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# THE PROSPECTS AND PERILS OF CLOUD COMPUTING:

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## **ABSTRACT:**

Although the buzz about the cloud computing has been doing rounds for quite some time, it is only lately the enterprises are clamoring for it. The prospects for growth are enormous. The Indian market which is now comparatively miniscule, but experts feel that by 2020 it will grow to the size of about Rs95,000 crore. As opposed to the present module, in cloud computing most of the infrastructure, hardware and software are in the custody of the vendor outside the business premises. This is economical particularly for SMEs who cannot afford the high investment in the hardware and software, ERP & other packages. Even for big enterprises cloud computing can help to bring down the IT/ITES cost significantly and improve their return on investment (ROI). However cloud computing is not free from risks and the user has to depend on the vendor's security system instead of building own fire wall and a superior broadband connection. Though it may sound as oversimplification, but "Cloud computing", is the same as people using Gmail or Yahoo mail services, except that it goes much further and includes daily computing activities. Cloud computing is where entire businesses and hundreds of employees will run their computer tools as online rented products and all the processing work and file saving will be done "in the cloud" of the Internet. Cloud computing has a great potential to create jobs in IT/ITES sector as more enterprises are opting for cloud based solutions. There are several players in cloud computing like Microsoft, Salesforce.com having the first mover advantage, joining the bandwagon are IBM., HP., Google., SAP., Oracle & Amazon just to name a few.

\_\_\_\_\_Key

Words:- *Cloud Computing, Cloud Management, IaaS, PaaS, Platform, SaaS, Vendor, [Virtual Private Network](#).*

1. ORIGIN AND HISTORY: The origin of the term cloud computing is unclear till date. The expression cloud is commonly used in sciences, like Meteorology, Mathematics, Astronomy and Physics to describe a large agglomeration of objects that visually appear from a distance as a cloud. Cloud Computing is the result of evolution and adoption of existing technologies and paradigms. The underlying concept of cloud computing dates back to the 1950s, when large-scale [mainframe computers](#) became available in academia and corporations, accessible via [thin clients](#) "static terminals". In order to make more efficient use of costly mainframes, a practice evolved that allowed multiple users to share both the physical access to the computer from multiple terminals as well as to share the [CPU](#) time. The practice of sharing CPU time on a mainframe became known in the industry as [time-sharing](#). Due to the expense of these powerful computers, many corporations and other entities could avail themselves of computing capability through time sharing and several organizations, such as GE's GEISCO, IBM subsidiary. During mid 70s it was popularly known as [Remote Job Entry](#) (RJE) process mostly associated with IBM and DEC. In the 1960s, [John McCarthy](#) opined that "computation may someday be organized as a [public utility](#)." Almost all of the modern-day characteristics of cloud computing; were thoroughly explored in [Douglas Parkhill](#)'s 1966 book, "The Challenge of the Computer Utility".

In the 1990s, Telecommunications companies, who previously offered mostly dedicated point-to-point data circuits, began offering [Virtual Private Network](#) (VPN) services. They began to use the cloud symbol to denote the demarcation point between the providers and users. Since 2000, after the [dot-com bubble](#), [Amazon](#) played a key role in all the development of cloud computing by modernizing their [data centers](#), which, like most [computer networks](#), were using as little as 10% of their capacity at any point of time, leaving enough room for occasional spikes. Amazon found that the new cloud architecture resulted in significant internal efficiency and in 2006, initiated a new product development effort to provide cloud computing to external customers, and launched [Amazon Web Services](#) (AWS) on a utility computing basis. In early 2008, [Eucalyptus](#) became the first open-source, AWS API-compatible platform for deploying private clouds and [OpenNebula](#), enhanced in the RESERVOIR European Commission-funded project, became the first open-source software for deploying private and hybrid clouds. By the middle of 2008, experts saw opportunities for cloud computing and predicted dramatic growth. In March 2011, IBM announced the [IBM Smart-Cloud](#) framework to support Smarter Planet and among them was cloud computing. Growth and popularity of internet contributed to the cloud computing. The present availability

of high-capacity networks, low-cost computers and storage devices as well as the widespread adoption of [hardware virtualization](#), [service-oriented architecture](#), [autonomic](#), and utility computing have led to an remarkable development in cloud computing.

## **2. KEY CHARACTERISTICS AND SALIENT FEATURES:**

**2.1** A plain definition of cloud computing from a user's point of view is using web applications and or server services that he pays to access rather than buying and installing software or hardware. The user will simply use the modern web browser to login from any web-enabled computer, and access the word processing documents in the same way that it would have done to access Emails. Cloud computing is the new territory of knowhow expected to benefit the industry in many ways like ultramodern technology, cost effectiveness, creation of new jobs et-el. The cloud is internet based computing where virtual shared servers provide software, infrastructure, platform and other resources and hosting to customers on a “pay as you use basis”. It allows access to information and computing power at a faster and more affordable rate by centralizing data storage, processing and bandwidth. It is the same business model as people using Gmail or Yahoo mail services, except that cloud computing goes much further and includes daily computing activities. Cloud computing is where almost entire businesses and its employees will run their computer tools as online rented products. All the processing work and data saving will be done “in the cloud” of the Internet and the users will plug into that cloud every day to do their job. While avant-garde western governments are still considering shifting to cloud computing, the Government of India has announced a “National Cloud” to shift congestion in IT infrastructure. In the nut shell “Cloud computing” is a somewhat nebulous term to describe, it simply means users “renting” or borrowing online software instead of actually purchasing and installing it on their own computers.

**2.2** In many ways, cloud computing is simply a new way of looking at and talking about virtual servers. As Dan Hoffman, CEO of [M5 Networks](#), puts it, "Cloud computing is indeed a new name for an old idea." He further adds that instead of having a software application running in a server room down the hallway from a person's office, the application runs in datacenter and this datacenter doesn't need to be anywhere near the office, either. In fact, you may not even know where the datacenter is”.

**There are three major types of services offered via cloud computing: @**



@ All the three major categories of services offered via cloud computing provide varying benefits to the businesses.

- ★ Infrastructure as a Service (**IaaS**); provides the user with virtual infrastructure, such as servers and data storage space, this is where [virtualization](#) fits into the cloud.
- ★ Platform as a Service (**PaaS**) provides the user with development environment services where the user can create and run home-grown applications, and
- ★ Software as a Service (**SaaS**) provides the user with access to already created applications that are operating in the cloud. For example, if an enterprise is using cloud computing to access online accounting and payroll services, rather than investing in accounting and or payroll software and installing it on the server in its office, it is using **SaaS**.

Some of the Cloud Computing Services available presently are:

- [Amazon EC2](#) - Virtual IT,
- [Google App Engine](#) - Application hosting,
- [Google Apps](#) - Software as a service,
- [Apple MobileMe](#) - Network storage.

The taxonomy also mentions other key components as a service. (**XaaS**) are described in a comprehensive taxonomy model published in 2009, such as Strategy-as-a-Service, Collaboration-as-a-Service, Business Process-as-a-Service, Database-as-a-Service, etc. In 2012, network as a service (**NaaS**) and communication as a service (**CaaS**) were officially included by

ITU (International Telecommunication Union) as part of the basic cloud computing models, recognized service categories of a telecommunication-centric cloud ecosystem.

### **3. CHALLENGES AND OTHER ISSUES:**

Though cloud computing offers several benefits, but it is vulnerable to threats. Some of the threats and challenges are delineated below:

- **Privacy and Security:** There is a higher risk that confidential data may be accessed by unauthorized parties. There are instances such as the [secret NSA program](#), working with [AT&T](#), and [Verizon](#), which recorded over 10 million telephone calls between American citizens. Cloud computing poses privacy concerns because the service provider can access the data that is on the cloud at any time. It could accidentally or deliberately alter or even delete information. Security issues have been categorized into sensitive data access, data segregation, privacy, bug exploitation, recovery, accountability, malicious insiders, management console security, account control, and multi-tenancy issues. While the cloud service provider needs to establish clear and t policies about how the data of each cloud user will be accessed and used; the users can encrypt data that is processed or stored within the cloud to prevent unauthorized access.
- **Legal Issues:** There are several legal issues arising like-Operational, Data Portability, Legislative or Regulatory, Third Party contractual limitations, Mitigation, Jurisdiction, Risk Allocations, etc., Being new field no standard set of legislations exists, this and myriad issues about operation and jurisdiction can make cloud computing a less attractive option. In United States and EU there are some good legislations in place but India has to really make progress in this direction. In future Intellectual Property issues could arise so it is necessary to have an international and local legislation to address the various legal issues to make the cloud computing hassle free.
- **Vendor lock-in:** Because cloud computing is relatively new, standards are still in the developing mode. Many cloud platforms and services are proprietary, i.e. built on the specific standards, tools and protocols developed by a particular vendor for its particular cloud offering. This makes migrating off a proprietary cloud platform prohibitively complicated and expensive. However, in recent years, there have been services that sync user's data from one cloud platform to another, making it portable and cost effective to ensure that there is not a Platform, Data, or Tool lock-in.
- **Open standards:** Most cloud providers expose APIs that are typically well-documented but also unique to their implementation and thus not interoperable. Some vendors have adopted others' APIs and there are a number of open standards under development, with a

view to delivering interoperability and portability. As of November 2012, the Open Standard with broadest industry support is probably [OpenStack](#), founded in 2010 by [NASA](#) and [Rackspace](#), and now governed by the [OpenStack Foundation](#). [OpenStack](#) supporters include [AMD](#), [Intel](#), [Canonical](#), [SUSE Linux](#), [Red Hat](#), [Cisco](#), [Dell](#), [HP](#), [IBM](#), [Yahoo](#) and now [VMware](#).

- **Sustainability:** The major environmental problem associated with the cloud is energy use. [Greenpeace](#) ranks the energy usage of the top ten big brands in cloud computing, and successfully urged several companies to switch to clean energy. Greenpeace and Facebook announced together that Facebook would shift to use clean and renewable energy to power its own operations. Soon thereafter, Apple agreed to make all of its data centers 'coal free' by the end of 2013 and doubled the amount of solar energy powering its Maiden, NC data center.
- **Abuse:** As with privately purchased hardware, customers can purchase the services of cloud computing for nefarious purposes. This includes password cracking and launching attacks using the purchased services. In 2009, a banking [trojan](#) illegally used the popular Amazon service as a command and control channel that issued software updates and malicious instructions to PCs that were infected by the malware.
- **IT governance:** The operation of cloud computing requires an appropriate IT governance model to ensure a secured computing environment and to comply with all relevant organizational information technology policies. As such, organizations need a set of capabilities that are essential when effectively implementing and managing cloud services. A danger lies with the explosion of companies joining the growth in cloud computing by becoming providers. This over-saturation may have ramifications for the industry as whole.
- **Consumer end storage:** The increased use of cloud computing could lead to a reduction in demand for high storage capacity consumer end devices, due to cheaper low storage devices via the cloud becoming more popular. Jake Gardner explains that while unregulated usage is beneficial for IT and tech moguls like Amazon, the anonymous nature of the cost of consumption of cloud usage makes it difficult for business to evaluate and incorporate it into their business plans.
- **Performance interference and noisy neighbors:** Due to its multi-tenant nature and resource sharing, cloud computing has also to deal with the "noisy neighbor" effect. Owing to the fact that the neighboring VMs may be activated or deactivated at arbitrary times, the result is disparity in the actual performance of Cloud resources.

- **Monopolies and privatization of cyberspace:** Philosopher [Slavoj Žižek](#) points out that, although cloud computing enhances content accessibility; this access is "increasingly grounded in the virtually [monopolistic privatization](#) of the cloud which provides this access". According to him, this access, necessarily mediated through a handful of companies, ensures a progressive privatization of global cyberspace "set prices at will but also filter the software they provide to give its "universality" a particular twist depending on commercial and [ideological](#) interests."

## **4. TYPES OF CLOUDS AND CLOUD MANAGEMENT:**

### **4.1 Types of Clouds:**

- ✚ **Private cloud:** Private cloud is cloud infrastructure operated solely for a single user, whether managed internally or by a third-party and hosted internally or externally. The project requires a significant degree of engagement to virtualize the business environment. It can improve business, but every step in the project raises security issues that must be addressed to prevent serious vulnerabilities. [Self-run data centers](#) are generally capital intensive, because users "still have to buy, build, and manage them".
- ✚ **Public cloud:** A cloud is called a "public cloud" when the services over a network are open for public use. Technically there may be little or no difference between public and private cloud architecture, however, security consideration may be substantially different for services applications, storage, and other resources etc., made available by a service provider for public audience and when communication is effected over a non-trusted network. Generally, public cloud service providers like Amazon AWS, Microsoft and Google own and operate the infrastructure and offer access only via Internet.
- ✚ **Community cloud:** Community cloud shares infrastructure between several organizations from a specific community with common concerns i.e. security, compliance, jurisdiction, etc., whether managed internally or by a third-party and hosted internally or externally. The costs are spread over fewer users than a public cloud but more than a private cloud, so only some of the cost savings potential of cloud computing are realized.
- ✚ **Hybrid cloud:** Hybrid cloud is a composition of two or more clouds (private, community or public) that remain unique entities but are bound together, offering the benefits of multiple deployment models. It allows one to extend either the capacity or the capability of a cloud service, by aggregation, integration or customization with another cloud service.

For example, an organization may store sensitive client data in house on a private cloud application, but interconnect it to a billing application provided on a public cloud as a software service. Managing the information flow in a hybrid cloud environment is also a big challenge as it poses security concerns if sensitive data lands on public cloud servers.

✚ **Distributed cloud:** Cloud computing can also be provided by a distributed set of machines that are running at different locations, while still connected to a single network or hub service. Examples of this include distributed computing platforms such as [BOINC](#) and [Folding@Home](#).

✚ **The Intercloud:** The Intercloud is an interconnected global "cloud of clouds" and an extension of the Internet "network of networks" on which it is based.

#### 4.2 Cloud Management:

A cloud management system is a combination of software and technologies designed to manage cloud environments. HP, Novell, Eucalyptus, OpenNebula, Citrix and are among the vendors that have management systems specifically for managing cloud environments. At a minimum, a cloud management solution should be able to manage a pool of heterogeneous compute resources, provide access to end users, monitor security, manage resource allocation etc., For Composite applications, cloud management solutions need frameworks for workflow mapping and management. Enterprises with large-scale cloud implementations may require more robust cloud management tools having the ability to manage multiple platforms from a single point of reference, including intelligent analytics.

**Public clouds** are managed by public cloud service providers, which include the public cloud environment's servers, storage, and networking and data center operations. Users of public cloud services can generally select from the following three basic categories:

- 🌈 User self-provisioning: Customers purchase cloud services directly from the provider, through a web form or console interface. The customer pays on the basis of per-transaction.
- 🌈 Advance provisioning: Customers contract a predetermined amount of resources, which are prepared in advance of service. The customer pays a flat fee or a monthly fee.
- 🌈 Dynamic provisioning: The provider allocates resources when the customer needs them, then decommissions them when they are no longer needed. The customer is charged on a pay-per-use basis.

Managing a **private cloud** requires software tools to help create a virtualized pool of compute resources, provide a self-service portal for end users and handle security, resource allocation, tracking and billing. Management tools for private clouds tend to be service driven, as opposed

to resource driven, because cloud environments are typically highly virtualized and organized in terms of portable workloads.

In **hybrid cloud** environments, compute, network and storage resources must be managed across multiple domains, so a good management strategy should start by defining what needs to be managed, and where and how to do it. It should include configuration and installation of images, access control, budgeting and reporting. Access control often includes the use of [Single sign-on](#) (SSO), in which a user logs in once and gains access to all systems without being prompted to log in again at each of them.

#### **4.3 Cloud Management Challenges:**

Cloud computing presents a number of management challenges. Companies using public clouds do not have ownership of the equipment hosting the cloud environment, and because the environment is not contained within their own networks, public cloud customers don't have full visibility or control. Users of public cloud services must also integrate with an architecture defined by the cloud provider, using its specific parameters for working with cloud components. Integration includes tying into the cloud APIs for configuring IP addresses, subnets, firewalls and data service functions for storage. Because control of these functions is based on the cloud provider's infrastructure and services, public cloud users must integrate with the cloud infrastructure management. Capacity management is a challenge for both public and private cloud environments because end users have the ability to deploy applications using self-service portals. Applications of all sizes may appear in the environment, consume an unpredictable amount of resources, and then disappear at any time. Chargeback or pricing resource use on a granular basis is a challenge for both public and private cloud environments. It is a challenge for public cloud service providers because they must price their services competitively while still creating profit. For private cloud operators, chargeback is fairly straightforward, but the challenge lies in guessing how to allocate resources closely to actual resource usage to achieve the optimum operational efficiency.

### **5. ADVANTAGES AND DISADVANTAGES:**

#### **5.1 The Advantages of Cloud Computing:**

- The primary benefit of cloud computing is reduced cost for everyone involved. Software vendors do not have to spend huge amounts and thousands of hours supporting users over the phone. They would simply maintain and repair a single central copy of the product online. Conversely, users need not have to shell out the large up-front costs of fully

purchasing word processing, spreadsheet, or other end user products. Users would instead pay nominal rental fees to access the large central copy.

- There is a special benefit to small business. The enterprise is being able to outsource all of the hassle and expense of housing and maintaining.
- Savings on the cost of personnel for installation or maintenance is sizable due to outsourcing. The enterprise is no longer required to pay for doing the things such as install and update software, install and manage email servers or expensive servers, run backups.
- File storage, data backup and software programs all require a lot of space on servers/computers. With cloud computing, the firm can use someone else's servers to store all this data. Thus the enterprise will be able to cut back on system hardware not only in terms of cost but also storage space which is very precious in big cities.
- A cloud computing application may make integration easier because many applications include an Application Programming Interface (API). Cloud computing applications are regularly updated, so an enterprise gets the advantage of access to an application's latest features and functions.
- Cloud computing allows an enterprise and its employees easy access to applications and data from different computers and devices such as smart phones and tablets etc.,

## 5.2 The disadvantages of Cloud Computing:

- Possible downtime: Cloud computing makes the business dependent on the reliability of Internet connection. Most reliable cloud computing service providers suffer server outages time and again.
- Security issues: Cloud computing means Internet computing so a firm should not be using cloud computing applications that involve using or storing data that is sensitive or business secrets.
- Cost: *Prima facie*, a cloud computing application may appear to be cheaper than a particular software solution installed and run in-house, but a firm has to be sure that the cloud application must have all the features that the software does and if not, whether the missing features important to the firm's business.
- The firm should make a *total cost-benefit-analysis*. Many cloud computer vendors present themselves as utility-based providers, claiming that a firm is only charged as per usage. In most cases, **SaaS** (Software as a Service) applications, the firm will have lower total cost of ownership for the first two years but after that in house option can be the real cost-saver.

- Lack of support. It is imperative that the company gets full and prompt support [before cloud computing becomes ubiquitous](#). Sending an email and hoping for a response within 48 hours is not an acceptable way to run a business.
- Inflexibility. The company has to be careful while choosing a cloud computing vendor and make sure that it will be able to adjust the number of users according to the business needs.

## **6. RESEARCH IN CLOUD COMPUTING:**

The chronological account will show that already lot of research has been done in this field but it may be called just a tip of an iceberg. As cloud computing is a new, novel and emerging field many universities, vendors, institutes and government organizations are investing significant amounts in research. Below are some of the examples prominent research projects: In October 2007, the Academic Cloud Computing Initiative (ACCI) was announced as a multi-university project designed to enhance students' technical knowledge to address the challenges of cloud computing. In April 2009, UC Santa Barbara released the first open source platform-as-a-service, [AppScale](#), which is capable of running Google App Engine applications at scale on a multitude of infrastructures. In the same period the St Andrews Cloud Computing Co-laboratory was launched, focusing on research in the important new area of cloud computing. In October 2010, the TClouds (Trustworthy Clouds) project was started, funded by the European Commission's 7th Framework Programme. The project's goal is to research and inspect the legal foundation and architectural design. In December 2010, the TrustCloud research project was started by HP Labs Singapore to address transparency and accountability of cloud computing via detective, data-centric approaches encapsulated in a five-layer TrustCloud Framework. In January 2011, the IRMOS EU-funded project developed a real-time cloud platform, enabling interactive applications to be executed in cloud infrastructures. *In June 2011, two Indian Universities i.e. [University of Petroleum and Energy Studies](#) and [University of Technology and Management](#) introduced cloud computing as a subject in India, in collaboration with [IBM](#).* In July 2011, the High Performance Computing Cloud (HPCCLoud) project was kicked-off aiming at finding out the possibilities of enhancing performance on cloud environments while running the scientific applications. In December 2011, the VISION Cloud EU-funded project proposed architecture along with an implementation of a cloud environment for data-intensive services aiming to provide a virtualized [Cloud Storage](#) infrastructure. In February 2013, the BonFIRE project launched multi-site cloud experimentation and testing facility. There is enormous

scope for further research in this ever-growing field. The main thrust areas for research could be Technology, Cloud Management, Cloud Engineering, Cost reduction, Reducing the damage being caused by the risks & threats, Application of newer cloud devices, such as [desktop computers](#), [laptops](#), [tablets](#) and [smart-phones](#) etc.,. Huge investment will be required for research in cloud computing in the coming years.

## **7. CONCLUSIONS AND SUGGESTIONS:**

Cloud computing is cost effective and efficient with a great potential and hence has a great future. It is going to rule the next century due to its numerous advantages. It cannot be denied that cloud computing is going to be the new frontier in infrastructure space in future. The power and elasticity of cloud computing will increase amazingly as its applications in usage & range grows. SatyaNadella of Indian origin newly appointed CEO of Microsoft considered as the cloud computing guru has predicted a great future for cloud computing. (TOI 06/02/2014). The other biggest advantage emanating from cloud computing is the huge employment potential. It has a great potential to create jobs in IT/ITES sector as more enterprises are opting for cloud based solutions. According to a recent study entitled “ Climate change: Cloud’s impact on IT Organisations& Staffing conducted by International Data Corporation,(**IDC**), a premier global provider of market intelligence- nearly 14 to 15 million new jobs will be created worldwide by 2015. India is set to become a big lure for top cloud talent will alone create alone 2 million jobs. The study further reveals that Seven million cloud related jobs in IT world wide by 2015, Cloud related jobs to grow by 24 percent per year to about 1.4 million in Europe, Middle East, and Africa, (**EMEA**) and that there will be an acute shortage of skilled candidates. Both the categories like Technical and Non Technical jobs that will be created are; Software Engineers, Systems Engineers, Network Administrators, Marketing and Sales Managers, Management Analysts and Financial Analysts. The cloud computing is also likely to generate nearly 1.4 million jobs in banking. There is a darker side to cloud computing and the biggest roadblock is the legal and regulatory issue. This however can be resolved by a setting up robust framework to protect every stakeholder’s rights.

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# A STUDY OF IMPACT OF PRIVACY CONCERNS ON USER ADOPTION OF SOCIAL NETWORKING SITES

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## Abstract

The internet age has witnessed the rapid growth of social networking websites such as Facebook, LinkedIn, Orkut etc. Users across the world have signed up for accounts on SNWs in order to discover other people with similar interests or experience, to share personal information with both friends and strangers, or to establish business contacts. For SNW users, theoretically, there are many privacy issues that deserve serious consideration. First, the information posted in public or semi-public user Profiles can lead to such risks as identity theft, sexual exploitation, online stalking, and cyber harassment. This paper develops two research models, with privacy concern conceptualized either as an antecedent of acceptance intention, or as a moderator of the relationships in the technology acceptance model (TAM). Using a survey questionnaire, empirical data were collected from 300 undergraduate college students. Structured equation modeling was used to test the validity of the proposed research models. The privacy concerns of the research respondents were found to be statistically significant. However, they did not directly affect users' acceptance of social networking web sites. Instead, privacy concerns did moderate the effects of perceived usefulness, and perceived ease of use, on users' intention to continue to use SNWs.

**Keywords:** Social Networking websites, TAM (Technology acceptance model)

## Introduction

SNWs are gaining a prominent role in modern times thanks to the modern digital revolution. but this is also leading to concern among people using it. The posting of personal and private information in SNW opens up a user to public scrutiny, possibly creating permanent records that can affect the user negatively in the future (Rosenblum, 2007). Third, the viral feature of news feed makes personal information far more accessible and visible, posing a disruption of privacy (Boyd, 2008). Despite some anecdotal evidence (Barnes, 2006; Boyd, 2008), however, the level of privacy concern and its impact on the usage pattern in SNWs are largely unknown.

The present study is an investigation into privacy concern in the context of SNW. A survey of actual SNW users was used to collect data for answering two related research questions.

RQ1. Are there significant privacy concerns among SNW users?

RQ2. What is the impact of privacy concern on users' acceptance of SNW?

The findings from this research provide empirical evidence to SNW operators, marketers, application developers, and other parties in managing their businesses in the context of SNW

The paper is organized as follows. The first section introduces related literature on SNW, privacy, and prior studies on privacy concern in social networking settings. The second section reports on the development of our research models and associated hypotheses. The third section presents the details of the survey study, and discusses the findings of the data analysis. The conclusion section addresses the implications of this study for research and practice, points out the limitations, and highlights the directions for future research.

## **LITERATURE REVIEW**

### **Social networking web sites**

A Social Networking Web site (SNW) provides users with web-based services that allow individuals to: construct a public or semi-public profile within a bounded system; articulate a list of other users with whom they share a connection; and view and traverse their list of connections and those made by others within the system (Boyd and Ellison, 2007).

Based on these features, the origin of SNW may be traced back to as early as 1997 when a web site called SixDegrees.com was founded (Boyd and Ellison, 2007)

While more and more users have joined various SNWs, many high profile incidents (as profiled earlier) have hinted that SNW users are concerned about their privacy. On the other hand, we also witnessed the dynamic and changing nature of privacy concern over time.

### **Concept of privacy**

The concept of privacy is not new, with definitions and studies on the issue spanning the fields of philosophy, anthropology, psychology, law, and management. As early as in the nineteenth century, Warren and Brandeis (1890) articulated that privacy referred to “the right to be left alone.” However, even today privacy is a concept that lacks a consistent definition. There are some scholars who advocate privacy as a unitary concept (Introna and Pouloudi, 1999; Johnson, 1989; Westin, 1967). For example, Johnson (Johnson, 1989) defined the function of privacy as “to isolate certain limited and culturally defined aspects of the individual’s life as being morally and legally protected from the evaluative judgment of others.” Karyda et al. (2009) discussed privacy in ubiquitous environments as an individual’s privacy including bodily privacy, territorial privacy, privacy of communications, information privacy, and location privacy, and how privacy can be preserved by enforcing “fair information practices”, which define how personal information should be collected and treated in a “fair way”.

### **Concept of privacy concern**

Privacy concern is the main focus of the present study. Privacy concern is a person’s awareness and assessment of risks related to privacy violations. Prosser (Prosser, 1960) discussed four components (legal torts) which comprise privacy, including false light (i.e. false public portrayals), disclosure (i.e. publicly disclosing embarrassing private facts),

appropriation (i.e. use of a person's image or identity without permission), and intrusion (i.e. physically invading a person's solitude or seclusion) (Prosser, 1960). This four-dimensional perspective on privacy has been embraced by most courts and has guided much federal and state legislation (McWhirter and Bible, 1992).

In the existing literature, privacy concern can be defined from a personal and consumer perspective as a "sense of anxiety regarding one's personal privacy" (Lanier and Saini, 2008). Another definition describes it as being "a concern for controlling the acquisition and subsequent use of information about him or her" (Westin, 1967). Certainly, with the increased use of the Internet, social networking, and other forms of information sharing, concerns over privacy continue to be a source of much research and discussion.

In general, it was found that individuals are more likely to be concerned about their privacy when information is used without one's permission or knowledge, or when the intended use of the information is not clearly stated (Phelps et al., 2000). Another important privacy concern is related to secondary use of private information. In this case, firms may sell or provide their customers' information to others, without notifying the customers who is receiving this information and how it may ultimately be used (Nowak and Phelps, 1995; Phelps et al., 2000)

### **Prior work on privacy concern in SNW**

SNW is a relatively new phenomenon, hitting the mainstream after 2003 (Boyd and Ellison, 2007). As a new social media, various SNWs have launched new features to attract more users, many of which are followed by questions about privacy concerns. Throughout the early evolution of SNW, researchers have paid particular attention to privacy issues in SNWs (Fogel and Nehmad, 2009)

Fogel and Nehmad (2009) studied the influence of gender on privacy and found that men generally have less privacy concern than their female counterparts, and thus tend to disclose more personal information on SNWs than female users.

Gross and Acquisti (2005) conducted a survey among more than 4,000 college students (Facebook users) to study patterns of information revelation in online social networks and their privacy implications. The findings indicate that, despite the potential attacks on various aspects of their privacy, only a small percentage of students changed their privacy preferences. There were some explanations as to the lack of privacy control by SNW users.

Despite the growing research interest in privacy and privacy concern in SNW context, there is a paucity of information and empirical evidence on how privacy concern affects acceptance of SNWs (Shin, 2010). A limited number of studies have been done to evaluate the impact of privacy concern on usage behavior in SNWs.

In another study, Cha (2010) found that privacy concern is negatively correlated with the frequency of users using SNW, but not the time spent on SNW. While these studies provided insights to various aspects of privacy concern's influence in SNW context, their findings could not directly answer our research questions, i.e.

RQ1. Are there significant privacy concerns among SNW users?

RQ2. What is the impact of privacy concern on users' acceptance of SNW?

In Cha's research (2010), the relative impact of privacy concern on SNW usage pattern is not measured through sophisticated statistical analysis

This study is an attempt to fill the void in the existing literature. A comprehensive understanding of the impact of privacy concern on users' acceptance of SNW may provide valuable insights for SNW operators and marketers to offer more effective services and applications to SNW users.

### **Development of research models**

The research objective of the present study is to answer two related questions. First, are there significant privacy concerns among SNW users? Second, what is the impact of privacy concern on SNW users' usage behavior? While the first question can be answered by simply measuring and comparing the mean and standard deviation of privacy concerns among SNW users, the second question needs to be operationalized as research hypotheses derived from established theories.

The concept of users' acceptance of SNW is a special case of technology acceptance. Therefore, the theoretical foundation of the research model should be the established theories in technology acceptance. In the IS field, the Technology Acceptance Model (TAM) by Davis (1989) has been extensively used to study the determinants of the adoption intention and usage behavior in different information technologies and systems, such as hardware (Igarria et al., 1995), software (Rimenschneider and Hardgrave, 2001), e-service (Hu et al., 1999), e-commerce (Gefen and Straub, 2000), and enterprise systems (Amoako-Gyampah and Salam, 2004). Several meta-analysis studies (e.g. King and He, 2006; Lee et al., 2003) have found evidences that support "the parsimony of TAM, the robustness of its scales, and the strong generalizability of the model" (Venkatesh et al., 2007). With the emergence of SNWs, researchers began to study their usage with TAM as the theoretical foundation. For instance, Willis (2008) applied TAM in a study of the acceptance of online social networking systems. Shin and Kim (2008) adapted TAM and Flow Theory to develop a framework for understanding attitudinal and behavioral patterns in social networking sites. The findings of these studies support the general applicability of TAM in the context of SNWs. However, privacy concern in SNWs as a factor has not been studied in the framework of TAM.

### **Technology Acceptance Model (TAM)**

TAM (Davis, 1989) has emerged as a powerful way to represent the antecedents of system usage through two beliefs: perceived ease of use (PEU) and perceived usefulness (PU) of an information system. The TAM theorizes that an individual's behavioral intention to use a system is determined by perceived usefulness, defined as "the extent to which a person believes that using the system will enhance his or her job performance", and perceived ease of use, defined as "the extent to which a person believes that using the system will be free of effort" (Davis, 1989). Many empirical tests of TAM indicate that perceived usefulness is a

strong determinant of behavioral intention (BI), while perceived ease of use is a relatively weak determinant of intention (Venkatesh and Davis, 2000). According to TAM, perceived usefulness is also influenced by perceived ease of use because, other thing being equal, the easier the system is to use, the more useful it will be (Davis et al., 1989).

### **Research models and hypotheses**

Privacy concern (PC) as “the degree to which a user believes using a system would result in a loss of control over their personal information.” To understand the impact of privacy concern on users’ acceptance of SNW, we need to conceptualize PC in a way that it can be integrated in the general framework of the TAM.

#### **Privacy concern as a direct determinant of BI.**

PC can be regarded as a factor that negatively affects attitude toward using SNWs. In other words, PC is one of the behavioral beliefs (like PU and PEU) that jointly affect attitude. The limited studies on privacy concern in SNW have suggested that users’ privacy concern creates negative attitudes toward SNW(Boyd, 2008; Schmidt, 2006).

Therefore the following hypothesis is proposed

H1. Privacy concern (PC) has a direct negative influence on a user’s intention to use SNW.

H2a. The effect of PU on BI will vary with different levels of privacy concern (PC).

H2b. The effect of PEU on BI will vary with different levels of privacy concern (PC).

### **Research method**

A survey study was employed to collect data in order to evaluate the level of privacy concerns among SNW users, and to test the research hypotheses outlined previously. The survey method is a typical approach for testing models in IS research (Galliers, 1992). Pinsonneault and Kraemer (1993) suggested that survey research is especially appropriate for explanatory models where the phenomena must be studied in natural settings and when the phenomena of interest occur in the recent past. This is the case in our study. We want to investigate the impact of privacy concern on users’ acceptance of SNW in natural settings.

### **Measurement**

A survey questionnaire was developed to measure each of the constructs contained in our research model. Measurement items for the constructs in the research model were adapted from prior studies. For instance, items to measure PU, PEU, and BI were developed based on the work of Davis and his colleagues (Davis, 1989; Venkatesh and Davis, 2000). Items to measure PC were based on the work in Featherman and Pavlou(2002) and Acquisti and Gross (2006). Each item was measured on a seven-point Likertscale where 1 means “strongly agree” and 7 means “strongly disagree.”

### **Data collection**

A pilot study was used to ensure that the survey items are relevant to the users of social networking web sites. Based on the feedback from the pilot study, refinements were made to the questionnaire items. The finalized survey questionnaire was then distributed to graduate and postgraduate students enrolled in Banaras Hindu University Varanasi. In total, 429 survey questionnaires were returned from the survey participants. After screening out incomplete responses, the survey yielded 400 usable responses.

Table I provides the summary of respondents' demographic information as well as their SNW usage patterns

<b>Measure/items</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age</b>		
Under20	20	5
20-23	100	25
24-30	200	50
31-35	65	16.2
36+	15	3.7
<b>Gender</b>		
Male	250	62.5
female	150	37.5
<b>Years of using SNW</b>		
Less than1	65	16.25
1-2	67	16.75
3-4	160	40
5+	108	27
<b>Frequency of logging onto social networking site</b>		
Several times a day	150	37.5
Once a day	100	25
Once a week	80	20
Biweekly	30	7.5
Once a month	25	6.25
others	15	3.75
<b>Time spent for each session</b>		
<30 minutes	200	50
30 minutes-1 hour	100	25
1-2 hours	60	15
>2 hours	40	10
<b>private info accessible to</b>		
Friends only	300	75
Friends and their friends	60	15
Public	30	7.5
I don't know	10	2.5

## Data analysis

SPSS was used to aggregate user profiles, generate descriptive statistics, and test the reliability

and validity of the measurement. SEM has been widely used in behavioral science research for the causal modeling of complex and multivariate data sets in which the research gathers multiple measures of proposed constructs (Hair et al., 1998). SEM is also widely used in MIS research to validate instruments and test linkages between constructs (Chin, 1998; Gefen et al., 2000).

**Descriptive statistics.** The descriptive statistics, including the minimum value, the maximum value, the mean value, and the standard deviation, for each survey item are listed in Table II

Instrument validity and reliability Using SPSS' component-based confirmatory factor analysis (CFA), analyses were done to examine the validity and reliability of the survey items. As shown in Table III, the factor loading of each item on the corresponding construct is above 0.600, indicating satisfactory convergent validity of the measurement items (Hair et al., 1998)

**Table II. Descriptive statistics of survey items**

	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. deviation</b>
<b>PU1</b>	1.0	7.0	1.648	1.1214
<b>PU2</b>	1.0	7.0	2.282	1.1516
<b>PU3</b>	1.0	7.0	2.150	1.0446
<b>PC1</b>	1.0	7.0	3.162	1.5764
<b>PC2</b>	1.0	7.0	3.381	1.5945
<b>PC3</b>	1.0	7.0	3.482	1.6044
<b>PEU1</b>	1.0	7.0	2.101	1.0172
<b>PEU2</b>	1.0	7.0	2.116	1.1566
<b>PEU3</b>	1.0	7.0	1.776	1.0452
<b>IN1</b>	1.0	7.0	2.869	1.4321
<b>IN2</b>	1.0	7.0	2.026	1.0146
<b>IN3</b>	1.0	7.0	2.108	1.0565

**Table III. Confirmatory factor analysis and reliability**

	<b>PC</b>	<b>IN</b>	<b>PEU</b>	<b>PU</b>
<b>Cronbach's alpha</b>	0.839	0.726	0.741	0.748
<b>PU1</b>	0.044	0.084	0.135	0.876
<b>PU2</b>	-0.060	0.355	0.355	0.628
<b>PU3</b>	0.024	0.436	0.213	0.536
<b>PC1</b>	0.868	-0.009	0.045	0.026
<b>PC2</b>	0.880	-0.010	0.031	-0.033
<b>PC3</b>	0.879	-0.006	-0.033	0.025
<b>PEU1</b>	0.025	0.420	0.613	0.136
<b>PEU2</b>	0.023	0.096	0.854	0.115
<b>PEU3</b>	0.017	0.124	0.782	0.312
<b>IN1</b>	-0.080	0.832	0.031	0.103
<b>IN2</b>	0.000	0.676	0.435	0.243

<b>IN3</b>	0.003	0.706	0.176	0.286
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### **Level of privacy concerns.**

One of the research questions is concerned with the level of privacy concern among SNW users. As seen in descriptive statistics in Table I, the average value of each privacy concern item is below 4 (“neutral” in the Likert scale). In other words, the survey respondents on average do have privacy concern when using SNWs. To test the level of significance, a one-sample t-test was performed in SPSS. The result is shown in the following table (see Table IV). With p-value being less than 0.000 for each of the t-tests, it is supported that the privacy concern is statistically significant among SNW users.

### **Test of research model 1**

The results indicate that Research Model 1 has a relatively good fit with the data.

### **Test of research model 2**

Research model 2 conceptualizes PC as a moderator in the TAM. To test the moderating effects using SEM, it is suggested to divide the data set into two groups based on high and low values of the candidate moderating variable. Then, a comparison of modeling fit can be done across the groups to determine the significance of the moderating effect (Cortina et al., 2001)

**Table IV. One-sample t-test of privacy concern**

	<b>Test value_4 (privacy concern is neutral)</b>			
	<b>t</b>	<b>df</b>	<b>Sig(two tailed)</b>	<b>Mean difference</b>
<b>PC1</b>	-10.639	399	0.000	0.8168
<b>PC2</b>	-6.768	399	0.000	0.5167
<b>PC3</b>	-6.567	399	0.000	0.5062

In our data analysis, we followed similar procedures in existing literature (Dabholkar and Bagozzi, 2002; Im et al., 2008). First, we divided the dataset into two sub-sets by the median of the average of PC items (3.33). After this step, there are two groups identified in the dataset, one labeled as low privacy concern (the average of PC items is above 3.33) and the other labeled as high privacy concern (the average of PC items is below 3.33). Second, we used multi-group testing in SEM to run two analyses, one for free estimate across groups (Model 2X), the other for constraining equal path coefficients across groups (Model 2Y). The model fit indices are displayed in Table VI.

To assess the moderating effect of privacy concern, we need to do a chi-square difference test between Model 2 X and Model 2 Y. According to the statistics in Table VI, chi-square change is 15.3 (= 141.2-125.9), and the change in degree of freedom is 3 (= 57-54). The p-value of this chi-square difference is .0016, indicating that the model fit with coefficients constrained as the same across groups is significantly worse than the model fit with no constraints. In

other words, the moderating effect of privacy concern on TAM relationships is statistically significant.

### Discussion of the results

The survey results show that the privacy concern of SNW users is significantly different from neutral

**Table V. Goodness-of-fit indices of research model 1**

(n=400)

df	$\chi^2$				
48	111.51	2.26	0.967	0.054	0.029

Notes: CFI = Comparative fit index; RMSEA = Root mean square error of approximation; SRMR= Standardized root mean square residual.\*p <0.001

**Table VI. Goodness-of-fit indices of model 2X and 2Y**

(n = 400)

	Df	$\chi^2$	$\chi^2/df$	CFI	RMSEA	SRMR
<b>Model 2X (free estimate across groups)</b>	53	125.40	2.366	0.937	0.079	0.074
<b>Model 2Y (same coefficients across groups)</b>	56	141.10	2.519	0.927	0.085	0.090

CFI = Comparative fit index; RMSEA = Root mean square error of approximation;

SRMR= Standardized root mean square residual

In addition to the findings of significant privacy concern, this study investigated the impact of privacy concern on users' acceptance of SNWs. While the original relationships in the TAM are supported by our data, the direct link between PC and BI is not significant. Therefore, we did not find evidence in this study to support H1. In other words, our study shows that privacy concern has no direct impact on user's intention to use SNW. This finding is consistent with recent studies that focused primarily on the direct impact of privacy concern on intention to use SNWs and found insignificant effects (von Stetten et al., 2011; McKnight et al., 2011)

There are a number of possible explanations for this finding. First, the respondents in this study have a relatively high control over their privacy options in SNWs. As shown in Table I,

75 percent of the users in our sample make their private information accessible to their friends only.

With regard to H2, we did find the moderating effect of privacy concern in this study. As reported in the previous section, Model 2X in Figure 4 clearly shows the difference in path coefficients between the high privacy concern group and the low privacy concern group. For the relationship between PU and BI, the high privacy concern group has a higher path coefficient than the low privacy concern group (0.874 vs 0.453). In other words, for users with higher privacy concern, the perceived usefulness will have a stronger influence on behavior intention. Thus, H2a is supported. Our data analysis indicates that with higher privacy concern, the effect of PU on BI is strengthened. This finding is different from that of Im et al. (2008), in which the moderating direction is opposite.

For the relationship between PEU and BI, the high privacy concern group has a lower path coefficient than the low privacy concern group (0.009 vs 0.410). This difference shows that, for users with higher privacy concern, the perceived ease of use will have a weaker (in fact, statistically insignificant) influence on behavior intention. Thus, H2b is supported. Our study finds that with higher privacy concern, the effect of PEU on BI is attenuated.

In summary, this study found that with higher privacy concern, the effect of PU on BI is strengthened, while the effect of PEU on BI is attenuated. One possible explanation is that when SNW users have higher privacy concern over using SNWs, it means they may perceive a higher risk of privacy violation. Thus, the SNW will be evaluated with greater caution. In this situation, the decision to use the SNW is heavily influenced by the perceived usefulness (utility) in order to justify the potential loss of privacy. On the other hand, those who have high privacy concern also feel the social networking site easier to use than those who have low privacy concern. As such, PEU has a weaker impact on intention to use for those who have high PC and perceive the social networking site easier to use. In other words, if an user already feel it easy to use, then ease of use will have a weaker effect on your future use.

## **Conclusion**

In summary, we investigated the effect of users' privacy concern on their acceptance of SNW. Using TAM as the theoretical foundation, we developed research models to hypothesize two types of effects:

- (1) Privacy concern having direct effect on behavioral intention (BI).
- (2) Privacy concern moderating the effects of perceived usefulness (PU) and perceived ease of use (PEU) on BI

Using data collected from a survey study, we tested the research models. Our data analysis indicates that the direct effect of privacy concern on behavioral intention is not significant. On the other hand, privacy concern significantly moderates the effects of PU and PEU on BI

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# ICT IN AGRICULTURE: ICT SERVICES & NEEDS OF FARMERS

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**Abstract-** This paper lays out an ICT in agriculture development. The intention is to give some ideas to farmers to do business by means of inexpensive technologies such as access market related information and to allow farmers to promote their commodities competitively. In particular, the aim is to put a light on existing and emerging technologies like GIS, GPS, etc. We propose that farmers should upgrade their own skills by training programs and information shop. We suggest government and prominent software companies like NGOs, Voxiyas, World Talk, etc to come forward for implementing a prototype for a low- as well as high-end technologies using CASE tools and advanced network technologies like WSNs for proper irrigation and rural agriculture development

**Key Terms-** Introduction, ICT For Agriculture, Services of ICT, Information Needs of Farmers, Conclusion, References.

## 1. INTRODUCTION

Information and Communication Technology (ICT) is an umbrella term that is defined as “Technologies that facilitate communication, processing and transmission of information by electronic means.” It comprises the various devices, services and applications such as Radio, Television, Cellular phones, Computers, Tablets and Networking Hardware and Software, Satellite systems. ICT performs a fundamental change in all aspects of our lives, including knowledge dissemination, social interaction, economic and business practices, political engagement, media, education, health, leisure and entertainment. The agricultural sector is confronted with the major challenge of increasing production to feed a growing and increasingly prosperous population in a situation of decreasing availability of natural resources. Factors of particular concern are water shortages, declining soil fertility, effects of climate change and rapid decrease of fertile agricultural lands due to urbanization.

## 2. ICT FOR AGRICULTURE

Following are some reasons that's why we are using ICT in the field of agriculture-

- To facilitate stakeholders in the agricultural sector this encompasses the ministries, local government authorities, marketers, farmers to correspond better and effectively through mobiles and computers which are linked to wide area networks and Internet.
- To empower the sustainability of small scale farms and meet the needs of farmers community.
- To acquire highly efficient agricultural practices necessitated by the scarcity of the land for crop cultivation.
- To make the right decisions at right time and to bring out best possible solutions in the field of agriculture.
- To design an automated system for water efficient irrigation system and increase the optimal production growth.
- To nurture the farmers and to reduce the travails of farmers, it is indispensable of applying the technology in agriculture.

There are lot of reasons for that we can use ICT in the field of agriculture.

## 3. SERVICES OF ICT

Following are the list of services of ICT which are used in this field.

1. **SMS Service:** -Sms service using Mobile phones is for making nexus among the farmers and the marketers, which makes the sharing of their experiences ease and, provides up-to-date market information and prices for commodities to the farmers. This service is used in Kissan SMS portal system, Indian Council of Agriculture Research, Department of Animal Husbandry, Dairying & Fisheries, India Meteorological Department and Food grain Procurement Agencies can use this portal for propagating relevant information such as information on drought and relief management, Livestock management, soil health, fertilizers, pesticides and seeds.
2. **Geographic Information System (GIS):** - GIS is a system designed for collecting geographic data through computer hardware and software to capture, store, update, display and analyze the information that is geographically based by matching coordinates and time to other variables. Data sets formed by GIS constitute "layers" of information (eg. on topography, population size, or agricultural household income) that can be merged and analyzed to establish relationships and

produce maps or charts that visualize geographical traits. It provides variety of information for understanding the farming areas such as information of what where to sell the produce.

3. **Global Positioning System (GPS):** - GPS is a technique for remote sensing using satellite technologies, geographical information systems, agronomy and soil sciences which are used to increase the agricultural output. GPS is satellite-based positioning and navigation system with three basic components: satellites that orbit the earth, control and monitoring stations on the earth and the GPS receivers owned by users. A GPS receiver catches signals from the satellites, including precise orbital information (latitude, longitude, and ellipsoidal GPS altitude) of a given object or location, as well as the time. GPSs can function in any weather and it is free for public use. This technology is useful for plotting source of produce and to map farms.
4. **Digital Revolution:** -Digital multimedia is a visual way to educate the farmers. Literacy is not an issue for this service because the same information can be given using digital photograph which in turn builds the skills of the farmers directly and indirectly. This is attainable because the contemporary digital cameras are affordable, low weight and small size.
5. **Satellite Imagery:** - In this service is an image of earth is taken from satellites in orbit. There are four types of satellite imagery: spatial (size of surface area); spectral (wavelength interval); temporal (amount of time); and radiometric (levels of brightness), which capture a variety of variables about a given area of varying size. The resolution of these images depends on the satellite system used and its distance from earth. This service is used by Agriculture Management Green Vegetation Index sampling by Agro watch.
6. **Wireless Sensor Network (WSN):** -Wireless Sensor Network is kind of ad hoc sensor networks that are made up of a very large number of nodes called sensors, which are deployed in remote environments. Wireless networks have wide variety of applications in the society. In the farming, WSN can be used in monitoring crops, soil moisture, nutrient content and environmental management, security and safety and most important for Precision Farming etc.
7. **Aerial Photography And Orthophoto Mosaic:** - An aerial photo is an image of the ground taken from an airplane, helicopter, or radio-controlled aircraft at a given altitude. Aerial images are presented as an orthophoto mosaic it is an alternative to a map. These

images are higher in resolution (deci-meter) than satellite images, it is useful for those who want more details of the terrain such as crop conditions or land use etc.

8. **Tele-centers, Radio & TV:** - Tele-centers, Radio & TV are useful to share farming information such as technical and marketing. And the rural Tele-centers are connected to Internet, so easier to find prices, share information for better transparency.
9. **Laser Scanning / Light Detection And Ranging (LiDAR):** - In this technique a set of laser beams is used to measure distance from an aircraft to features on the ground. Airplanes and helicopters can be used for laser scanning. The data from laser scanning are three-dimensional at very high accuracy, and they also allow ground elevation under the tree canopy to be measured. The elevation accuracy of laser scanning data is much better than aerial photography, which makes laser scanning useful for accurate topographic mapping where elevation is critical. The data can also be used to measure forest attributes such as the height and density of trees and thus the volume of the forest.
10. **E-Agriculture:** -E-Agriculture is an emerging field in ICT. It is to transform marketing processes, make business enhancement and, to improve the agricultural and rural development.

After analysis of all services which are provided by ICT , we get that the results must reach those who need to react to the findings, using following tools.

- **SMS. Text options that allow interaction between fixed-line and mobile phones.**
- **Radio.** Transmission of information through electromagnetic waves with low frequencies.
- **WiFi.** Wireless local area network that allows various devices to connect to the Internet remotely.
- **Knowledge management system.** Electronic system that provides relevant information as it is requested.

#### **4. INFORMATION NEEDS OF FARMERS**

The main focus of ICT in agriculture is meeting the farmers' needs for information. An attempt was therefore made to find out what agricultural development information the farmers really considered relevant to their needs. The needs can be provided by ICT .Following is the list of information requirements which are known to farmers for growing their business.

##### **1. Marketing information**

The farmers perceived market information, including daily updates on the prices of agricultural commodities in the markets of the surrounding district, as one of the most relevant ICT services. The farmers, enabling them to sell at those markets where their goods would command the best prices.

## **2. Facilitating access to land records/online registration**

The farmers perceived obtaining access to land records as most appropriate. In all, the farmers perceived this information as relevant to their needs. However it may not be possible for a private company network to provide government revenue records on land.

## **3. Question-and-answer service**

The service, called ‘Ask the Expert’, consists of a group of specialists on agriculture and animal husbandry answering farmers’ questions about the latest techniques and new technologies in their areas of expertise, and giving advice on various problems.

## **4. Information about rural development programs and subsidies**

The respondents felt this information because it provided detailed information on all government programmes relating to rural development. The information was indeed appropriate for the poor tribal farmers to whom the programmes were addressed. Once the tribal people became aware of the rural development programmes they realized they could get help through the subsidies and benefits the programmes provided.

## **5. Latest (best) packages of practices**

The farmers considered the provision of information on best practices for cultivating soybean and wheat as appropriate, in the hope that they might save their crops despite the longstanding drought in the district. They were also looking forward to receiving information regarding drought-resistant varieties.

## **6. Post-harvest technology**

Information on post-harvest technology, particularly storage, was considered appropriate farmers. It may be that the farmers do not seek out this information because they are unaware of the value added of food processing.

## **7. General agricultural news**

Farmers were able to obtain general information and news of various agricultural events in their districts.

## **8. Information on crop insurance**

Detailed information on crop insurance schemes, the type of damage covered and compensation offered, premiums to be paid, etc. were felt to be appropriate information.

#### **9. Farm business and management information**

The farmers considered information on farm business and management because most of them are subsistence farmers who do not anticipate being able to take on any farm business.

#### **10. Input prices and availability**

Information relating to the availability of agricultural inputs and prices was also perceived by farmers. The some farmers, operating in an agriculturally prosperous area where inputs are always in demand.

#### **11. Early warning and management of diseases and pests**

Early warning systems about outbreaks of disease and pest infestation, and information about how to manage such outbreaks, were felt by farmers. In a period of unbroken drought the farmers felt that pests and diseases did not pose a major threat.

#### **12. Accounting and payment**

This is understandable, that the any project aims to improve the efficiency of the cooperative setup and also aims at direct accounting and an easy payment system.

#### **13. Soil testing and soil sampling information**

Focused on agricultural development, in which soil sampling is very useful. Farmers also know the type of their farms soil for proper plantation & getting more income from that farm.

## **5. CONCLUSION**

When designed in an integrated way, ICT could have a high potential in fostering development in poor regions. This paper shows the technologies of ICT in the field of Agriculture. This paper also shows some basic needs that farmers should have to know for growing their business. WSN technology is very useful in this field. It is used for Precision Farming. Future scope of this paper is that we suggest government and prominent software companies like NGOs, Voxiyas, World Talk, etc to come forward for implementing a prototype for a low- as well as high-end technologies using CASE tools and advanced network technologies like WSNs for proper irrigation and rural agriculture development

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# FACEBOOK COMMERCE

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## Abstract

In this paper the researcher wants to focus on the revolution of facebook commerce. How facebook marketing has merged with the e-commerce and form the new concept facebook commerce. The facebook commerce is now a days being popular and facebook stores are been encorporated on the sites. These facebook stores promoted the products and events through out the facebook users which is beneficial for the promoters as they get a huge traffic on facebook with more then 7 million users.

**Keywords: Facebook commerce**

Over time, Facebook has become an everyday part of our lives. What we've seen over the past few years, however, is the e-commerce gain for retailers who market their company and products through Facebook. These days many retailers own and run a Facebook page. But it's *how* you run it that is the vital component in its success.

Each quarter, our Facebook Commerce Index tracks retailers' Facebook pages, analysing their growth over the past three months and the method they used to achieve such results. This quarter in the UK Facebook Commerce Index we delve into the Facebook strategies of Amazon, New Look, Boux Avenue and Isme. For the US Facebook Commerce Index we identified Walmart, Tommy Hilfiger, Ahnu Footwear and Northern Tools as the notable success stories of the past three months.

Facebook and other social platforms are a great way to increase social engagement with clients and their friends. It's a great way to keep loyal customers updated with your latest sales and products, as well as a valuable secondary sales channel.

Like/share buttons allow your customers to show their friends things on your store that they might be interested in buying. This simple step can help get your products out there for the world to see. Nobody knows your prospective customers as well as their friends, so allowing easy sharing can generate great leads.

Facebook stores that sell your Shopify products are also super easy to set up with Shopify apps. Allowing your customer to make purchases right from your Facebook fan page can greatly reduce friction for your customers by allowing them to browse your shop and make a purchase without ever leaving your page. This seamless experience results in better conversions and happier customers.

There are a dizzying array of e-commerce shopping platforms available for small businesses that want to sell their wares on the Web. One of the simpler ones is from Ecwid, which powers about 375,000 online merchants. Ecwid's pitch is that it is a cloud-based store builder that can be integrated with existing Web, mobile or social sites that a small company is already using.

"The people who use us are people who want to get selling very quickly and who want to reach their profile of customers through methods they are already familiar with," said Jim O'Hara, Ecwid's president.

Even though Facebook commerce has fallen out of favor with some larger merchants, this is one of the places where Ecwid does especially well: its Facebook app is the leading shopping app on the social network, if you count active users, with more than 40,000 Facebook stores.

One of those stores is run by Jena Green, co-owner of the Apricot Lane Peoria boutique (which is actually part of a franchise network, but it run independently by Green and her mother). About one year in (February 2011), Green said she noticed that many customers were making their way over to her e-commerce site after finding the store on Facebook. At the time, she only had 5,000 "likes," now the page boasts around 123,000.

"We absolutely need to sell on Facebook, so we needed to make it easy for people to check out from there," Green said.

Facebook's gravitational pull of 750 million users is enough to hold digital marketers spellbound. Once they get past the sheer size, they find that Facebook also offers unique and nuanced selling opportunities amidst difficult obstacles.

First off, Facebook users have better things to be doing. The average Facebook user is connected to 130 Friends and 80 interest groups and makes his or her preferences known through rich profiles and by posting 90 pieces of content per month. Facebook users spend 700 billion minutes per month in an active, relaxed environment where word-of-mouth is built into every turn. The traffic, of course, also matters. Compete found that large brands like Coca-Cola are getting about 11% of their unique visits through Facebook Pages.

Selling on or through Facebook now has a name: F-commerce. As with most aspects of social media, it does not yet live up to the potential that many foresee and it has no problem finding both strong advocates and cynical detractors

## **Four Types of F-Commerce**

### **1. Facebook-Facilitated On-Site Selling:**

Brands can bring the Facebook experience to their websites, tapping users' connections and interests to support the purchasing process. The simplest examples involve using social plugins — short code snippets that ping Facebook's network for information about the user visiting the

brand's site. The Like Button is the most common plugin and is usually regarded as a content sharing device, but when it is used in conjunction with a product page it can provide peer support by displaying the names and profile images of people who have Liked the product — most appealing for brands is the fact that it also highlights any of the user's Facebook friends who have Liked the product.

For the past few months Amazon.com has been offering a "Tap into Your Friends" option). After the permission screen, the user is taken to an Amazon page showing the upcoming birthdays of Facebook Friends and their Amazon Wish List if they have one. Amazon uses a user's friends' profile data, which often includes favorite books and music, to make gift suggestions.

## **2. Facebook-Initiated Selling:**

Business accounts can set up a storefront for free on their Facebook Pages, and many thousands have already done so. The vast majority start the shopping process at Facebook.com but then jump to their own ecommerce pages at some point. Lady Gaga's Facebook store is an example of a store that takes users on a rather abrupt transition. Users can browse products on her Facebook Page, but any click takes them to the product page at bravadousa.com, a licensed merchandise marketer and fulfillment service. The Facebook branding is gone, and the look and feel changes completely. A new window opens which would make any Facebook multitasking (e.g., chat) cumbersome. Apparently, a Page with over 30 million Likes can get away with this — Justin Bieber has the exact same arrangement.

Best Buy keeps shoppers in the Facebook environment a bit longer and takes advantage of the social features while they are there. Its store app isn't labeled "Shop," it is "Shop + Share." Users can search or browse for products, and when they find something that interests them, they have two options: "Ask Friends" or "Shop Now." "Ask Friends" leads to a Wall post asking about the product. Interestingly, Best Buy currently makes "Ask Friends" much more noticeable than "Shop Now," which takes the user to the product page at BestBuy.com for the shopping cart and checkout process.

## **3. Complete Selling through Facebook:**

Shoppers can select products, options, see delivery dates and even include a personal message without interrupting their Facebook experience. 1-800-Flowers does not take full advantage of the social environment, though, as it doesn't provide an easy way to ask a relative what Mom's favorite flowers are or what her zip code is, for example.

Delta Airlines has built a complete ticketing system into its Facebook Page, and while it allows the user to promote Delta by posting a general message on his or her Wall, it doesn't do much to help the user share details with Friends involved in the trip, something that a Send Button could do nicely.

## **4. iFrames vs. Facebook Apps:**

There are two ways of displaying F-commerce Pages on Facebook.com, each with its pluses and minuses. In February 2011, Facebook adopted iFrames as the method that businesses use to supply custom content to their Pages. In the simplest terms, iFrames allow a business to create and host its own content and to display it in the 520-pixel middle column of a Facebook Page.

Lady Gaga, Justin Bieber and even Best Buy, present their F-commerce pages through an iFrame. The advantage is simplicity, since businesses can create and maintain the content on their own terms — iFrames tend to offer the most seamless experiences for consumers. 1-800-Flowers and Delta do their selling via Facebook apps. The primary advantage of going to an app is real estate. iFrame content is restricted to the 520 pixel-wide middle Page column, while an app can control the left most 760 pixels — a 46% increase in visible selling space. The disadvantage of apps is that they are more difficult to maintain and they may stress smaller budgets within businesses lacking Facebook development expertise.

### **F-Commerce Developers Emerge as a Resource**

The list of software developers offering F-commerce products is growing. Many come from traditional ecommerce, offering Facebook as an extension for their clients. SortPrice, for example, powers the Dallas Mavericks's Facebook store, and Usablenet, which powers JCPenney's Facebook store. Another popular application for adding Facebook to an existing ecommerce program is Storefront Social, which Borders uses.

### **The Future of F-Commerce**

There are many more questions than there are answers about the long term future of F-commerce, which is still in its infancy and barely survived its birth. In 2007, Facebook tried Project Beacon, which collected ecommerce activity on third party sites and announced a user's purchases on his or her friends' news feed. Many Facebook users have become so accustomed to Facebook's aggressive data sharing policies that they automatically assume the worst. A recent study from JWT found the percentage of people worried about Facebook privacy and security to be in the 75% range.

Experienced ecommerce managers also see problems with Facebook.com itself. "The user experience is less-than-optimal with slow page loads and smaller page size due to Facebook's advertising and navigation. I don't see why customers would bother shopping through Facebook when a faster and better experience is only a browser tab away," notes Linda Bustos, director of ecommerce research at Elastic Path Software. Facebook advertising is certainly an issue.

Many web marketers question the social nature of shopping itself, and there is considerable opinion that people visit Facebook to catch up with their Friends and not to be sold products. The good news on that front, from the JWT study, is that 48% of millennials (aged 20-33) would like to see the places where they shop give them the ability to buy directly on Facebook.

The best reason for businesses to take a deep breath before investing in a F-commerce is Facebook itself, which currently benefits from F-commerce primarily through the sale of ads promoting it. They'd obviously like a better cut and nobody is quite sure how they would do it. Facebook Credits could somehow be expanded to become the currency for F-commerce. Credits for gaming and virtual goods earn Facebook a 30% commission — F-commerce Credits would probably be in the 5% range. There is no shortage of opinions regarding the future of selling on Facebook, but one overwhelming motivation

— it is where the customers are, and they should be able to buy wherever and whenever they lik

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# PERSONALIZED E-BUSINESS THROUGH WEB MINING

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**Abstract**— Data mining software allows users to analyze large databases to solve business decision problems. Data mining is, in some ways, an extension of statistics, with a few artificial intelligence and machine learning twists thrown in. Ever rising competition and changing demands of customer it is difficult to satisfy the people with different backgrounds. E- business with its various advantages of low cost, high efficiency, time saving has assumed importance these days. Like statistics, data mining is not a business solution; it is just a technology. This paper provides the concise outline how the user access behavior is used for e-business.

**Keywords**— **Web mining, Web usage Mining, Web Mining Applications, e-business.**

## I. INTRODUCTION

The wide use of the Internet has essentially changed the ways in which we communicate, collect information and make purchases. As the utilization of the World Wide Web (WWW) and exchange of email, data over internet increased radically, the computer scientists hurried to describe this new phenomenon. In the beginning they were shocked by the incredible mixture the Internet confirmed in the size of its features, they soon exposed a general pattern in their capacity: there are a lot of small elements enclosed within the Web, but only some large ones. A few sites have of millions of pages, but millions of sites only have a handful of pages. Few sites have millions of links, but many sites contain one or two. Millions of users gather to a few select sites, giving little awareness to millions of others.[1]With the volatile increase of information sources offered on the World Wide Web, it has become more and more essential for users to utilize computerized tools in order to find, extract, filter, and evaluate the preferred information and resources. In addition, with the revolution of the Web into the main tool for electronic commerce, it is essential for organizations and companies, who have invested millions in Internet and intranet technologies, to follow and evaluate user behavior. These factors give rise to the need of creating client-side and server-side intelligent systems that can successfully extract knowledge. Many organizations make available information and services on the web such as on-line shopping, customer support, web based applications etc. are becoming common practice. The WWW is becoming everywhere and a regular tool for daily activities of common people, from a child to a senior across the world [2].

The business benefits that web mining affords to digital service providers include personalization, collaborative filtering, enhanced customer support, product and service strategy definition and fraud

detection. Today business talks are more and more on e-business as they incorporate internet technology into their core business processes. This new and modern business requires the key web mining process to be merged with the new technologies [11].

## II. SOURCE OF DATA IN E-BUSINESS

Web Mining is based on knowledge discovery (KD) from web. It extracts the knowledge & represents in a proper way. Web mining is like a graph & all pages are node & each connects with hyperlinks. Web mining is useful to extract the information, image, text, documents etc. Sources of data in e-business are shown in fig 1 and brief explanation as follows[9]:

*a. Web Pages:*

Web pages usually include text, links, images, graphics, audio & video. Web pages are the main source of data for e-business.

*b. User Registration:*

When user wants to create account then he or she has to register itself. Here user has to fill different types of information. It usually contains demographic information and personal interests and preference of the person.

*c. Web Server Log:*

Website statistics are based on server logs. A server log is a simple text file which records activity on the server. There are several types of server log — website owners are especially interested in access logs which record hits and related information. Information about the request, including clientIP address, request date/time, page requested, HTTP code, bytes served, user agent, and referrer are typically added.

*d. Event Log:*

Event log is also an important data source. It logs the information such as advertisements seen, products added to shopping cart, products bought, etc.

*e. Customer Queries:*

These are the search terms used by the customer. This data is produced on e-business web servers. These types of data can be very useful.

*f. Transaction Database:*

It includes details such as customer id, products ordered, time, quantity, price etc,

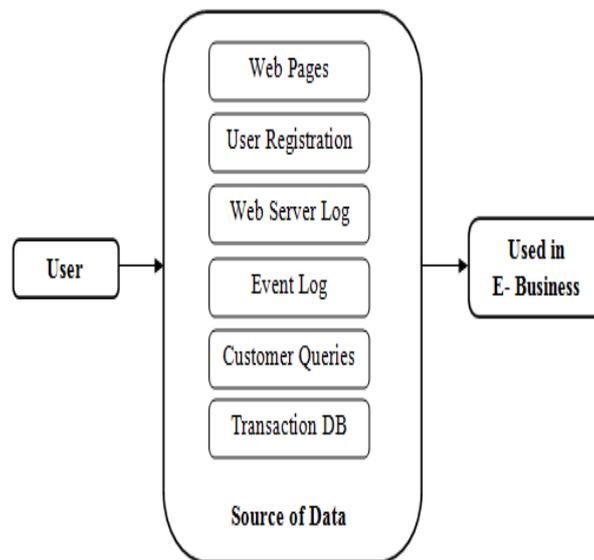


Fig. 1 Sources of data used in E-Business

### III. OVERVIEW OF WEB MINING

#### A. Task of Web Mining:

To clarify the uncertainty to find out what forms Web mining. Kosala and Blockeel [4] had recommended a decomposition of Web mining in the following tasks :

1. *Resource finding*: the task of retrieving intended Web documents.
2. *Information selection and pre-processing*: automatically selecting and pre-processing specific information from retrieved Web resources.
3. *Generalization*: automatically discovers general patterns at individual Web sites as well as across multiple sites.
4. *Analysis*: validation and/or interpretation of the mined patterns.

#### B. Web Mining Categories:

Extraction of interesting information or patterns from large databases is called Data Mining. Web Mining [3] is the application of data mining techniques to discover and retrieve useful information (knowledge) from the WWW documents and services. Web mining can be divided into three categories [5] namely web usage mining, web content mining and web structure mining.

##### a) Web Structure Mining (WSM):

Web structure mining, one of three categories of web mining for data, is a tool used to identify the relationship between Web pages linked by information or direct link connection. This connection allows a search engine to pull data relating to a search query directly to the linking Web page from the Web site the content rests upon. This completion takes place through use of spiders scanning the Web sites, retrieving the home page, then,

linking the information through reference links to bring forth the specific page containing the desired information. [7].

*b) Web Content Mining (WCM):*

Web content mining, also known as text mining, is generally the second step in Web data mining. Content mining is the scanning and mining of text, pictures and graphs of a Web page to determine the relevance of the content to the search query some ranking mechanism (web mining) either This scanning is completed after the clustering of web pages through structure mining and provides the results based upon the level of relevance to the suggested query. With the massive amount of information that is available on the World Wide Web, content mining provides the results lists to search engines in order of highest relevance to the keywords in the query. The main uses for this type of data mining are to gather, categorize, organize and provide the best possible information available on the WWW to the user requesting the information.

*c) Web Usage Mining (WUM):*

Web usage mining is the third category in web mining Web usage mining is used to discover user navigation patterns and the useful information from the web data present in server logs, which are maintained during the interaction of the users while surfing on the web. Most existing Web analysis tools provide mechanisms for reporting user activity in the servers and various forms of data filtering. Using such tools it is possible to determine the number of accesses to there server and to individual files, the times of visit and the domain names and url's of users.

**C. Techniques of Web Mining**

There are different types of techniques are offered for data mining. The most frequently used techniques are artificial neural networks, decision trees, and the nearest-neighbor method visualization, association rule, classification and clustering. each one of these approaches brings special advantages and disadvantages that have to be considered prior to their use [6].A good way to apply advanced data mining techniques is to have a flexible and interactive data mining tool that is completely incorporated with a database or data warehouse..In web mining some of the techniques of data mining can be used for example association rule, classification and clustering etc. The brief descriptions of these techniques are as follows.

**Classification:**

Classification is use to build up a idea of the type of customer, item, or object by relating several attributes to categorize a particular class. For example, one can easily classify cars into different types (sedan, 4x4, convertible) by identifying different attributes (number of seats, car shape, driven wheels). One can apply the same principles to customers, for example by classifying them by age and social group. Classification algorithms can be used to categorize users into special classes according to their browsing behavior or pattern. The criterion by which items are assigned to different clusters is the degree of similarity among them.

**Prediction:**

Prediction is a wide topic and runs from predicting the failure of components or machinery, to identifying fraud and even the prediction of company profits. Used in combination with the other web mining

techniques, prediction involves analyzing trends, classification, pattern matching, and relation. By analyzing past events or instances, you can make a prediction about an event.

### ***Sequential Pattern:***

Sequential patterns are a helpful technique for identifying trends, or regular occurrences of similar events. For example, with customer data we can identify that customers buy a particular collection of products together at different times of the year. In web usage mining, sequential patterns are exploited to find sequential navigation patterns that appear in users sessions frequently.

### ***Decision Tree:***

The objective is to build a model that predicts the value of a target variable based on several input variables. A decision tree is a simple representation for classifying examples. Decision tree learning is one of the most successful techniques for supervised classification learning

### ***Association Rules:***

The association rule method can be used to show pages that are mainly referenced together and to discover the direct or indirect relationships between web pages in users browsing behavior. After transactions are detected in the preprocessing phase, frequent item-sets are discovered using the each hyperedge is weighted by the averaged confidence of all the possible association rules formed on the basis of the frequent item-set that the hyperedge represents [2].

## **IV. PERSONALIZED E-BUSINESS PROCESS**

The drastic development of internet and information technology made E-business which is a new type of commercial channels developing prosperously [8]. How to analyze data of E-business users for mining users' information that enterprises interest is critical for their development. Web mining has advantages that it can mine data efficiently and intelligently, so it is becoming more and more important in modern E-business.



web server log files or actual web contents to discover meaningful information. E-business with the help of internet grows quickly; personalized e-business should be worth paying more concentration and increasing from the theoretical and practical standpoints. It is easy to collect data from web-enabled e-business sources as all visitors to a web site leave the trail which automatically is stored in log files by web server. The data mining tools can process and analyse such web server log files or actual web contents to discover meaningful information. E -Business holds an important key to every organizations future. This paper presents an architectural framework for personalized e-business service recommendation system using data mining techniques.

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# “DEVELOPMENT OF COMMUNICATION AND IT SERVICES IN EDUCATION SECTOR IN INDIA.”

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## **Abstract**

The Indian information and communication technology (ICT) industry has witnessed excellent growth in the past two decades. Capitalising on its advantages of talent pool, lower cost of operation and the innovative remote delivery model, India has established itself as a global leader in the ICT sector.

The advent of the knowledge economy and global economic competition compel governments to prioritise educational quality, lifelong learning and the provision of equal opportunities for all. Education policymakers widely accept that improved access to information and communication technology (ICT) in education can help individuals to compete in a global economy by creating a skilled work force and facilitating social mobility.

They emphasize that ICT in education has a multiplier effect throughout the education system, by enhancing learning and providing students with new sets of skills; by reaching students with poor or no access (especially those in rural and remote regions); by facilitating and improving the training of teachers; and by minimizing costs associated with the delivery of instruction.

Beyond the rhetoric, and of equal if not greater importance to policymakers, are basic questions about the role that ICT plays in basic educational outcomes, including retention and learning achievement.

There are those that argue that ICTs are merely a delivery mechanism for teaching and learning, while it is the foundational pedagogy which matters. Others, however, contend that computers and other ICTs may possess properties or affordances that can directly change the nature of teaching and learning. For instance, it is believed that ICT can help to bring abstract concepts to life using images, sounds, movement, animations and simulations. In any case, a better understanding of ICTs and their impact on student outcomes are priorities in all countries, regardless of level of economic development.

## **Introduction**

A scientific revolution began in the 1950s, bringing what have been called "third wave changes." Science and information technology brought innovations and inventions with increasing speed. One of the fields affected

by information technology is education, a field that had changed less than some like medicine. Third wave changes brought fast, current, cheap, and reliable tools to education.

Digital education has not only effected teaching and learning but has also had an influence on supporting services (Galusha 1997). That includes libraries and librarianship.

The definition of librarianship has changed and developed because of changing methods of library science and services. These changes have affected library users, bringing a new pattern to librarianship (Watson, 1992). The library is an essential component of an education system, and a lack of information sources will cause a decline in the quality of education (Mabawonku 2004). Designing quality digital education includes quality support services, because "libraries and information centers have a very important role in increasing the quality of digital education programs" (Sacchandand, 2002)In Iran more attention has been paid to developing digital education with less attention to support services.

### **Role of Information and Communication Technology (ICT) in Defining the Purposes of Distance Education**

The increasing need for education, limitations on access to information centers, economic problems, a lack of experienced experts, and the costs of education brought about the development of new delivery methods for instruction. There is a growing need for methods that are economical, high quality, and suitable for use by large populations. The meaning of "literacy" is being able to read and write, but as Alvin Toffler has said, in the 21st century, an illiterate is not one who cannot read or write but one who cannot teach or learn.

Rapid changes in ICT have made the world face this new meaning of illiteracy and examine education requirements. The attempt to:

- ❖ increasing the quality of learning need for widespread information and computer literacy call for new teaching methods. Digital education: remote or distance education delivered online, is a way of solving this problem. Remote education systems require technology that provides access to information and education without limits on time or place. In such an atmosphere anyone can learn according to their individual needs and abilities. Remote education systems
- ❖ reducing the time of attaining educational goals
- ❖ increasing efficiency
- ❖ increasing the independence of users and flexibility of education

- ❖ reduction of costs without effecting quality
- ❖ eliminating limitations on time and place

### **Benefit to the Economy as well**

- ❖ Reducing costs in comparison with traditional methods.
- ❖ Most of these students have career and income and this will affect the economy of the country.
- ❖ Reducing the costs of institutions and buildings.

### **Methods of Digital Education:**

Advances in technology during these years have made changes in these methods. The following are a few of the methods of digital education:

#### **Interactive user interfaces**

Software for managing courses was first used as a supplement to face-to-face instruction but has now become an important independent method.

#### **Video conferencing**

This method allows interaction that is similar to face-to-face.

#### **Satellite system**

In this remote method, a screen, a computer connected to the network, and a projector are used. These can erase boundaries, hours, distances, and scientific and technological differences between countries. This method is used in international scale.

#### **Web-based methods**

Web-based learning does not require students and teachers to be physically present. There is no need for travel or travel time. It can use multimedia and students can manage their own learning.

#### **Digital Education and Libraries**

An information explosion and advances in ICT have influenced librarianship. Librarians should be open to the idea that librarianship is not just working in and managing a library. Today libraries can change the world, and can be the source of new educational services. No machine can replace libraries. Course management systems include provision of library services. Digital libraries are necessities for virtual education and remote education is impossible without them. Digital libraries include different collections such as journals and magazines, books, and websites.

Bringing together libraries, information technology, and education has made a union that brings economy. Education systems are under pressure to reduce costs. Information technology has helped do that. Virtual libraries and digital education systems have made fundamental changes in librarianship. Libraries have the duty of using new methods and providing new services to students. Watson (2003) divides library services into three main categories:

- Access to information sources
- Information literacy

### **Potential of new ICTs for rural development**

While the term 'ICTs' can be interpreted as including a wide range of media, 'new ICTs' is used to denote "the use of computers and communication systems between computers". These new ICTs are becoming more accessible, and users can obtain information from various sources, and one computer could meet the needs of a large rural community.

Although the Internet is not a panacea for food security and rural development problems, it can open new communication channels that bring new knowledge and information resources to rural communities. Traditional communication channels have been used successfully but these have been monologic and have not allowed for much interaction with users.

Some examples of areas where ICTs could play a catalytic role in developing rural areas include:

- **Decision-making process** - Sound decision making is dependent upon availability of comprehensive, timely and up-to-date information. Food security problems facing developing countries demonstrate the need for informed researchers, planners, policy makers, development workers and farmers.

Information is also needed to facilitate the development and implementation of food security policies. E-mail and The Internet could be used to transmit information to and from rural inaccessible areas.

- **Market outlook** – farmers could promote their products and handle simple transactions such as orders over the web while payment transactions for the goods can then be handled off-line (O’Farrell et al 1999:4). It has been shown to be cheaper and faster to trade online than on paper-based medium, telephone or fax. Electronic-commerce could, therefore, enable entrepreneurs to access global market information and open up new regional and global markets that fetch better prices and increase farmers’ earnings.
- **Empowering rural communities** – ICTs can empower rural communities and give them "a voice" that permits them to contribute to the development process. With new ICTs, rural communities can acquire the capacity to improve their living conditions and become motivated through training and dialogue with others to a level where they make decisions for their own development (Balit 1998:30). Giving rural people a voice means giving them a seat at the table to express their views and opinions and become part of the decision making process. The approach should be participatory and could lead to improved policy formation and execution.

ICT has the potential to penetrate under-serviced areas and enhance education through distance learning, facilitate development of relevant local content and faster delivery of information on technical assistance and basic human needs such as food, agriculture, health and water. Farmers can also interact with other farmers, their families, neighbours, suppliers, customers and intermediaries and this is a way of educating rural communities. The Internet can also enable the remotest village to access regular and reliable information from a global library (the web). Different media combinations may, however, be best in different cases - through radio, television, video cassettes, audio cassettes, video conferencing, computer programmes, print, CD-ROM or the Internet. Rural areas also get greater visibility by having the opportunity to disseminate information about their community to the whole world.

## *Examples from India*

- ❖ In India, ICTs have transformed the lives of rural people and village women. The women have started small-scale enterprises through small loans from the Bank to buy mobile cell phones that have been used to provide telephone services and earn them good income. "Much of the voice traffic over the cell phones is commerce directed - access to agricultural market prices, access to agricultural trade information, facilitation of remittances from foreign workers, information on work opportunities, using the phone to reduce substantial travel costs".
- ❖ In India, the British Council and partners, including bilateral and multilateral donor agencies, NGO's and government departments are planning the establishment of India's Development Information Network (INDEV). A proposal drafted by One World has been discussed with partners, and the project hopes to disseminate different forms of information to different target audiences using the Internet and web technology. Project outputs will include a web site, e-mail digests, printed reports, exhibitions and CD-ROM.

India, Pakistan and Nepal have come out in support of a mass communication project aimed at changing perceptions and behaviour that hamper the survival, protection and development of female children in the region. The Initiative involves the production of multi-media packages, including animated films, videos, radio series, comic books, posters, discussion guides, folk media, calendars, stickers and other materials. The package aims to put across gender, child rights and educational messages using the medium of popular entertainment.

## *Methodology*

The study used a questionnaire, with 32 questions spread over eight sections: (A) General profile of the respondent, (B) Attitude towards ICT, (C) Use of ICT, (D) ICT enabled teaching and research, (E) ICT training provision, (F) ICT skill of medical students, (G) Access to Medical Information on the Web, and (H) Constraints. To facilitate quantification and analysis of data, mainly close-ended questions were used along with checklists and rating scales. To capture a response and to have fewer missing responses, options such as "no opinion", "don't know", and "don't know about it" are also included. A random sample of 150 (25%) of 600 medical students of VSS Medical College, Burla, was selected and questionnaires were distributed among them. Of those, 128 (85.33%) questionnaires were returned completed

Effectiveness of medical education and research

Medical education will not be effective without use of ICT tools and techniques	Frequency	Percent
Agree	100	78.12%
Disagree	22	17.18%
Don't Know	6	4.68%
Don't use it	0	0%

Nearly 80 percent of respondents agree that medical education and research will not be effective unless ICT tools and techniques are used in the educational process. Further, it is evident from this data that the students realize that ICT tools and techniques should become a part of medical education.

### **Use of Internet**

More than 80 percent of respondents use the Internet. The table summarizes the purpose and frequency.

Table 3: Purpose and frequency of Internet use

Purpose for using Internet	At least daily	Weekly	Monthly	Occasionally	Never
Literature search	7 (5.47%)	28 (21.87%)	9 (7.03%)	35 (27.34%)	25 (19.53%)
E-mail	11 (8.59%)	49 (38.28%)	17 (13.28%)	26 (20.31%)	6 (6.25%)
Information for patient	9 (7.03%)	11 (8.59%)	12 (9.37%)	12 (9.37%)	47 (36.71%)
Reading recommended coursework	11 (8.59%)	19 (14.84%)	9 (3.03%)	30 (23.43%)	26 (20.31%)
Chat	14 (10.94%)	42 (32.81%)	7 (5.47%)	26 (20.31%)	20 (15.62%)

Most students use the Internet weekly to send and receive email and chat with friends online. More than one quarter, however, use the Internet for accessing reading material recommended by their teachers.

Problems accessing electronic information

Reasons	Frequency	Percent
Inadequate number of PCs	59	46.09%
Lack of support from IT staff	71	55.46%
ICT not present in syllabus	72	56.25%
Lack of time to use	64	50%
No computer lab	60	46.87%
E-Resources not available in library	40	31.25%
No campus computer network	55	42.96%
No Internet connectivity	27	21.09%

Women’s participation in ICT may be in the form of dedicated users, workers, entrepreneurs, technical service facilitators, inventors, managers and policy makers.

Information and communication have been playing an increasingly important role in economic and social development of nations. Experts believe that this century belongs to the power of *Knowledge & Information*. On one side, the recent developments in communication technology have drastically reduced the geographical barriers, while on the other side computers have enormously enhanced the capacity to accumulate and access information. The possibilities for information access are infinite. This ‘information society’ has grown in the last one decade in leaps & bounds breaking many existing paradigms and creating an image of “indispensability” in our lives.

Unfortunately the access to these technologies is highly unequal, somewhat built-in in all our development sectors. This is true for different geographical regions and diverse socio-ethnic groups inside India. The inequality contributes to increasing the gap between those who have access to abundant information resources and those who are deprived of this access, thus reinforcing the marginalization that already exists in terms of development and technical resources. If not the worst, but a major suffering

group of this bias is the women. They are not only under-represented in terms of access to these technologies, they also do not get a fair deal in many social transactions.

Women contribute largely to the work force that produces computer components and finer elements of technology in extremely deplorable working conditions. Women are in high demand for these jobs, but are conspicuously absent in computer systems administration, technical development and decision-making. Women are very few as producers of information, thus with less access than men to the information and networking resources. Naturally they have fewer possibilities of orienting technology to address their specific needs. The reasons for this gender inequality are as follows:

- ❖ Lack of a clear National policy for promoting ICT for women's development.
- ❖ Poor ICT infrastructure, inefficient telephone services, lack of electricity in many remote, far-flung areas, and frequent power cuts.
- ❖ Poor literacy among women (in spite of intensive measures to promote education), and inadequate computer skills
- ❖ Unaffordable costs of computer hardware and software, maintenance and connectivity.
- ❖ Little awareness of the full range of opportunities offered by ICT other than access to information; limited online information in vernacular languages.
- ❖ Absence of favourable bandwidth and connectivity for smooth operation.

## Conclusion

- ❖ Education has created new patterns for library services and librarianship services. Changes include:
- ❖ Virtual institutions that provide more convenience and rapid services for library science students.
- ❖ New relationships and communication among teachers, students, and librarians.
- ❖ Librarians in digital libraries have a very important responsibility in offering services for learners.
- ❖ Librarians need new skill in technology for better services.
- ❖ Libraries need new patterns for service to users.

Technology has transformed both digital and traditional education. All students in all countries do not have an equal chance to use these services, but technology has also erased the distance between students, teachers, and librarians.

## Suggestions

The suggestion on the development of Communication and information technology in Education. Are as follows:

- Should explore the role of ICT in education and research;
- Assess the use of electronic information resources by students;
- Identify and analyze specific factors that have hindered the use of electronic information resources by students;
- Examine students' attitudes towards use of ICT in education and research;
- The measures for improvement of existing ICT-based resources should be taken and services in the Education system

**ICT Supported Education:** A large number of distance education universities and programmes use ICT to support the print content that they deliver to students. These include broadcast audio and video such as radio and television programmes, audio and video tapes delivered to students as part of a learning kit, and in more recent times, multimedia content such as lessons which are delivered off line, i.e. on CDs. This is also sometimes called multimedia education, where multiple media are used to support learning.

**ICT Enabled Education:** Any educational programme that is purely delivered through ICTs, or with ICT delivered content as the primary backbone of the teaching-learning process, such as on line courses through the web, is ICT enabled education. In simple words, this form of education requires ICT access and requires that the learner use ICTs as a primary or basic medium of instruction.

When deciding to use ICTs, you must always decide the purpose for which you have made the decision and what you expect to achieve from the content that will be produced. Is it to teach computer skills, to support the learning

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