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# Information & Communication Technology Management: Alleviating Poverty in *India*

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## **ABSTRACT**

Stands for "Information and Communication Technologies." ICT refers to technologies that provide access to information through [telecommunications](#). It is similar to [Information Technology](#)(IT), but focuses primarily on communication technologies. This includes the [Internet](#), wireless networks, cell phones, and other communication mediums.

The use of ICT applications can enhance poor people's opportunities by improving their access to markets, health, and education. Furthermore, ICT can empower the poor by expanding the use of government services, and reduce risks by widening access to micro finance. The rural poor in India are isolated from the information revolution; there are several examples in rural India where ICT management is used to contribute to poverty reduction in the areas of opportunity, empowerment and security.

The use of ICT applications can enhance poor people's opportunities by improving their access to markets, health, and education. In India, even where telephone lines have reached rural areas through the introduction of Public Call Offices (PCOs), the poor have indeed very limited access to ICT. While many factors contribute to the success of ICT projects in rural areas of developing countries, low cost access to information infrastructure is the basic necessary -but insufficient- condition to reach the poor.

## *Introduction*

Information and Communications Technology or (ICT), is often used as an extended synonym for information technology (IT), but is a more specific term that stresses the role of unified communications and the integration of telecommunications, computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information. The phrase *ICT* had been used by academic researchers since the 1980s, but it became popular after it was used in a report to the UK government by Dennis Stevenson in 1997 and in the revised National Curriculum for England, Wales and Northern Ireland in 2000.

Information & Communication Technology Management focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums. In the past few decades, information and communication technologies have provided society with a vast array of new communication capabilities. For example, people can communicate in [real-time](#) with others in different countries using technologies such as instant, voice over IP ([VoIP](#)), and video-conferencing. Networking websites like [Facebook](#) allow users from all over the world to remain in contact and communicate on a regular basis. Modern information and communication technology management have created a "global village," in which people can communicate with others across the world as if they were living next door. For this reason, ICT is often studied in the context of how modern communication technologies affect society.

The *World Development Report 2000/01: Attacking Poverty* identifies three priority areas for reducing poverty: increasing opportunity, enhancing empowerment, and improving security. Opportunity makes markets work for the poor and expands poor people's assets. Empowerment makes state institutions work better for poor people and removes social barriers. Security helps poor people manage risk (World Bank 2001). In the light of current experiences in rural India and elsewhere in the developing world, it is apparent that ICT -defined as the set of activities that facilitate the capturing, storage, processing, transmission and display of information by electronic means- can be utilized to support poverty reduction strategies.

The use of ICT applications can enhance poor people's opportunities by improving their access to markets, health, and education. Furthermore, ICT can empower the poor by expanding the use of government services, and reduce risks by widening access to micro finance.

### *ICT Management Projects for Poverty Reduction in Rural India*

Although most of the rural poor in India are isolated from the information revolution, there are several examples in rural India where ICT management is used to contribute to poverty reduction in the areas of opportunity, empowerment and security.

- **Opportunity**

#### **Improving Access to Basic Services: India Healthcare Delivery Project**

ICT can improve health care delivery to the poor. Telemedicine can diminish the cost and hardship of long distance travel for medical attention and diagnosis, and e-mail and medical list-serves can deliver at minimal cost recent medical findings to health workers lacking research and technological facilities. Furthermore, ICT has simplified medical data collection, record management, and paper filing. Handheld computers or Personal Digital Assistants (PDAs), are allowing auxiliary nurse midwives (ANMs) participating in the InfoDev-sponsored India Healthcare

Delivery project to reduce redundant paperwork and data entry, freeing up time for healthcare delivery to the poor.

ANMs shoulder most of the responsibility for healthcare delivery in vast and densely populated rural areas. Their duty is to administer immunization, offer advice on family planning, educate people on mother-child health programs, and collect data on the rural population's growth, birth, and immunization rates. Each ANM serves 5,000-4 people, typically residing in different villages and hamlets, often located several kilometers apart. ANMs usually spend between 15 and 20 days per month on data collection and registration. PDAs are facilitating data collection and transmission, saving up to 40 percent of ANMs' worktime. Redundant data entry prevalent in paper registers is eliminated and reports are generated automatically. These gains in efficiency multiply the impact and reach of limited resources, thus expanding access to basic services.

- **Empowerment**

**Improving Access to Government Services: Gyandoot**

ICT can be used by government agencies to transform relations with citizens and businesses. In India, as in much of the developing world, it is not uncommon for rural villagers to travel long distances to government district headquarters in order to submit applications, meet officials, obtain copies of public records, or seek information regarding prevailing prices in commodity markets. This involves the loss of a day's income as well as the cost of transportation.

In effect, government officials working with paper records enjoy a monopoly over information and records. Information disclosure and the possibility of interacting with public officials also build pressure for government accountability. The poor become empowered because they feel they are getting a service rather than a favour. Since January 2000, Gyandoot - a government-owned computer network - has been making government more accessible to villagers in the poor and drought-prone Dhar district of Madhya Pradesh. Gyandoot attempts to reduce the time and money people spend trying to communicate with public officials and to provide immediate, transparent access to local government data and documentation.

- **Security**

**Improving access to microfinance: Smart Cards**

Microfinance is an important tool for poor people to reduce, mitigate and cope with risk. Computerization, Smart Cards, and software systems providing loan tracking, financial projections and branch management information can reduce costs and help microfinance institutions reach clients more efficiently.

Smart Cards with an embedded microchip containing information on clients' credit histories are helping SKS, a microfinance institution operating in the Medak district of Andhra Pradesh to reduce transaction costs.

Grameen Bank is the high cost of service delivery to the poor. All cash transactions take place at village group meetings and each transaction takes about 90 seconds per person. Much time is spent not only on paperwork but also discussing terms and conditions and counting coins. Office computerization alone would not bring much time savings because staff would have more free

time during the day, but not in the mornings and evenings when people in villages are available for meetings.

Smart Cards have been identified as a solution to the high cost of delivery, because they can lead to gains in efficiency, eliminating paperwork, reducing errors, fraud and meeting time. Potential savings in operations are estimated to be around 18 percent. Once all of SKS operations are conducted with handheld computers, a read-only device will be left in each village for clients to check the information stored on the Smart Cards. Micro finance projects like SKS enable poor people and their micro businesses to gain broader access to financial service.

### *Access to ICT in Rural India*

Of course, in practice the rich are likely to use both mobile phones and the Internet, but each for different purposes. Furthermore, mobile phones can in certain circumstances provide access to the Internet. In India, even where telephone lines have reached rural areas through the introduction of Public Call Offices (PCOs), the poor have indeed very limited access to ICT. As revealed by a recent survey conducted in five villages in Uttar Pradesh, West Bengal and Andhra Pradesh, only radios are owned by a majority of poor households. Televisions, telephones and newspapers are available to the majority of households on a shared basis. Very few families have shared access to a computer or Internet connection, and some households have never viewed television, read a newspaper or used a telephone. Surveys also suggest that the poor rely on information from informal networks of trusted family, friends and local leaders, but these networks do not adequately satisfy their information needs. This indicates that ICT could play a pivotal role in improving access to information by the poor. However, it remains very difficult for people with low levels of education to reap the full benefits of new technologies, including wide access to knowledge and information.

### *Achieving low-Cost Connectivity*

#### **A Necessary Condition for Pro -Poor ICT**

While many factors contribute to the success of ICT projects in rural areas of developing countries, low cost access to information infrastructure is the basic necessary -but insufficient-

condition to reach the poor. Inadequate or absent connectivity and unstable power supply clearly reduce the economic viability of ICT projects (Kirkman 1999).

Gyandoot, for instance, faces problems with dial-up connections because most of the local rural telephone exchanges do not operate with optical fiber cable. Given that it is not realistic to provide telephones or computers to all households in developing countries, government and regulators should be concerned with policy instruments for achieving “universal access.” The latter is generally defined as the

presence of a public telecom booth in every village, or within reasonable distance. India is striving to achieve universal access through its national telecom policies focused on the provision of telecom facilities to every village at “affordable and reasonable prices” but almost 40 percent of rural communities still lack shared access to a telephone.

### **1. Fostering Competition**

Fostering competition in the telecom sector can significantly reduce communication costs, and thus improve physical access to ICT by the poor. In countries that reformed their telecommunications sector, teledensity -the number of telephone mainlines per 1,000 people- grew at a much higher rate between 1996 and 2000 than in countries where reform had not taken place.

In India, teledensity has significantly improved between 1997 and 2000. This has been mainly the result of market-oriented reforms in the telecom sector. Prior to 1992, the Department of Telecommunications was the sole provider of telecom services in India, and the rigid regulatory framework was a big obstacle to the development of telecom infrastructure. In 1992, the mobile market was privatized. In 1994, the fixed services market followed and finally, in 1999, national long distance operations were opened to private competition.

Privatization permitted prospective telecom operators to bid for the right to operate in a whole state. Given the size of states in India, bids of over US\$1 billion were common.

### **2. A Role for Small Entrepreneurs**

Large telecom operators tend to limit their operations to higher-income urban areas because of the lower revenue potential of poor rural areas and the higher cost of servicing them.

Typically, microentrepreneurs install dish antennas for cable TV and provide service to subscribers within a 700-meters radius. Operators sell the connection and visit homes to collect charges -between US\$1.50 and US\$4 per month. Customers know the operator personally, and the service operator is available to rectify problems anytime of the week. For these reasons, cable services in India are considered superior to telephone services, although cable technology is significantly more complicated than telephone technology. Consequently, it can be argued that privatization should be opened up to allow small entrepreneurs –or Local Service Providers- to supply telecom services in rural areas.

### **3. Regulatory Mechanisms**

However, the market by itself might not be able to provide a sufficient level of connectivity to the poorest and most isolated rural areas. The key to achieving connectivity for these areas is to determine how far market forces will carry the rollout of voice and data networks. The gaps left by the private sector can then be remedied by public intervention. Regulatory mechanisms that can help extend access to information infrastructure include geographic coverage requirements and universal access funds. One alternative is to invite private operators to bid for services in areas that are not commercially viable in return for a subsidy financed from a universal access fund. A concession contract is then awarded to the company requesting the smallest subsidy.

### *Project Design Lessons*

Even if information infrastructure reaches rural areas, there is no guarantee that the poor will access ICT applications. Many of the projects that attempt to provide access to the Internet in rural India, for instance, end up favoring middle and upper-class men. Rural women tend to be excluded because of their restricted mobility, lack of education, and, in some cases, male control over information and media.

#### **1. Grassroots Intermediaries**

In rural India, as in much of the developing world, direct ownership and use of ICT -for instance through a PC with Internet access- applies only to a very minimal fraction of the population. Although the availability of content in local languages and the use of graphic and voice

interfaces can make ICT applications more accessible to poor people, illiteracy, low levels of education, gender, class and caste inequalities are all powerful obstacles to the use of computers and other ICT tools. It follows that, in most cases, poor people have to rely on a human intermediary between them and ICT, in what is termed a “reintermediation model”. The profile of the intermediaries who add human skills and knowledge to the presence of ICT is thus critical for projects that want to reach the poor. Successful examples of ICT projects for poverty reduction are conducted by intermediaries that have the appropriate incentives and proven track record working with poor people. If these intermediaries are grassroots-based and understand the potential of ICT for social change, they can be tremendously effective in promoting local ownership of ICT projects. In rural India, many telekiosk operators are young, educated, computer-savvy, and much attached to their communities. They are also extremely entrepreneurial. Given the right incentives and opportunities, these grassroots intermediaries are keen to make access to information easily available for everybody and are willing to train others in the villages.

## **2. Community Involvement**

Applications developed by or with the collaboration of local staff are more likely to be appropriate for local conditions when there is continuous involvement and feedback from the community. Local ownership fosters the success and resilience of ICT projects. Outside control and top-down approaches, on the other hand, often waste resources in the initial periods of projects endangering their future sustainability.

In the case of e-governance projects, the local administrative and political machinery needs to be involved in the implementation of the project, or otherwise the chance of failure is almost certain. Information technology officers working on the CARD (Computer Aided Registration Department) e-governance project in Andhra Pradesh have also learned that it is important to develop constituencies outside the political and administrative system, i.e. with citizens themselves. In

Rajasthan, the state-sponsored RajNidhi e-governance program has failed to deliver, despite the fact that the software is easy to use and in Hindi, because of extremely centralized planning that did not take local conditions into consideration. Content, in fact, lacks regular updating because of communications problems between the state and the local government.

### **3. Information Needs, Locally-Contextualized Information and Pro-Poor Services**

Local, governmental, non-governmental and international organizations planning ICT projects in the field should thoroughly assess the information needs of a community before launching ICT projects. Rapid, participatory rural appraisals and other survey instruments have been used for several years to ensure community ownership of development programs. These tools could be used in the context of ICT initiatives.

Content provided through ICT should not be limited to the knowledge that can be accessed from outside sources, but rather extended to ensure that the poor have the means to speak for themselves. The poor know a great deal: they know their needs, circumstances, worries and aspirations better than anybody. The Honey Bee Network, with its database of solutions to local development problems, is an excellent example of the creation of relevant content for the lives of poor people. It is advisable that ICT projects focus on a limited number of well-run pro-poor services –and expand them incrementally- rather than offer a great number of services that end up lying unutilized because of lack of demand.

### **4. Awareness-Raising and Training**

Raising awareness among the poor about the potential of ICT is another important aspect of successful ICT projects. In the Dhar district of Madhya Pradesh, poor people are generally not aware of the services offered by Gyandoot. Although some efforts have been undertaken to raise awareness –by designing posters with pictorial depictions of the services offered at the telekiosks and by displaying prominent Gyandoot signs outside the telekiosks– more could be done. Word of mouth is often a very powerful tool for publicity. The leaders of poor communities, as well as school children, could be brought to the telekiosks for a demonstration showing what ICT can do for them.

Furthermore, the provision of content that is not directly related to development goals, such as news, matrimonials and entertainment information could also be a winning strategy to raise awareness about telekiosks. A recent survey from rural India found that entertainment programs, together with news, are the types of information most frequently accessed by the rural poor.

Training poor women and men in information technology skills is also important.

## 5. Financial Sustainability, Monitoring and Evaluation

Finally, a major challenge for ICT projects is reaching financial sustainability. Connectivity can be particularly expensive. In urban areas of India, each fixed-line telephone connection costs more than US\$650.

A phone booth operator needs to earn at least US\$190 per year to break even. Telephones in rural areas are even dearer - a line can cost US\$1,500-1,700. To break even, the annual revenue per line would have to be around US\$425. Since most ICT projects are recent and not expected to reach self-sustainability for three or four years, experience on sustainability is limited. Gyandoot, which started operating in 2000, has seen few telekiosks reach commercial viability.

How will we know whether the benefits derived from ICT projects outweigh the costs? In order to answer this and other questions, rigorous monitoring and evaluation (M&E) of the social and economic benefits of ICT projects in rural areas are needed. M&E measure performance, identify and correct potential problems early on, and improve the understanding of the relationship between different poverty outcomes and ICT policies. M&E are especially needed to measure the success of many pilots currently under way. In fact, in the case of pilots, successful outcomes might be implicitly biased due to the choice of favorable places and conditions. Projects might not yield the same results in more challenging and realistic situations.

### *Conclusion*

Reaching the poor and realizing the potential of ICT for poverty reduction in the areas of opportunity, empowerment and security is a difficult endeavor. Nevertheless, ICT projects implemented by grassroots - based organizations and individuals who have the appropriate incentives to work with marginalized groups can achieve encouraging results. Successful ICT projects are characterized by local ownership and the participation of the community.

## *Summary*

- The use of ICT applications can enhance poor people's opportunities by improving their access to markets, health, and education.
- ICT has simplified medical data collection, record management, and paper filing. Handheld computers, or Personal Digital Assistants (PDAs), are allowing auxiliary nurse midwives (ANMs) participating in the InfoDev-sponsored India Healthcare Delivery project.
- Since January 2000, Gyandoot -a government-owned computer network- has been making government more accessible to villagers in the poor and drought-prone Dhar district of Madhya Pradesh. Gyandoot attempts to reduce the time and money people spend trying to communicate with public officials and to provide immediate, transparent access to local government data and documentation.
- Microfinance is an important tool for poor people to reduce, mitigate and cope with risk. Computerization, Smart Cards, and software systems providing loan tracking, financial projections and branch management information can reduce costs and help microfinance institutions reach clients more efficiently.
- In India, even where telephone lines have reached rural areas through the introduction of Public Call Offices (PCOs), the poor have indeed very limited access to ICT.
- While many factors contribute to the success of ICT projects in rural areas of developing countries, low cost access to information infrastructure is the basic necessary -but insufficient- condition to reach the poor.
- In India, teledensity has significantly improved between 1997 and 2000. This has been mainly the result of market-oriented reforms in the telecom sector.
- A recent survey from rural India found that entertainment programs, together with news, are the types of information most frequently accessed by the rural poor. Training poor women and men in information technology skills is also important.
- Finally, a major challenge for ICT projects is reaching financial sustainability. Connectivity can be particularly expensive.

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## ELECTRONIC COMMERCE: A CURRENT TREND

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### ABSTRACT:

*Electronic commerce or ecommerce is a term for any type of business, or commercial transaction that involves the transfer of information across the Internet. Electronic commerce, commonly known as e-commerce, is a type of industry where buying and selling of product or service is conducted over electronic systems such as the Internet and other computer networks. Electronic commerce is generally considered to be the sales aspect of e-business. It also consists of the exchange of data to facilitate the financing and payment aspects of business transactions. These activities include the use of commercial e-mails, online advertising and consumer privacy. E-Commerce is also expanding across the Middle East. Having recorded the world's fastest growth in internet usage between 2000 and 2009, the region is now home to more than 60 million internet users.*

### Introduction:

Electronic commerce, commonly known as e-commerce, is a type of industry where buying and selling of product or service is conducted over electronic systems such as the Internet and other computer networks. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web at least at one point in the transaction's life-cycle, although it may encompass a wider range of technologies such as e-mail, mobile devices social media, and telephones as well.

Electronic commerce is generally considered to be the sales aspect of e-business. It also consists of the exchange of data to facilitate the financing and payment aspects of business transactions.

**Definition:**

*“Electronic commerce or ecommerce is a term for any type of business, or commercial transaction that involves the transfer of information across the Internet. It covers a range of different types of businesses, from consumer based retail sites, through auction or music sites, to business exchanges trading goods and services between corporations. It is currently one of the most important aspects of the Internet to emerge.”*

**E-commerce can be divided into:**

- ❖ E-tailing or "virtual storefronts" on websites with online catalogs, sometimes gathered c into a "virtual mall"
- ❖ The gathering and use of demographic data through Web contacts and social media
- ❖ Electronic Data Interchange (EDI), the business-to-business exchange of data
- ❖ E-mail and fax and their use as media for reaching prospective and established customers (for example, with newsletters)
- ❖ Business-to-business buying and selling
- ❖ The security of business transactions

**Time to Time development of e-commerce:**

- 1979: Michael Aldrich invented online shopping<sup>[1]</sup>
- 1990: Tim Berners-Lee writes the first web browser, WorldWideWeb, using a NeXT computer.
- 2000: The dot-com bust.
- 2005: Yuval Tal founds Payoneer - a secure online payment distribution solution.<sup>[citation needed]</sup>
- 2010: Groupon reportedly rejects a \$6 billion offer from Google. Instead, the group buying websites went ahead with an IPO on November 4, 2011. It was the largest IPO since Google.
- 2011: Quidsi.com, parent company of Diapers.com, acquired by Amazon.com for \$500 million in cash plus \$45 million in debt and other obligations. GSI Commerce, a company specializing in creating, developing and running online shopping sites for brick and mortar businesses, acquired by eBay for \$2.4 billion.
- 2012: US eCommerce and Online Retail sales projected to reach \$226 billion, an increase of 12 percent over 2011.: Us eCommerce and Online Retail holiday sales reach \$33.8 billion, up 13 percent.

### **Applications related to electronic commerce:**

- ✦ Document automation in supply chain and logistics
- ✦ Domestic and international payment systems
- ✦ Enterprise content management
- ✦ Group buying
- ✦ Automated online assistants
- ✦ Instant messaging
- ✦ Newsgroups
- ✦ Online shopping and order tracking
- ✦ Online banking
- ✦ Online office suites
- ✦ Shopping cart software
- ✦ Teleconferencing
- ✦ Electronic tickets

### **Governmental regulation:**

In the United States, some electronic commerce activities are regulated by the Federal Trade Commission (FTC). These activities include the use of commercial e-mails, online advertising and consumer privacy. The CAN-SPAM Act of 2003 establishes national standards for direct marketing over e-mail. The Federal Trade Commission Act regulates all forms of advertising, including online advertising, and states that advertising must be truthful and non-deceptive. Using its authority under Section 5 of the FTC Act, which prohibits unfair or deceptive practices, the FTC has brought a number of cases to enforce the promises in corporate privacy statements, including promises about the security of consumers' personal information. As result, any corporate privacy policy related to e-commerce activity may be subject to enforcement by the FTC.

### **Global trends:**

In 2010, the United Kingdom had the biggest e-commerce market in the world when measured by the amount spent per capita, even higher than the USA.

Amongst emerging economies, China's E-Commerce presence continues to expand. With 384 million internet users, China's online shopping sales rose to \$36.6 billion in 2009 and one of the reasons behind the huge growth has been the improved trust level for shoppers. The Chinese retailers have been able to help consumers feel more comfortable shopping online. E-Commerce is also expanding across the Middle East. Having recorded the world's fastest growth in internet

usage between 2000 and 2009, the region is now home to more than 60 million internet users. Retail, travel and gaming are the region's top E-Commerce segments, in spite of difficulties such as the lack of region-wide legal frameworks and logistical problems in cross-border transportation. E-Commerce has become an important tool for businesses worldwide not only to sell to customers but also to engage them.

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## **E-COMMERCE: A REVOLUTION IN COMMERCE**

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### **ABSTRACT**

Electronic Commerce is process of doing business through computer networks. A person sitting on his chair in front of a computer can access all the facilities of the Internet to buy or sell the products.

Unlike traditional commerce that is carried out physically with effort of a person to go & get products, ecommerce has made it easier for human to reduce physical work and to save time. E-Commerce which was started in early 1990's has taken a great leap in the world of computers, but the fact that has hindered the growth of e-commerce is security. Security is the challenge facing e-commerce today & there is still a lot of advancement made in the field of security. The main advantage of e-commerce over traditional commerce is the user can browse online shops, compare prices and order merchandise sitting at home on their PC.

For increasing the use of e-commerce in developing countries the B2B e-commerce is implemented for improving access to global markets for firms in developing countries. For a developing country advancement in the field of e-commerce is essential. The research strategy shows the importance of the e-commerce in developing countries for business applications.

## **INTRODUCTION :-**

Electronic commerce, commonly known as e-commerce, is a type of industry where buying and selling of product or service is conducted over electronic systems such as the Internet and other computer networks. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web at least at one point in the transaction's life-cycle, although it may encompass a wider range of technologies such as e-mail, mobile devices social media, and telephones as well. E-commerce is the use of electronic communications and digital information processing technology in business transactions to create, transform, and redefine relationships for value creation between or among organizations, and between organizations and individuals.

Commerce is normally associated with the buying and selling of items. Traditionally, commerce is one of the oldest activities of human beings and the concept of traders selling and buying items is a part of history. Normally the activity of commerce/trade is supposed that the buyer and the seller as well as the items of trade are available at one place. This brings us to the concept of markets which is a common place where the buyers and sellers meet along with their products. Money is also an essential part of the market place. Though commerce started and to some extent continues even today with the barter system, where both the seller and the buyer exchange their respective items, to make the entire activity flexible, the concept of money is an essential component. Originally money, in a mutually acceptable form is also a part of market place with the advent of time, the concept also changed the term commerce extended to beyond the concept of items and today includes buying and selling of products, information as well as information and knowledge. The concept of single merchants and traders has extended to the concept of organizations, business houses, service providers and several levels of consumers. Though the scope of commerce has broadened, it is still possible to apply the basic concepts of commerce's and trading to the transactions of these days.

Broadly speaking the following categories came under e-commerce.

1. Transactions between supplier/a shopkeeper and a buyer or between two companies over a public network like the service provider network (like ISP). With suitable encryption of data and security for transaction, entire operation of selling/buying and settlement of accounts can be automated.
2. Transactions with the trading partners or between the officers of the company located at different locations.
3. Information gathering needed for market research.
4. Information processing for decision making at different levels of management.
5. Information manipulation for operations and supply chain management.
6. Maintenance of records needed for legal purposes, including taxation, legal suits etc.
7. Transactions for information distributions to different retailers, customers etc. including advertising, sales and marketing.

### **WORKING OF E-COMMERCE :-**

The consumer moves through the internet to the merchant's web site. From there, he decides that he wants to purchase something, so he is moved to the online transaction server, where all of the information he gives is encrypted. Once he has placed his order, the information moves through a private gateway to a Processing Network, where the issuing and acquiring banks complete or deny the transaction. This generally takes place in no more than 5-7seconds.

There are many different payment systems available to accommodate the varied processing needs of merchants, from those who have a few orders a day to those who process thousands of transactions daily. With the addition of Secure Layer Technology, E-Commerce is also a very safe way to complete transactions.

### **IMPACT OF E-COMMERCE ON BUSINESS:-**

E-commerce and e-business are not solely the Internet, websites or dot com companies. It is about a new business concept that incorporates all previous business management and economic concepts. As such, e-business and e-commerce impact on many areas of business and disciplines of business management studies. For example:

- Marketing – issues of on-line advertising, marketing strategies and consumer behavior and cultures. One of the areas in which it impacts particularly is direct marketing. In the

past this was mainly door-to door home parties (like the Tupperware parties) and mail order using catalogues or leaflets. This moved to telemarketing and TV selling the advances in telephone and television technology and finally developed into e-marketing spawning ‘E-CRM’ (customer relationship management) data mining and the like by creating new channels for direct sales and promotion.

- Computer sciences – development of different network and computing technologies and languages to support e-commerce and e-business, for example linking front and back office legacy systems with the ‘web based’ technology.
- Finance and accounting – on-line banking; issues of transaction costs; accounting and auditing implications where ‘intangible’ assets and human capital must be tangibly valued in an increasingly knowledge based economy.
- Economics – the impact of e-commerce on local and global economies; understanding the concepts of a digital and knowledge-based economy and how this fits into economic theory.
- Production and operations management – the impact of on-line processing has led to reduced cycle times. It takes seconds to deliver digitized products and services electronically; similarly the time for processing orders can be reduced by more than 90 per cent from days to minutes. Production systems are integrated with finance marketing and other functional systems as well as with business partners and customers.

As business needs are determined, it is necessary to establish the technological feasibility of various E-commerce plans that could meet the needs. The starting point should be a clear sense of what functions each E-commerce technology can provide to improve business functioning. We summarize these in the below given table:

Most Powerful Functions of Each E-commerce Technology	
Technology	Business Value
EDI	<ol style="list-style-type: none"> <li>1. Integration of incoming and outgoing structured data into other applications (e.g., use of customer orders to schedule production)</li> <li>2. Lowers cost when transaction volume is high</li> <li>3. Eases communication with many different trading partners (customers, suppliers, vendors)</li> </ol>

Bar Code	<ol style="list-style-type: none"> <li>1. Locate and identify material</li> <li>2. Integrate location and identification information with other applications and data bases (e.g., bar codes inserted at loading dock can be integrated into an advance ship notice EDI transaction).</li> </ol>
Electronic mail	<ol style="list-style-type: none"> <li>1. Free-text queries to individuals or groups</li> <li>2. Share information via simple messages</li> <li>3. Share complex information (via attachments)</li> <li>4. Collaboration across distance (by making it easier to communicate and share information)</li> </ol>
World Wide Web	<ol style="list-style-type: none"> <li>1. Present information about company</li> <li>2. Search for information from a large number of sources</li> <li>3. Electronic commerce -- buy/sell products and services</li> <li>4. Collaboration, information sharing among selected users within or without a company</li> </ol>
Product Data Exchange	<ol style="list-style-type: none"> <li>1. Accurate product details transmitted to trading partners</li> <li>2. Oversight of trading partners design work</li> <li>3. Collaborative engineering across distance</li> </ol>
Electronic Forms	<ol style="list-style-type: none"> <li>1. Managing processes when human oversight, approvals, or information input needs to be combined with standard elements of information (e.g., catalogue data)</li> <li>2. Tracking progress in a process where many people are involved doing different activities</li> <li>3. Integrating human input data with automated data bases or applications</li> <li>4. Electronic commerce (through integration with the WWW and internal systems)</li> </ol>

## **TYPES OF E-COMMERCE:-**

### **1. Business-to-Business (B2B):**

B2B e-commerce is simply defined as e-commerce between companies. This is the type of e-commerce that deals with relationships between and among businesses. About 80% of e-commerce is of this type, and most experts predict that B2B e-commerce will continue to grow

faster than the B2C segment. The B2B market has two primary components: e-frastructure and e-markets. E-frastructure is the architecture of B2B, primarily consisting of the following:

- logistics - transportation, warehousing and distribution (e.g., Procter and Gamble);
- application service providers - deployment, hosting and management of packaged software from a central facility (e.g., Oracle and Linkshare);
- outsourcing of functions in the process of e-commerce, such as Web-hosting, security and customer care solutions (e.g., outsourcing providers such as eShare, NetSales, iXL Enterprises and Universal Access);
- auction solutions software for the operation and maintenance of real-time auctions in the Internet (e.g., Moai Technologies and OpenSite Technologies);
- content management software for the facilitation of Web site content management and delivery (e.g., Interwoven and ProcureNet); and
- Web-based commerce enablers (e.g., Commerce One, a browser-based, XML-enabled purchasing automation software).

## **2. Business-To-Consumer (B2C):**

Business-to-consumer e-commerce, or commerce between companies and consumers, involves customers gathering information; purchasing physical goods (i.e., tangibles such as books or consumer products) or information goods (or goods of electronic material or digitized content, such as software, or e-books); and, for information goods, receiving products over an electronic network.

It is the second largest and the earliest form of e-commerce. Its origins can be traced to online retailing (or e-tailing). Thus, the more common B2C business models are the online retailing companies such as Amazon.com, Drugstore.com, Beyond.com, Barnes and Noble and Toys Rus. Other B2C examples involving information goods are E-Trade and Travelocity.

The more common applications of this type of e-commerce are in the areas of purchasing products and information, and personal finance management, which pertain to the management of personal investments and finances with the use of online banking tools.

### **3. Business-To-Government (B2G) :**

Business-to-government e-commerce or B2G is generally defined as commerce between companies and the public sector. It refers to the use of the Internet for public procurement, licensing procedures, and other government-related operations. This kind of e-commerce has two features: first, the public sector assumes a pilot/leading role in establishing e-commerce; and second, it is assumed that the public sector has the greatest need for making its procurement system more effective.

Web-based purchasing policies increase the transparency of the procurement process (and reduces the risk of irregularities). To date, however, the size of the B2G e-commerce market as a component of total e-commerce is insignificant, as government e-procurement systems remain undeveloped.

### **4. Consumer-To-Consumer (C2C):**

Consumer-to-consumer e-commerce or C2C is simply commerce between private individuals or consumers. This type of e-commerce is characterized by the growth of electronic marketplaces and online auctions, particularly in vertical industries where firms/businesses can bid for what they want from among multiple suppliers.<sup>16</sup> It perhaps has the greatest potential for developing new markets.

This type of e-commerce comes in at least three forms:

- auctions facilitated at a portal, such as eBay, which allows online real-time bidding on items being sold in the Web;

- peer-to-peer systems, such as the Napster model (a protocol for sharing files between users used by chat forums similar to IRC) and other file exchange and later money exchange models; and
- classified ads at portal sites such as Excite Classifieds and Wanted , Pakwheels.com (an interactive, online marketplace where buyers and sellers can negotiate and which features “Buyer Leads & Want Ads”).

Consumer-to-business (C2B) transactions involve reverse auctions, which empower the consumer to drive transactions. A concrete example of this when competing airlines gives a traveler best travel and ticket offers in response to the traveler’s post that she wants to fly from New York to San Francisco.

There is little information on the relative size of global C2C e-commerce. However, C2C figures of popular C2C sites such as eBay and Napster indicate that this market is quite large. These sites produce millions of dollars in sales every day.

## ➤ **ADVANTAGE OF E-COMMERCE:-**

### **1. Overcome Geographical Limitations:**

If you have a physical store, you are limited by the geographical area that you can service. With an ecommerce website, the whole world is your playground. Additionally, the advent of m-commerce, i.e., ecommerce on mobile devices, has dissolved every remaining limitation of geography.

### **2. Gain New Customers with Search Engine Visibility :**

Physical retail is driven by branding and relationships. In addition to these two drivers, online retail is also driven by traffic from search engines. It is not unusual for customers to follow a link in search engine results, and land up on an ecommerce website that they have never heard of. This additional source of traffic can be the tipping point for some ecommerce businesses

Ecommerce facilitates comparison shopping. There are several online services that allow customers to browse multiple ecommerce merchants and find the best prices.

### **3. Lower Costs:**

One of the most tangible positives of ecommerce is the lowered cost. A part of these lowered costs could be passed on to customers in the form of discounted prices. Here are some of the ways that costs can be reduced with ecommerce:

- Personnel -

The automation of checkout, billing, payments, inventory management, and other operational processes, lowers the number of employees required to run an ecommerce setup.

- Real-estate -

This one is a no-brainer. An ecommerce merchant does not need a prominent physical location.

### **4. Locate the Product Quicker:**

It is no longer about pushing a shopping cart to the correct aisle, or scouting for the desired product. On an ecommerce website, customers can click through intuitive navigation or use a search box to immediately narrow down their product search. Some websites remember customer preferences and shopping lists to facilitate repeat purchase.

### **5. Eliminate Travel Time and Cost :**

It is not unusual for customers to travel long distances to reach their preferred physical store. Ecommerce allows them to visit the same store virtually, with a few mouse clicks.

### **6. Create Targeted Communication:**

Using the information that a customer provides in the registration form, and by placing cookies on the customer's computer, an ecommerce merchant can access a lot of information about its customers. This, in turn, can be used to communicate relevant messages. An example: If you are searching for a certain product on Amazon.com, you will automatically be shown listings of other similar products. In addition, Amazon.com may also email you about related products.

## **DISADVANTAGE OF E-COMMERCE:-**

### **1. Time for delivery of Physical product :**

It is possible to visit a local music store and walk out with a compact disc, or a bookstore and leave with a book. E-commerce is often used to buy goods that are not available locally from businesses all over the world, meaning that physical goods need to be delivered, which takes time and costs money. In some cases there are ways around this, for example, with electronic files of the music or books being accessed across the Internet, but then these are not physical goods.

## **2. Physical product supplier,& delivery uncertainty :**

When you walk out of a shop with an item, it's yours. You have it; you know what it is, where it is and how it looks. In some respects e-commerce purchases are made on trust. This is because, firstly, not having had physical access to the product, a purchase is made on an expectation of what that product is and its condition. Secondly, because supplying businesses can be conducted across the world, it can be uncertain whether or not they are legitimate businesses and are not just going to take your money. It's pretty hard to knock on their door to complain or seek legal recourse! Thirdly, even if the item is sent, it is easy to start wondering whether or not it will ever arrive.

## **3. Perishable goods :**

Forget about ordering a single gelato ice cream from a shop in Rome! Though specialised or refrigerated transport can be used, goods bought and sold via the Internet tend to be durable and non-perishable: they need to survive the trip from the supplier to the purchasing business or consumer. This shifts the bias for perishable and/or non-durable goods back towards traditional supply chain arrangements, or towards relatively more local e-commerce-based purchases, sales and distribution. In contrast, durable goods can be traded from almost anyone to almost anyone else, sparking competition for lower prices. In some cases this leads to disintermediation in which intermediary people and businesses are bypassed by consumers and by other businesses that are seeking to purchase more directly from manufacturers.

## **4. Limited and selected sensory information :**

The Internet is an effective conduit for visual and auditory information: seeing pictures, hearing sounds and reading text. However it does not allow full scope for our senses: we can see pictures of the flowers, but not smell their fragrance; we can see pictures of a hammer, but not feel its weight or balance. Further, when we pick up and inspect something, we choose what we look at and how we look at it. This is not the case on the Internet. If we were looking at buying a car on the Internet, we would see the pictures the seller had chosen for us to see but not the things we might look for if we were able to see it in person. And, taking into account our other senses, we can't test the car to hear the sound of the engine as it changes gears or sense the smell and feel of the leather seats. There are many ways in which the Internet does not convey the richness of experiences of the world. This lack of sensory information means that people are often much more comfortable buying via the Internet generic goods – things that they have seen or experienced before and about which there is little ambiguity, rather than unique or complex things.

#### **5. Returning goods :**

Returning goods online can be an area of difficulty. The uncertainties surrounding the initial payment and delivery of goods can be exacerbated in this process. Will the goods get back to their source? Who pays for the return postage? Will the refund be paid? Will I be left with nothing? How long will it take? Contrast this with the offline experience of returning goods to a shop.

### **CONCLUSION**

After careful observation, it has come to my conclusion that e-commerce has undeniably become an important part of our society. The World Wide Web is and will have a large part in our daily lives. It is therefore critical that small businesses have their own to keep in competition with the larger websites. Since web developers have lowered down the prices for their services, it

has become more affordable for small businesses to use the world wide web to sell their products. Although there are negative aspects of e-commerce, small businesses have tried to accommodate to the needs of the consumers. For example, one of the negative aspects of e-commerce is that consumers lack the advice and guidance of sellers, to accommodate that, they have customer service through the phone or online to answer any questions. It is also important to note that e-commerce does not benefit all small companies equally. How much revenue a business gets from e-commerce depends on what kind of service it gives. For example, most people would like to try on clothes before they buy them, so it probably would not benefit a small business that sells clothes as much as a small business that sells home supplies or specialty books.

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## COMMERCE & E-COMMERCE

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### ABSTRACT

*Electronic commerce or ecommerce is a term for any type of business, or commercial transaction, that involves the transfer of information across the Internet. It covers a range of different types of businesses, from consumer based retail sites, through auction or music sites, to business exchanges trading goods and services between corporations. It is currently one of the most important aspects of the Internet to emerge.*

*Ecommerce allows consumers to electronically exchange goods and services with no barriers of time or distance. Electronic commerce has expanded rapidly over the past five years and is predicted to continue at this rate, or even accelerate business to Business or B2B refers to electronic commerce between businesses rather than between a business and a consumer. B2B businesses often deal with hundreds or even thousands of other businesses, either as customers or suppliers. Carrying out these transactions electronically provides vast competitive advantages over traditional methods. When implemented properly, ecommerce is often faster, cheaper and more convenient than the traditional methods of bartering goods and services.*

### ***Introduction***

***What is commerce?***

Electronic commerce or ecommerce is a term for any type of business, or commercial transaction that involves the transfer of information across the Internet. It covers a range of different types of businesses, from consumer based retail sites, through auction or music sites, to business exchanges trading goods and services between corporations. It is currently one of the most important aspects of the Internet to emerge.

Ecommerce allows consumers to electronically exchange goods and services with no barriers of time or distance. Electronic commerce has expanded rapidly over the past five years and is predicted to continue at this rate, or even accelerate business to Business or B2B refers to electronic commerce between businesses rather than between a business and a consumer. B2B businesses often deal with hundreds or even thousands of other businesses, either as customers or suppliers. Carrying out these transactions electronically provides vast competitive advantages over traditional methods. When implemented properly, ecommerce is often faster, cheaper and more convenient than the traditional methods of bartering goods and services.

Electronic transactions have been around for quite some time in the form of Electronic Data Interchange or EDI. EDI requires each supplier and customer to set up a dedicated data link (between them), where ecommerce provides a cost-effective method for companies to set up multiple, ad-hoc links. Electronic commerce has also led to the development of electronic marketplaces where suppliers and potential customers are brought together to conduct mutually beneficial trade.

The road to creating a successful online store can be a difficult if unaware of ecommerce principles and what ecommerce is supposed to do for your online business. Researching and understanding the guidelines required to properly

implement an e-business plan is a crucial part to becoming successful with online store building.

### **What is E-commerce?**

One of the most popular activities on the Web is shopping. It has much allure in it — you can shop at your leisure, anytime, and in your pajamas. Literally anyone can have their pages built to display their specific goods and services.

History of ecommerce dates back to the invention of the very old notion of "sell and buy", electricity, cables, computers, modems, and the Internet. Ecommerce became possible in 1991 when the Internet was opened to commercial use. Since that date thousands of businesses have taken up residence at web sites.

At first, the term ecommerce meant the process of execution of commercial transactions electronically with the help of the leading technologies such as Electronic Data Interchange (EDI) and Electronic Funds Transfer (EFT) which gave an opportunity for users to exchange business information and do electronic transactions. The ability to use these technologies appeared in the late 1970s and allowed business companies and organizations to send commercial documentation electronically.

Although the Internet began to advance in popularity among the general public in 1994, it took approximately four years to develop the security protocols (for example, HTTP) and DSL which allowed rapid access and a persistent connection to the Internet. In 2000 a great number of business companies in the United States and Western Europe represented their services in the World Wide Web. At this time the meaning of the word ecommerce was changed. People began to define the term ecommerce as the process of purchasing of available goods and services over the Internet using secure connections and electronic payment services.

History of ecommerce is unthinkable without Amazon and Ebay which were among the first Internet companies to allow electronic transactions. Thanks to their founders we now have a handsome ecommerce sector and enjoy the buying and selling advantages of the Internet. Currently there are 5 largest and most famous worldwide Internet retailers: Amazon, Dell, Staples, Office Depot and Hewlett Packard. According to statistics, the most popular categories of products sold in the World Wide Web are music, books, computers, office supplies and other consumer electronics.

Amazon.com, Inc. is one of the most famous ecommerce companies and is located in Seattle, Washington (USA). It was founded in 1994 by Jeff Bezos and was one of the first American ecommerce companies to sell products over the Internet. After the dot-com collapse Amazon lost its position as a successful business model, however, in 2003 the company made its first annual profit which was the first step to the further development.

At the outset Amazon.com was considered as an online bookstore, but in time it extended a variety of goods by adding electronics, software, DVDs, video games, music CDs, MP3s, apparel, footwear, health products, etc. The original name of the company was Cadabra.com, but shortly after it became popular in the Internet Bezos decided to rename his business "Amazon" after the world's most voluminous river. In 1999 Jeff Bezos was entitled as the Person of the Year by Time Magazine in recognition of the company's success. Although the company's main headquarters is located in the USA, WA, Amazon has set up separate websites in other economically developed countries such as the United Kingdom, Canada, France, Germany, Japan, and China. The company supports and operates retail web sites for many famous businesses, including Marks & Spencer, Lacoste, the NBA, Bebe Stores, Target, etc.

## **Concept of Commerce & E-Commerce**

Commerce is normally associated with the buying and selling of items. Traditionally, commerce is one of the oldest activities of human beings and the concept of traders selling and buying items is a part of history. Normally the activity of commerce/trade is supposed that the buyer and the seller as well as the items of trade are available at one place. This brings us to the concept of markets which is a common place where the buyers and sellers meet along with their products. Money is also an essential part of the market place. Though commerce started and to some extent continues even today with the barter system, where both the seller and the buyer exchange their respective items, to make the entire activity flexible, the concept of money is an essential component.

Originally money, in a mutually acceptable form is also a part of market place with the advent of time, the concept also changed the term commerce extended to beyond the concept of items and today includes buying and selling of products, information as well as information and knowledge. The concept of single merchants and traders has extended to the concept of organizations, business houses, service providers and several levels of consumers. Though the scope of commerce has broadened, it is still possible to apply the basic concepts of commerce's and trading to the transactions of these days. Further, to take care of the concept of money, we have several concepts of banking, various methods of representing and transferring money like cheques, MOUs, Drafts etc. as also the concept of different currencies, their equalities, trade restrictions, concept of taxes etc. however, over the years there is a continued effort to improve the efficiency of trading, cut costs, sped up the operations and also to make the entire operation trouble free.

The advent of computers brought in another dimension to the situation; originally computers were used mainly for calculations and scientific applications. This resulted not only in faster calculation, but also made it error free. Further, with floppy disks and magnetic tapes being available, it was possible to transfer the data and files from one computer to another- say from one office of the company to the other office or from the sellers computers to the buyers computer etc.

### **Electronic Commerce Research and Applications:**

Electronic Commerce Research and Applications aims to create and disseminate enduring knowledge for the fast changing **e-commerce** environment. A major dilemma in e-commerce research is how to achieve a balance between the currency and the life span of knowledge.

Electronic Commerce Research and Applications will contribute to the establishment of a research community to create the knowledge, technology, theory, and applications for the development of **electronic commerce**. This is targeted at the intersection of technological potential and business aims.

E-commerce is a multi-disciplinary area, which should be developed in co-operation with existing fields such as Information Systems and Technology; Marketing, Finance and Supply Chain Management; Business Strategy and Management; Public Policy; Computer Science and Telecommunications; and Legal Studies. We will solicit papers on current technologies from these areas, as well as publish papers on completely new topics. We also seek proposals for special issues on new topics in e-commerce that will create new directions for research.

### **Advantages of Ecommerce:**

Top 11 Advantages of Ecommerce Over Traditional Retail

When you read the following list of advantages of ecommerce for businesses and customers, you will get the sense that ecommerce is the holy grail of retail. To see the other side of the coin, do not miss out on my article about the [disadvantages of ecommerce](#).

### **1. Overcome Geographical Limitations:**

If you have a physical store, you are limited by the geographical area that you can service. With an ecommerce website, the whole world is your playground. Additionally, the advent of [commerce](#), i.e., ecommerce on mobile devices, has dissolved every remaining limitation of geography.

### **2. Gain New Customers with Search Engine Visibility:**

Physical retail is driven by branding and relationships. In addition to these two drivers, online retail is also driven by traffic from search engines. It is not unusual for customers to follow a link in search engine results, and land up on an ecommerce website that they have never heard of. This additional source of traffic can be the tipping point for some ecommerce businesses.

### **3. Lower Costs:**

One of the most tangible positives of ecommerce is the lowered cost. A part of these lowered costs could be passed on to customers in the form of discounted prices. Here are some of the ways that costs can be reduced with ecommerce:

- Advertising and Marketing

Organic search engine traffic, [pay per click](#), and [social media](#) traffic are some of the advertising channels that can be cost-effective.

- Personnel

The automation of checkout, billing, payments, inventory management, and other operational processes, lowers the number of employees required to run an ecommerce setup.

- Real-estate

This one is a no-brainer. An ecommerce merchant does not need a prominent physical location.

#### **4. Locate the Product Quicker:**

It is no longer about pushing a shopping cart to the correct aisle, or scouting for the desired product. On an ecommerce website, customers can click through intuitive navigation or use a search box to immediately narrow down their product search. Some websites remember customer preferences and shopping lists to facilitate repeat purchase.

#### **5. Eliminate Travel Time and Cost:**

It is not unusual for customers to travel long distances to reach their preferred physical store. Ecommerce allows them to visit the same store virtually, with a few mouse clicks.

#### **6. Provide Comparison Shopping:**

Ecommerce facilitates comparison shopping. There are several online services that allow customers to browse multiple ecommerce merchants and find the best prices.

#### **7. Enable Deals, Bargains, Coupons, and Group Buying:**

Though there are physical equivalents to deals, bargains, coupons, and group buying, online shopping makes it much more convenient. For instance if a customer has a deep discount coupon for turkey at one physical store and toilet paper at another, she may find it infeasible to avail of both discounts. But the customer could do that online with a few mouse-clicks.

#### **8. Provide Abundant Information:**

There are limitations to the amount of information that can be displayed in a physical store. It is difficult to equip employees to respond to customers who require information across product lines. Ecommerce websites can make additional

information easily available to customers. Most of this information is provided by vendors, and does not cost anything to create or maintain.

### **9. Create Targeted Communication:**

Using the information that a customer provides in the registration form, and by placing cookies on the customer's computer, an ecommerce merchant can access a lot of information about its customers. This, in turn, can be used to communicate relevant messages. An example: If you are searching for a certain product on Amazon.com, you will automatically be shown listings of other similar products. In addition, Amazon.com may also email you about related products.

### **10. Remain Open All the Time:**

Store timings are now 24/7/365. Ecommerce websites can run all the time. From the merchant's point of view, this increases the number of orders they receive. From the customer's point of view, an "always open" store is more convenient.

### **11. Create Markets for Niche Products:**

Buyers and sellers of niche products can find it difficult to locate each other in the physical world. Online, it is only a matter of the customer searching for the product in a search engine. One example could be purchase of obsolete parts. Instead of trashing older equipment for lack of spares, today we can locate parts online with great ease.

### **Benefits of e-commerce:**

Electronic technologies will continuously and progressively be deployed throughout the entire supply chain of all industries over the next decade. It is expected that e-Business will become so commonplace, that the "e" will become redundant and it will be "business as usual", but conducted through a whole new medium.

Far too many small and medium businesses fail to perceive the full importance of the electronic business model and make little effort to understand it or adopt it. Indeed, many businesses still confuse e-Business with e-commerce, which is the transactional aspect of e-Business. E-Commerce refers to the various transactions which occur between Government, citizens/households and businesses.

Though e-commerce opens a world of businesses to customers and a world of customers to business, the model clearly shows that e-Business incorporates both this function and the provision of more significant opportunities for interaction, transaction and profitability in back office and supply chain systems. Many supply chain systems are, in fact, e-commerce tools, eg procurement, inventory management, CRM and some ERP systems.

Front-end e-Business systems include email, websites (whether in-house or out-sourced, passive brochures or highly interactive) and marketing strategies geared to promote the website. Back-end systems include procurement (purchasing), warehousing, production, delivery, administration, accounting systems, inventory systems etc. The bottom line benefits of e-Business are simply this:

**Business process optimization:**

Full integration of electronic technologies throughout front and back end business processes will provide significant benefits.

**Improvements to customer responsiveness and service:**

By allowing customers to track delivery of parcels in real time, the Federal Express website keeps customers in touch with the location of their goods and when they will arrive. Provision of this sort of information creates greater customer satisfaction and sense of control. Automatic Teller Machines (ATM's) are now well used by most bank customers, who, although some still express feelings about the lack of personal interaction with bank staff, generally would not want to return

to the old system of standing in a queue for personal service. They also allow the business to concentrate on generating more business rather than dealing with often simple issues. Automatic email responses provide customers with instant information to their inquiries and help create more sales by answering general queries more quickly and comprehensively. Websites with interactive features, egchat line, bulletin board, email, e-forms. These facilities help keep the customer in touch with the “real person” in the business. Some customers respond better in this environment and the business owner can ask more direct questions of the customer to help build personal profile information.

Useful information about products, services, prices etc and something FREE or value adding. This again provides the customer with what they are generally looking for in their first contact with a business and helps to create a successful sale more quickly.

**Across the board cost savings:**

**Labour costs:**

Reduce Wages by engaging labour via the Internet on performance based rewards. Incur labour expenses only when you need them by outsourcing work like invoicing, debt collection and customer support, advertising, copywriting etc. turning fixed costs into variable costs. Labour costs can also be reduced by automating business processes which require less human intervention.

**Materials costs:**

Reduce materials costs by requesting and receiving both expressions of interest and quotes from materials suppliers worldwide. Collaborate electronically with other businesses to bulk purchase materials.

**Overhead and other costs:**

- Outsourcing labour and casual work and automating business processes both help reduce space and equipment requirements.
- Using email for communicating and information dissemination saves phone, fax and courier costs. Also other Internet tools can be similarly used to communicate with suppliers, staff and customers.
- MS Netmeeting, IRC Chat and other tools allow voice, image and word communication saving travel, airfares, accommodation and teleconferencing costs.
- Voice recognition software helps minimise the need for secretarial support and increasing your typing speed.
- Most communication costs can be significantly reduced with a combination of email, other Internet tools, phone answering machines, voice response systems, call diversion and mobiles.
- Reduction of inventory holdings.
- Reduction of work capital requirements.
- Reduction in transactional costs.

**Cash flow improvements:**

Reduce Interest charges, bank fees, collection fees, postage and printing by using Electronic Funds Transfer (EFT), Point of Sale (POS) and electronic banking facilities.

**More fruitful customer/supplier relationships:**

Using email and other voice, image, word communication facilities not only saves money and provides greater responsiveness, but can facilitate better supplier, customer and staff relationships, because it can be used more often, much more readily and can provide so much more information at no cost. With interactive databases and electronic loyalty programs, personalized and targeted direct mailing used wisely, can strengthen customer relationships and increase sales.

E-Business tools can empower the customer to find many of their own answers, monitor order status and check account details etc.

**Faster provision of products and services to the marketplace through streamlined and thus cheaper production**

Integrating a strong marketing website with business processes allows the customer to order via the website, the order is then sent electronically through the other business processes, eg. accounting, production, warehousing and distribution and the customer is provided with a product to their specification and in a timely manner.

**New markets:**

Whether geographical, industry or niche, the clever use of email and a website can increase customer numbers, purchasing volumes and frequency of return (loyalty). It will improve your ability to capture and leverage customer intelligence to direct your marketing, purchasing, warehousing, delivery and pricing strategies and will ultimately result in increased revenues.

**Trust:**

Investing in a well-built e-Business system including email, website and back end systems will greatly assist in building client trust. Providing free, useful information, secure ordering and payment transactions and reliable delivery, support and feedback systems are the key to establishing strong and successful customer relationships on the Internet.

**Customer loyalty:**

Successfully capturing customer intelligence will help the small business operator to anticipate customer needs, tailor products and services, set pricing strategies, ensure availability and provide superior delivery, support and feedback systems, all of which helps to build trust in the business, confidence in the system, loyalty to the supplier and repeat sales “at the till”.

### **Market leadership:**

For many businesses, planning, investment and implementation of electronic technologies will improve international competitiveness, resulting in improved market share, return on investment (ROI) and consequently market performance through business leadership. For example, using the Internet, a business can seek out and respond to a tender from anywhere around the world more quickly than ever before. Also, a business can use the Internet to source technical specifications, materials and other resources more cheaply and quickly than traditional means. Further, email and teleconferencing can facilitate greater collaboration between businesses in joint ventures to enter new markets, produce products or supply a customer. These factors combined contribute to better “access to markets” and a faster “time to market” for businesses and their products.

### **New products and services:**

Electronic technologies significantly add to organizational agility and lead to new services valued by customers. In many cases, information and knowledge are becoming the new products or services of the future. Businesses are also able to source new materials, technologies or techniques and venture into markets previously outside the scope of business operations. Joint ventures are increasingly possible through e-technologies providing businesses with new opportunities and potential areas for growth. To access a new market, a business should consider the following 10 steps:

1. Consider the language of the country, ensuring navigation and important information is translated to suit.
2. Prepare website keywords and search engine listings to suit the language.
3. Product instructions or manuals must also be translated to suit.
4. Some products may require approval by the country’s authorities.
5. Check out VAT/GST and other tax issues.

6. Establish an after-sales and repair service reasonably close to the new market.
7. Establish a toll-free number directed to either your own business or a branch or a partnering business close by.
8. Promote the website within the new market area using the appropriate strategies, eg email, reciprocal links with local prominent website services and portals, newspapers, magazines, TV/Radio etc.
9. Specify where legal issues are to be dealt with.
10. Determine a suitable currency for exchange.

**Intellectual and human capital:**

Email and website technologies support business, procurement, production, administration, warehousing, payment, delivery, support and feedback systems. Together, these provide whole new opportunities for a business to capture research and leverage so much information about its customers and transactions that exponential growth in intellectual capital is emerging as a major business benefit and addition to the balance sheet. Systems that are “smart” and informed by business trends can improve the quality and uniformity of decision making ensuring businesses operate more effectively if staff leave or are away.

**Technology**

These days, electronic technologies, from an accounting perspective, should be considered an ongoing operational cost, rather than a capital investment. Thus, the key to achieving the most benefit in the bottom line from computer systems lies in choosing the right technology and implementing it to optimize the many benefits of e-Business. This means that putting “boxes” on desks needs to be accompanied by effective training in data storage techniques and security procedures with regular assessment of best practice processes and systems. The above benefits are

related to business infrastructure, relationships and marketplace performance perspectives. If these systems are part of a well-specified and well-implemented business plan, they can bring about benefits and improvements in productivity, efficiency and cost savings, which ultimately contribute to increases in profitability.

### **Conclusions:**

New E-commerce is still in its formative stage. The business-to-business and intra-organizational segments currently dominate e-commerce. Many major digital retailers are as yet in the investment and brand-building mode and show no profits; yet many established retailers realize profits from the new selling channel. Buoyant growth is apparent throughout. The hierarchical framework presented above offers an opportunity to separate concerns and analyze the specific aspects of this enterprise. The technological infrastructure currently imposes several limitations on the development of a global market-space and on the personal convenience of the participants. An integrated consumer-oriented transaction space is yet to emerge. The consumer marketplace is being developed by a large number of entrepreneurial initiatives, many of them experimenting on the frontiers. Moving the links of supply chains and products into market-space offers a major promise in raising economic efficiency of both manufacturing and service industries.

The tension between the transactional efficiency of spot purchasing facilitated by electronic markets and the need for long-term relationships of trust and forbearance, enabled by electronic hierarchies, will persist and call for much study. A number of countries that had been marginalized by their geographical position take extremely active interest in E-commerce as the means to move to the

center of the virtual geography. The redistribution work has to be studied from multiple perspectives.

E-commerce has entered a stage of rapid and sustained development. A large number of business models have been enabled by it. A number of questions have been posed here. All of these and many others will require further experimentation, experience, observation, analysis, and research.

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# **THE HAZARDS OF E-WASTE IT'S MANAGEMENT AND OUR RESPONSIBILITY'S**

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## **ABSTRACT**

"E-waste" is a popular, informal name for electronic products nearing the end of their "useful life." E-wastes are considered dangerous, as certain components of some electronic products contain materials that are hazardous, depending on their condition and density. The hazardous content of these materials pose a threat to human health and environment. Discarded computers, televisions, DVD's, stereos, copiers, fax machines, electric lamps, cell phones, audio equipment and batteries if improperly disposed can leach lead and other substances into soil and groundwater. Many of these products can be reused, refurbished, or recycled in an environmentally sound manner so that they are less harmful to the ecosystem. This paper highlights the hazards of e-wastes, the need for its appropriate management and options that can be implemented.

## **INTRODUCTION**

These days computer has become most common and widely used gadget in all kinds of activities ranging from schools, residences, offices to manufacturing industries. E-toxic components in computers could be summarized as circuit boards containing heavy metals like lead & cadmium; batteries containing cadmium; cathode ray tubes with lead oxide & barium; brominated flame retardants used on printed circuit boards, cables and plastic casing; poly vinyl chloride (PVC) coated copper cables and plastic computer casings that release highly toxic dioxins & furans when burnt to recover valuable metals; mercury switches; mercury in flat screens; poly chlorinated biphenyl's (PCB's) present in older capacitors; transformers; etc. Basel Action Network (BAN) estimates that the 500 million computers in the world contain 2.87 billion kg of plastics, 716.7 million kg of lead and 286,700 kg of mercury. The average 14-inch monitor uses a tube that contains an estimated 2.5 to 4 kg of lead. The lead can seep into the ground water from landfills thereby contaminating it. If the tube is crushed and burned, it emits toxic fumes into the air.

Industrial revolution followed by the advances in information technology during the last century has radically changed people's lifestyle. Although this development has helped the human race, mismanagement has led to new problems of contamination and pollution. The technical prowess acquired during the last century has posed a new challenge in the management of wastes. **For example**, personal computers (PCs) contain certain components, which are highly toxic, such as chlorinated and brominate substances, toxic gases, toxic metals, biologically active materials, acids, plastics and plastic additives. The hazardous content of these materials pose an environmental and health threat. Thus proper management is necessary while disposing or recycling e-wastes.

## **EFFECT'S ON ENVIRONMENT AND HUMAN**

Disposal of e-wastes is a particular problem faced in many regions across the globe. Computer wastes that are land filled produces contaminated leachates which eventually pollute the groundwater. Acids and sludge obtained from melting computer chips, if disposed on the ground causes acidification of soil., This is due to disposal of recycling wastes such as acids, sludge's etc. in rivers. Now water is being transported from faraway towns to cater to the demands of the population. Incineration of e-wastes can emit toxic fumes and gases, thereby polluting the surrounding air. Improperly monitored landfills can cause environmental hazards. Mercury will leach when certain electronic devices, such as circuit breakers are destroyed. The same is true for polychlorinated biphenyls (PCBs) from condensers. When brominates flame retardant plastic or cadmium containing plastics are land filled, both polybrominateddiphenyl ethers (PBDE) and cadmium may leach into the soil and groundwater. It has been found that significant amounts of lead ion are dissolved from broken lead containing glass, such as the cone glass of cathode ray tubes, gets mixed with acid waters and are a common occurrence in landfills.

Not only does the leaching of mercury poses specific problems, the vaporization of metallic mercury and dim ethylene mercury, both part of Waste Electrical and Electronic Equipment (WEEE) is also of concern. In addition, uncontrolled fires may arise at landfills and this could be a frequent occurrence in many countries. When exposed to fire, metals and other chemical substances, such as the extremely toxic dioxins and furans (TCDD tetrachlorodibenzo-dioxin, PCDDs-polychlorinated dibenzodioxins. PBDDs-polybrominateddibenzo-dioxin and PCDFspoly chlorinated dibenzo furans) from halogenated flame retardant products and PCB containing condensers can be emitted. The most dangerous form of burning e-waste is the open-air burning of plastics in order to recover copper

and other metals. The toxic fall-out from open air burning affects both the local environment and broader global air currents, depositing highly toxic by products in many places throughout the world.

Table I summarizes the health effects of certain constituents in e-wastes. If these electronic items are discarded with other household garbage, the toxics pose a threat to both health and vital components of the ecosystem. In view of the ill-effects of hazardous wastes to both environment and health, several countries exhorted the need for a global agreement to address the problems and challenges posed by hazardous waste. Searching for cheaper ways to get rid of the wastes, "toxic traders" began shipping hazardous waste to developing countries. International outrage following these irresponsible activities led to the drafting and adoption of strategic plans and regulations at the Basel Convention. The Convention secretariat, in Geneva, Switzerland, facilitates and implementation of the Convention and related agreements. It also provides assistance and guidelines on legal and technical issues, gathers statistical data, and conducts training on the proper management of hazardous waste.

## **BASEL CONVENTION**

The fundamental aims of the Basel Convention are the control and reduction of trans boundary movements of hazardous and other wastes including the prevention and minimization of their generation, the environmentally sound management of such wastes and the active promotion of the transfer and use of technologies.

A Draft Strategic Plan has been proposed for the implementation of the Basel Convention. The Draft Strategic Plan takes into account existing regional plans, programmes or strategies, the decisions of the Conference of the Parties and its subsidiary bodies, ongoing project activities and process of international environmental governance and sustainable development. The Draft requires action at all levels of society: training, information, communication, methodological tools, capacity building with financial support, transfer of know-how, knowledge and sound, proven cleaner technologies and processes to assist in the concrete implementation of the Basel Declaration. It also calls for the effective involvement and coordination by all concerned stakeholders as essential for achieving the aims of the Basel Declaration within the approach of common but differentiated responsibility.

### **Table I: Effects of E-Waste constituent on health**

Source of e-wastes	Constituent	Health effects
Solder in printed circuit boards, glass panels and gaskets in computer monitors	Lead (Pb)	<ul style="list-style-type: none"> <li>• Damage to central and peripheral nervous systems, blood systems and kidney damage.</li> <li>• Affects brain development of children.</li> </ul>
Chip resistors and semiconductors	Cadmium (Cd)	<ul style="list-style-type: none"> <li>• Toxic irreversible effects on human health.</li> <li>• Accumulates in kidney and liver.</li> <li>• Causes neural damage.</li> <li>• Teratogenic.</li> </ul>
Relays and switches, printed circuit boards	Mercury (Hg)	<ul style="list-style-type: none"> <li>• Chronic damage to the brain.</li> <li>• Respiratory and skin disorders due to bioaccumulation in fishes.</li> </ul>
Corrosion protection of untreated and galvanized steel plates, decorator or hardener for steel housings	Hexavalent chromium (Cr) VI	<ul style="list-style-type: none"> <li>• Asthmatic bronchitis.</li> <li>• DNA damage.</li> </ul>
Cabling and computer housing	Plastics including PVC	<p>Burning produces dioxin. It causes</p> <ul style="list-style-type: none"> <li>• Reproductive and developmental problems;</li> <li>• Immune system damage;</li> <li>• Interfere with regulatory hormones</li> </ul>
Plastic housing of electronic equipments and circuit boards.	Brominated flame retardants (BFR)	<ul style="list-style-type: none"> <li>• Disrupts endocrine system functions</li> </ul>
Front panel of CRTs	Barium (Ba)	<p>Short term exposure causes:</p> <ul style="list-style-type: none"> <li>• Muscle weakness;</li> <li>• Damage to heart, liver and spleen.</li> </ul>
Motherboard	Beryllium (Be)	<ul style="list-style-type: none"> <li>• Carcinogenic (lung cancer)</li> <li>• Inhalation of fumes and dust. Causes chronic beryllium disease or beryllicosis.</li> <li>• Skin diseases such as warts.</li> </ul>

A set of interrelated and mutually supportive strategies are proposed to support the concrete implementation of the activities as indicated in the website ([www.basel.int/DraftstrateKJcplan4Seot.pdf](http://www.basel.int/DraftstrateKJcplan4Seot.pdf)) is described below:

1. To involve experts in designing communication tools for creating awareness at the highest level to promote the aims of the Basel Declaration on environmentally sound management and the ratification and implementation of the Basel Convention, its amendments and protocol with the emphasis on the short-term activities.
2. To engage and stimulate a group of interested parties to assist the secretariat in exploring fund raising strategies including the preparation of projects and in making full use of expertise in non-governmental organizations and other institutions in joint projects.
3. To motivate selective partners among various stakeholders to bring added value to making progress in the short-term.
4. To disseminate and make information easily accessible through the internet and other electronic and printed materials on the transfer of know-how, in particular through Basel Convention Regional Centers (BCRCs).
5. To undertake periodic review of activities in relation to the agreed indicators;
6. To collaborate with existing institutions and programmes to promote better use of cleaner technology and its transfer, methodology, economic instruments or policy to facilitate or support capacity-building for the environmentally sound management of hazardous and other wastes.

The Basel Convention brought about a respite to the Trans boundary movement of hazardous waste. India and other countries have ratified the convention. However United States (US) is not a party to the ban and is responsible for disposing hazardous waste, such as, e-waste to Asian countries even today. Developed countries such as US should enforce stricter legislations in their own country for the prevention of this horrifying act.

In the European Union where the annual quantity of electronic waste is likely to double in the next 12 years, the European Parliament recently passed legislation that will require manufacturers to take back their electronic products when consumers discard them. This is called Extended Producer Responsibility. It also mandates a timetable for phasing out most toxic substances in electronic products.

## **MANAGEMENT OF E-WASTES**

It is estimated that 75% of electronic items are stored due to uncertainty of how to manage it. These electronic junks lie unattended in houses, offices, warehouses etc. and normally mixed with household wastes, which are finally disposed off at landfills. This necessitates implementable management measures.

In industries management of e-waste should begin at the point of generation. This can be done by waste minimization techniques and by sustainable product design. Waste minimization in industries involves adopting:

- Inventory management,
- Production-process modification,
- Volume reduction,
- Recovery and reuse.

### **Inventory management**

Proper control over the materials used in the manufacturing process is an important way to reduce waste generation (Freeman, 1989). By reducing both the quantity of hazardous materials used in the process and the amount of excess raw materials in stock, the quantity of waste generated can be reduced. This can be done in two ways i.e. establishing material-purchase review and control procedures and inventory tracking system.

Developing review procedures for all material purchased is the first step in establishing an inventory management program. Procedures should require that all materials be approved prior to purchase. In the approval process all production materials are evaluated to examine if they contain hazardous constituents and whether alternative non-hazardous materials are available.

Another inventory management procedure for waste reduction is to ensure that only the needed quantity of a material is ordered. This will require the establishment of a strict inventory tracking system. Purchase procedures must be implemented which ensure that materials are ordered only on an as-needed basis and that only the amount needed for a specific period of time is ordered.

### **Production-process modification**

Changes can be made in the production process, which will reduce waste generation. This reduction can be accomplished by changing the materials used to

make the product or by the more efficient use of input materials in the production process or both. Potential waste minimization techniques can be broken down into three categories:

- i) Improved operating and maintenance procedures,
- ii) Material change
- iii) Process-equipment modification.

Improvements in the operation and maintenance of process equipment can result in significant waste reduction. This can be accomplished by reviewing current operational procedures or lack of procedures and examination of the production process for ways to improve its efficiency. Instituting standard operation procedures can optimise the use of raw materials in the production process and reduce the potential for materials to be lost through leaks and spills. A strict maintenance program, which stresses corrective maintenance, can reduce waste generation caused by equipment failure. An employee-training program is a key element of any waste reduction program. Training should include correct operating and handling procedures, proper equipment use, recommended maintenance and inspection schedules, correct process control specifications and proper management of waste materials.

Hazardous materials used in either a product formulation or a production process may be replaced with a less hazardous or non-hazardous material. This is a very widely used technique and is applicable to most manufacturing processes. Implementation of this waste reduction technique may require only some minor process adjustments or it may require extensive new process equipment. For example, a circuit board manufacturer can replace solvent-based product with water-based flux and simultaneously replace solventvapor degreaser with detergent parts washer.

Installing more efficient process equipment or modifying existing equipment to take advantage of better production techniques can significantly reduce waste generation. New or updated equipment can use process materials more efficiently producing less waste. Additionally such efficiency reduces the number of rejected or off-specification products, thereby reducing the amount of material which has to be reworked or disposed of. Modifying existing process equipment can be a very cost-effective method of reducing waste generation. In many cases the modification can just be relatively simple changes in the way the materials are handled within the process to ensure that they are not wasted. For example, in many electronic manufacturing operations, which involve coating a product, such

as electroplating or painting, chemicals are used to strip off coating from rejected products so that they can be recoated. These chemicals, which can include acids, caustics, cyanides etc are often a hazardous waste and must be properly managed. By reducing the number of parts that have to be reworked, the quantity of waste can be significantly reduced.

### **Volume reduction**

Volume reduction includes those techniques that remove the hazardous portion of a waste from a non-hazardous portion. These techniques are usually to reduce the volume, and thus the cost of disposing of a waste material. The techniques that can be used to reduce waste-stream volume can be divided into 2 general categories: source segregation and waste concentration. Segregation of wastes is in many cases a simple and economical technique for waste reduction. Wastes containing different types of metals can be treated separately so that the metal value in the sludge can be recovered. Concentration of a waste stream may increase the likelihood that the material can be recycled or reused. Methods include gravity and vacuum filtration, ultra filtration, reverse osmosis, freeze vaporization etc.

For example, an electronic component manufacturer can use compaction equipments to reduce volume of waste cathode ray-tube.

### **Recovery and reuse**

This technique could eliminate waste disposal costs, reduce raw material costs and provide income from a salvable waste. Waste can be recovered on-site, or at an off-site recovery facility, or through inter industry exchange. A number of physical and chemical techniques are available to reclaim a waste material such as reverse osmosis, electrolysis, condensation, electrolytic recovery, filtration, centrifugation etc. For example, a printed-circuit board manufacturer can use electrolytic recovery to reclaim metals from copper and tin-lead plating bath.

However recycling of hazardous products has little environmental benefit if it simply moves the hazards into secondary products that eventually have to be disposed of. Unless the goal is to redesign the product to use nonhazardous materials, such recycling is a false solution.

### **Sustainable product design**

Minimization of hazardous wastes should be at product design stage itself keeping in mind the following factors\*

- **Rethink the product:** Efforts should be made to design a product with fewer amounts of hazardous materials. For example, the efforts to reduce material use are reflected in some new computer designs that are flatter, lighter and more integrated. Other companies propose centralized networks similar to the telephone system.
- **Use of renewable materials and energy:** Bio-based plastics are plastics made with plant-based chemicals or plant-produced polymers rather than from petrochemicals. Bio-based toners, glues and inks are used more frequently. Solar computers also exist but they are currently very expensive.
- **Use of non-renewable materials that are safer:** Because many of the materials used are non-renewable, designers could ensure the product is built for re-use, repair and/or upgradeability. Some computer manufacturers such as Dell and Gateway lease out their products thereby ensuring they get them back to further upgrade and lease out again.

## THE INDIAN SCENARIO

While the world is marvelling at the technological revolution, countries like India are facing an imminent danger. E-waste of developed countries, such as the US, disposes their wastes to India and other Asian countries. A recent investigation revealed that much of the electronics turned over for recycling in the United States ends up in Asia, where they are either disposed of or recycled with little or no regard for environmental or worker health and safety. Major reasons for exports are cheap labour and lack of environmental and occupational standards in Asia and in this way the toxic effluent of the developed nations 'would flood towards the world's poorest nations. The magnitude of these problems is yet to be documented. However, groups like Toxic Links India are already working on collating data that could be a step towards controlling this hazardous trade.

It is imperative that developing countries and India in particular wake up to the monopoly of the developed countries and set up appropriate management measures to prevent the hazards and mishaps due to mismanagement of e-wastes.

## MANAGEMENT OPTIONS

Considering the severity of the problem, it is imperative that certain management options be adopted to handle the bulk e-wastes. Following are some

of the management options suggested for the government, industries and the public.

### Responsibilities of the Government

**(i)** Governments should set up regulatory agencies in each district, which are vested with the responsibility of co-ordinating and consolidating the regulatory functions of the various government authorities regarding hazardous substances.

**(ii)** Governments should be responsible for providing an adequate system of laws, controls and administrative procedures for hazardous waste management (Third World Network. 1991). Existing laws concerning e-waste disposal be reviewed and revamped. A comprehensive law that provides e-waste regulation and management and proper disposal of hazardous wastes is required. Such a law should empower the agency to control, supervise and regulate the relevant activities of government departments.

Under this law, the agency concerned should

- Collect basic information on the materials from manufacturers, processors and importers and to maintain an inventory of these materials. The information should include toxicity and potential harmful effects.
- Identify potentially harmful substances and require the industry to test them for adverse health and environmental effects.
- Control risks from manufacture, processing, distribution, use and disposal of electronic wastes.
- Encourage beneficial reuse of "e-waste" and encouraging business activities that use waste". Set up programs so as to promote recycling among citizens and businesses.
- Educate e-waste generators on reuse/recycling options

**(iii)** Governments must encourage research into the development and standard of hazardous waste management, environmental monitoring and the regulation of hazardous waste-disposal.

**(iv)** Governments should enforce strict regulations against dumping e-waste in the country by outsiders. Where the laws are flouted, stringent penalties must be imposed. In particular, custodial sentences should be preferred to paltry fines, which these outsiders / foreign nationals can pay.

(v) Governments should enforce strict regulations and heavy fines levied on industries, which do not practice waste prevention and recovery in the production facilities.

(vi) Polluter pays principle and extended producer responsibility should be adopted.

(vii) Governments should encourage and support NGOs and other organizations to involve actively in solving the nation's e-waste problems.

(viii) Uncontrolled dumping is an unsatisfactory method for disposal of hazardous waste and should be phased out.

(ix) Governments should explore opportunities to partner with manufacturers and retailers to provide recycling services.

### **Responsibility and Role of industries**

1. Generators of wastes should take responsibility to determine the output characteristics of wastes and if hazardous, should provide management options.

2. All personnel involved in handling e-waste in industries including those at the policy, management, control and operational levels, should be properly qualified and trained. Companies can adopt their own policies while handling e-wastes. Some are given below:

- Use label materials to assist in recycling (particularly plastics).
- Standardize components for easy disassembly.
- Re-evaluate 'cheap products' use, make product cycle 'cheap' and so that it has no inherent value that would encourage a recycling infrastructure.
- Create computer components and peripherals of biodegradable materials.
- Utilize technology sharing particularly for manufacturing and de manufacturing.
- Encourage / promote / require green procurement for corporate buyers.
- Look at green packaging options.

3. Companies can and should adopt waste minimization techniques, which will make a significant reduction in the quantity of e-waste generated and thereby lessening the impact on the environment. It is a "reverse production" system that designs infrastructure to recover and reuse every material contained within e-wastes metals such as lead, copper, aluminium and gold, and various plastics,

glass and wire. Such a "closed loop" manufacturing and recovery system offers a win-win situation for everyone, less of the Earth will be mined for raw materials, and groundwater will be protected, researchers explain.

4. Manufacturers, distributors, and retailers should undertake the responsibility of recycling/disposal of their own products.

5. Manufacturers of computer monitors, television sets and other electronic devices containing hazardous materials must be responsible for educating consumers and the general public regarding the potential threat to public health and the environment posed by their products. At minimum, all computer monitors, television sets and other electronic devices containing hazardous materials must be clearly labelled to identify environmental hazards and proper materials management.

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Waste prevention is perhaps more preferred to any other waste management option including recycling. Donating electronics for reuse extends the lives of valuable products and keeps them out of the waste management system for a longer time. But care should be taken while donating such items i.e. the items should be in working condition.

Reuse, in addition to being an environmentally preferable alternative, also benefits society. By donating used electronics, schools, non-profit organizations, and lower-income families can afford to use equipment that they otherwise could not afford.

E-wastes should never be disposed with garbage and other household wastes. This should be segregated at the site and sold or donated to various organizations.

While buying electronic products opt for those that:

- are made with fewer toxic constituents
- use recycled content
- are energy efficient

- are designed for easy upgrading or disassembly
- utilize minimal packaging
- offer leasing or take back options
- have been certified by regulatory authorities. Customers should opt for upgrading their computers or other electronic items to the latest versions rather than buying new equipments.

NGOs should adopt a participatory approach in management of e-wastes.

## **REFERENCES:**

-Freeman M. H. 1989. Standard Handbook of Hazardous Waste Treatment and Disposal, McGraw-Hill Company, USA.

-Third World Network. 1991. Toxic Terror: Dumping of Hazardous Wastes in the Third World, Third World Network, Malaysia.

## THE HAZARDS OF E-WASTE IT'S MANAGEMENT AND OUR RESPONSIBILITY'S

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### ABSTRACT

"E-waste" is a popular, informal name for electronic products nearing the end of their "useful life." E-wastes are considered dangerous, as certain components of some electronic products contain materials that are hazardous, depending on their condition and density. The hazardous content of these materials pose a threat to human health and environment. Discarded computers, televisions, DVD's, stereos, copiers, fax machines, electric lamps, cell phones, audio equipment and batteries if improperly disposed can leach lead and other substances into soil and groundwater. Many of these products can be reused, refurbished, or recycled in an environmentally sound manner so that they are less harmful to the ecosystem. This paper highlights the hazards of e-wastes, the need for its appropriate management and options that can be implemented.

### INTRODUCTION

These days computer has become most common and widely used gadget in all kinds of activities ranging from schools, residences, offices to manufacturing industries. E-toxic components in computers could be summarized as circuit boards containing heavy metals like lead & cadmium; batteries containing cadmium; cathode ray tubes with lead oxide & barium; brominated flame retardants used on printed circuit boards, cables and plastic casing; poly vinyl chloride (PVC) coated copper cables and plastic computer casings that release highly toxic dioxins & furans when burnt to recover valuable metals; mercury switches; mercury in flat screens; poly chlorinated biphenyl's (PCB's) present in older capacitors; transformers; etc. Basel Action Network (BAN) estimates that the 500 million computers in the world contain 2.87 billion kg of plastics, 716.7 million kg of lead and 286,700 kg of mercury. The average 14-inch monitor uses a tube that contains an estimated 2.5 to 4 kg of lead. The lead can seep into the ground water from landfills thereby contaminating it. If the tube is crushed and burned, it emits toxic fumes into the air.

Industrial revolution followed by the advances in information technology during the last century has radically changed people's lifestyle. Although this development has helped the human race, mismanagement has led to new problems of contamination and pollution. The technical prowess acquired during the last century has posed a new challenge in the management of wastes. **For example**, personal computers (PCs) contain certain components, which are highly toxic, such as chlorinated and brominated substances, toxic gases, toxic metals, biologically active materials, acids, plastics and plastic additives. The hazardous content of these materials pose an environmental and health threat. Thus proper management is necessary while disposing or recycling e-wastes.

### EFFECT'S ON ENVIRONMENT AND HUMAN

Disposal of e-wastes is a particular problem faced in many regions across the globe. Computer wastes that are land filled produces contaminated leachates which eventually pollute the groundwater. Acids and sludge obtained from melting computer chips, if disposed on the ground causes acidification of soil, This is due to disposal of recycling wastes such as acids, sludge's etc. in rivers. Now water is being transported from faraway towns to cater to the demands of the population. Incineration of e-wastes can emit toxic fumes and gases, thereby polluting the surrounding air. Improperly monitored landfills can cause environmental hazards. Mercury will leach when certain electronic devices, such as circuit breakers are destroyed. The same is true for polychlorinated biphenyls (PCBs) from condensers. When brominated flame retardant plastic or cadmium containing plastics are land filled, both polybrominated diphenyl ethers (PBDE) and cadmium may leach into the soil and groundwater. It has been found that significant amounts of lead ion are dissolved from broken lead containing glass, such as the cone glass of cathode ray tubes, gets mixed with acid waters and are a common occurrence in landfills.

Not only does the leaching of mercury poses specific problems, the vaporization of metallic mercury and dim ethylene mercury, both part of Waste Electrical and Electronic Equipment (WEEE) is also of concern. In addition, uncontrolled fires may arise at landfills and this could be a frequent occurrence in many countries. When exposed to fire, metals and other chemical substances, such as the extremely toxic dioxins and furans (TCDD tetrachlorodibenzo-dioxin, PCDDs-polychlorinated dibenzodioxins. PBDDs-polybrominated dibenzo-dioxin and PCDFs polychlorinated dibenzo furans) from halogenated flame retardant products and PCB containing condensers can be emitted. The most dangerous form of burning e-waste is the open-air burning of plastics in order to recover copper and other metals. The toxic fall-out from open air burning affects both the local environment and broader global air currents, depositing highly toxic by products in many places throughout the world.

Table I summarizes the health effects of certain constituents in e-wastes. If these electronic items are discarded with other household garbage, the toxics pose a threat to both health and vital components of the ecosystem. In view of the ill-effects of hazardous wastes to both environment and health, several countries exhorted the need for a global agreement to address the problems and challenges posed by hazardous waste. Searching for cheaper ways to get rid of the wastes, "toxic traders" began shipping hazardous waste to developing countries. International outrage following these irresponsible activities led to the drafting and adoption of strategic plans and regulations at the Basel Convention. The Convention secretariat, in Geneva, Switzerland, facilitates and implementation of the Convention and related agreements. It also provides assistance and guidelines on legal and technical issues, gathers statistical data, and conducts training on the proper management of hazardous waste.

## **BASEL CONVENTION**

The fundamental aims of the Basel Convention are the control and reduction of trans boundary movements of hazardous and other wastes including the prevention and minimization of their generation, the environmentally sound management of such wastes and the active promotion of the transfer and use of technologies.

A Draft Strategic Plan has been proposed for the implementation of the Basel Convention. The Draft Strategic Plan takes into account existing regional plans, programmes or strategies, the decisions of the Conference of the Parties and its subsidiary bodies, ongoing project activities and process of international environmental governance and sustainable development. The Draft

requires action at all levels of society: training, information, communication, methodological tools, capacity building with financial support, transfer of know-how, knowledge and sound, proven cleaner technologies and processes to assist in the concrete implementation of the Basel Declaration. It also calls for the effective involvement and coordination by all concerned stakeholders as essential for achieving the aims of the Basel Declaration within the approach of common but differentiated responsibility.

**Table I: Effects of E-Waste constituent on health**

Source of e-wastes	Constituent	Health effects
Solder in printed circuit boards, glass panels and gaskets in computer monitors	Lead (Pb)	<ul style="list-style-type: none"> <li>• Damage to central and peripheral nervous systems, blood systems and kidney damage.</li> <li>• Affects brain development of children.</li> </ul>
Chip resistors and semiconductors	Cadmium (Cd)	<ul style="list-style-type: none"> <li>• Toxic irreversible effects on human health.</li> <li>• Accumulates in kidney and liver.</li> <li>• Causes neural damage.</li> <li>• Teratogenic.</li> </ul>
Relays and switches, printed circuit boards	Mercury (Hg)	<ul style="list-style-type: none"> <li>• Chronic damage to the brain.</li> <li>• Respiratory and skin disorders due to bioaccumulation in fishes.</li> </ul>
Corrosion protection of untreated and galvanized steel plates, decorator or hardener for steel housings	Hexavalent chromium (Cr) VI	<ul style="list-style-type: none"> <li>• Asthmatic bronchitis.</li> <li>• DNA damage.</li> </ul>
Cabling and computer housing	Plastics including PVC	<p>Burning produces dioxin. It causes</p> <ul style="list-style-type: none"> <li>• Reproductive and developmental problems;</li> <li>• Immune system damage;</li> <li>• Interfere with regulatory hormones</li> </ul>
Plastic housing of electronic equipments and circuit boards.	Brominated flame retardants (BFR)	<ul style="list-style-type: none"> <li>• Disrupts endocrine system functions</li> </ul>
Front panel of CRTs	Barium (Ba)	<p>Short term exposure causes:</p> <ul style="list-style-type: none"> <li>• Muscle weakness;</li> <li>• Damage to heart, liver and spleen.</li> </ul>
Motherboard	Beryllium (Be)	<ul style="list-style-type: none"> <li>• Carcinogenic (lung cancer)</li> <li>• Inhalation of fumes and dust. Causes chronic beryllium disease or beryllicosis.</li> <li>• Skin diseases such as warts.</li> </ul>

A set of interrelated and mutually supportive strategies are proposed to support the concrete implementation of the activities as indicated in the website ([www.basel.int/DraftstrateKJcpian4Seot.pdf](http://www.basel.int/DraftstrateKJcpian4Seot.pdf)) is described below:

7. To involve experts in designing communication tools for creating awareness at the highest level to promote the aims of the Basel Declaration on environmentally sound management and the ratification and implementation of the Basel Convention, its amendments and protocol with the emphasis on the short-term activities.
8. To engage and stimulate a group of interested parties to assist the secretariat in exploring fund raising strategies including the preparation of projects and in making full use of expertise in non-governmental organizations and other institutions in joint projects.
9. To motivate selective partners among various stakeholders to bring added value to making progress in the short-term.
10. To disseminate and make information easily accessible through the internet and other electronic and printed materials on the transfer of know-how, in particular through Basel Convention Regional Centers (BCRCs).
11. To undertake periodic review of activities in relation to the agreed indicators;
12. To collaborate with existing institutions and programmes to promote better use of cleaner technology and its transfer, methodology, economic instruments or policy to facilitate or support capacity-building for the environmentally sound management of hazardous and other wastes.

The Basel Convention brought about a respite to the Trans boundary movement of hazardous waste. India and other countries have ratified the convention. However United States (US) is not a party to the ban and is responsible for disposing hazardous waste, such as, e-waste to Asian countries even today. Developed countries such as US should enforce stricter legislations in their own country for the prevention of this horrifying act.

In the European Union where the annual quantity of electronic waste is likely to double in the next 12 years, the European Parliament recently passed legislation that will require manufacturers to take back their electronic products when consumers discard them. This is called Extended Producer Responsibility. It also mandates a timetable for phasing out most toxic substances in electronic products.

## **MANAGEMENT OF E-WASTES**

It is estimated that 75% of electronic items are stored due to uncertainty of how to manage it. These electronic junks lie unattended in houses, offices, warehouses etc. and normally mixed with household wastes, which are finally disposed off at landfills. This necessitates implementable management measures.

In industries management of e-waste should begin at the point of generation. This can be done by waste minimization techniques and by sustainable product design. Waste minimization in industries involves adopting:

- Inventory management,
- Production-process modification,
- Volume reduction,
- Recovery and reuse.

## **Inventory management**

Proper control over the materials used in the manufacturing process is an important way to reduce waste generation (Freeman, 1989). By reducing both the quantity of hazardous materials used in the process and the amount of excess raw materials in stock, the quantity of waste generated can be reduced. This can be done in two ways i.e. establishing material-purchase review and control procedures and inventory tracking system.

Developing review procedures for all material purchased is the first step in establishing an inventory management program. Procedures should require that all materials be approved prior to purchase. In the approval process all production materials are evaluated to examine if they contain hazardous constituents and whether alternative non-hazardous materials are available.

Another inventory management procedure for waste reduction is to ensure that only the needed quantity of a material is ordered. This will require the establishment of a strict inventory tracking system. Purchase procedures must be implemented which ensure that materials are ordered only on an as-needed basis and that only the amount needed for a specific period of time is ordered.

## **Production-process modification**

Changes can be made in the production process, which will reduce waste generation. This reduction can be accomplished by changing the materials used to make the product or by the more efficient use of input materials in the production process or both. Potential waste minimization techniques can be broken down into three categories:

- i) Improved operating and maintenance procedures,
- ii) Material change
- iii) Process-equipment modification.

Improvements in the operation and maintenance of process equipment can result in significant waste reduction. This can be accomplished by reviewing current operational procedures or lack of procedures and examination of the production process for ways to improve its efficiency. Instituting standard operation procedures can optimise the use of raw materials in the production process and reduce the potential for materials to be lost through leaks and spills. A strict maintenance program, which stresses corrective maintenance, can reduce waste generation caused by equipment failure. An employee-training program is a key element of any waste reduction program. Training should include correct operating and handling procedures, proper equipment use, recommended maintenance and inspection schedules, correct process control specifications and proper management of waste materials.

Hazardous materials used in either a product formulation or a production process may be replaced with a less hazardous or non-hazardous material. This is a very widely used technique and is applicable to most manufacturing processes. Implementation of this waste reduction technique may require only some minor process adjustments or it may require extensive new process equipment. For example, a circuit board manufacturer can replace solvent-based product with water-based flux and simultaneously replace solventvapor degreaser with detergent parts washer.

Installing more efficient process equipment or modifying existing equipment to take advantage of better production techniques can significantly reduce waste generation. New or updated equipment can use process materials more efficiently producing less waste. Additionally such efficiency reduces the number of rejected or off-specification products, thereby reducing the amount of material which has to be reworked or disposed of. Modifying existing process equipment can be a very cost-effective method of reducing waste generation. In many cases the modification can just be relatively simple changes in the way the materials are handled within the process to ensure that they are not wasted. For example, in many electronic manufacturing operations, which involve coating a product, such as electroplating or painting, chemicals are used to strip off coating from rejected products so that they can be recoated. These chemicals, which can include acids, caustics, cyanides etc are often a hazardous waste and must be properly managed. By reducing the number of parts that have to be reworked, the quantity of waste can be significantly reduced.

### **Volume reduction**

Volume reduction includes those techniques that remove the hazardous portion of a waste from a non-hazardous portion. These techniques are usually to reduce the volume, and thus the cost of disposing of a waste material. The techniques that can be used to reduce waste-stream volume can be divided into 2 general categories: source segregation and waste concentration. Segregation of wastes is in many cases a simple and economical technique for waste reduction. Wastes containing different types of metals can be treated separately so that the metal value in the sludge can be recovered. Concentration of a waste stream may increase the likelihood that the material can be recycled or reused. Methods include gravity and vacuum filtration, ultra filtration, reverse osmosis, freeze vaporization etc.

For example, an electronic component manufacturer can use compaction equipments to reduce volume of waste cathode ray-tube.

### **Recovery and reuse**

This technique could eliminate waste disposal costs, reduce raw material costs and provide income from a salvable waste. Waste can be recovered on-site, or at an off-site recovery facility, or through inter industry exchange. A number of physical and chemical techniques are available to reclaim a waste material such as reverse osmosis, electrolysis, condensation, electrolytic recovery, filtration, centrifugation etc. For example, a printed-circuit board manufacturer can use electrolytic recovery to reclaim metals from copper and tin-lead plating bath.

However recycling of hazardous products has little environmental benefit if it simply moves the hazards into secondary products that eventually have to be disposed of. Unless the goal is to redesign the product to use nonhazardous materials, such recycling is a false solution.

### **Sustainable product design**

Minimization of hazardous wastes should be at product design stage itself keeping in mind the following factors\*

- **Rethink the product:** Efforts should be made to design a product with fewer amounts of hazardous materials. For example, the efforts to reduce material use are reflected in some

new computer designs that are flatter, lighter and more integrated. Other companies propose centralized networks similar to the telephone system.

- **Use of renewable materials and energy:** Bio-based plastics are plastics made with plant-based chemicals or plant-produced polymers rather than from petrochemicals. Bio-based toners, glues and inks are used more frequently. Solar computers also exist but they are currently very expensive.
- **Use of non-renewable materials that are safer:** Because many of the materials used are non-renewable, designers could ensure the product is built for re-use, repair and/or upgradeability. Some computer manufacturers such as Dell and Gateway lease out their products thereby ensuring they get them back to further upgrade and lease out again.

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**REFERENCES:**

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# Emerging Trends of Virtual Machines in Education Sector

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## Abstract

For the past many years, education sector has enjoyed technological changes as the personal computer has moved from being a rarity to a mainstay of classrooms around the world. While the details can be technical and abstract, virtualization can have a large impact on education technology. Educational institutions can use virtual machines to teach a variety of information technology topics and courses. The scope of this paper is to present the technical aspects of virtual machine, the existing problem and the solution by using different type of virtualization of education. Lastly the paper also includes the various benefits of virtualization for education like hardware usability, total cost ownership (TCO), licensing and data security.

*Keywords: virtualization, virtual machines, total cost ownership, data security.*

## I. Introduction

Now the computing capabilities have improved drastically, and this has made it easier for preparing the environment to run virtual machines with less stress. This growth has also made it easier for utilizing the environment to run a number of virtual machines on a physical machine, simultaneously. Especially in a server environment, the use of virtual machine has become widely common. In addition, the utilization of virtual machines is also focused in the academic field. A crucial part of the teaching in computer and IT related subjects is continuous experimentation with the latest technology. An ideal learning environment in educational institutes should allow students to experience a broad range of hands on server operating systems and situations, and provide a real-life learning experience that will give them field type experiences in a controlled lab. Much of the educational training today involves preset labs that do not mimic real-world scenarios. The capability to provide such learning platform is usually capped by the budget allocated and affordable by the institute.

Virtual machine based computer labs provide a rich educational experience to its students by enabling them to work on virtual images of computer systems with variety of configurations and complexities while controlling the cost of enabling this experience. Deploying real servers within virtual machines opens up the teaching opportunities in the lab, and gives students testing and training on a simulated production environment with real-world issues rather than experimenting on a hypothetical test environment.

A virtual computer is a logical representation of a computer in software. By decoupling the physical hardware from the operating system, virtualization provides more operational flexibility and increases the utilization rate of the underlying physical hardware. Although virtualization is implemented primarily in software, many modern microprocessors now include hardware features explicitly designed to improve the efficiency of the virtualization process. In a traditional physical computer, one instance of the operating system supports one or more application programs. In a virtualization environment, a single physical computer runs software that abstracts the physical computer's resources so that they may be shared between multiple "virtual computers." Each virtual computer may be running a different operating system from all of the other virtual machines on the physical machine. A crash or other program error on any of the virtual machines leaves all of the other virtual machines unaffected.

Virtual machines combine technology resources, reusable software environments, and automation to enable hands-on training that can be delivered to anyone, anywhere, anytime.

The key components of a virtual machines are:

- Server-based repositories of virtual machine images (instructor and student class loads)
- The infrastructure (web portal, servers, storage, networking). that supports secure usage of the images
- Centralized management of the virtual machines and their usage.

On the other hand virtualization is the simulation of the software and/or hardware upon which other software runs. This simulated environment is called a virtual machine . There are many forms of virtualization, distinguished primarily by computing architecture layer, and virtualized components may include hardware platforms, operating systems (OS), storage devices, network devices or other resources. The virtualization on can be broadly classified as:

- **Hardware virtualization.** Run multiple operating systems (for example, Linux and Windows) on a single server.

- **Application virtualization.** Rapidly deploy applications, even those that conflict with each other, with low administrative overhead.
- **Presentation virtualization.** Execute an application on one computer and present it with another.
- **Desktop virtualization.** Run multiple operating systems (OSs) on a single desktop.
- **Server virtualization.** Allows a physical server to be partitioned to run multiple secure virtual servers.
- **Virtualization management.** Manage your entire virtual and physical infrastructures with a unified set of tools.

## II. Technical aspect of Virtual Machines

A virtual machine (VM) is a software implementation of a computing environment in which an operating system (OS) or program can be installed and run. The virtual machine typically emulates a physical computing environment, but requests for CPU, memory, hard disk, network and other hardware resources are managed by a virtualization layer which translates these requests to the underlying physical hardware. VMs are created within a virtualization layer, such as a hypervisor or a virtualization platform that runs on top of a client or server operating system. This operating system is known as the host OS. The virtualization layer can be used to create many individual, isolated VM environments.

Typically, guest operating systems and programs are not aware that they are running on a virtual platform and, as long as the VM's virtual platform is supported, this software can be installed in the same way it would be deployed to physical server hardware. For example, the guest OS might appear to have a physical hard disk attached to it, but actual I/O requests are translated by the virtualization layer so they actually occur against a file that is accessible by the host OS. Virtual machines also provide numerous advantages over the installation of OS's and software directly on physical hardware. Isolation ensures that applications and services that run within a VM cannot interfere with the host OS or other VMs. VMs can also be easily moved, copied, and reassigned between host servers to optimize hardware resource utilization. Administrators can also take advantage of virtual environments to simply backups, disaster recovery, new deployments and basic system administration tasks. The use of virtual machines also comes with

several important management considerations, many of which can be addressed through general systems administration best practices and tools that are designed to manage VMs.

VM features such as isolation, compatibility, and encapsulation allow to build virtual network topologies encompassing multiple, independent operating systems and networks. These features permits to create a “virtual kernel development environment in which operating systems can be developed, debugged, and rebooted in a shared computing lab environment without affecting other applications users”. This type of applications development and debugging support is particularly important in the network and operating system “development cycle of plan-implement-reboot-test-debug” and valuable for emphasizing troubleshooting in teaching system administration.

Most modern computers are powerful enough to run entire operating systems within your main operating systems, which means virtual machines are more commonplace today than ever. Following figure shows the major queries related to the virtual machine.

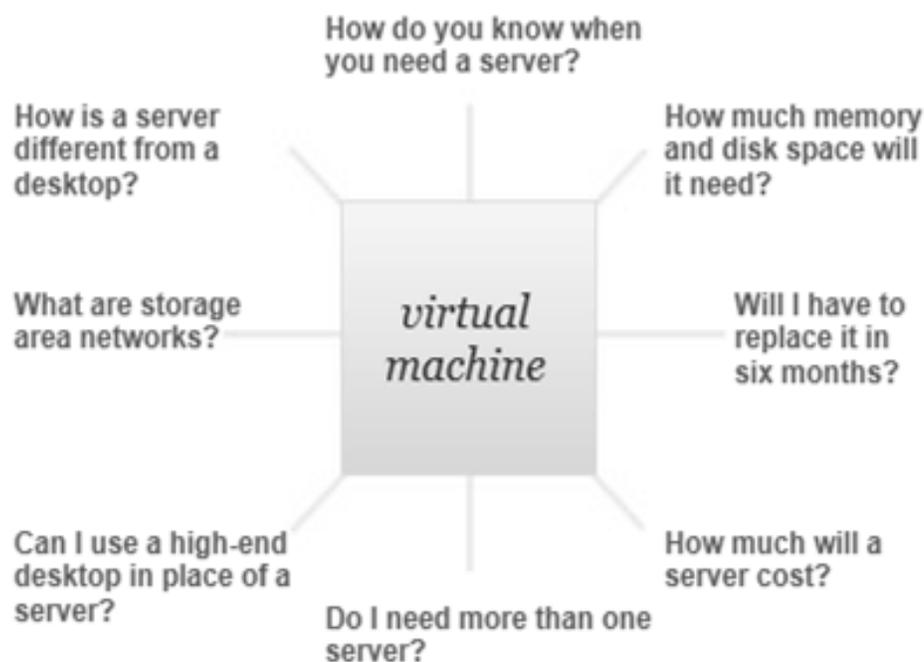


Figure 1: Major queries related to the virtual machine

### III. Existing Problems

Some computer science and management information system courses require students to install, configure, and experiment with operating system and network computing environments. Students

may use one or more operating systems, multiple configurations of a single operating system, and a variety of application software and other tools. Providing needed hardware and software in a laboratory that supports multiple courses and general-purpose uses can be cumbersome or impossible. Hands on training are known to have the maximum learning impact on students in professional courses. With the rapid advent of technology, students these days need to experiment with multiple computers at time for exploring high end technologies like client-server models, networking, systems debugging etc. But access to any traditional student computer lab even in the big institutes is challenged by its physical limitations of the lab resources. For example, students could only use certain machines configured with software that matched their assignment requirements. If that system was being used by another student, they had to wait.

Another issue is physical access to the lab. Students are generally limited by the hours that the lab are open and allocated to their specific batch. The problem becomes even more critical for the usage of pricy licensed software. Usually they are tied to a few physical computers in a few labs. So students need to queue up for a limited usage of the software. Sometimes, students have to work with the computer to try a task given by teachers. For example, in the OSS development course, students can choose some tasks shown in Table 1 for their themes for the hands-on training. To conduct this training in a quick and efficient manner, teachers have to prepare the working environment preliminary.

**Table 1.**Tasks provided by the textbook, as examples of the efficient use of ready-made resources in C-language programming.

Handling command-line option	GUI programming
Data structure	Computer graphics
Database application	Accessing devices
Networking	Encode / decode, text handling
Scientific calculation	Testing framework
Image processing	

In libraries there remain certain problems. For some libraries, there are differences between the version numbers of the libraries installed and those shown in the textbook. They are due to the

difference of the platforms. In addition, even if we want to construct a server in the network, it requires a complicated procedure, so there remains a problem that we have to use stand-alone version of a content management system (CMS), when students are trying to configure the CMS as part of the hands-on training.

#### **IV. Solutions using Virtualization**

Virtualization is a technique for hiding the physical characteristics of computing resources from the way in which other systems, applications or end users interact with those resources. As a practical matter, when you get a Google map on your cell phone or when you let your PC automatically shop for the lowest price, you are using virtualization. The concept of virtualization is very broad and can be applied to devices, servers, operating systems, applications and even networks.

The interest in virtualization has been growing rapidly in the IT industry because of inherent benefits like better resource utilization and ease of system manageability. The experimentation and use of virtualization as well as the simultaneous deployment of virtual software are increasingly getting popular and in use by educational institutions for research and teaching.

Virtualization in education can help to deliver faster and more reliable service, free up critical resources, and help reduce costs.

- Automate campus-wide application deployment.
- Manage applications for school labs.
- Run multiple operating systems, including legacy software.
- Enable students to access school applications from a variety of devices.

#### **Type of Virtualizations of Education**

Successfully managing multiple sites and an array of faculty, staff, and student needs is becoming increasingly difficult as budgets decrease and equipment and facilities age. Use virtualization in education to help cut costs, increase efficiency, and adapt quickly and automatically to changing requirements. There are the major three type of virtualization used in education: technological virtualization, geographical virtualization, and organizational virtualization. Each type has its own unique logic, its own distinctive advantages, and its characteristic problems. These categories may be characterized as follows.

**1] Technological Virtualization of Education:** Technological virtualization of education exists when the learning processes of students are mediated by technology. Technological virtualization is the creation of “virtual classrooms” through the use of technological frameworks such as Internet learning platforms, multi-media telecommunications systems, or other configurations of information and communications technology. Technological virtualization may take place either on the main facility of the university or as a component of distance education.

**2] Geographical Virtualization of Education:** Geographical virtualization is the distribution of educational activities (or the “classroom”) over multiple geographical locations. In other words, physical space may mediate the relationship between the students and the primary faculty and facilities of the university.

**3] Organizational Virtualization of Education:** Organizational virtualization is the use of inter-organizational arrangements for the delivery of educational programs. In other words, a university may choose to cooperate with, or enter into contractual arrangements with, other organizations for part, or all, of the educational process. A third party may mediate the relationship between students and the primary faculty of a university, in whole or part.

## **V. The Benefits of Virtualization for Education**

### **1] Hardware refresh cycle savings**

Most of the educational institute acquires student workstation computers over an extended period. The typical school is faced with the dilemma of whether to spend scarce technology budget dollars to expand the number of student workstations toward one per student or to replace the oldest machines with newer models that will better support current operating systems and desktop applications. Desktop virtualization provides a way to increase the useful life of existing older PCs while at the same time reducing the cost-per-seat of new student workstations.

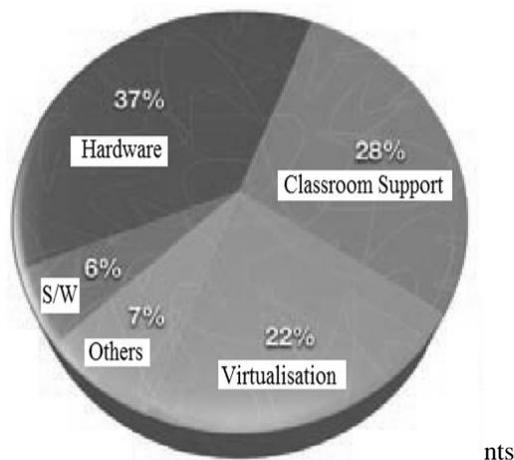
### **2] Effective use of disparate hardware**

Virtualization technologies provide a way to abstract the workspace environment in such a way as to be able to present educationally valid content on a broad range of devices. The virtualization layer abstracts the resources of the underlying computer and presents them in a standardized way to the virtual machine’s operating system and applications, any virtual machine can be run on any server in the data center. Older, smaller servers can support fewer virtual

machines than newer, larger servers. However, the management can interface to all of the virtual machines uniformly and can result in lower administration costs.

### 3] Lower total cost of ownership

The management of virtualized PC clients takes place mostly in the data center rather than in classrooms, administration is both simplified and standardized. Many system set-up and configuration operations that require access to physical computers in traditional computing environments become simple file copy operations in a virtualized desktop environment. Virtualization technology helps the customers realize significant energy and cost savings while addressing critical data center capacity issues. Virtual client computing is one of the most powerful tools available in reducing student computing the total cost of ownership. Figure 2 shows the components associated with the total cost of ownership (TCO) of any personal computers.



### 4] Stretching software licensing cost

With virtual desktop workstations, you need only purchase software licenses for the peak instantaneous usage of any given product. The licensed software runs in virtual PC clients on the server rather than on individual machines, it's easier to control. Limiting usage of a particular program to the number of licenses on hand becomes a manageable task. Just as virtual servers maximize utilization of physical server resources, virtual PC clients maximize utilization of software licenses.

### 5] Better data security

In a virtual desktop environment, software, data and most of the hardware elements that comprise the desktop workstation are in the data center and not on the desktop. This makes virtual PC clients inherently more secure since all of the data resides on servers in a secure data

center rather than spread over desktops. The inherent security provided by virtualizing client machines lets you open the network to outside connections without compromising security. Teachers can use virtual clients running on district-owned notebooks or on their own personal PCs without the risk of insecure, virus-contaminated computers infecting the existing network. Likewise, students using virtual client technology can connect to the existing network using family-owned hardware without compromising the security of the network.

#### **6] Higher equipment utilization**

By isolating applications on dedicated virtual machines, the machine's available resources become the factor limiting the number of applications that can be supported, instead of the complexity of supporting multiple applications that share a single operating system environment. On the other hand server virtualization allows each server-based product to run in its own virtual server free of interactions with other server-based products running in other virtual servers on the same physical server. Additional server-based products running in dedicated virtual servers can be added to the physical server until the resources of the physical server are fully utilized. When a new piece of server-based software (such as a learning management system) is deployed, the IT department must determine whether that system requires a dedicated server or if it can coexist with other systems on an existing server.

## **VI. Conclusion**

Teaching courses that provide hands-on instruction in information technology can be expensive and challenging. The use of virtual machines, allows considerable flexibility over the use of dedicated-use computers. Virtualization is a powerful technology trend that is already underway and the outlook is that it will grow very rapidly. Educators owe it to themselves and their institutions to examine the opportunity very closely and see when and how they can start taking advantage of this exciting capability. Virtualization lets your IT staff deliver better service at lower cost and with greater security and reliability.

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*E-commerce in India With special reference to credit cards market in India*

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***Abstract:***

With the emergence of internet and the World Wide Web new methods of carrying out business transactions using the World Wide Web began to be explored. Electronic Commerce emerged as a very important application of the World Wide Web. Electronic Commerce (EC) has changed and is still changing the way business is conducted around the world. It is cheaper and faster to carry out business transactions within an organization and among organizations electronically using the network connection. E-commerce has evolved as one of the means of relationship within the business processes. It can be in the form of electronic advertising, electronic payment system, electronic marketing, electronic customer support service and electronic order and delivery. E-commerce in India is still in nascent stage, but even the most-pessimistic projections indicate a boom. India's ecommerce industry is on the growth curve and experiencing a spurt in growth. Credits cards are the facilitators of E-commerce. Banks facilitate E-commerce by providing the most vital trade instrument, namely the Credit or Debit Card, without which E-commerce would be impossible.

***Keywords:*** E-commerce, business processes, electronic marketplaces, credit cards, India

### ***Introduction:***

In the emerging global economy, e-commerce and e-business have increasingly become a necessary component of business strategy and a strong catalyst for economic development. Internet has recently become the important ingredient of quick and rapid business. It may be for communication, explorations, connecting with people or for official purposes, 'internet' has become the central-hub for all. In the present dynamic scenario, ecommerce market in the B2C space is growing in demand as well as in the array of services. The transition to online purchasing from traditional purchasing is taking a long time in the Indian market. E commerce includes not only buying and selling goods over Internet, but also various business processes within individual organizations that support the goal. Electronic commerce is not just another mechanism to sustain and enhance existing business practices. It is a paradigm shift that is radically changing traditional ways of doing business. (MacGregor and Vrazalic, 2008; Kendall & Kendall, 2001; Kuljis et al, 1998; Fuller, 2000). Existing business processes must be seamlessly integrated with the new, electronic form of interaction with suppliers and customers (Jansen-Vullers, and Reijers, 2004). In spite of this, little research has focused on the relationship between business process and successful adoption of electronic commerce by using credit cards. This study focuses on ecommerce for two key reasons. First, ecommerce is very important for economic development in developing countries such as India. The second reason is due to internet all the enterprises are in a very good position to adapt to new technology like ecommerce.

### ***Concepts and Definitions:***

Electronic commerce or e-commerce refers to a wide range of online business activities for products and services. It also pertains to "any form of business transaction in which the parties interact electronically rather than by physical exchanges or direct physical contact."

E-commerce is usually associated with buying and selling over the Internet, or conducting any transaction involving the transfer of ownership or rights to use goods or services through a computer-mediated network. E-commerce is the use of electronic communications and digital information processing technology in business transactions to create, transform, and redefine relationships for value creation between or among organizations, and between organizations and

individuals. Online businesses like financial services, travel, entertainment, and groceries are all likely to grow.

### ***Different types of E-commerce:***

The major different types of e-commerce are: business-to-business (B2B); business to-consumer (B2C); business-to-government (B2G); consumer-to-consumer (C2C); and mobile commerce (m-commerce).

### ***E-commerce in India***

India has an internet user base of about 137 million as of June 2012. The penetration of e-commerce is low compared to markets like the United States and the United Kingdom but is growing at a much faster rate with a large number of new entrants. The key drivers for growth in E-commerce in India are as follows.

- Increasing broadband Internet (growing at 20% MoM) and 3G penetration.
- Rising standards of living and a burgeoning, upwardly mobile middle class with high disposable incomes
- Availability of much wider product range (including long tail and Direct Imports) compared to what is available at brick and mortar retailers
- Busy lifestyles, urban traffic congestion and lack of time for offline shopping
- Lower prices compared to brick and mortar retail driven by disintermediation and reduced inventory and real estate costs
- Increased usage of online classified sites, with more consumer buying and selling second-hand goods
- Evolution of the online marketplace model with sites like ebay, Infibeam, and Tradus

Many sites are now selling a diverse range of products and services from flowers, greeting cards, and movie tickets to groceries, electronic gadgets, and computers. With stock exchanges coming online the time for true e-commerce in India has finally arrived. On the negative side there are many challenges faced by e-commerce sites in India. The relatively small credit card population and lack of uniform credit agencies create a variety of payment challenges unknown in India. Delivery of goods to consumer by couriers and postal services is not very reliable in smaller

cities, towns and rural areas. However, many Indian Banks have put the Internet banking facilities.

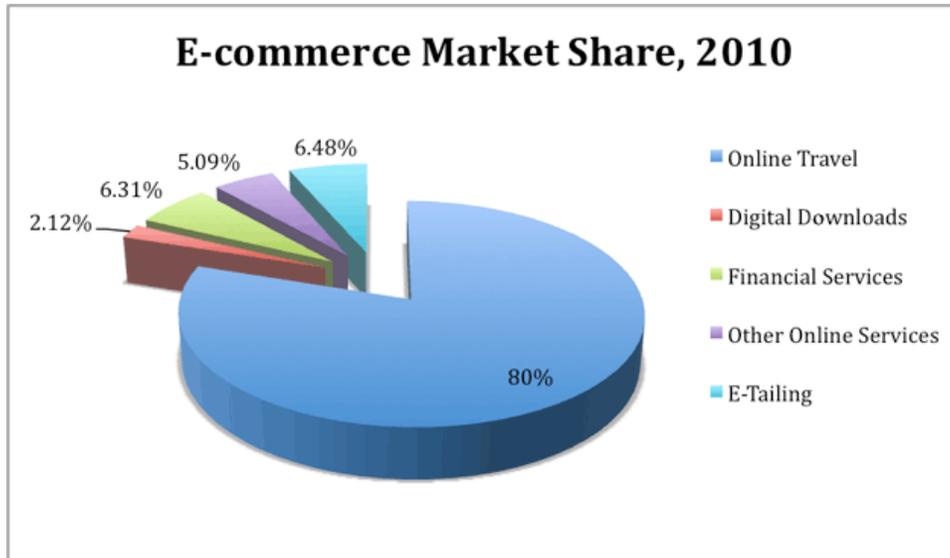


Figure 1.

E-Tailing and digital downloads are expected to grow at a faster rate, while online travel will continue to rule the major proportion of market share. Due to increased e-commerce initiatives and awareness by brands, e-Tailing has experienced decent growth.

India's e-commerce market was worth about \$2.5 billion in 2009, it went up to \$6.3 billion in 2011 and to \$14 billion in 2012. About 75% of this is travel related (airline tickets, railway tickets, hotel bookings, online mobile recharge etc.). Online Retailing comprises about 12.5% (\$300 Million as of 2009). India has close to 10 million online shoppers and is growing at an estimated 30% CAGR vis-à-vis a global growth rate of 8–10%. Electronics and Apparel are the biggest categories in terms of sales.

### ***Future trends:***

India's *retail market* is estimated at \$470 billion in 2011 and is expected to grow to \$675 Bn by 2016 and \$850 Bn by 2020, – estimated CAGR of 7%. According to Forrester, the e-commerce market in India is set to grow the fastest within the Asia-Pacific Region at a CAGR of over 57% between 2012–16. India's e-tailing market in 2011 was about \$600 Mn and expected to touch \$9 Bn by 2016 and \$70 Bn by 2020 – estimated CAGR of 61%.

***List of Top E-Commerce Companies of India:***

**1) ASA Systel Communications Pvt Ltd:**

It is a leading E-commerce company in India which provides innovative and superb quality web services which encompasses the building of e-commerce related websites and portals. The company also uses the latest payment modes and security. The company has its offices in Chennai, Lucknow and will shortly set up offices in Delhi, Mumbai, Kathmandu, Bhopal.

**2) Candid Info:**

This Indian E-commerce company is based in New Delhi. It is a renowned Offshore Outsource Web designing development e-commerce Company. It offers off shore web development, designing, and SEO solutions for large corporations and SME's.

**3) Chenab Information Technologies Private Limited:**

This E-commerce company in India comprises of web enabled business and web bases services, airline and security systems by using the internet technologies and tools of the state of the art. The company has three Software Development centers in Mumbai and the overseas branch office in New York.

**4) Euro link Systems Limited:** This leading E-commerce company provides consulting and e-business solutions, FlexTCA Systems, Trillium Protocol services to the global community. The company has its office in England, U.S, Switzerland, and India with about 200 employee strength.

**5) HashPro Technologies:** It offers e-business and traditional analysis, development, implementation, design and strategic planning. It is a leader in the provider of integrated talent management software organization in India. It is key technology consulting provider. It renders services like the E-commerce Hosting, Internet Marketing and Human Resources. The e-Workforce initiative of the company will enable the company to become a 100 percent e-Corporation.

**6) Compare Info Base:** The company is leading provider of e-commerce portals and IT solutions. The company manages about 1500 websites and portals with 4000 domain names. It has web presence in Maps, Software Development, GIS Travel, Education, Media, and Greetings etc. It specializes in Content development services, Website development services; PHP Programming & Development etc. It has its office in Mumbai, Kolkata and Delhi.

**7) Sanver E-solutions:** This Company is based in Mumbai. They believe that Information Technology is a way to the business objectives. It is an IT consulting and Solutions Provider which offers personalized and personal business solutions using Information and Communication Technology.

**8) Planet Asia:** This E-commerce company in India uses track record and deep experience in externalized applications to produce high quality B2SPEC(Business to Partner, Supplier, Customer) solutions to global enterprises.

**9) Candid Web Technology-** This fast growing E-Commerce Company in India is a provider of Com Web Solutions for the design and development of dynamic web sites .The clients of the e-commerce company spans from the small scale companies to corporate organizations.

**10) Trisoft Design:** Trisoft Systems is a software services company that offers solutions exclusively on the Microsoft Platform to customers worldwide. 10 years of experience on the Microsoft Platform puts the company at the forefront of .Net Technology.

### ***Facilitators of e-commerce:***

**A. Information directories:** The products and services are listed with appropriate sub-headings to make it easy for a serious information-seeker to find what he wants. Allied services provided by them: Message boards, chat rooms, forums, etc.

**B. Banks:**

**1) Net banking/phone banking:** This is an online banking facility available for savings account holders as well as current account holders. Some of the special Net banking services are: Demat accounts for sale/purchase of stocks and shares, Foreign Exchange services, Direct/Instant payment of bills on the account-holder's behalf, Financial Planning.

**2) Credit/Debit Cards-** Banks facilitate E-commerce by providing the most vital trade instrument, namely the Credit or Debit Card, without which E-commerce would be impossible.

E-commerce credit card payment system

The amount of trade conducted electronically has grown extraordinarily with widespread Internet usage. The use of commerce is conducted in this way, spurring and drawing on innovations in electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web at least at some point in the transaction's lifecycle, although it can encompass a wider range of technologies such as e-mail as well.

A large percentage of electronic commerce is conducted entirely electronically for virtual items such as access to premium content on a website, but most electronic commerce involves the transportation of physical items in some way. Online retailers are sometimes known as e-tailers and online retail is sometimes known as e-tail. Almost all big retailers have electronic commerce presence on the World Wide Web.

Electronic commerce that is conducted between businesses is referred to as business-to-business or B2B. B2B can be open to all interested parties (e.g. commodity market) or limited to specific, pre-qualified participants (private electronic market). Electronic commerce that is conducted between businesses and consumers, on the other hand, is referred to as business-to-consumer or B2C. This is the type of electronic commerce conducted by companies such as Amazon.com. Online shopping is a form of electronic commerce where the buyer is directly online to the seller's computer usually via the internet. There is no intermediary service. The sale and purchase transaction is completed electronically and interactively in real-time such as

Amazon.com for new books. If an intermediary is present, then the sale and purchase transaction is called electronic commerce such as eBay.com.

As per Laudon and Traver, 2007 this payment system has been widely accepted by consumers and merchants throughout the world, and by far the most popular methods of payments especially in the retail markets. Laudon and Traver, (2007) also highlighted some advantages over the traditional modes of payment. Some of the most important are: privacy, integrity, compatibility, good transaction efficiency, acceptability, convenience, mobility, low financial risk and anonymity.

This flow of ecommerce payment system can be better understood from the flow of the system below.

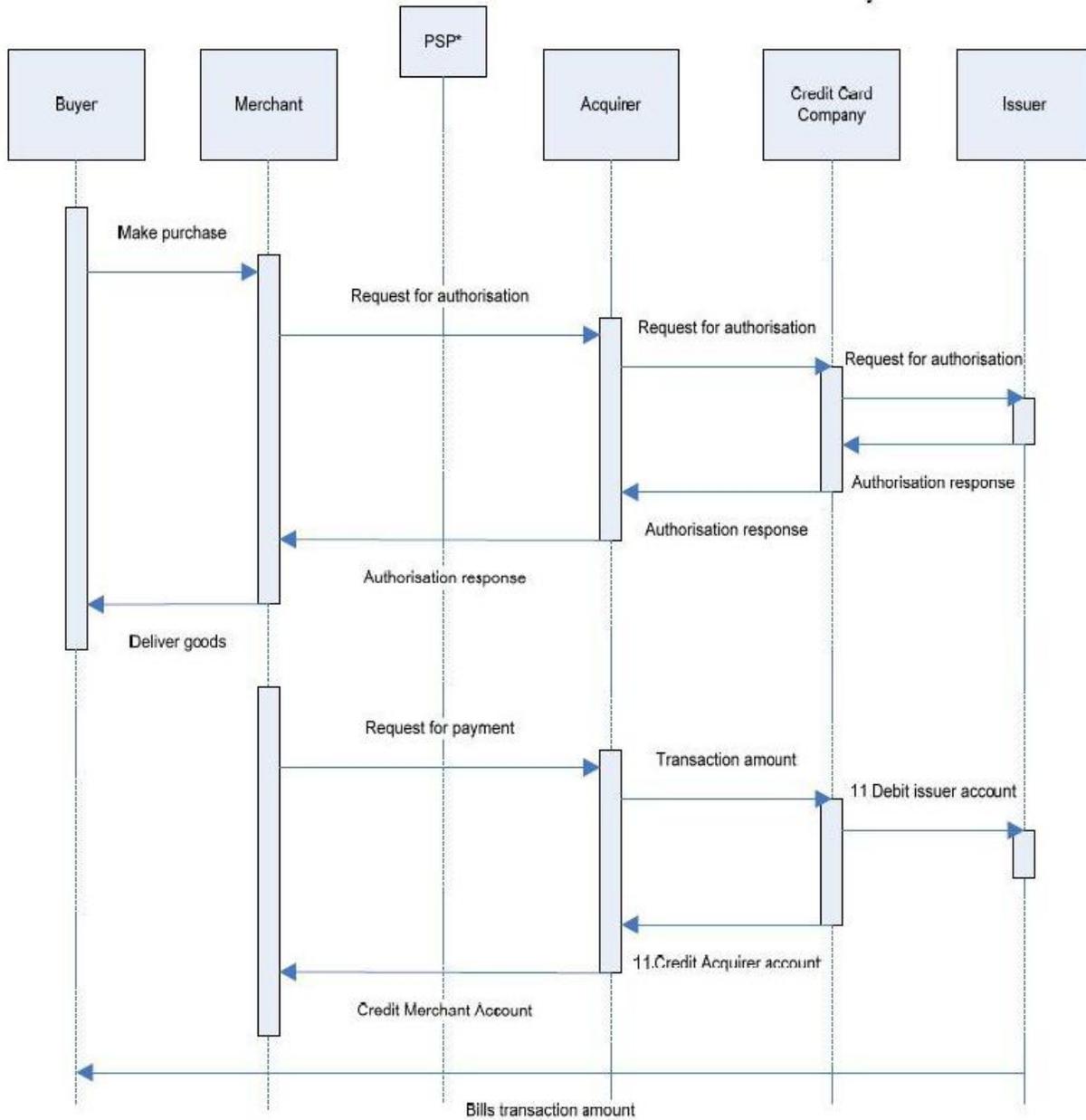


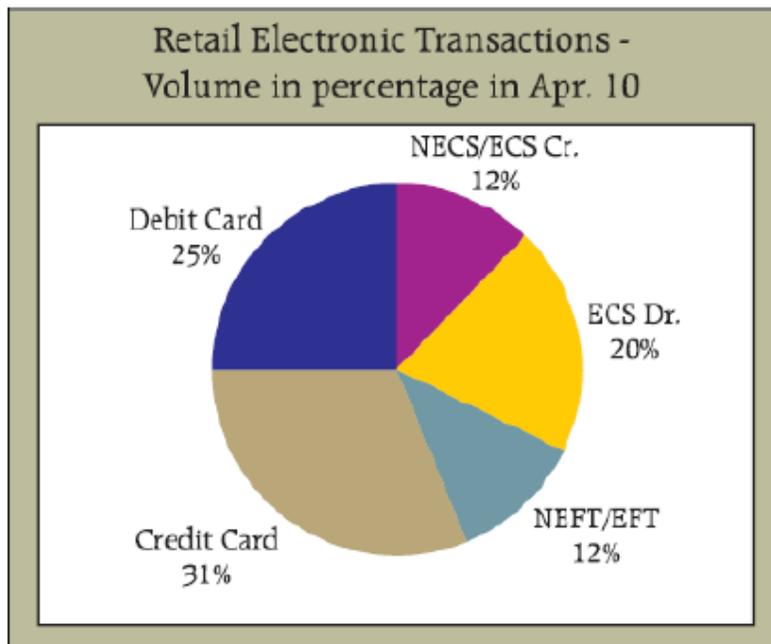
Figure2 : Online Credit Card (VISA) Transaction Process

***Credit cards in India:***

In context of the Indian market, the leading credit card service providers are ICICI, HDFC, HSBC and Standard Chartered to name a few. These financial institutions have tried their hands

on ensuring value-addition while offering customer-friendly credit card deals. The Best credit cards in India are usually meant for specific user group such as women, students and small business owners. These cards are offered to the prospective customers with appealing deals. Statistics have clearly revealed that the numbers of credit card holders in India are close to 22 million as of January, 2007. It has been also revealed that the increasing consumerism in the country has led to a two-fold increase in the number of credit card transactions from FY 2003-04 to 2005-06. The trends were as favorable as ever in the financial years, FY 2006-07 and 2007-08 and the same is likely to continue in the coming financial years.

A snapshot, as in Figure below, indicates that in volume terms 56% of retail electronic transactions are through credit and debit cards (though in value terms, it is only 10%).



*Source: RBI Bulletin June 2010*

Figure 3.

In India, the number of valid credit and debit cards in circulation is 2,000 lakh. During 2009- 10, the number of transactions on such cards had been of the order of 4,040 lakh and the amount of transactions ` 89,270 crore. The number of card transactions increased by 193% during the period 2003-04 to 2009-10.

Table 1

Credit Card Payments						
Year / Period	Number of Valid Cards as of End-March (Lakh)	Number of Transactions (Lakh)	Average Number of Transactions per Card	Amount of Transactions (Rs. Crore)	Average Amount per Transaction (Rs.)	Average Amount of Transactions per Card (Rs.)
2003-04	—	1001.79	—	17662.72	1763	
2004-05	—	1294.72 (29%)	—	25698.36 (45%)	1984	
2005-06	173.27	1560.86 (21%)	—	33886.47 (32%)	2171	
2006-07	231.23 (33%)	1695.36 (9%)	8.38	41361.31 (22%)	2440	20451
2007-08	275.47 (19%)	2282.03 (35%)	9.01	57984.73 (40%)	2541	22887 (12%)
2008-09	246.99 (-10%)	2585.61 (14%)	9.94	65355.80 (13%)	2518	25018 (9%)
2009-10	183.19 (-26%)	2340.65 (-10%)	10.88	62851.86 (-4%)	2685	29221 (17%)

Source: RBI Bulletin June 2010

Note: 1. The figures within parenthesis indicate % increase over previous year

2. The average number (amount) of transactions per card in a year is number (amount) of transactions in the year divided by mean value of the end-march figures of number of valid cards for the year and previous year

### ***Future of Credit cards in India:***

With high and industry-favorable figures as above, there is no doubt that the rise in number of credit card providers and users have come of age. With these positively-influencing trends expected to continue in the near and far-future, the writing is on the wall. The credit card industry is likely to soar more than any industry segment. To add to that, easy and continuous payments' structures with each passing day and with every Bank poised to expand its network, the Indian credit card user community is the biggest beneficiary. The intensifying competition prevalent in the present day Indian credit card market has further fuelled the usage of **credit cards** in the country like never-before. In an aim to overpower the peers and to sustain and prosper themselves, the Banks and financial institutions have started cutting down the interest rates and offering lucrative deals.

Payment card systems such as MasterCard and Visa involve four main parties, i.e.,

- the cardholder;
- the institution that provides the card to the cardholder – the issuer;
- the merchant that provides the goods or services to the cardholder; and
- the institution that provides services to the merchant – the acquirer

Thus, the system consists of a customer who holds a credit / debit card from his issuing bank (issuer), a merchant who has been given the facility of accepting credit cards by his acquiring bank (acquirer) and the payment network MasterCard / Visa, etc. In this system, first a merchant who decides to accept credit or debit cards in exchange for goods or services establishes a merchant account by forming a relationship with an acquiring bank. This relationship enables the merchant to receive sale proceeds from credit / debit card purchases through credits in his account. However, the acquirer, while paying such credits to the merchant, applies a Merchant Discount Rate (MDR), which is a proportion of the sale proceed that is paid by the merchant to the acquirer in consideration for card acceptance services. Thus, the MDR is a percentage of sales that a merchant pays to the acquiring bank to process credit / debit card transactions. In India on MasterCard and Visa card transactions this rate generally varies from 1% to 2%. The MDR is generally greater for premium cards than for standard cards.

Thus, considering the average MDR to be 1.5%, the revenue generated in the card business, through MDR only, is of the order of ₹ 1,340 crore. A component of MDR on every card transaction, called interchange, flows from the merchant acquiring bank to the card issuing bank. The settlement and credit transactions between the issuer and the acquirer are done using the network of MasterCard / Visa, who also gets a share of the fee in exchange. Figure 4 illustrates a typical transaction in a four-party card system.

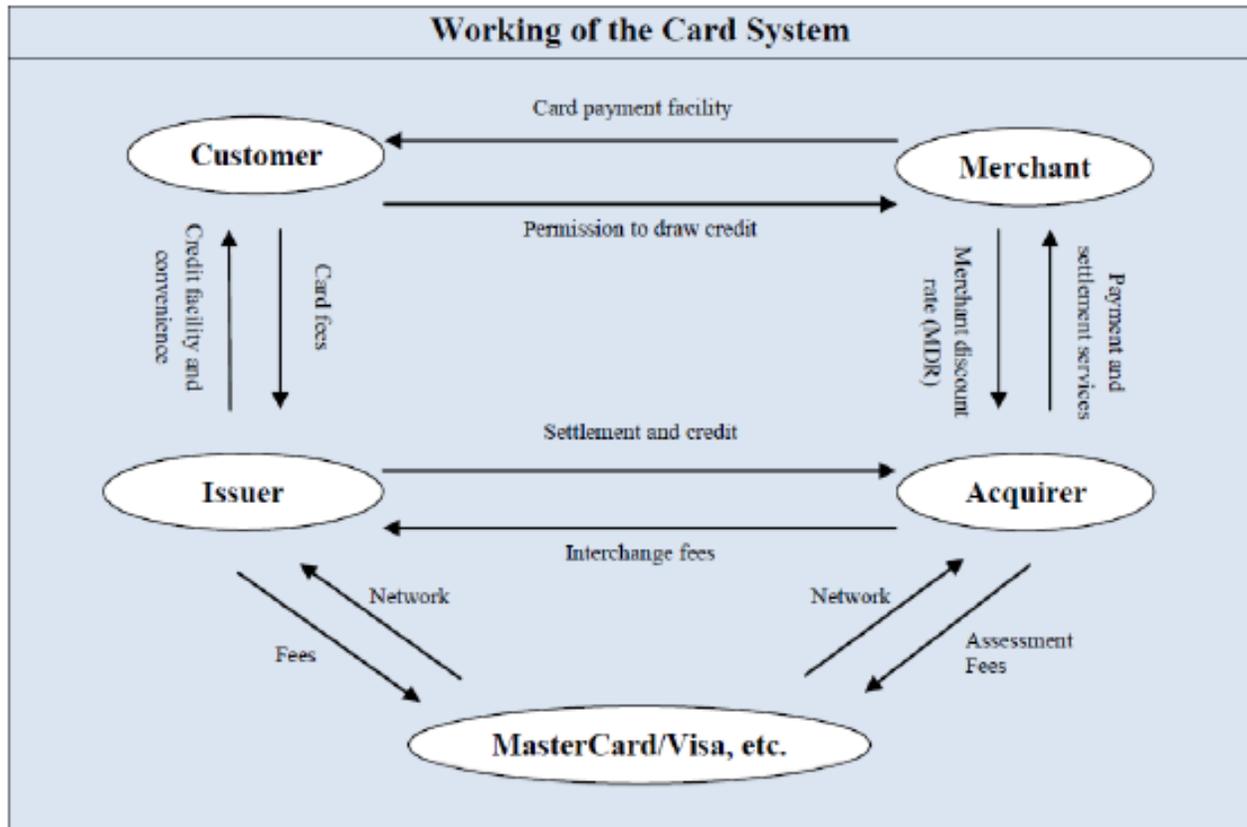


Figure 4.

In practical terms, when a cardholder uses his or her card to make a purchase from a merchant, the acquiring institution makes a payment to the merchant equal to the retail price less the MDR. The acquiring institution receives a payment from the card-issuing institution equal to the retail price less an interchange fee. The average interchange fee on MasterCard and Visa card transactions is approximately two-thirds of MDR. The interchange fee being a cost from the perspective of the acquiring institution affects the level of MDR. The interchange fee, however, is a source of revenue from the perspective of issuing institutions. Issuers incur a variety of costs like costs for, marketing to new cardholders, providing service to existing cardholders (including call centre services), extending credit, bearing risk, absorbing default, preventing fraud, etc. Revenues from interchange fees help issuers recover costs and help issuers hold down cardholder fees and maintain card benefits such as interest-free periods and reward programs

It may be noted that in India a gas station (petrol pump) merchant does not charge extra, but it is the issuing bank who may charge some extra money from the cardholder for using card at gas station. Also, for purchases of train tickets over counters / net it is the bank who charges an

additional amount and not the railways. Currently, such charges are 2.5% of the actual transaction amount (the exception being for train tickets bought over the net for which a rate of 1.8% applies). This raises a vital question on the reasonability of banks' charging 2.5% from cardholders for purchases of petrol / diesel / CNG at gas stations or charging 2.5% from cardholders for train ticket purchases at railway ticket counters. Based on general interaction with banks, it transpires that over the years, the average MDR has been decreasing. However, MasterCard / Visa found it justified to retain the 2.5% charge at gas stations and on train ticket purchases. Furthermore, one needs to take into consideration that non-payment of any merchant service charges by gas station owners or railways amounts to acceptance by MasterCard / Visa that there is no value addition in terms of convenience gained by these merchants for accepting card payment as a mode of receiving sale proceeds. This may be in contradiction to the general view floated by MasterCard / Visa that MDR includes a charge that merchants pay for the convenience gained in non-handling of cash.

### ***Credit cards and interchange fees:***

Credit cards and Debit cards: In case of Credit Cards and Debit Cards there is no visible charge on the customer for use of cards at merchant establishments. Charges are levied directly on customers only at few locations like petrol stations etc. and for cash withdrawal at ATMs. In all other cases, charges levied by banks have been for the credit availed (beyond the due date). In credit cards and debit cards the interchange fees - the charges paid by the merchant are an integral part of the pricing structure of credit and debit card transactions. As this fee is levied on the merchant establishment, there is differential cost for the merchant for payment received by cards or cash. This serves as a disincentive for merchants to encourage payments by cards. This was observed as the reason why the use of cards for purchase of valuable items and goods continue to be discouraged by the merchants; if payments are made by cards the interchange fee is recovered from the customer. This is because, in case of larger value purchases, the merchants find it unremunerative to absorb this interchange fee.

It is obvious that for increasing business in the area of credit / debit cards, apart from issuing more credit / debit cards, the banks try to acquire and thus bring more and more merchants under the umbrella. Any card transaction leads to sharing the revenue earned from use of credit / debit cards. The share holders are primarily the (1) MasterCard / Visa, (2) card issuing bank and (3)

merchant acquiring bank. Every merchant acquiring bank is required to incorporate a clause in their agreement binding the merchant not to pass on any component of the MDR to a customer using a payment card. In India, though competition guides acquirer-merchant pricing policies, it is generally understood that interchange fees is one component of the MDR established by acquirers and issuers under guidelines provided by the card companies. The implementation of proper interchange rates is necessary and also very crucial for maintaining a strong and vibrant card payments network. The banks and MasterCard / Visa generate revenue and make profits in the card system by charging fees in form of MDR. In 2008, a study had been carried out on —Acceptability Standards in Credit Card Industry . It observed the behaviour of the players in the credit card industry on the issue of surcharge. Surcharge is a charge to cardholders for use of credit / debit card at merchant establishments. It may be worthy to note that when a merchant decides to pass some component of the MDR to the customer, he may well be justified in doing so in case the MDR set by the acquirer bank is disproportionate to his profit margins or gains he has on account of increase in sales by accepting credit / debit cards. The outcome of the study indicated slipshod attitude on the part of banks to address the issue in the correct perspective. Some banks were reluctant to comment either way while some appeared to favour different treatment by merchants on receipts of cash and card. In fact MasterCard and Visa also do not discourage different treatment to cash and credit card payments through their policy of cash discounts.

Priceless?The Economic Costs of Credit Card Merchant Restraints| by Levitin, Adam J.

Priceless is how MasterCard has touted the benefits of its cards in a successful decade-long ad campaign. But this is hardly the case. Credit cards and debit cards create significant costs for merchants and, most strikingly, for consumers who do not use cards. In some countries, including India, merchants are not allowed to add a surcharge for payment card transactions because of legal or contractual restrictions, but they are allowed to give cash discounts. Even if differential pricing based on the payment instrument used is not common, the possibility to do so may enhance the merchants' bargaining power in negotiating their fees. If merchants charged different prices for cash and card then cash-paying consumers would be paying less vis-à-vis card-paying customers.

Schwartz and Vincent (2006) studied the distributional effects among cash and card users with and without no-surcharge rules .They find that in the absence of differential pricing based on the

payment instrument used, the network profit increases while it harms cash users and merchants. The payment network prefers to limit the merchant's ability to separate card and cash users by forcing merchants to charge a uniform price to all of its customers. When feasible, the payment network prefers rebates given to card users. Granting such rebates to card users boosts their demand, while simultaneously forcing merchants to absorb part of the corresponding rise in the merchant fee, because any resulting uniform increase in the good's price would apply equally to cash users. In this way, the network uses rebates to indirectly extract surplus from cash-paying customers in the form of partial hike in prices.

### ***Conclusion:***

As E-commerce in India is at nascent stage but growing at a very high rate, these competition issues may arise in the near future. E-commerce may become a platform for the anti-competitive agreements between the companies. There are some international cases where anti-trust issues have come up with E-commerce as a platform.

Credit cards being the facilitators of E-commerce, some international case studies are done where anti-competitive agreements and anti-trust issues between the credit cards companies have come up. Credit cards market in India is growing at a fast rate. These issues may come up in India in the near future. The implementation of proper interchange rates is necessary and also very crucial for maintaining a strong and vibrant card payments network.

CCI must keep an eye on developing E-commerce market in India as well as the credit cards companies that might indulge in the anti-competitive practices to increase their own profits.

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