL	47	42	19	12	120

Source: Primary Data

Note: Figures in parenthesis are Expected Frequencies

Calculated Value	Degree of Freedom	Level of Significance	Table Value
12.755	6	5	12.592

The above table shows that, the calculated value is more than table value. Hence Null hypothesis is rejected and Alternate Hypothesis is accepted. So there is a significant difference between occupation and usage of type of services selected. It is true that, for business people internet banking is more convenient for availing services where as employees tend to use mobile banking, as it is easy for them. Students and Housewives, Retired people percentage may be increased further.

HYPOTHESIS - III:

Ho: There will be no significant difference between Level of Income and usage of type of service. H1: There will be significant difference between Level of Income and usage of type of services.

Table - IX
Level of Income and Type of Services used

Type of Services	Level of Income in Rupees				TOTAL
	Below 20,000	20,000-40,000	30,000-60,000	Above 60,000	
Internet Banking	5 (7.23)	23 (19.98)	14 (13.6)	9 (10.2)	51
Mobile Banking	9 (6.1)	20 (16.84)	8 (11.47)	6 (8.6)	43
Direct Branch Visit (Traditional Banking)	3 (3.68)	4 (10.18)	10 (6.93)	9 (5.2)	26
TOTAL	17	47	32	24	120

Source: Primary Data

Note: Figures in parenthesis are Expected Frequencies

Calculated Value	Degree of Freedom	Level of Significance	Table Value
13.123	6	5	12.592

The above table shows that, the calculated value is more than table value. Hence Null hypothesis is rejected and Alternate Hypothesis is accepted. So there is a significant difference between Level of Income and usage of type of services selected. Hence, it is concluded that, usage of various I.T. enabled services are depended on Level of income earnings and earners.

CONCLUSION:

Information Technology offers enormous potential and various opportunities to the Indian banking sector. It provides cost-effective, rapid and systematic provision of services to the customer. The efficient use of technology has facilitated accurate and timely management of the increased transaction volumes of banks which comes with larger customer base. Indian banking industry is greatly benefiting from I.T. revolution all over the world. Today's banking is Virtual banking or Direct Banking is now gaining an importance all over the world. According to this concept Banks offer Products, services and financial transaction through electronic delivery channels generally without any physical branch.

By designing and offering simple, safe and secure technology, banks reach at the doorsteps of the customers with an objective of "delight customer satisfaction". In fact, Information technology has

succeeded in creating a win- win situation for all concerned segments in India. At the same time there is a serious concern about cyber crimes with regard to accounts hacking, since the majority of the transactions are being carried out by internet and online.

FUTURE RESEARCH

Everyone today is convinced that the technology is going to hold the key to the future of banking. The achievements in the banking today would not have make possible without Information Technology (I.T.) revolution. Although, the adoption of technology in banks continues at a rapid pace, the concentration is perceptibly more in the metros and urban areas. The benefit of Information Technology is yet to percolate sufficiently to the common man living in his rural hamlet. More and more programs and software's in regional languages could be introduced to attract more and more people from the rural segments also. Hence, then it can be expected inclusive banking.

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Antecedents Of E-Loyalty Towards Online Shopping: An Empirical Analysis Of Indian Online Customers

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ABSTRACT

In recent years, online shopping has entered the phase of exponential growth. The use of Internet for shopping and information gathering has become an essential channel. In order to remain competitive, e-retailers need to adopt effective measures to satisfy their customers' needs and wants. This would help them to enhance their customers shopping experience and win their loyalty towards them (Nelson, 2012). Following the same line, the present study aims to examine the factors influencing customer loyalty in an online shopping environment, especially amongst the citizens of developing country like India. Furthermore, this study also examines the impact of online customer's trust, customers' behavioral intention and e-satisfaction on e-loyalty in an online shopping environment. Based on the analysis of the data collected from 207 responses, the authors have presented a model that is based on all such factors and has the potential to influence customers' loyalty towards online shopping. However, the authors have limited the scope of the present paper to antecedents of e- satisfaction only. Overall, the findings of this study would help marketers to formulate and implement effective online marketing strategies, as well as in the decision making process.

Keywords: *Online shopping, loyalty, e-satisfaction, behavioural intention, customer's trust, technical satisfaction, and emotional satisfaction.*

Introduction

In order to remain competitive, e-retailers need to adopt effective measures to satisfy their customers' needs and wants. But, customer's behaviour in a virtual environment often seems to be a complex subject as his expectations change with the change in time, and technological advancement. Furthermore, in a virtual environment where next web-store is just a mouse click away, it becomes extensively difficult to understand customer behaviour and take effective measures to attract them to make purchases online and from the same store. Thus, researchers and managers have often acknowledged that the source of competitive advantage is closely related to the long-term relationships between customers and e-retailers (Palmer 2002). Liaw (2013) suggested that the key growth point of online retail would shift from the motivating new customers to purchase online to retain existing customers to make repeat purchases.

It is also evidenced that retaining current customers is less expensive in comparison to seek new ones, as usually web- stores retain records of their customers which made personalized marketing possible (Kolter, 2010). To sum up, the loyally of online customer has emerged out to be one of the essential factor for online business survival and growth. Therefore, the prime aim of this study is to identify and discuss the factors that help e-retailers to win customers loyalty towards them.

Recently, there have been a number of researches investigating the impact of online customer satisfaction on loyalty or patronized behavior towards online shopping. Satisfied customers, with respect to functionality of the web-site, tend to have higher probability to transact online and also posses intention to revisit and re-transact. A loyal customer often seems to be satisfied but vice versa is not true. This indicates that there exists certain other factor also that may influence customers' loyalty. Trust is seen to be one such critical factor in online shopping environment that has impact on customers' loyalty or long term buyer-customer relationship (Lee et al., 2007). As online shopping is web based application, its virtual environment is based on faceless interaction between customers and e-retailer that requires sharing of personal and maybe confidential information, hence this is often termed as risky (Reichheld and Schefter, 2000). This lack of trust and high perceived risk may cause customers to avoid the e- vendors (Grefen et al, 2003). Further, it is often believed that if you don't feel like doing something than the probability of you doing that particular task is very low. Researchers have also acknowledged the same from the perspective of online customer's behavioral intention. That is, if the customer does not possess positive behavioral intention towards online shopping environment they will be reluctant to experience its environment (Salisbury et al., 2001). Therefore, to gain customers loyalty, their behavioral intentions need to be addressed and understand.

Given this situation it is important for researchers to develop and validate the model that captures the attitudes and feelings of the customers while purchasing online. The present study aims to answer the questions like: How do you measure customer loyalty in the field of online shopping? To what extent the emotional state of customer favours the creation of a long-term relationship between the e-retailer and the customer? What is the significance of customers' trust in online shopping environment? What is the significance of satisfaction on customers' level of loyalty? What are factors ensuring e-satisfaction in online shopping environment? In this context, the objective of this research is to discuss the effect of Trust, behavioural intention and e-satisfaction on customer's loyalty in online shopping environment from the perspective of customers especially from developing countries like India. The researchers also made a modest attempt to formulate and validate an integrated model of online customers' loyalty. For this, a convenience sampling of 207 responses has been collected empirically using survey questionnaires method from various part of India in early 2014.

2. Literature Review

The empirical literature has most frequently studied online shopping environment in the notion of behavioral intention to purchase online. Notwithstanding, a review of such studies on building long term relationship with customers in order to win their loyalty has been less researched. As such, our review specifically examines empirically tested models that include one or more loyalty constructs in terms of beliefs in an online vendor. In the study which researched the impact of loyalty on organization's success, (Flint et al., 2011) concluded that customer's loyalty is important especially in online shopping environment where customer acquisition alone is not sufficient to remain competitive. It is often observed that in virtual environment, retaining customer has proved to be a less expensive in comparison to motivating and attracting new (Kolter, 2010). Organizations usually maintain records of their customers, therefore it become easy for them to conduct personalized promotional activities (Reid and Reid, 1993). According to references, loyal customer are usually serve as an information source for other customer and even work as a promotional agent for e-retailers by spreading good words about the web-store (Shoemaker and Lewis, 1999) with respect to any specific product range or even functionality of the web-site. Several antecedents have been proposed by different researchers. Fornell et al., (1996) conducted an empirical research and discovered that customer satisfaction, which is determined by perceived product quality, perceived value and customer expectation, raises customer loyalty and reduces customer discontent. Following the same lines, Pavlou, (2003) identified customers' trust as one of the prime antecedents of patronage behaviour towards online shopping environment. They stated that customer level of trust vary with the amount they are planning to invest in shopping i.e. they fear high risk and trust less with increases spending. Kassim and Abdullah, (2010) have also notified a positive relationship between customer loyalty, trust and satisfaction. They study trust and satisfaction from the perspective of service quality and vendor's assurance. Further, Interactivity aspect has also been acknowledged as one of the core factor influencing customer's loyalty towards online shopping applications (Srinivansan et al., 2002).

In line with earlier research, it is cited that satisfied customer will probably be more loyal (Zins, 2001). However, ensuring customer experience to be satisfactory or predicting customers satisfactory measures is rather complex. E-satisfaction from the perspective of customer has been studied by Szymanski and Hise, (2000). In their study they found positive relation between factors like convenience, site design and financial security and e-satisfaction. In an online shopping environment, it is observed that building customers trust is one of the biggest hurdles to e-retailers (Rexha et al., 2003) and has been found to be one of the major obstacles to the popularity and adoption of online shopping over traditional offline shopping (Ribbink et al., 2005). Chaudhuri and Holbrook (2001), in their study identified a positive relation between loyalty and continual buying behaviour of online customers. They

further notify that loyally which lead to continual buying behaviour has been created by trust. Many literatures have acknowledged a positive relationship between customers' behavioral intention and e-loyalty. As it is notify that if the customer does not possess positive behaviors towards online shopping environment they will never get acquaintance with its environment and will not be able to form any opinion about it (Salisbury et al., 2001). The literature review also witnessed that perceived ease of Internet use positively influence customers behavioural intention towards online shopping environment (O'Cass and Fenech, 2003). In their study, Brock and Sulsky, (1994), found that belief about perceived benefits from the information technology, significantly influence customers' intention towards performing a particular behavior.

3. Operationalization of the Constructs

A questionnaire instrument with a 10-point Likert scale ranging from 'strongly disagree/ absolutely untrue (1)' to 'strongly agree/absolutely true (10)' was used for measure the level of significance of different constructs. These constructs include loyalty, behavioural intention, customer's Trust and E-satisfaction which are briefly discussed below:

Customer's Loyalty:

Loyalty can be defined as a continual relationship between customer and the brand/ firm/ channel (Ltifi and Jamel-Eddine, 2012). From the perspective of online customers and online shopping environment, e-loyalty can be viewed as customer's favourable attitude towards internet service provider or a web-store in particular resulting in continual purchases over time (Keller, 1993; Anderson and Srinivasan, 2003). Lee et al., (2000) states that irrespective of efficient technical and managerial action, sooner or later the value of business will become zero if none of the customers willing to revisit the web-store. Thus, customer's loyalty is often considered to be an important source of success for any customer centric business (Crosby and Johnson 2005). Following the discussion, the present study identified customer's loyalty has positive impact on an organizations growth and success. As per the literature review, number of studies identified different factors pertaining to customer's loyalty. Findings from them suggests that customers loyalty towards online shopping channel can be determined by level of trust (Schlosser et al., 2006); degree of satisfaction (Palmatier et al. 2006; Shankar et al., 2003); interactivity level between buyer and seller (Schlosser, 2000); usefulness; perceived value (Brock and Sulsky, 1994) which in turn positively influence their intention towards online shopping environment. Keeping in view of the above the authors identified e-satisfaction, behavioural intention and customer's trust as the three major factors affecting customer's loyalty towards online shopping environment.

Behavioural intention

In an online shopping environment, behavioural intention of online customer is viewed from the angel of their buying behaviour i.e. what are the beliefs they posses about the particular shopping environment and their efficacy with that. It has been often noticed that an individual's behavioural intention has a positive impact on his/her decision to perform the intended action or behaviour (Ajzen, 1991). Hence, customer's intention to purchase online is often influenced by their views regarding online shopping channel (Belanger et al., 2002), their willingness to perform a specified behaviour online (Salisbury, W.D. et al., 2001) and by their past behaviour or experience with online shopping (Cho, 2006). The literature also indicates perceived ease of Internet use (O'Cass and Fenech, 2003); general attitude towards information technology (Brock and Sulsky, 1994); belief about benefits from the information technology (Brock and Sulsky, 1994); and user satisfaction from website (Wixom and Todd's, 2005), as some of the significant factors influencing the customer's intention to purchase products online. In many literatures, customers' behavioural intention is also considered as a standard of continuing customer's purchasing behaviour in the future, as if the customer does not possess positive behaviours towards online shopping environment they will never get acquaintance with its experience and will not be able to form any opinion about its efficacy. Keeping in view of the above, the authors have identified customer's behavioural intention as one of the core antecedent of loyalty from the perspective of individual beliefs and attitude.

Customer's Trust

E-trust or online customer's trust can be viewed as the degree of confidence and sense of security that customers posses over online shopping environment (Gefen et al., 2003), so that they can make transaction or share their sensitive information comfortably (Bart et al., 2005). In an online shopping environment, it is observed that building customers trust is one of the biggest hurdles to e-retailers (Rexha et al. 2003) and has been found to be one of the major obstacles to the popularity and adoption of online shopping over traditional offline shopping (Ribbink et at., 2005). Since customers lack direct contact with the retailer or sales personnel, the perceive high risk in sharing sensitive personal information, such as credit card numbers, in order to complete the transaction. Therefore, Trust appears to be especially important for creating loyalty in online shopping environment (Kim and Benbasat, 2003). Lee et al. (2007) also indicated that trust leads to loyalty. Researchers have also identified a positive relationship between customer's trust and loyalty, in term of increased spending (Pavlou, 2003), and intentions to purchase (Kim et al., 2008) or repurchase. Following the above discussion, the authors identified trust from the perspective of information quality and personalised features as one of the major antecedent of loyalty.

E-Satisfaction:

Satisfaction can be defined as customer's evaluation of the degree by which their expectations from the system/product matches with its actual performance (Oliver, 1999). The higher degree of satisfaction in turn influences customer's online shopping attitudes, and purchase behaviour positively, which in contrast is negatively associated with dissatisfaction (Ho and Wu 1999; Jahng et al., 2001). Thus, if the customer is satisfied purchasing online, the probability of him/her purchasing online again will increase considerably. Following the above discussion, the factors impacting online customer's satisfaction is of great importance to researchers and the e-sellers (McKinney et al., 2002). Satisfaction is closely related to service quality and consist of both a behavioural dimension created by experience, as well as a mental dimension, created by worked up attitudes (Oliver, 1999). Overall, prior studies indicate that satisfaction toward an e-retailer depends primarily on customers' evaluation of performance on various online store attributes like website design, navigation structure, and graphic style factors (Montoya-Weiss et al., 2003; Szymanski and Hise 2000); convenience (Szymanski and Hise 2000); information quality (Shankar et al., 2003; Park and Kim 2003); communication, user-friendliness (Wagner and Rydstrom 2001); security and privacy (Park and Kim, 2003; Szymanski and Hise 2000; Wagner and Rydstrom 2001); perceived efficiency and effectiveness, emotions and thoughts arising from the usage (Ferreira and Pithan, 2005). Of the many other features discussed, the authors selected technical satisfaction and emotional satisfaction as the key factors to ensure e-satisfaction which in turns enhance their loyalty towards online shopping.

Technical Satisfaction: The technological factors that deal with the design and smooth functionality of the website greatly influence online customer's satisfaction level. As online customers are primarily dependent upon the website information as a replacement of sales personnel (McKinney et al., 2002), therefore the quality of information provided by retailers, and design elements of the Website such as ease and fun of navigation (Wolfinbarger and Gilly, 2003) play a vital role in influencing customers to purchase online which in return results in a satisfied customer. Researchers have also examined site design and financial security displayed (Szymanski and Hise, 2000); and simple transaction process (Buskin 1998) from customer's perspective as some of the major factors that greatly affect online customer's satisfaction level. Keeping in view of the above the authors identified transaction process, site navigation and order tracking as some of the basic factors affecting customer's technical satisfaction level which in turn help to build a satisfactory experience with the website or online shopping channel.

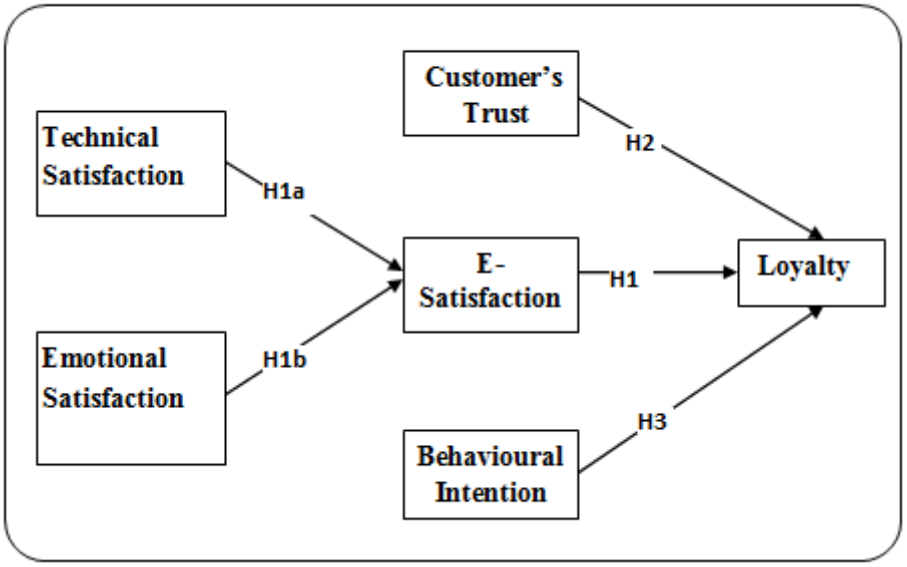
Emotional Satisfaction: Typically a person choose online shopping channel to save time as he/she may have either weird lifestyle or they want to save time or travelling hassle (Bellman et al., 1999). Therefore it become more important to make the overall shopping experience convenient to the customer in terms

of ease of finding a product, time spent on shopping, post purchase service, complete contact information, and minimization of overall shopping effort (Bellman et al., 1999). Prior research on online satisfaction evaluation indicates that hedonic value (Jones et al., 2006); affective responses arising from evaluation of the outcomes of product/service usage (Oliver, 1989; Weiner, 1986); information quality (Ghasemaghjaei and Hassanein, 2013); benefits and advantages of performing web-based online transaction (Teck, 2002) are some of the important factors that result in positive and healthy experience with online shopping channel or e-shopping. Following the above discussion, the authors identified time and effort reduction, convenience and efficiency as some of the basic factors affecting customer's emotional satisfaction level which in turn help to build a satisfactory experience with the website or online shopping channel.

4. Research Model

Based on the above discussion, the authors made a modest attempt to propose a research model as shown in figure 1 below. The literature review generally considers customer's past experience as an antecedent to determine the customer's level of loyalty towards online shopping channel. Our model offers a distinct categorization of customer's loyalty as based on three major sub-constructs namely: e-satisfaction, customers' trust and behavioural intention. Further the authors have viewed e-satisfaction from the perspective of technical satisfaction and emotional satisfaction

FIGURE 1. A SCHEMATIC DIAGRAM OF THE RESEARCH MODEL



5. Research Hypothesis

Based on the literature review and the proposed model, a series of testable hypotheses were developed. To validate the significance of proposed research model and analyse/depict the relationships between the various factors identified in the study, following hypothesis were set and tested.

H1: E-satisfaction of customers associated with online shopping environment has the potential to influence level of customer's loyalty in online shopping environment.

H2: Customer's Trust associated with online shopping environment has the potential to influence level of customer's loyalty in online shopping environment.

H3: Customer's Behavioural Intention associated with online shopping environment has the potential to influence level of customer's loyalty in online shopping environment.

H1a: Technical Satisfaction of customers associated with online shopping environment has the potential to influence their level of E-satisfaction.

H1b: Emotional Satisfaction of customers associated with online shopping environment has the potential to influence level of E-satisfaction.

6. Sample Selection And Methodology

To collect the perception of customers to be loyal towards online shopping channel, a survey to identify factors influencing customer's loyalty was administered in the beginning of the year 2014. However, prior to the final distribution, the questionnaire was pre-tested with 25 respondents having high level of adoption of online shopping. Based on their feedback, the questionnaire was checked and improved. Both online and offline methods were used to collect the responses from target group belonging to different age groups and of different educational background from various states of India. The questionnaire instrument consisted of 3 sections. The first section was designed to extract online customers' demographic profile. The second section was designed to ask respondents to rate questions related to attributes having potential to influence online customers loyalty on a ten-point Likert scale ranging from 'strongly disagree/absolutely untrue (1)' to 'strongly agree/absolutely true (10)'. The last section consisted of overall perception of the respondents regarding the major factors under which the questions in section two were grouped. In total about 250 responses were received and of which around 207 responses were filtered to be complete and fit for further analysis. Hence, the response rate was about 80 percent.

Data in this study was analysed using Statistical Package for Social Science (SPSS) Version 20.0. Firstly the reliability test of scales was performed using Cronbach's alpha test. Then the linear regression model was used in order to study the significance of independent variables influencing dependent variable i.e. loyalty. The proposed model (as specified in figure 1), used loyalty as dependent variable and customer's trust, customers' behavioural intention and e-satisfaction as independent variables. The model also highlights the significance of e-satisfaction from the perspective of its antecedent's technical satisfaction and behavioural satisfaction. The regression analysis was carried out on the data collected. Finally the model obtained was duly tested.

7. Demographic Characteristics Of The Respondents

In order to find the relationship between the demographic characteristics and the customer's loyalty towards online shopping environment, data on the various characteristics was analysed. The aim behind selecting the characteristics was to have a fair distribution of the sample survey with respect to sex, age, occupation, monthly income and educational qualification. Since Internet usage has often been cited as one of the influencing factors in online shopping channel, therefore care was taken to collect data regarding the frequency of Internet usage and the purpose for choosing the virtual electronic medium for shopping.

The descriptive statistics of the respondents' demographic characteristics were analysed and presented in Table 1.

Table 1. Demographic profile of the respondents

Demographic characteristic		Frequency	Percentage
Sex	Male	87	42
	Female	120	58
Age	Below 20	33	15.9
	Between 20 and 25	66	31.9
	Between 25 and 30	43	20.8
	Between 30 and 35	39	18.8
	Above 35	26	12.6
Occupation	Private sector/MNC	68	32.9
	Govt sector/PSU/Banks	25	12.1
	Students/Non earning	101	48.8
	Businessman	13	6.3
Educational qualification	12th or less	41	19.8
	Graduate	79	38.2
	Post graduate	32	15.5
	Professional degree	55	26.6
Monthly income	Non earning	100	48.3
	Less than 50,000	26	12.6
	Between 50,000 and 1,00,000	47	22.7
	More than 1,00,000	34	16.4
Frequency of internet usage	Daily less than 2 hours	65	31.4
	Daily more than 2 hours	92	44.4
	Weekly	20	9.7
	As and when required	30	14.5
Purpose to go online	For checking emails	6	2.9
	For social networking sites	19	9.2
	For information gathering	76	36.7
	For online shopping	106	51.2
	Apparels/Accessories/ Sports	80	38.6

As can be observed from Table 1(above), the sample was fairly diversified in respect of the attributes identified. The number of male respondents (42%) and female respondents (52%) are comparable which can account to an impartial feedback from both the perspectives. Almost three fourth of the sample respondents fell within the age group of 20-35 years. This clearly indicates that technology acceptance is much more prevalent among young people. This included almost 20% of young professionals and experienced professionals each. All of them have minimum education level of high school or equivalent. About 40% of them have done graduation and around 40% of them have master's degree or some professional course. As regards to occupation, almost one-third of the respondents belonged to private sector or working in MNC and only 12% of the respondents belonged to government sector.

Majority of respondents use Internet quite frequently. Around 75% of the respondents use Internet daily; among then 45% use Internet for more than 2 hours a day. In contrast to frequent Internet users only 14% of the respondents go online as and when required. Very few of the respondents go online for social networking sites (9%) or checking emails (3%) only. 51% of the respondents go online to shop and around 37% of the respondents go online for information gathering or e- learning.

8. Reliability

Reliability can be defined as the degree to which a person or system perform consistently in routine as well as unexpected circumstances. Reliability of the proposed model was tested by calculating the coefficients Alpha for the constructs of intention to transact (see table 2 (below) for a complete list of reliability coefficients). As can be seen from Table 2, the composite reliability score for each of the constructs was found to be above 0.70 which is considered to be the acceptable critical value for reliability (Suh and Han, 2003). Further a composite reliability of all the factors was also calculated and was found to be 0.924.

Table 2. Reliability of measurement items

Constructs	**Cronbach's alpha (>0.7)**
Loyalty	.752
E-satisfaction	.718
Technical satisfaction	.868
Behavioural satisfaction	.825
Composite	.924

9. Results And Interpretations

The purpose of regression analysis is to investigate the relationship between the independent variables and the dependent variable and to test the fitness of the model so developed. As explained in the above section, the model described customer's loyalty to be dependent on e-satisfaction, customer's trust and his/her behavioral intention. Hence, the results of the data analysis primarily relate to factors influencing customer's loyalty towards online shopping. Further, the present paper limits its scope or analysis to factors influencing e-satisfaction of online customers. The results with respect to the hypothesis (stated above) tested have been discussed in the following section.

Factors influencing customer's loyalty towards online shopping.

In order to identify various factors that have significant influence on the loyalty of online customers E-satisfaction, Customer's Trust and Behavioral Intention were regressed against the dependent variable loyalty as perceived by the respondents. According to the results (shown in table 3) obtained, all the factors were found to be statistically significant (R2=.539). The adjusted R2 obtained is 0.532 indicating that around 53.2% of the variation in customer's loyalty towards online shopping channel could be collectively explained by the identified factors. This is often statistically accepted for real time data. Further, F-test outcome is 79.031 (sig=0.000) obtained is highly significant, so the model fits the data.

Table 3. Coefficients[a] of regression analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.157	.427		7.389	.000
E-Satisfaction	.455	.106	.263	4.291	.000
Customers' Trust	.198	.057	.220	3.504	.001
Behavioral Intention	.364	.057	.388	6.422	.000

a.Dependent Variable: Loyalty

The results clearly imply that customer's e-satisfaction contributes most significantly towards gaining customer's loyalty towards online shopping channel. Customer e-satisfaction, as perceived by the authors, is based on elements like past experience in terms of transaction; product and information quality; perceived risks; ease of use; and usefulness of site. Hence these elements influencing the e-satisfaction also contribute towards loyalty. Customer's behavioural intention to perform a specified action was found to be next significant contributor to gain customers' loyalty. This indicates that a customers' intention to go online is often related to his/her lifestyle, his/her socially accepted status, and his/her acceptance and adoption of technology. Thus if the customer posses positive beliefs and favourable attitude towards online shopping environment then he/she is more likely to be loyal towards it. The various policies displayed on the site relating to security, privacy, dispute resolution is found to

directly impact customers trust on the web-site and results indicate that customers' trust also contributes towards gaining customers' loyalty. Thus the results support hypothesis H1, H2 and H3.

Factors influencing satisfaction level of online customers

In order to identify various factors that have significant influence on customer's level of satisfaction in the virtual environment, technical satisfaction and emotional satisfaction were regressed against the dependent variable e-satisfaction as perceived by the respondents. According to the results (shown in table 4) obtained after liner regression, both the factors were found to be statistically significant (R2=.588). The adjusted R2 obtained is 0.584 which indicating that around 58.4% of the variation in customer's satisfaction from online shopping channel could be collectively explained by the identified three factors. Further, F-test outcome is 145.775 (sig= .000) obtained is highly significant, so the model fits the data.

Table 4. Coefficients[a] of regression analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-7.181E-017	.045		.000	1.000
Technical satisfaction	.307	.062	.307	4.914	.000
Emotional satisfaction	.522	.062	.522	8.364	.000

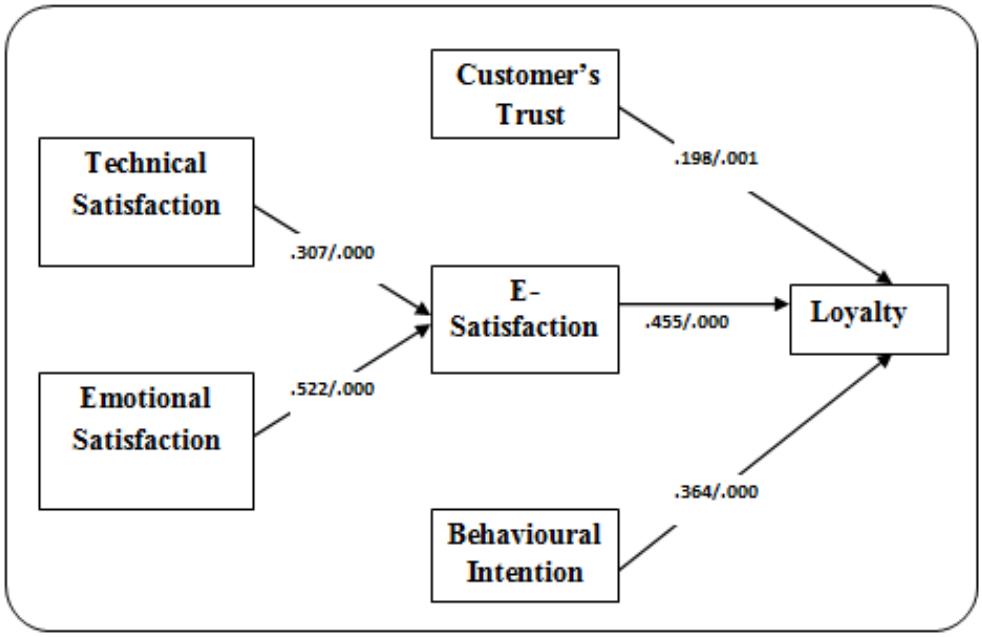
b. Dependent Variable: E-Satisfaction

The results indicated a higher contribution of emotional satisfaction vis-à-vis technical satisfaction towards customer's e-satisfaction. This indicates that a customer gives higher preference to convenience, saving of time, increased efficiency, enjoyment and services offered than the transaction process of online shopping. This would indicate that a user's satisfaction from online shopping channel would largely be motivated by the perceived usefulness of the site. Thus, the results support the hypothesis H2a, and H2b.

10. Summary Results and Discussions

In the earlier section of the paper the authors had proposed a research model based on customer's perception regarding the various factors influencing customers' loyalty. In an attempt to identify the significance of customer's loyalty to online shopping environment, contribution of factors namely e-satisfaction, behavioural intention and customers' trust (in the specified order) were hypothesised. The authors further made an attempt to identify the key antecedents of e- satisfaction. They found emotional satisfaction and technical satisfaction as core constructs of customer's e-satisfaction in virtual environment. The analysis of the data so collected empirically validates the proposed research model.

FIGURE 2. THE RESEARCH MODEL



The results so obtained after in depth analysis of the proposed model indicate a positive relation between customers' e-satisfaction, trust and behavioural intention towards loyalty in online shopping environment. It is found that, if the customer is satisfied purchasing online, then the probability of him/her being loyal will increase significantly. A customer is largely satisfied by the product quality and range specified by the site and various services offered. He is also found to be attracted towards various discount schemes and other pleasure activities associated with the shopping experience. His/her ease of use and access of the site also impacts the satisfaction achieved while conducting the online transaction. He/she is often found to be more concerned about features like ability to track order, the policies to secure the transaction and protect the confidential information given by him/her over the site. The customer, during the survey, was found to be influenced by social norms and often transacts online assuming it to go with his/her social status and lifestyle. Customers were also found to have indulged in online shopping motivated by the social upcoming trend. In addition to that, it has also been found that customers' behavioural intention also plays a vital role in gaining their loyalty. A customer who possesses positive beliefs and favourable attitude towards online shopping is likely to be more loyal towards it. The results of this study have also identified the importance of customer's trust over e-retailer or web-site. Due to absence of physical entity/presence between customers and e-retailer in virtual online shopping transactions, it became more difficult for the customers to trust the e-retailers. This leads to an increase in perceived risk among customers while sharing their personal and confidential information over the site during the shopping transactions. Hence, in order to build loyalty among online customers, it is essential to incorporate features that enhance trust, e- satisfaction and behavioural intentions of the customers.

11 .Implications And Scopes

Overall, the findings of this study have number of implications for the marketers or the e-retailers to formulate and implement effective online marketing strategies to establish long term customer- retailer relationship. Retaining the present customer base is found to be far less cost consuming than attracting new online customers. Hence, for the companies to remain competitive in online shopping environment, they must formulize effective policies that not only understand online customer behavior but act as a tool to gain their loyalty. A satisfactory experience during the online transactions is found to develop a positive attitude towards online shopping and thereby build loyalty. A customer is more likely to revisit the site where he/she has experienced a convenient and time saving environment with ease to navigate transact and track orders.

In the present study, the authors have also found that customers' trust and behavioural intention played a key role in the success of any online retailers. To build the customer trust and help users to possess a positive behavioural intention towards online purchasing, e-retailers need to incorporate features in their websites/ web-stores that offer similar cues as in the physical world. This would include comprehensive information regarding the products, their company, and their policies and sending personalized e-mails or recommendations to the customers on the basis of their past purchase and surfing history. This helps in building loyalty.

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It Applications Improving Green Supply Chain Efficiency Of Businesses And Industries

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A B S T R A C T

Manufacturers today face three significant organization-related challenges: maximizing profits, conserving cash flow and creating shareholder value. According to consulting firm TMG-IMC, North America, process of EBITDA (earnings before interest, taxes, depreciation and amortization) optimization is an effective strategy for achieving environmental sustainability.

Citing statistics that show a company's supply chain performance and production performance have a 56% impact on cost of goods sold (COGS) and a 35% impact on sales, general and administration (SG&A) expenses. This paper highlights latest developments in implementing IT applications in supply chain management practices towards making green supply chain management more effective and environmental friendly in various industries.

Key words: *Reducing carbon, greater efficiency, carbon footprint, optimal supply chain organizational, monitors the contracts.*

Introduction

Wal-Mart had always focused on improving sales, constantly reducing costs, adopting efficient distribution and logistics management systems and using innovative information technology (IT) tools. According to analysts, Wal-Mart was able to achieve a leadership status in the retail industry because of its efficient supply chain management practices. Reducing carbon in the life cycle of a company's products reduces energy use, greater efficiency and, with the rising cost of energy, lowers costs, making business stronger and more competitive. This helps suppliers to reduce their energy use, costs and carbon footprint.

The program to reduce GHGs has three main components namely:-

- **Selection** -- Focus on the product categories with the highest embedded carbon. This is defined as the amount of life cycle GHG emissions per unit multiplied by the amount the company sells. This approach ensures the project team focuses on the categories that have the greatest opportunity for reductions. Reductions can come from any part of a product's life cycle.
- **Action** -- For a project to be included as part of this goal, it must reduce GHGs from a product in either the sourcing of raw materials, manufacturing, transportation, customer use or end-of-life disposal.
- **Assessment** -- Suppliers and companies will jointly account for the reductions. Clear Carbon will perform a quality assurance review of those claims to ensure methodology, completeness and calculations are correct.

9 Best Practices for Improving Supply Chain Efficiency

[1] Properly Staff the Supply Chain: Optimal supply chain organizational methods vary by company, but may include a centralized operation or containing the process within departments. Regardless, it's essential to ensure the supply chain is properly staffed, as is educating and improving the supply chain management skill level of the staff.

[2] Appoint a Governing Body: Give your supply chain strategy a sense of direction and help to align in with the overall organizational goals by establishing a supply chain council. This can help the supply chain organization get the recognition it deserves and remove barriers standing the way of success.

[3] Invest in Technology: Assess your processes to look for deficiencies, and then search for technology that can meet those needs instead of adopting processes to fit the technology. Technology should produce useful data that can be accessed easily.

[4] Forge Alliances with Top Suppliers: Work closely with your suppliers to keep the lines of communication open and continuously work together to reach shared performance goals. The communication should run in both directions which make problems easier to solve and make use of talent and expertise of the supplier

[5] Focus on Strategic Sourcing and Total Cost of Ownership: Strategic sourcing is essential to maintain a successful supply chain procurement process. Allow internal customers to participate in

the decision-making process to ensure the availability of supplies and reduce total costs of ownership - operating, training, maintenance, warehouse and other related expenses.

[6] **Let Supply Chain Team Manage Contracts:** A failure to communicate contract terms and monitor compliance often causes companies to spend more than necessary, so move contract management to the supply chain group to simply the process and make it more efficient and easier to monitor the contracts.

[7] **Optimize Inventory Levels:** Constantly review inventory levels to ensure they're kept at optimal levels, as holding more inventory than necessary can result in significant costs. Better planning and forecasting can help keep inventories aligned with the company's needs.

[8] **Create Risk Management Policies:** Prepare for the unexpected by establishing proper levels control to manage and minimize risk. Periodically review these policies to ensure they remain efficient. Among the areas mitigation strategies should weigh are: calculating the financial impact, determining risks and their likelihood of occurring and setting a priority for monitoring the risks.

[9] **Incorporate "Green" Initiatives and Social Responsibility:** These days, it's essential to do everything possible to reduce your carbon footprint, because you may lose business if you don't. Additionally, people expect companies to adhere to a certain level of social responsibility with policies that can be measured. Companies that don't are at risk of enduring major criticism.

Conclusions

IT can transform high-technology companies into green enterprises by enhancing the economic and ecological impact of operations. Green IT can accelerate product innovation, minimize costs and mitigate risks, while reducing the carbon footprint. In present economic scenario, organizations are trying to achieve sustainable competitiveness in global markets. Sustainability incorporates the concepts of economic, social, and environmental performance. Green supply chain management (GSCM) practices comprise green design, reducing energy consumption, reusing/recycling material and packaging, reverse logistics and environmental collaboration in the supply chain. An effective supply chain procurement process is essential to the success of every company. It's important to continuously examine practices used to ensure they're the most effective way to maximize efficiency.

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Reaching Out to the Users with Innovative Technologies in University Libraries: A Case Study of the Central Library, Jawaharlal Nehru University, New Delhi.

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ABSTRACT

The write-up describes the challenges faced by university libraries in the Google age. It gives an insight to different innovative technologies and user services to meet the information needs and other challenges in a University Library. The paper outlined the web 2.0 and other tools, assistive technologies for differently able scholars and other outreach services for reaching out to users. It also, gives an overview of different projects undertaken, innovative technologies used and services being provided by the Central Library, Jawaharlal Nehru University, New Delhi, India.

Keyword: *Outreach Services, Innovative Technology, Web 2.0, Assistive Technology*

Introduction

We are living in the Google age and everyone is getting the required information with minimum efforts or on a single click. Information is growing rapidly and no doubt that Google has made it easier to search and retrieve the information. But locating authentic information in Google has been just like looking for a needle in a haystack, this brings the role of library & information professionals into the picture. To meet the challenges and for survival, the University Libraries need to use new and innovative technologies for managing libraries and its services. University libraries are taking advantage of technology to provide enhanced library services, reach new library users, develop new community relationships, and enhance the role of the library as an information resource center. Libraries and library professionals play a critical role in facilitating access to information required by the scholars. The university libraries have witnessed a paradigm shift in every sphere of its working with the incorporation of Information Communication Technology (ICT) applications. To keep pace with the

challenges andto remain in competition the university libraries offer a variety of services and information resources to their patrons than in the past. University libraries subscribe to a large number of online and print resources to meet the research needs. For example Lib 2.0, Web 2.0 and other nascent tools are being used to provide quality services. Mobiles and other portable communication devices are enabling users to have libraries in their pockets. Cloud computing, discovery tools, open content, open source software and social networking tools are some of the important technological changes in the libraries. Now, in today's information society the focus of collection development has changed from physical to online, print resources to web resources, blogs and publishing, wikis and encyclopedias, synchronous messaging and virtual reference, streaming media and collection creation, social networks and library networks, tagging and cataloguing, RSS feeds and publishing contents etc.

Innovative Technologies & Services

For providing better access to information and knowledge the university libraries can provide a number of outreach services with the help of innovative technologies which are as follows:

Cloud Computing

Cloud computing is a very vital technology for university libraries to provide world class innovative user services.Through a remote login without procuring any specialized hardware and software, the users can get seamless access to library resources via mobiles, laptops, tablet, desktops, etc. The research scholars can focus on their research without facing technological barriers.

Remote Access

The university library should provide remote access facility of online library resources to confide patrons. This will enable them to 24x7 accesses to library resources from any part of the world at their luxury. Remote access will ensure optimum use of online library resources remotely via desktops, laptops, notebooks, mobiles, etc.

Federated Search

Federated search provides the facility of information retrieval through a single window search to all library resources. The scholars can get all the relevant information in real time from multiple databases. Also, scholars can retrieve such information which they might not have come across through other searches.

Discovery Search

Discovery service is a search interface to pre-index metadata. It searches across all library resources

including institutional repository and other collections. Information retrieval is quicker in discovery search than federated search.

Virtual Reference

Virtual reference is a reference service initiated electronically, often in real-time, where patrons employ computers of other internet technology to communicate with reference staff, without being physically present. Communication channels used frequently in virtual reference include chat, video-conferencing, voice over IP, co-browsing, e-mail, and instant messaging.

Radio Frequency Identification Technology (RFID)

RFID technology allows an item, in a library, to be tracked and communicated with by radio waves. RFID can be used in library circulation, stock verification operations and theft detection systems. The advantages of RFID technology in the university library are as follows:

™ Fastest, easiest, most efficient way to track, locate & manage library materials.
™ Facilitates patrons to self-Check-In, Check-Out and Renewal of the documents.
™ Minimum manpower is required for circulation of documents.
™ Scholars can Check-In the books at 24 x 7.

Web OPAC

Web OPAC provides the online search and retrieval facility of the library database. The new generation Web-OPAC have following advantages:

™ Enables speedy and comprehensive searching of the library database.
™ Category and number of document collection can be viewed.
™ Patron can reserve specific document.
™ Patron can access cover page, contents, abstract and sometimes the chapters of the document.
™ Patron can get the facility to add cart and check the status and history of his/her account.

Content Management System (CMS)

Content Management System is a system used to manage the content of a website. A website is a mirror of any institution or individual. University libraries can use CMS to manage the creation, modification, and removal of content from a website without much technical knowledge about Hypertext Markup Language (HTML).

The features of a CMS system vary, but most include web-based publishing, format management, revision control, indexing, search, and retrieval. Examples of open source CMS are Drupal, Joomla, WordPress, etc.

Digital Library Management System (DLMS)

Digital Library Management System facilitates storing the digital collection and it can be accessed remotely via computer networks. Dspace, Fedora, Eprints & Greenstone are some open source software for DLMS which can be used for creating the Institutional Repositories. The key features of Digital Library Management System are as follows:

™ Facilitate capture and ingest of materials, including metadata.
™ Facilitate the long term preservation of the materials.
™ DLMS allows capturing items in any format – in text, video, audio, and data.
™ Interoperability of digital documents and metadata.
™ Creator (faculty/researcher) can directly upload their research document.
™ Easy to add, browse and search content.
™ Customized user interface as per the requirement.
™ Indexes your work, so users can search and retrieve your items.
™ Reaching a worldwide audience through exposure to search engines such as Google.

Anti-Plagiarism

Plagiarism is a matter of concern for the research community world over. A number of anti-plagiarism tools are available to check and to ensure the originality of the research. The university library should procure such tools and provide training to scholars in practising ethics in research and publishing. This will enhance the quality and academic status of the university. Turnitin and plagiarism.org are some of the anti-plagiarism tools.

Web 2.0 Tools

Web 2.0 tools provide a new way of using the Internet for interactive purposes. These tools include Social Networking, Instant Messaging, Blogs, Wikis, RSS (Really Simple Syndication), Podcasting, Tagging, etc.

Social Networking

Social networking is the grouping of individuals into specific groups, depending on the common interests or hobbies. Although one can socialize in person, especially in the workplace, universities etc.,

but the most popular form nowadays is online. Nowadays, a number of social networking tools are available i.e. MySpace, Face book, Twitter, Orkut, Linkedin, etc. The university library can use these tools to do the following:

™ Create a page to reach to new users.
™ Social networking not only facilitates librarians and patrons to interact but also enables them to share and change resources dynamically in an electronic medium.
™ Also brings the scholars together to share their knowledge and resources.
™ The scholars' contents can be added to library catalogue or can be archived, including their book reviews and other comments.

Instant Messaging (IM)

IM is a form of real time communication between two or more people. IM has become increasingly popular due to its quick response time, its ease of use, and possibility of multitasking (Mohmed 2009). The advantages of IM in university library:

™ Librarians and users can communicate in real time.
™ IM can be implemented in reference services to replace traditional methods like telephone, e-mail etc.
™ Reference librarians can also send text, video and audio files such as library instruction files, ready reference, etc.
™ For Online meetings.

Blogs

It is a two-way based tool. A blog is a website where library users can enter their thoughts, ideas, suggestions and comments. Blog entries known as blog posts and are usually displayed in reverse chronological order. Entries listed in specific categories that can be searched; links to other websites of interest and places for comments; and a monthly archive of previous entries (Mohmed 2009). A blog entry might contain text, images or links to other blogs and web pages. The use of blogs in university library:

™ Serve as a platform where the library user can post their concerns, queries and suggestions regarding the services and activities of the library.
™ Tool for marketing the information as well as the library.
™ Library can post updates about the recent development and activities concerned for users.
™ It can also be used for the collection development, where the users can request the desired resources.

™ Serve as a discussion forum from which users can get the appropriate solutions for their research queries.

™ The university library can collect users' feedback to improve the overall functioning.

Really Simple Syndication (RSS)

It is a universal tool for syndicating content from web pages or blogs. The university libraries can buildan RSS feeds and can easily add their own feeds to a web page. The RSS can be used for providing following updates:

™ Libraries can subscribe to RSS from the sources for compiling their customized alerts.

™ Announce new arrivals of print and online resources i.e. books, theses, serials etc.

™ Publicise different events organised for library users.

™ Announce learning opportunities in research and development.

™ Announce availability of new opportunities in various academic and research departments.

™ Integrating library services through RSS feeds.

Wikis

A wiki is a webpage that can be viewed and modified by anybody with a web browser and access to the internet (Hazarika 2012). The Wikipedia is a fine example of the popularity of wikis. The university library can use Wikis for following:

™ Improve interaction among the users and library professionals.

™ Users can share information and enhance the content. Also these transactions can be archived for future use.

™ Users can make an original and genuine contribution to subject content.

™ Provide the very mechanism that enables participatory librarianship.

™ For creating subject guides and subject gateways.

™ Reference resources wiki can be built.

Podcasting

Podcasting is the practice of automatically distributing digital audio and video files via the internet to subscribers who listen to or view the files at their convenience on a computer or a portable device. The university library can use podcasting for following:

™ Promotional recordings about the library's programs and services.

™ Highlighting about the new resources.

™ Librarians and users, audio/video presentations can be published using the podcast tool.

™ Podcasts enable librarians to share their audio-video digital media files with anyone at any time.

Social Book Marking / Tagging

A tag is a keyword that is added to a digital object (e.g. a website, picture or video clip) to describe it, but not as part of a formal classification system (Sahu et al. 2010). Tagging is a significant feature of social bookmarking systems, enabling users to organize their bookmarks in a flexible way and develop shared vocabularies.Uses of tagging in university library are as follows:

™ It can be applied to the Library Management System for editing the subject headings from the user point of view.

™ The tagging to the collection will make the indexing and relevancy of the searches more dynamic.

™ It would greatly facilitate the lateral searching.

Assistive Technologies for Differently Able Scholars

The differently able scholars' need special facilities for their information and research work. A number of specialized hardware and software are available for meeting their specific needs.

™ Talking books for visually impaired scholars which can automatically read the content of the book.

™ Large print textbooks for partially impaired scholars.

™ Separate catalogue of resources made available in their desired format.

™ Equipped them with latest hardware and software like Digital Voice Recorder, Laptops, Notebooks, Jaws, Kurzweil, Magic Magnifier etc.

™ Barrier free access to library and its resources.

™ Make a library website accessible to the visually impaired scholars.

™ Concerted efforts need to be taken to ensure that the library is accessible to physically challenged /differently abled scholars.

Other Outreach Services

The university library should be committed to assisting scholars by offering literacy instruction classes and Library tours etc.Library should also provide individualized services to meet out the specific information needs of the scholars. The library can do the following activities:

™ Library professionals should take the initiatives to teach research scholars in their classrooms and aware them with latest library tools and techniques.

™ Provide students with hands-on experience using state of the art information retrieval resources.

™ Organize workshops, seminars and conferences for scholars on different aspects of study and research to develop their research skills and practices.

™ Provide list of new arrivals of books, theses, journals, etc.

™ Familiarize students with an academic library and university environment.

™ Support students in successfully completing research assignments at their current education level.

™ Decentralized approach for library collection development.

™ Provide the contents and cover page of the current print journals.

™ Create collaborations between teachers, scholars and academic library professionals.

™ Organize a book release, book talk, etc. to promote the research of the University.

™ Provide opportunitiesto research scholars to publish their research output.

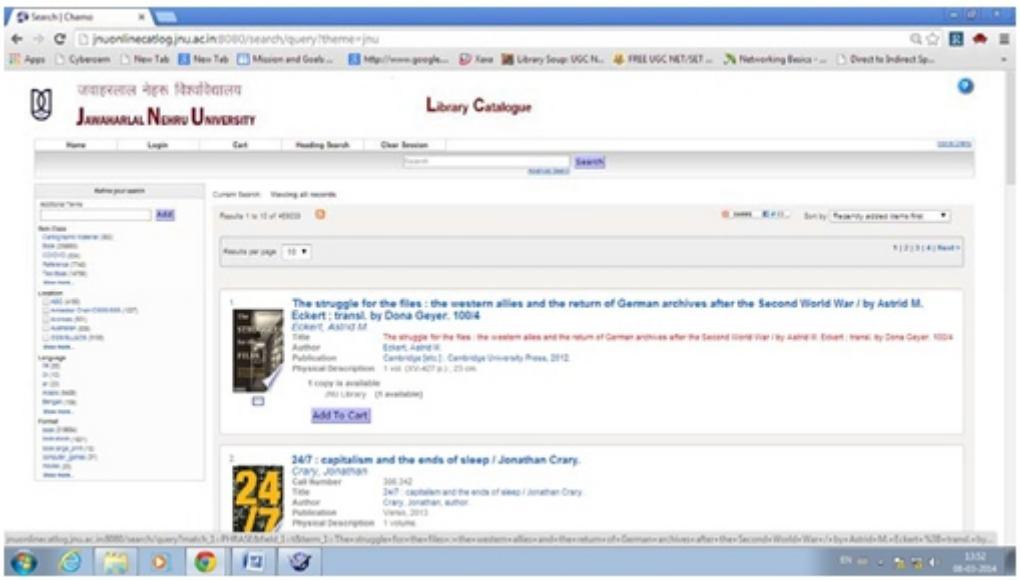
™ The library must act as a hub of research and development of the University.

Initiative for Outreach Services at JNU Library

The Central Library, Jawaharlal Nehru University, New Delhi, India is using Virtua integrated library management software. The library has already deployed some of the innovative tools and techniques for reaching out to the JNU academic community. Some of the initiatives taken by JNU Library are as follows:

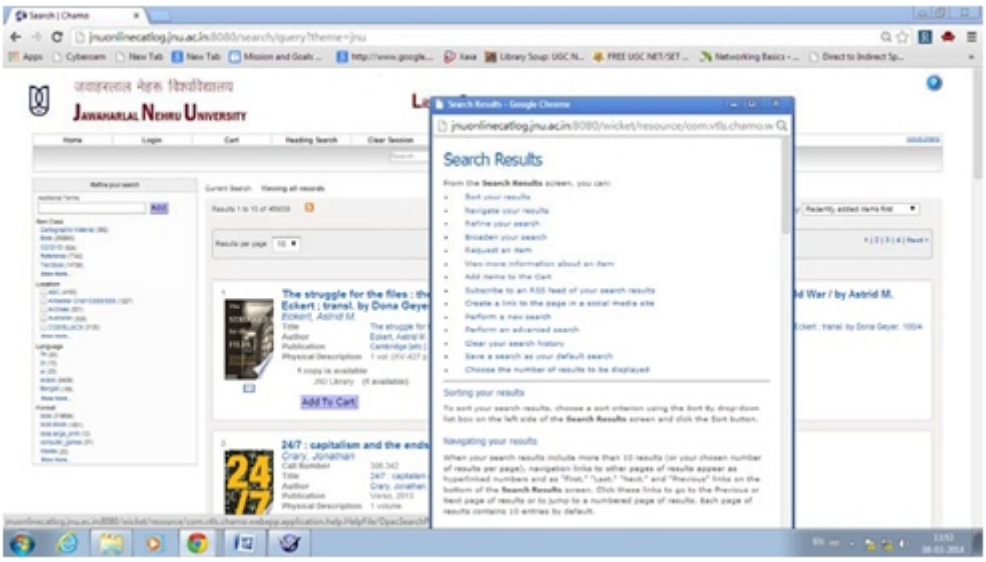
New Generation of Web-OPAC

Recently, the library has switch over from Web-OPAC to New Generation of Web-OPAC known as Chamo. The Library has approximately 4,70,000 bibliographic records which are accessible over the Web-OPAC. The library users now can search and refine their search easily by Type of Documents, Format of Documents and Category of documents etc. The Web-OPAC also provides total numbers bibliographic records in database along with the category of documents with their respective numbers in the database. One of the key features of Chamo is that its gives users instant access to book jackets, reviews etc.



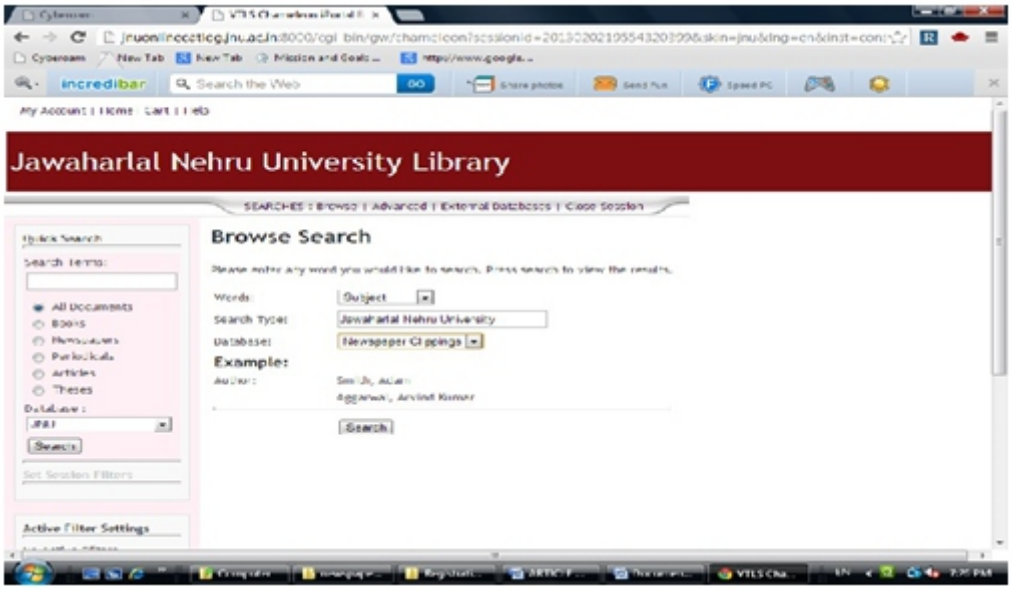
Search Help for Chamo

The software provides the ready help to the users on the screen itself for benefiting the scholars in locating the right information in the right way.

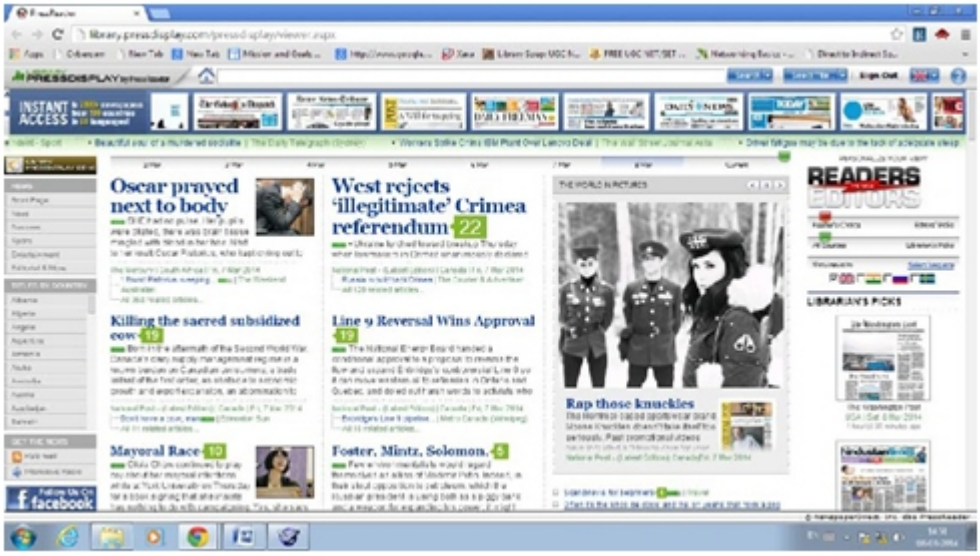


Press Clippings Database

This is the unique indigenous database of the JNU Library. The press-clippings service of the JNU Library is one of the widely used service among the scholars. The library has been providing the press clippings services to academic community right from its inception in seventies. In the recent past the library has digitised approximately 8 lacs newspaper articles culled out from over 30 English newspapers from India and abroad. After digitization of the collection the usage has multiplied. Presently, the newspaper articles are culled out from 21 newspapers (http://172.16.21.5:8000/cgi-bin/gw/chameleon/). A sample screen shot of Press Clipping Database:



Apart from this, the JNU Library also subscribed "PressDisplay.com" an online newspaper database to complement the press clippings database. This database covers 2000 newspapers from 100 countries in 60 languages.

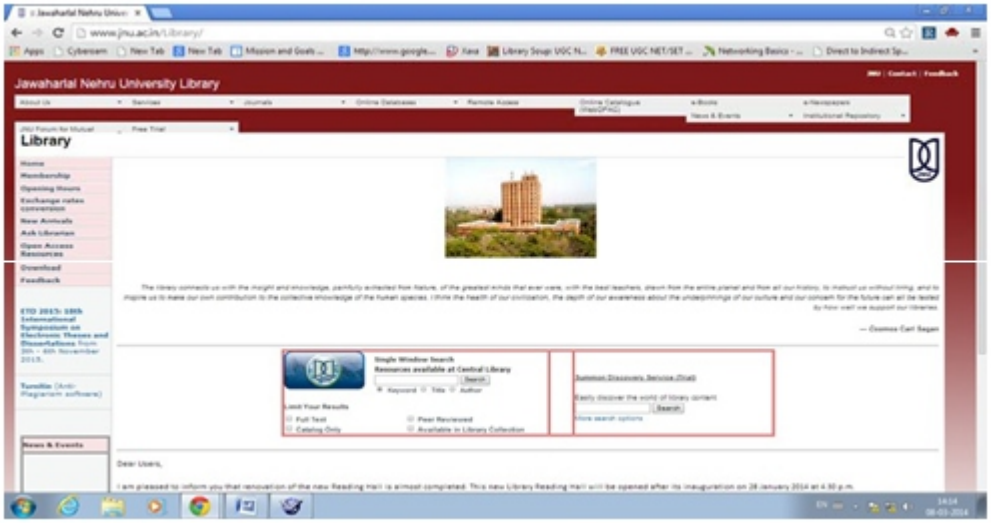


Digitization of Theses and Dissertation

The JNU library has digitised approximately 18 thousand Theses and Dissertation covering over 30 lacs pages and the metadata has been captured as per MARC21 standard. The full text of M.Phil./Ph.D. Theses can be access through JNU Web-OPAC on the intranet (http://jnuonlinecatlog.jnu.ac.in: 8000/cgi-bin/gw/chameleon/).

Search Tools

The library facilitates its users with the federated and discovery search tools (a single window search) which provides precise and comprehensive search results. The user can use the federated and discovery search tools from the library home page i.e. http://www.jnu.ac.in/Library/default.htm

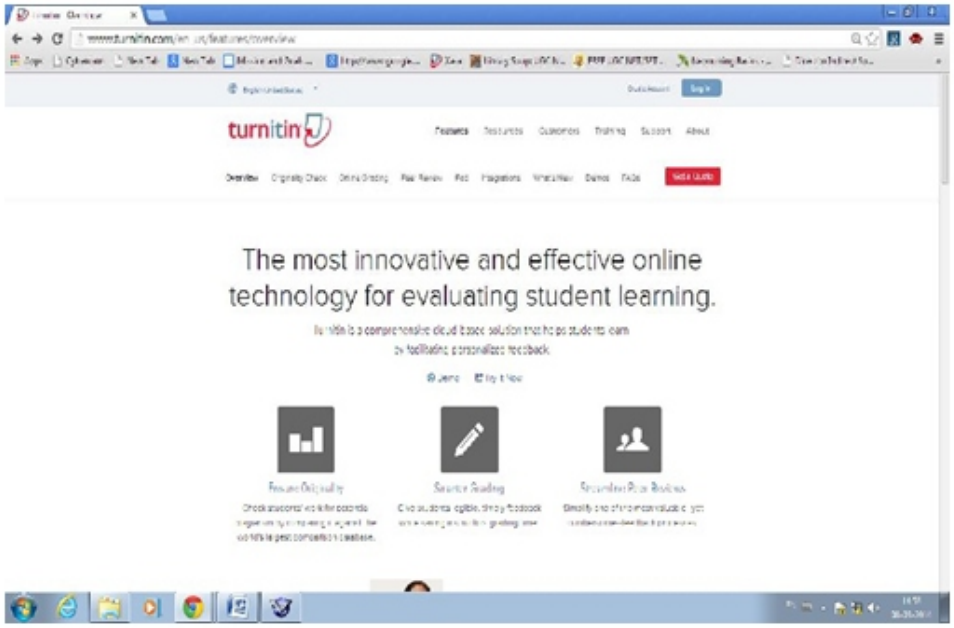


Remote Access

The library has facilitated its bonafide users with the remote access facility of online information resources. Now, the users of the library can access all the online resources from any place of the world with their unique ID and Password via desktops, laptops notebooks, mobiles, etc.

Anti-Plagiarism

The Library is providing plagiarism check to its researchers through the TURNITIN software. The anti-plagiarism tool has created a new enthusiasm in the faculty and research scholars. Also, the quality of research has been improved with the use of anti-plagiarism software.



Virtual Reference

A number of reference queries are being attended online by means of email, ask librarian and over telephone etc. The library is responding on each and every query in quick time and due to which these virtual reference services is gaining popularity among research community of JNU and beyond.

Assistive technology for Visually Impaired Scholars

One special unit called Helen Keller has been setup especially for visually impaired scholars which consists of more than twenty computers, equipped with bunch of special software and hardware to facilitate the visually challenged scholars in their study and research. Special software includes Jaws, Kurzweil, and Magic Magnifier etc. Apart from the above, the JNU Library also distributed more than 50 laptops equipped with the special software to the visually impaired scholars of the university.

(Equipped with special Speech Software, Scanners & Printing facility for Visually Impaired Students)

Conclusion

The main question in managing university libraries in present time is totally dependent on how effectively the new and innovative technology is being exploited to meet the information needs of the scholars.There is an apprehension among the experts that the role of library and library professionals will diminish. This fear is unfounded as their importance will grow with time provided that they reach out to the users with innovative services. They should provide services beyond the four walls of the library, and do not limit themselves to providing place based services.

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A Secure And Reliable Authentication Mechanism For Users Of Microsoft Cardspace Framework

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ABSTRACT

The development of web applications on Cloud computing platform has given rise to various concerns about the private data of the consumers of cloud. The traditional form of security tokens like username/password used to access cloud services are prone to phishing attacks and hence do not provide complete security.

CardSpace (formerly known as InfoCard) is a Digital Identity Management system that has recently been adopted by Microsoft. In this paper identification of two security flaws in CardSpace that may lead to a serious privacy violation have been detected. The first flaw is the reliance on Internet user judgements of the trustworthiness of service providers, and the second is the reliance of the system on a single layer of authentication. A multi-level solution is designed to address both flaws using biometric authentication techniques. Solution is compatible with the currently deployed CardSpace identity metasystem, and should enhance the privacy of the system with minor changes to the current CardSpace framework.

Keywords: *Authentication, Microsoft Cardspace, biometric, token*

Introduction

Along with the growing reliance on Internet web applications in our daily life, comes the problem of managing the necessary digital identities and preserving their privacy. In an open large-scale domain such as the Internet, preserving user privacy is not a straightforward task. Identity theft, which occurs when an impostor uses a legitimate user's identifying information without his/her consent, is becoming one of the biggest concerns for organizations offering services on the Internet. Many solutions have been proposed in the last few years to address the threat of identity theft, and to tackle identity oriented attacks such as phishing and pharming. Most of those solutions are based on the concept of Identity Federation (different identities that belong to the same user in a particular trust domain are “federated”), and Single Sign-On (where a user performs an authentication process only once in a single working session).

In 1999, Microsoft adopted .NET Passport, an identity federation and ticket-based single sign-on system. Although .NET Passport was supported by a number of well-known service providers, such as

eBay and Visa, it was not widely used for single sign-on. The single sign-on features have since been dropped, and Passport now functions simply as a means of logging into Microsoft sites. In 2005, Microsoft published two papers that discuss the "failure" of .NET Passport.

Recently, Microsoft has proposed a new identity management framework named CardSpace. CardSpace has some similarities to other identity federation systems; however it is not a single sign-on system. CardSpace is designed to reduce the reliance on passwords for Internet user authentication by service providers, and to improve the privacy of personal information.

In this paper, identification of significant security and privacy issues in the CardSpace scheme is done. The main focus is on two particular security problems, namely, its reliance on user judgements of the trustworthiness of service providers and its dependency on a single layer of user authentication to the Identity Provider.

2. MICROSOFT CARDSPACE

In line with the continuing increase in the number of online services requiring authentication, there has been a proportional rise in the number of digital identities needed for authentication purposes. This has contributed to the recent rapid growth in identity- oriented attacks, such as phishing, pharming, etc. In an attempt to mitigate such attacks, a number of identity management systems have been proposed.

Identity management deals with uniquely identifying individuals in a system, and with effectively controlling access to the system resources by managing the rights and privileges associated with digital identities. The most important service provided by an identity management system is authentication.

Most identity management architectures involve the following main roles:-

1. The identity provider (IdP), which issues an identity token to a user.
2. The service provider (SP), or the relying party (RP) in CardSpace terminology, which consumes the identity token issued by the IdP in order to identify the user, before granting him/her access.
3. The user, also known as the principal.
4. The user agent, i.e. software employed by a user to send requests to webservers and receive data from them, such as a web browser. Typically, the user agent processes protocol messages on behalf of the user, and prompts the user to make decisions, provide secrets, etc.

CardSpace is the name for a Microsoft WinFX set of software components that form an identity management system or an identity metasystem, since it is a system of systems. This identity metasystem

is designed to comply with the Laws of Identity promulgated by Microsoft1. Digital identities in CardSpace are represented as claims made by one digital subject (e.g. an Internet user) about itself or another digital subject. A claim is an assertion that certain identifying information (e.g. given name, SSN, credit card number, etc.) belongs to a given digital subject . According to this definition, identifiers (e.g. username) and attributes (e.g. user gender) are both treated as claims within the identity metasystem.

The Card Space Framework

The CardSpace framework is based on the identification process we experience in the real world using physical identification cards. Within the CardSpace framework, an identity provider issues a user with a virtual card called InfoCard, which is an XML file containing (relatively) nonsensitive metainformation about the user. Subsequently, a user can use one of its InfoCards to help identify itself to any service provider who trusts the identity provider that issued the selected InfoCard. InfoCards can also be self-issued by the users themselves. Figure 1 provides a simplified sketch of the CardSpace framework. In the figure it is assumed that the user has already been issued an InfoCard by an identity provider (IdP).

1. In step 1, the CardSpace-enabled user agent or the Service Requestor (henceforth abbreviated to CEUA), which is essentially a CardSpace-enabled web browser, requests a service from the relying party (RP), that is, the service provider.

2. In step 2, the RP identifies itself using a public key certificate (e.g., a certificate used for SSL/TLS) and declares itself as a CardSpace-enabled RP using XHTML code or HTML object tags.

3. After recognizing that the RP is CardSpace-enabled, the CEUA retrieves the RP security policy in step 3. This policy contains a list of the claim types that must beasserted about the Internet user (henceforth abbreviated to user) in order for this user to be granted the service, the IdPs that are trusted to make such assertions, and the types of security token that are acceptable to the RP. The security policy also specifies requirements that must be met by the retrieved security token (e.g., the type of proof key, or the maximum token age). It is important to emphasize here that CardSpace identity metasystem itself does not restrict the type of security tokens; that is, all types of token can be used within the framework.

4. In step 4 the CEUA matches the RP's security policy with the InfoCards possessed by the user in order to find one that satisfies the RP's policy. If one or more suitable InfoCards are found, the user is

prompted to select an InfoCard from amongst them. After the user has selected an InfoCard, the CEUA initiates a connection with the IdP that issued that InfoCard.

5. The user performs an authentication process with the IdP in step 5.

6. If the authentication process succeeds, step 6 takes place, in which the CEUA requests the IdP to provide a security token that holds an assertion of the truth of the claims listed within the selected InfoCard; the message that holds this request is called a request security token message. The IdP will then check whether its security policy permits it to generate the requested security token. If so, the IdP will reply by sending a security token within a message called a request security token response message.

7. Finally, the CEUA forwards the security token to the RP in step 7.

8. If the RP verifies it successfully, the service will be granted in step 8.

It is worth mentioning here that, after step 6, the contents of the security token can optionally be displayed to the user before proceeding to step 7. Moreover, the RP will get an assertion from the IdP that the security token received was issued to a particular user. This assertion is based on the use of a secret "proof-key," where a user asserts ownership of a security token by demonstrating knowledge of the proof key included in the token. This assertion helps to prevent token replay attacks, that is, where an attacker "steals" a token for another user.

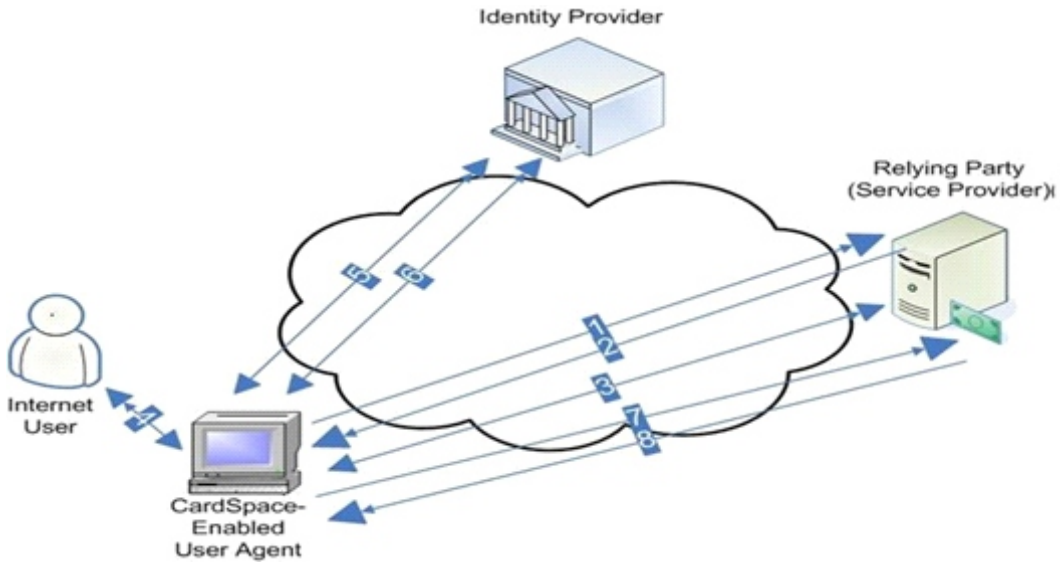

Fig 1 Cardspace Framework

It is worth mentioning here that, after step 6, the contents of the security token can optionally be displayed to the user before proceeding to step 7. Moreover, the RP will get an assertion from the IdP that the security token received was issued to a particular user. This assertion is based on the use of a secret "proof-key," where a user asserts ownership of a security token by demonstrating knowledge of the proof key included in the token. This assertion helps to prevent token replay attacks, that is, where an attacker "steals" a token for another user.

The message flows of the CardSpace framework are as follows:

(1) CEUA → RP: HTTPGETLoginHTML Page Request

(2) RP → CEUA: HTML Login Page + InfoCard Tags (XHTML or HTML object tags)

(3) CEUA ↔ RP: CEUA retrieves security policy via WSSecurityPolicy

(4) CEUA ↔ User: User picks an InfoCard

(5) CEUA ↔ IdP: User Authentication

(6) CEUA ↔ IdP: CEUA retrieves security token via WSMetadataExchange and WS-Trust

(7) CEUA → RP: CEUA presents the security token via WS-Trust

(8) RP → CEUA: Welcome, you are now logged in!

WS-MetadataExchange, WS-Trust, and WSSecurityPolicy messages are transported over SOAP. The messages in steps 3, 5, 6, and 7 must be carried over an SSL/TLS channel to preserve their confidentiality. It appears reasonable to assume that the most commonlyused security token type will be a SAML assertion, carried over SOAP. The integrity of the security token is preserved using an XMLSignature as part of theWS-Security protocol.

3. SECURITY LIMITATIONS

CardSpace framework suffers from serious drawbacks. One such limitation is its reliance on DNS names to identify the IdPs and the RPs. If the DNS server is controlled by an attacker, it can direct the identity metasystem parties to false websites. This problem is common to many current Internet identity management solutions and is very difficult to address. Probably the only long-term solution to this problem is to hope that the use of DNSSEC, or some other secure address resolution solution, will become widespread. Another limitation is that, in the default scenario for the CardSpace framework, the IdP is aware of the identities of the RPs to which the user attempts to log in. Accordingly, the IdP can learn about the behavior of users on the web.

. Judgements of RP Trustworthiness

The user judgement regarding the honesty of the RP is a security-critical task. The RP will obtain personal information belonging to the user in the form of "asserted claims" within a security token, as sent in step 7 of the message flow. Thus, if the RP is not trustworthy, it could gather information about

users and potentially use this information in unauthorized ways. Accordingly, any misjudgment of the trustworthiness of an RP could result in a serious privacy violation. Hence, the task of judging the honesty of the RP is a very important one. In the CardSpace framework, when the user is prompted for its consent to be authenticated to an RP using a particular InfoCard, the user makes a judgment regarding the trustworthiness of the RP based on one of the following:

(1) a high-assurance public key certificate belonging to the RP,

(2) an "ordinary" public key certificate belonging to the RP (e.g., a certificate used for SSL/TLS), or

(3) no certificate at all.

Obviously, in the third situation the user has no evidence of the honesty of the RP. Microsoft recommends the first option, that is, the use of a high assurance certificate (also referred to as a "higher-value," "higher-assurance" or "extended validation" certificate). Such a certificate is an X.509 certificate that is only issued after a rigorous and well-defined registration process, unlike the CA-specific procedures used for issuing certificatescommonly employed as the basis for SSL/TLS security. A high assurance certificate might include a digitally signed bitmap of the RP's company logo in order to make it easier for the user to identify the certificate holder (The inclusion of such a logo is discussed in a number of documents circulated by Microsoft, although the latest version of the draft standard for extended validation certificates, as published by the CA/Browser Forum, does not mandate the inclusion of a logo. Whether or not such a requirement will be included in the standard at a later date remains unclear.)

3.2. Reliance on a Single Layer of Authentication

The security of the CardSpace identity metasystem relies on the authentication of the user by the IdP. In a case where a single IdP and multiple RPs are involved in a single working session, which we expect to be a typical scenario, the security of the identity metasystem within that working session will rely on a single layer of authentication, that is, the authentication of the user to the IdP. This user authentication can be achieved in a variety of ways (e.g., using an X.509 certificate, Kerberos v5 ticket, self-issued token or password); however, it seems likely that, in the majority of cases, a simple username/password authentication technique will be used. If a working session is hijacked (e.g., by compromising a self-issued token) or the password is cracked (e.g., via guessing, brute- force, key logging, or dictionary attacks), the security of the entire system will be compromised. It is fair to mention here that most of the deployed Internet identity management solutions, such as Liberty and OpenID, suffer from the same vulnerability.

4. LITERATURE SURVEY

1. “Privacy in cloud computing through identity management” paper basically focuses on the security issues in the Microsoft cardspace technique which is recently developed by the Microsoft in order to provide the privacy to the users data. In this paper already implemented tools are discussed such as OpenId and PRIME (privacy and identity management for Europe). But these also suffer from the problems like phishing and single layer authentication. So they discussed Microsoft cardspace technique with its loopholes such as single layer authentication and relying on third party for private data. The authors come up with new technique called “zero knowledge proofing” which do not allow disclosing private data to anybody and “SAML” which offers broader authentication and is compatible with all existing products.[1]

2. In the paper “Improving the security of cardspace” whole card space technique is discussed in detail with its full architecture and its 2 major flaws are taken into consideration and a new methodology with 3 approaches is developed. Its analysis is also made in order to check its level of providing required security.[2]

3. “Privacy Preserving Multi-Factor Authentication with Biometrics” paper focuses on a two-phase authentication mechanism for federated identity management systems. The first phase consists of a two-factor biometric authentication based on zero knowledge proofs. The authors employ techniques from vector-space model to generate cryptographic biometric keys. These keys are kept secret, thus preserving the confidentiality of the biometric data, and at the same time exploit the advantages of a biometric authentication. The second authentication combines several authentication factors in conjunction with the biometric to provide a strong authentication. A key advantage of our approach is that any unanticipated combination of factors can be used. Such authentication system leverages the information of the user that are available from the federated identity management system. They provide a new application of vector-space model to generate efficiently cryptographic biometric keys. They preserve privacy and unconditional security of the biometric key by employing information theoretically secures ZKPK.[3]

4. “Truststore: Making Amazon S3 Trustworthy with Services Composition” have successfully proposed a secure virtual file system, called TrustStore to preserve the privacy, integrity and confidentiality of the data stored in the untrusted storage service. Firstly, they develop a service-oriented architecture for provisioning Trustworthy Storage Services (TSS) with untrusted storage service providers where the data is encrypted to cipher text on the client computer and then this cipher text is stored on the SSP. Further the key form is stored on KMSP which can reverse the whole process but does

not have the cipher text to apply on. The prototype design, TrustStore preserves the confidentiality of the outsourced data and also encrypts the meta data and file structure. Efficient integrity check detects if any data is corrupted and performance wise outperforms the ordinary usage latency with Amazon S3.[4]

5. THE PROPOSED SECURED SOLUTION

After going through the various papers related to Microsoft card space technique, it has been observed that although it is a good technique to provide the security but then also it has two major loopholes in security that needed to be overcome. One is to reduce Judgements of RP Trustworthiness and the other is to remove single layer authentication. So there is a need to implement multi-level authentication architecture in it, to use some strong technique for providing authentication and prevent relying on third party for claims. It will remove the dependability on the third party and the tokens generated for the users will be more secure as the authentication process will be made more complex to attack by attacker.

In this paper, we will take irises as the biometric characteristic that is used for authentication. We adopt the XOR operation as the function and we use a secret, randomly chosen string, as the secret information. The XOR operation is chosen because it will not affect the matching result, because the matching algorithm for irises uses a Hamming distance comparison between two biometric strings. That is, since the Hamming distance is, itself, a population count of a bitwise XOR, the affect of the extra XORs will be canceled out. The idea is shown in Fig. 2

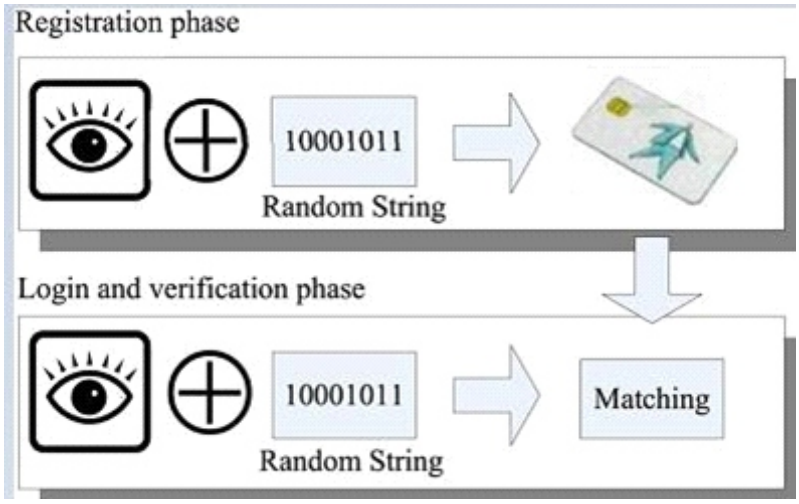

Fig 2 Iris matching

Users randomly select a string and combine it with their iris data via the exclusive-or operation.

The combined string is stored in the smart card in the registration phase. The smart card then combines the same randomly chosen string with the iris data input in the login phase.Finally, the two strings created from the registration phase and from the login phase are sent to the server for matching. The proposed protocol therefore meets our needs: the server cannot learn the user's biometric data, but the correctness of the data can still be checked by the server.

6. CONCLUSION

We summarize the main contributions of the paper as follows.

1) Truly Three-Tier Authentication: The three true factors (smart cards, passwords, and biometrics) are of three different data types, where smart cards display what you have, passwords depicts what you know, and biometrics represent what you are, and they are all verified in the server.
2) Strong Privacy based on Biometrics: In our proposed scheme, the biometric template and biometric samples of every user are protected while the server performs the matching algorithm, so that the server cannot learn biometric data in authentication processes. Moreover, the server itself or any adversary who has corrupted the server cannot still obtain users' biometric data even if users' cards have been stolen or lost and the data in the cards are leaked.
3) Efficiency: The server does not need to maintain password or biometric databases, and the user does not perform time-consuming operations, such as exponentiation computations, in the smart card.
4) Provable Security: We formally analyze the proposed protocol to show the completeness and prove the soundness of the protocol theoretically with our security definition of three-factor authentication.

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