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Architectural Framework and Business Models in Electronic Commerce: Its Characteristics and Benefits

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ABSTRACT : Electronic commerce (E-commerce) is involved in buying and selling of goods and services or in transmitting of funds or data using computer or electronic networks. Electronic commerce facilitates trading in various services including information services, financial and legal services using computer technologies such as websites, internet and e-mail. In this contemporary business methodology, the needs of organizations, merchants and consumers are addressed promptly to cut selling costs, while improving the quality of goods and services due to increase in the speed of service delivery using computer network. Modern electronic commerce typically uses the World Wide Web for at least one part of the transaction's life cycle, although it may also use other technologies such as e-mail. Moreover, E-commerce also has its utility in marketing of agriculture products on the basis of consumer trends and it facilitates the farmers about the up-to-date market information on prices of farm commodities, fertilizer and pesticide inputs using computer networks such as the internet and online shopping web sites. E-commerce system could also be developed for providing informed decisions about the public or industry requirement of particular crops and commodities as well as about best time for marketing the farm produce. Architectural framework of E-commerce includes Application layer, Interface and support services, Management layer, Messaging layer, Middleware services and Network service layer. To facilitate the integration of data and software for better applications, it make use of various existing resources like DBMS, data repository, computer languages, software agent based transactions, monitors or communication protocols. Thus, E-commerce offers many advantages to customers, business, society and nation. The limitations of E-commerce include security, lack of privacy, tax issue, product suitability, cultural obstacles, high labour cost, legal issues and huge technological cost. In this article, E-commerce characteristics, architectural framework, its applications and limitations will be discussed with reference to present scenario to provide expert knowledge/information to the consumers, businessmen and farming community over the network.
Keywords - E-commerce, Computer technology, E-mail, Consumer, Business, Websites, Internet.

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I. INTRODUCTION

Electronic commerce facilitates trading in various products and services including information services, financial and legal services using computer technologies such as websites, internet and e-mail. It has applications in diverse fields such as online delivery of digital content and online shopping web sites for retail sales direct to consumers. It also includes remote banking, electronic trading of shares, supply chain management, public procurement and providing or participating in online market places, which process third-party business-to-consumer or consumer-to-consumer sales. Moreover, E-commerce deals with direct consumer marketing and in collecting and using demographic data through web contacts and social media, online shopping, advertisement, marketing of agriculture products, It is also involved in marketing/launching of new products and services to prospective and established customers using computer networks such as the internet or fax. Electronic commerce also provides better markets resulting from informed decisions about future crops and commodities and best time and place to sell and buy goods [1, 2]. It also provides up-to-date market information on prices for commodities, inputs and consumer trends. Systems could be developed for betterment of markets resulting from informed decisions about future crops, agri-produce and commodities as well as about best time and place to sell and buy the goods. E-commerce make use of technologies such as mobile commerce, electronic fund transfer, supply chain management, electronic data interchange (EDI), inventory management systems, automated data collection systems, internet marketing and online transaction processing. Electronic commerce has also played significant role in import-export business. Importers can now make enquiries about the products, their manufacturers, quality, price, terms and conditions through use of internet. Exporters

can also make enquiries about suitable customers. Payments can be made by electronic modes including internet money transfer.

The volume of cross-border electronic commerce (CBEC) is quickly becoming a new form of international trade. Behind this development, information technology plays a critical role in developing consumer informedness [3]. As social commerce is proliferating and evolving across many emerging markets, familiarity and trust play a major role in mediating exchange between sellers and buyers, and its positive effects in buyers' perceived usefulness of each social commerce platform [4]. Finally, Word of Mouth also plays a vital role in building trust and helps in increasing buyer propensity and intention to search for products on these social commerce platforms. namely, social (trust and familiarity), technical (governing form factor and technological utility), and socio-technical (perceived ease of use, perceived usefulness and word of mouth). Moreover, E-commerce provides suppliers with a range of opportunities to reduce distance as perceived by online buyers. They can reduce psychological barriers to cross-border demand by designing websites that simplify the search for and comparison of products and suppliers across countries. They can reduce cost barriers by applying pricing strategies that redistribute transportation costs and they can overcome time barriers offering express delivery services.

Propelled by rising smartphone penetration, the launch of 4G networks and increasing consumer wealth, the Indian e-commerce market is expected to grow to US$ 200 billion by 2026 from US$ 38.5 billion in 2017. The ongoing digital transformation in the country is expected to increase India's total internet user base to 829 million by 2021 from 560.01 million as of September 2018. Moreover, India's internet economy is expected to double from US$125 billion as of April 2017 to US$ 250 billion by 2020, majorly backed by E-commerce. India's E-commerce revenue is expected to jump to US$ 120 billion in 2020, growing at an annual rate of 51 per cent, the highest in the world. During 2018, electronics is currently the biggest contributor to online retail sales in India with a share of 48 per cent, followed closely by apparel at 29 per cent. Online retail sales in India are expected to grow by 31 per cent to touch US$ 32.70 billion in 2018, led by Flipkart, Amazon India and Paytm Mall. In addition, the Government of India has announced various initiatives since 2014 namely, Digital India, Make in India, Start-up India, Skill India and Innovation Fund. The timely and effective implementation of such programmes will likely support the E-commerce growth in the country.

II. CHARACTERISTICS OF E-COMMERCE

Before implementation of E-commerce in particular organizations, following are few important characteristic features of the E-commerce [5]. The E-commerce is a technology to run the business and it is expensive to implement. The E-commerce allows us reach to market and sale our products through website and collect information from our customers. E-commerce concept in business is aligned with our presence on the internet. E-commerce acts as information gathering and dispensing device to conduct the business. It not only allows us to advertise market and sell the products but also keep track of accounts receivable and payables. Whenever, we consider implementing E-commerce in our business, the flow of information from our website into our back office operations may also be considered. The additional information like the location of the customers could be collected and compiled. E-commerce allows us to process credit card information of our customers and take care of cyber cash from our customers. Moreover, the decision of implementing E-commerce is dependent on the choice of making day to day business transaction online. During implementation of E-commerce, we need to work with sales, marketing finance, technical support, customer service, information systems network about administrations and support staff, E-commerce framework and architecture.

III. ARCHITECTURAL FRAMEWORK FOR E-COMMERCE

E-commerce system consists of many layers and each layer has a specific function that can be described separately. The lower layers support the upper ones. They provide us with a logical means of discussing the architecture of E-commerce systems. The bottom layer is physical layer, which consists of physical infrastructure such as cables, wires, satellites, mobile phone system etc. Their common function is that they provide the communication infrastructure for E-commerce. The emergence of wireless communications has enabled the use of mobile. The Architectural framework for E-commerce consists of six layers (Fig. 1) as follows:

3.1. Application Layer

In the application layer services of E-commerce, it is decided that what type of E-commerce application is going to be implemented. There are four types of distinguished E-commerce

applications, which include C2B E-commerce (Consumer to Business E-commerce), B2B E-commerce (Business to Business E-commerce), C2C E-commerce (Consumer to consumer E-commerce) and G2E E-commerce (Government to Employee E-commerce).

3.2. Interface and Support Services

The second layer of the architectural framework is interface layer. Interactive catalogs and directory support services are the examples of this layer. Interactive catalogs are the customized interface to customer applications such as home shopping. Interactive catalogs are very similar to the paper-based catalog except that the first one has the additional features such as use of graphics and video to make the advertising more attractive. Directory services have the functions necessary for information search and access. The directories attempt to organize the enormous amount of information and transactions generated to facilitate e-commerce. The main difference between the interactive catalogs and directory services is that the interactive catalogs deal with people while directory support services interact directly with software applications.

3.3. Management Layer

This layer deals with the voluminous amounts of information on the networks. This layer works as an intermediary that provides service integration between customers and information providers, given some constraint such as low price, fast services or profit maximization for a client. For example, a person wants to go to USA from India, the person checks the sites of various airlines for the low-price ticket with the best available service. For this he must know the URL's of all the sites. Another aspect of the brokerage function is the support for data management and traditional transaction services. Brokerages may provide tools to accomplish more sophisticated, time-delayed updates or future-compensating transactions.

3.4. Messaging Layer

In any business, electronic messaging is an important issue. The commonly used messaging systems like phone, fax and courier services have certain problems such as if phone line is dead or the phone number is wrong. In the case of courier service, if you want to deliver themes sages instantly, it is not possible as it will take some time depending on the distance between the source and destination places. Electronic messaging services like e-mail, enhanced fax and EDI are the solution for such type of problems. The major advantage of the electronic messaging is the ability to access the right information at the right time across diverse work groups. The main constraints of the electronic messaging are security, privacy and confidentiality through data encryption and authentication techniques. Messaging layer includes the following i.e., digital encryption standard (DES), advanced encryption standard (AES), public key encryption (PKE), digital signature (DS) and electronic data interchange (EDI) protocol.

3.5. Middleware Services

The enormous growth of networks, client server technology and all other forms of communication among unlike platforms is the reason for the invention of middleware services. The middleware services are used to integrate the diversified software programs and make them talk to one another. Middleman services layer consists of the following: value added networks, digital signature, electronic payment schemes, E-payment, electronic cash (E-cash) and hosting services.

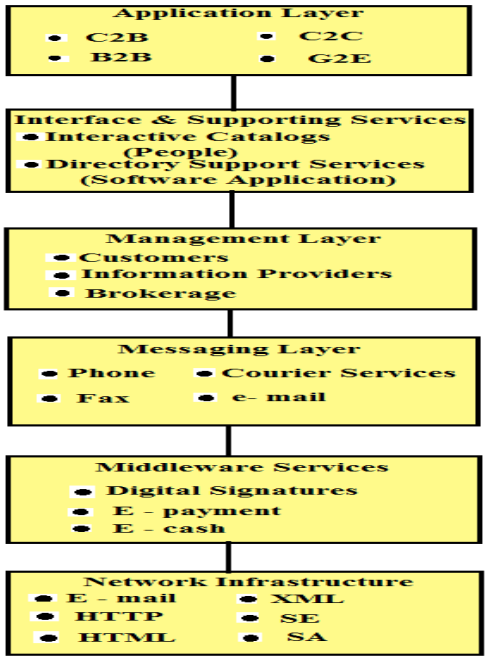

Fig. 1. Architectural framework for E-commerce

3.6. Network Infrastructure

The effective and efficient linkage between the customer and the supplier is a precondition for E-commerce. Therefore, this layer is also known as information superhighway in which the data flow from sender to receiver is noticed. Network service layer includes e-mail, WWW (World wide web), HTTP (Hyper Text Transfer Protocol), HTML (Hyper Text Markup Language), XML (Extensible Markup Language), SE (Search Engines) and SA (Software Agents).

IV. E-COMMERCE BUSINESS MODELS

The design theory of a business pattern as well as the design artifact of a pattern comic has been suggested to offer a range of contributions to the literature on business models [6, 7]. First, they permit a clearer distinction to be drawn between business model, business motivation and business strategy. Secondly, they suggest a clearer way of building models of "business" (organizing) either as currently conceived (as-is) or in terms of envisaged models (as-if). This also allows clearer expression of business motivation in terms of transitions between as-is and as-if business patterns. Third, business patterns offer a practical way of thinking about the reuse of business models as patterns and their potential for benchmarking purposes. Yooa and Jangb [8] suggested a conceptual framework containing the concepts of business models, service relationships and technology. E-commerce research was divided into three phases based on milestones of E-commerce evolution based on over 1000 E-commerce articles into three perspectives.

In overall, E-commerce business models can generally be categorized into the following seven categories [9] that includes (i) Business-to-Business (B2B), (ii) Business-to-Consumer (B2C), (iii) Consumer- to-Consumer (C2C), (iv) Consumer-to-Business (C2B), (v) Business-to-Government (B2G), (vi) Government-to-Business (G2B) and (vii) Government-to-Citizen (G2C). The various categories of business model are represented in Fig. 2.

In **Business - to – Business** (B2B) model, a website sells its products to an intermediate buyer, who then sells the product to the final customer [10]. As an example, a wholesaler places an order from a company's website and after receiving the consignment, sells the end product to the final customer who comes to buy the product at one of its retail outlets. In **Business – to – Consumer** (B2C) model, a website following B2C business sells its products directly to a customer (Fig. 3). A customer can view the products shown on the website. The customer can choose a product and order the same. The website will then send a notification to the business organization via e-mail and the organization will dispatch the product/goods to the customer. For example, Amazon is the largest bookstore in the world (at www.amazon.com), with 50% of the book market share. After gaining a reputation in the bookstore, Amazon expanded the offerings to music, video, gifts and auction.

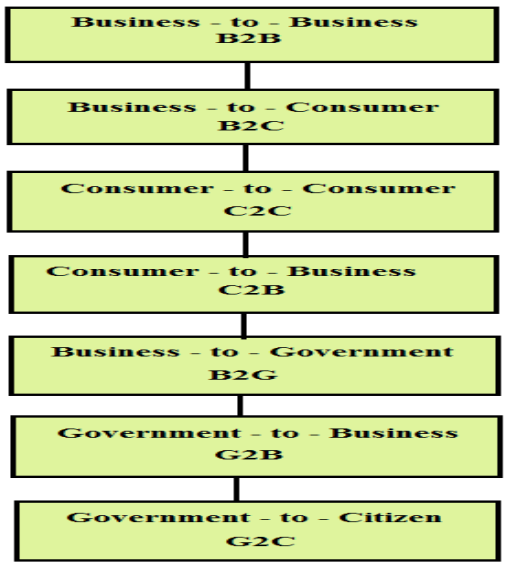

Fig. 2. Different business models utilized in E-commerce

In **Consumer - to – Consumer** (C2C) business model, a website the helps consumers to sell their assets like residential property, cars, motorcycles etc., or rent a room by publishing their information on the website. Website may or may not charge the consumer for its services. Another consumer may opt to buy the product of the first customer by viewing the post/advertisement on the website. Thus, the deal is finalized through the website without an actual meeting. In **Consumer – to – Business** (C2B) model, a consumer approaches a website showing multiple business organizations for a particular service (Fig. 4). The consumer places an estimate of amount he/she wants to spend for a particular service. For example, the comparison of interest rates of personal loan/car loan provided by various banks via websites. A business organization fulfills the consumer's requirement within the specified budget, approaches the customer and provides its services.

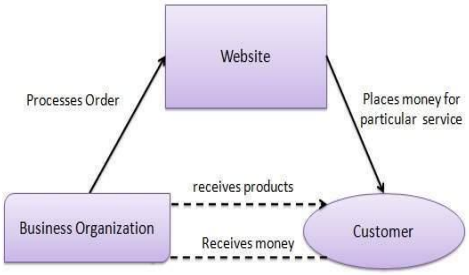

Fig. 3. Business - to – Consumer model

In **Business - to – Government (**B2G) model, websites are used by governments to trade and

exchange information with various business organizations. Such websites are accredited by the government and provide a medium to businesses to submit application forms to the government. In **Government - to – Business (G2B)** model, governments use websites to approach business organizations). Such websites support auctions, tenders and application submission functionalities. In G2B models, it reduce the time to fill out export forms, enable businessmen for online tax filling and business organizations can comment on rules and regulations of the government.

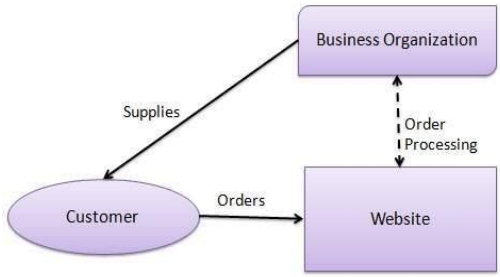

Fig. 4. Consumer - to – Business model

In **Government - to – Citizen** (G2C) model, governments use websites to approach citizen in general (Fig. 5). Such websites support auctions of vehicles, machinery or any other material. Such website also provides services like registration for birth, marriage or death certificates. The main objective of G2C websites is to reduce the average time for fulfilling citizen's requests for various government services. Citizens may communicate their opinion on wide range of government proposals and policies through the internet.

Fig. 5. Government - to – Citizen model

V. BENEFITS OF E-COMMERCE

E-commerce is proved to be highly cost-effective for business organizations as it cuts down the cost of marketing, processing, inventory management, customer care etc. It also reduces the burden of infrastructure required for conducting business. The information related to the customers could be collected and managed efficiently, which in turn will assist in developing efficient promotional strategy. In E-commerce, business activities and business transactions can be executed at all times (24x7) leading to the increment in sales as well as profits.

Kim et al. [11] examined distance effects on cross-border electronic commerce in 721 regions in five countries of the European Union and reported that express delivery reduces distance for cross-border demand and that e-demand delivered by express services is more time sensitive and less price sensitive than e-demand satisfied by standard delivery. The willingness of e-customers to pay for express services is shown to be affected by income and by the relative lead-time benefits and express charges. Furthermore, the adoption of express delivery is positively associated with e-loyalty in terms of repurchase rates. The results confirm the importance for e-suppliers of cleverly designed delivery services to reduce distance in order to attract online customers across borders.

The benefits of E-commerce can be further subdivided into benefits to organizations, benefits to customers and benefits to society.

5.1. Benefits to organisations

E-commerce expands the market place to national and international markets. The company can easily and quickly locate more customers, the best suppliers and the most suitable business partners across the globe. E-commerce caters to the demands of national as well as international business simultaneously and brings your business activities out of geographical boundaries [12]. With E-commerce, even small businesses get the access to the global market. E-commerce reduces the cost of creating, processing, distributing, storing and retrieving paper based information. It provides organizations with an ability to create highly specialized business. E-commerce reduces the time between outlay of capital and the receipt of products and services. It allows reduced inventories and overheads. The productivity, sales, knowledge of workers and administrators can be increased significantly. E-commerce lowers telecommunications cost as the internet is much cheaper medium of communication.

5.2. Benefits to Customers

E-commerce enables customers to shop or to do other transactions 24 hours a day and 365 days a year. It provides many choices to the customers. A customer can choose from many vendors and products. Shopping online is time saving and convenient. In addition to it, you also get to see the reviews of other consumers that will help you in making beneficial purchase decision. Due to the competition in market, E-commerce provides customers with less expensive products and services. E-commerce gives customers an opportunity to look for cheaper and better quality products. With E-commerce, consumers can search the specific product or service they require and can

even find the direct manufacturer from where they can purchase products at comparatively less price. Relevant information about the product is delivered to the customers within seconds. E-commerce allows the customers to participate in virtual auctions.

5.3. Benefits to Society

E-commerce facilitates the delivery of public services like health care, education and distribution of government social services at a reduced cost and improved quality. It allows people to spend more time at home rather wasting time in shopping. E-commerce allows some articles to be sold at cheap prices and this way, less affluent people can buy more to increase their standard of living. It enables the people of developing countries to buy products and services that are not otherwise available to them.

VI. LIMITATIONS OF E-COMMERCE

Though E-commerce offers many advantages to customers, business, society and nation, there are still some areas of concern that need to be addressed [13]. The following are some of the limitations or disadvantages of E-commerce.

6.1. Security

The biggest drawback of E-commerce is the issue of security. People fear to provide personal and financial information, even though several improvements have been made in relation to data encryption. Certain websites do not have capabilities to conduct authentic transactions. Fear of providing credit card information and risk of identity limit the growth of E-commerce. In case of B2C model of E-commerce, the security and privacy issues are of the most concerns. Careful design of security policies is needed to make sure the safety of customer information. People fear to operate in a paperless and faceless electronic world. Some of the business organizations do not have physical existence. People do not know with whom they are conducting commercial transactions. This aspect makes people to opt physical stores for purchases. As the seller and buyers are not face to face, the customer hardly trusts a seller. This is a limiting factor in implementing the E-commerce solution.

6.2. Product suitability

People have to rely on electronic images to purchase products. Sometimes, when the products are delivered, the product may not match with electronic images. Finally, it may not suit the needs of the buyers. The lack of 'touch and feel' prevent people from online shopping.

6.3. Lack of privacy and Cultural obstacles

Many websites do not have high encryption for secure online transaction or to protect online identity. Some websites illegally collect statistics on consumers without their permission. Lack of privacy discourages people to use internet for conducting commercial transactions. E-commerce attracts customers from all over the world. Habits and culture of the people differ from nation to nation. They also pose linguistic problems. Thus, differences in culture create obstacles to both the business and the consumers

6.4. Tax and Legal issue

Sales tax is another bigger issue when the buyer and seller are situated in different locations. Computation of sales tax poses problems when the buyer and seller are in different states. Another factor is that physical stores will lose business if web purchases are free from tax.

The cyber laws that govern the E-commerce transactions are not very clear and vary from country to country. These legal issues prevent people from entering into electronic contracts. Many legal issues regarding the implementation of E-commerce are yet to be resolved.

6.5. Technical limitations

There is a lack of system security, reliability, standards and some communication protocols. There is insufficient telecommunication bandwidth and software development tools are changing rapidly. It is difficult to integrate the internet and E-commerce software with some existing applications and databases. Vendors may need special web servers and other infrastructures, in addition to network servers. Some E-commerce software might not be compatible with the existing hardware of the organization. It may not be possible to browse through a particular page due to lack of standardized software.

6.6. Huge technological cost

The cost of developing an E-commerce solution can be very high [14]. Highly talented and technically qualified workforces are required to develop and manage the websites of the organization. Since internet provides a lot of job opportunities, business organizations have to incur a lot of expenses to retain a talented pool of employees. If it is developed by the programmers of the organization, lack of experiences can result in delays. Technological infrastructure may be expensive and huge cost has to be incurred to keep pace with ever changing technology. For business organizations, it is necessary to allocate more funds

for technological advancement to remain competitive in the electronic world.

VII. CONCLUSION AND FUTURE PERSPECTIVES

The e-commerce industry been directly impacting the micro, small and medium enterprises (MSME) in India by providing means of financing, technology and training and has a favourable cascading effect on other industries as well. The Indian e-commerce industry has been on an upward growth trajectory and is expected to surpass the US to become the second largest e-commerce market in the world by 2034. Technology enabled innovations like digital payments, hyper-local logistics, analytics driven customer engagement and digital advertisements will likely support the growth in the sector. The growth in E-commerce sector will also boost employment, increase revenues from export, increase tax collection by ex-chequers, and provide better products and services to customers in the long-term.

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