



ROLE OF ELECTRONIC COMMERCE IN CONSTRUCTION: A REVIEW ON CURRENT TRENDS AND CHALLENGES

Dr. R. Magesh Kumar

Assistant Professor, Department of Management Studies, KITS, India

Nisha Malini

Assistant Professor, Department of Management Studies, KITS, India

Praising Linijah

Assistant Professor, Department of Management Studies, KITS, India

Dr. Siamala Devi

Associate Professor, Department of Computer Science and Engineering,
Sri Krishna College of Technology, India

ABSTRACT

Today E commerce is the buzzword for every industry for enabling their business. Considering the growth of E commerce by leaps and bounds, even the micro, small and medium enterprises are also influenced by the latest developments of E commerce Business transaction done with the aid of Internet and other networks through electronic medium is popularly known as electronic commerce. This study will evaluate the recent developments in electronic commerce and emphasize on its application and its acceptability within the construction industry. Some of the earlier models are reviewed, and the trends and the challenges faced are highlighted in this paper.

Key words: Electronic commerce, Internet, Dedicated networks.

Cite this Article: Dr. R. Magesh Kumar, Nisha Malini, Praising Linijah and Dr. Siamala Devi, Role of Electronic Commerce in Construction: A Review on Current Trends and Challenges, International Journal of Civil Engineering and Technology, 9(7), 2018, pp. 295–302.

<http://www.iaeme.com/IJCIET/issues.asp?JType=IJCIET&VType=9&IType=7>

1. INTRODUCTION

The Internet has brought a significant change in how the information are received and stored. The world has witnessed a greater space for new business and opportunities over the last few years. Opportunities provided in the information and communication technology have led to an intense competition among the organizations. In 2014, the users of internet in India are

around 280 million and it was estimated that it would grow by leaps and bounds to around 640 million by 2019. With this it was projected that the volume of business transactions would touch USD 100 billion. Thus the companies have to acclimatize to the paradigm shift in the new technology as it is a need for every business. Changes in the business in the form of technology can help to innovate products, services, and develop appropriate strategies for successful product development. The electronic way of conducting business has impacted across all sectors and construction industry is not exclusion.

In India construction industry plays a pivotal rule and is the second largest industry, besides agriculture. In terms of GDP is concerned it contributes nearly 9% towards the economy and more than 35 million people are directly benefitted by direct employment. Based on the data by global construction and oxford economics, India will become the third largest market in the construction sector. Construction industry intertwined with E commerce can provide a competitive edge for global business transactions. This study reviews the recent developments in the usage of electronic commerce in the construction sector. The inside and outside of construction sector are deeply analyzed and elaborated in detail. The bottle necks that are hindering the growth of electronic commerce are discoursed. Finally the recent developments and progress in construction sector are reviewed and evaluated.

2. LITERATURE REVIEW

According to Garret and Skevington (1999), electronic commerce is defined as “trading by means of new communication technology. Thus it includes trading, commercial market making, ordering, supply chain management and transfer of money”. According to the definition of European Union (2000), “One of those rare cases where changing needs and new technologies come together to change the way which business is managed”.

The definition of electronic commerce is not stable and it keeps evolving based on the user's perspective. On looking at the communication front it is the electronic delivery of services and information. On the other side from the business process perception, electronic commerce is the automation of business transactions and workflows. Thus it can be said as it is a modern tool to address the problem of organizations, traders, and customers to reduce their cost while enhancing the quality and speed of service delivery. According to Economic Cooperation and Development (OECD) electronic commerce is the exchange of information that support and govern commercial activities including organizational management, commercial management, commercial negotiations, and contracts, legal and regulatory frame works, financial settlement, arrangements and taxation (OECD, 1999). Since 1960's electronic commerce has been in the forms of Electronic Data Interchange (EDI). With the development of World Wide Web (WWW) and internet browsers, electronic commerce has blossomed (Black, 2000).

McCarthy and John (1999) have observed that internet channel had made the e commerce world easier and concludes a company who provides services for partners and customers through electronic commerce will be highly successful. Anderson consulting (2000) observed that significance of e commerce refers to a major economic change that is more prevalent.

The application of electronic commerce include some of the applications like E-marketing, E-selling, E procurement of goods and services, E Collaboration, E-Finance and E customer relationship management and services. (Veeramani et al. 2002) Jones and Saad (2003) have concluded that usage of e commerce has improved in operations side of the project and operations in the information network system have diversified participants in the construction supply chain.

3. CLASSIFICATION OF E COMMERCE

E Commerce can be classified in to four important types, they are

- Business to Business (B2B)
- Business to Consumer (B2C)
- Business to Administration (B2A)
- Consumer to Administration (C2A). The classification is suitably explained in the figure 1

3.1. Business to Business (B2B)

Business to Business is an involving business transaction for more two or more business. B2B. It includes all starting from manufacturing to service providers. For example company using the internet access to quote an order from the trade partners such as suppliers or retailers receive electronic invoices and make payments electronically.

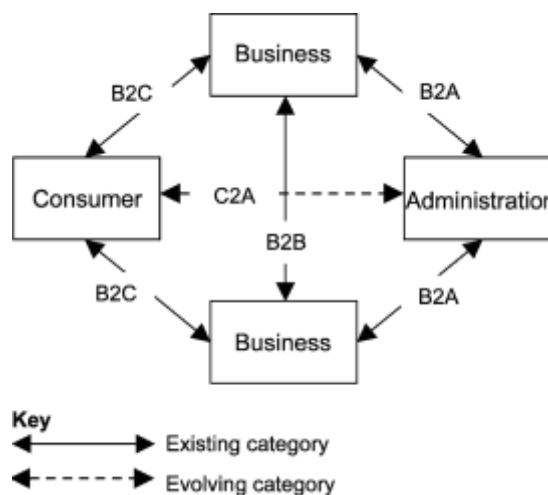


Figure 1 Process on Classification of E Commerce

3.2. Business to Consumer (B2C)

This is the oldest and it is very similar to the method of retailing. The actual difference is the medium used to carry out business which is the internet. This kind of method involving business transactions uses World Wide Web. By this selling directly to the customers without any intermediaries, the companies can earn more profits even charging the customers with very low prices.

3.3. Business to Administration (B2A)

This classification of e commerce includes all the transactions that exists between business and government bodies. The governments could take various initiatives to promote the growth of electronic commerce such as department of transport, environment and other areas.

3.4. Consumer to Administration (C2A)

This category has emerged over the years. The governments are requesting to do more initiatives to familiarize this category. According to the European level and C2A it includes some of the actions such as e-democracy, e-voting, information about public services and e-health.

4. ADVANCEMENTS IN ELECTRONIC COMMERCE

Electronic commerce has been used for a longer while in the way of EDI, which is the exchange of business documents in a standard format amongst the companies. It has created greater benefits in the form of easier communication, less paper work and reduced costs compared to traditional methods. Regardless the use of EDI, one of the drawbacks of EDI, it cannot be assimilated in to existing company networks. Later this difficulty grew bigger as more trading partners are added. This resulted in advance for a tailored software program. Whenever a new sender or receiver is incorporated to the client list, a new set of program are required to format the data to confirm to the standards of the other participants. This led to increase in cost and the process became very unyielding. However this problem could be overcome by using the value added networks (VANs).

4.1. Value added Network

It is a third party network, which could help in sending data to the receiver through a modem or phone line. The VAN receives transactions, arranges them, and stores them in the receiver's mail till they are picked up. It is illustrated in the figure 2.

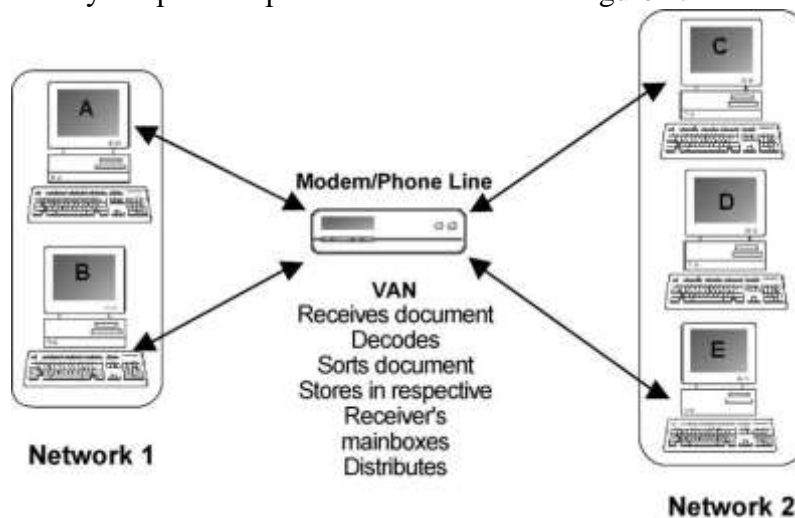


Figure 2 Value Added Network

New technologies such as extensible Markup Language (XML) have now emerged and will be the base for future sharing of information. The core objective of this system is to be more adaptable and flexible to add new technologies as and when they emerge. This will help to broaden the importance of new developments such as XML. XML/EDI provides a cushion of 100% compatibility to the existing EDI transactions. Now with the use of XML/EDI, the company need not shed the investments they made in the earlier EDI systems.

5. OVERVIEW OF E COMMERCE IN CONSTRUCTION

The endorsement of e commerce in the construction sector has a limited benefits and advantage, when comparing with any other engineering sectors like automotive or defense sector. The major reason could be the disjointed type of the construction sector and various other reasons.

The project involved in the construction is very multifaceted as it involves many of the participants such as the client, the architect, structural engineer, fabricator and the contractor. The earlier form of communication in the construction industry has adhered the conventional type of using paper copies of documents and drawings. But it seems to consume a lot of time and it is very dreary. Further it has increased the burden as the expenses are increased for

project delivery and distribution. The usage of internet services lead to higher savings and quicker time for construction projects. This advantage of effectiveness in project communication may help to reduce the building costs.

5.1. Current Trends of Electronic Commerce in Construction

Lot of internet tools invariably is used in the construction industry. The companies which are not conservative are likely to adopt new technologies such as electronic commerce. Few of the current techniques that are adopted in e commerce in construction sector are listed as follows:

5.2. Company Promotion

Internet is widely used to brand and promote companies by diffusion of company values and information. To highlight a few architects, designers, fabricators, contractors and others use web to promote companies about offers and their services.

5.3. Product Promotion

Product promotion through online has witnessed an increasing sales trend. This has been done through the website of the own company or with the help of online vendors. These kind of product promotion include details such as manufacture details, product availability, quality assurance and method of delivery.

5.4. E Procurement of Search Engines and Web Directories

Some of the basic methods of finding the information on the web are done with the help of search engines, web directories and broadcast or push technology (Laudon, 2000). This process done based on the specified keywords and return with a list of documents. Some advantages of this method is easy access to information based on the construction sector, product details, easy procurement business processes and comparisons in terms of price and quality.

5.5. Project Management

Some of the website can help to stream line the process of design and operations of a construction project. Thus the site provides enormous benefit to the users. Process of communication between the parties of project becomes hassle free and less complex to avoid any delay due to lack of communication clarity.

5.6. Project Collaboration

This facility is catalyzed through online collaboration for project partners in real time. Irrespective of the boundaries and geographical locations the communications are exchanged due to the latest online project collaboration tools available for construction project teams.

5.7. Online Tendering

The latest development in the internet has made everything possible to have online tendering services. Because of this facility, the information about tendering are accessed online alongside of project specifications.

6. BENEFITS OF E COMMERCE TECHNOLOGIES ON THE CONSTRUCTION SUPPLY CHAIN

There benefits of e commerce in the construction process have resulted in the primary and secondary effects. The primary effects are mostly applicable in the information related activities like creation, retrieval and delivery of information. The secondary activities focus on efficient material handling in information processing with the help of information technology. (Bjork, 2002).

Table 1 Potential benefits of e-construction to supply chain members

Branch of construction supply chain	Potential Benefits of E-construction (e-commerce applications)
Owners/Developers	Improved project efficiency Reduced construction costs, chance of errors, and the need for rework Compressed construction programme
Designers	Time savings Improved communication Increased accuracy and speed of specification
Contractors and subcontractors	Lower administration and communication costs Tendering and procurement efficiencies Time savings More project control and security Enhanced project communication
Builder merchants	Lower inventory and real estate costs Lower cost of serving customers
Manufacturers	Reduced channel costs Improved access to information Cost-effective access to actively purchasing and specifying customers

(Source: McIntoish, 2005)

However there are other applications of e commerce such as lower transaction costs; reduced staffing requirements, shorter procurement cycles, less inventory levels, and more transparency.

7. CHALLENGES OF E COMMERCE IN CONSTRUCTION

Even though there is wide range of benefits through e commerce there are some difficulties which are to be addressed to embrace electronic commerce applications. Some of the general barriers are listed below:

7.1. Infrastructure

Infrastructure is the key for progress in any sector. But the facilities in the telecommunications are not adequate in most of the developing countries and further the sector is not prepared to face the advances in the e commerce technologies.

7.2. Trust and Reliability

Secrecy of the information is very important, as the information shouldn't reach the 'eaves droppers'. It is very vital that communicating parties are able to authorize the identity of the other party and know when data integrity has been compromised.

7.3. Regulatory Issues

Regulatory issues in financial areas like customs, taxation and electronic payments. Other problems in legal issues like 'Uniform Commercial Code' for electronic commerce, intellectual property protection and privacy or other security issues.

7.4. Other Issues

There are many factors which inhibited the benefit of e commerce in construction due to higher investment in the initial stage and training of appropriate personnel, threat of security of business transactions in online and return of investment made. (Anumba et al. 2000)

Additionally the industry is quite pessimistic of unnecessary risk as it operates using "arm's length contractual relationships" (Lewis, 1999). Alternative significant barrier is on the investment side as there is logic or justifications for the firms exclusively. Elliman and Orange observed that small medium enterprise (SME) finds it very harder to apply e commerce technologies in their firms due to their lack of investment. And further the initial layout becomes a dead investment.

The development in the electronic commerce technologies has spawned huge amount of data which causes information overload. (Cheng et al.2000). Further the data collected from both internal and external communications results in information management load in security, filtering, data cleansing, storing, knowledge discovery, and knowledge integration which caused in great challenge of managing the information. (Badii and Sharif, 2003). Organization does not have required skills to adopt new innovation technology for instance new techniques in the emerging construction sector. This may not be embedded with an underlying supportive culture (Ling, 2003). It is very harder to implement new process of work systems when the current working environment is not ready to adapt it (Alshawi and Faraj, 2002). Walker (2004) has concluded the current ICT such as knowledge repository can enhance great value, provided if the employees have required skills to utilize this technique.

8. DISCUSSIONS

Patrick (2006) has concluded, companies adopt e commerce mainly due to reduction in time consumption and cost, remaining economical in the market, enhance project document and meet the market demand. The current industry practices in the construction sector lack good training, and hence learning and knowledge dissemination are affecting implementation of e-commerce technology. Consequently ascertaining the barriers is important as it will help in enhancing the implementation of e commerce. The most significant barriers are dearth of understanding of how to start, lack of significant benefits of training and learning and lastly inadequate time allocations are the reasons that potentially affects the growth of e commerce in construction sector (Anumba and Ruikar, 2007).

9. CONCLUSIONS

It is very imperative the use of electronic commerce in construction has many benefits. The complex issues faced today are made easy due to the electronic solutions provided to a large number of customers. However construction industry is still at its nascent stage. Over the recent years the construction industry has realized the significance of electronic commerce which has immense solutions to provide to the industry. Security and Privacy are the main barriers that are obstructing the growth of electronic commerce. Framing new regulatory norms and policies in operating the e commerce sector can provide a new facelift to the emerging electronic commerce of construction industry.

REFERENCES

- [1] Garrett, S G E and Skevington, P J (1999) An Introduction to eCommerce, BT Technology Journal, 17 (3), 11-16.
- [2] European Union (2000) European commission information society directorate general, Electronic commerce unit, <http://www.ispo.cec.be/e-commerce/>, site accessed June 2000.
- [3] O.E.C.D., The Economic and Social Impact of Electronic Commerce: Preliminary Findings and Research Agenda, Organization for Economic Co-operation and Development, OECD, Online Bookshop, Paris, February 1999, ISBN: 9264169725.
- [4] D. Black, e-commerce Innovation Centre. Available from: <http://www.cf.ac.uk/carbs/ecic/ecicr1.html>, 2000.
- [5] McCarthy, and John, C (1999) The social Impact of Electronic Commerce, IEEE Communication Magazine, 53-57.
- [6] Veeramani R., Russel J.S., Chan C., Cusick N., Mahle M.M. and Roo B.V. (2002). State-of-practice of e-commerce application in the construction industry, CII Research Report, 180-11
- [7] Jones M. and Saad M. (2003). Managing Innovation in Construction, Thomas Telford Limited, London, UK.
- [8] Bjork B. (2002). A formalized model of the information and materials handling activities in the construction process, Construction Innovation, Vol. 2, 133-149.
- [9] K.C. Laudon, J.P. Laudon, Management Information Systems, 6th edn., Prentice-Hall, London, 2000
- [10] O.O. Ugwu, C.J. Anumba, J.M. Kamara, Integration of customer requirements with products and services on the internet, Proceedings of the UK National Conference on Objects and Integration for Architecture, Engineering and Construction. Watford, 13 – 14 March, 2000, pp. 40 – 49
- [11] T. Lewis, Electronic Data interchange in the Construction Industry: Volume-1, PhD Thesis, Department of Civil and Building Engineering, Loughborough University, 1999
- [12] T. Elliman, G. Orange, Electronic commerce to support construction design and supply chain management, International Journal of Physical Distribution and Logistics Management, Vol. 30, No. 3/4 (2000) pp. 345 – 360
- [13] Cheng E.W. L., Li H., Love P. E. D. and Irani Z. (2001). An e-business model to support supply chain activities in construction, Logistics Information, Vol. 14, No. 1/2, 68-78.
- [14] Badii A. and Sharif A. (2003). Information management and knowledge integration for enterprise innovation, Journal of Logistics Information Management, Vol. 16, No. 2, 145-155.
- [15] Ling F.Y.Y. (2003). Managing the implementation of construction innovations, Journal of Construction Management and Economics, Vol. 21, 635-649.
- [16] Alshawi M. and Faraj I. (2002). Integrated construction environments: technology and implementation, Construction Innovation, Vol. 2, No. 1, 33-51.
- [17] Walker D.H.T. (2004). The competitiveness of having a knowledge advantage, The Building Economist, June, 26-29
- [18] Patrick, X. W., & Young sin and seo. (2006). Effective Applications of E- Commerce Technologies In Construction Supply Chain: Current Practice And Future Improvement. *IT con*, 11(127-135).
- [19] Patrick, X. W., & Young sin and seo. (2006). Effective Applications Of E- Commerce Technologies In Construction Supply Chain: Current Practice And Future Improvement. *IT con*, 11(127-135).