

# A COMPREHENSIVE STUDY ON E-COMMERCE IN THE CONSTRUCTION INDUSTRY WITH THE APPLICATION OF IT AND ELECTRONIC TRANSACTIONS

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## **Abstract:**

*The construction industry is faced with the ongoing challenge to enhance current work practices and become more client-oriented. This trend is influenced by a number of factors, including greater performance expectations by clients, globalization of the economy, increased competitions between contractors, continued restructuring of work practices, industrial relations, and industry's need to implement information and communication technologies (Love and MacSporran 1996 cited in Weippert, Kajewski and Tilley 2003).*

*Despite the unique and individual nature of any construction project, it requires involvement by many participants, such as clients, designers, consultants, contractors, subcontractors, and suppliers, as an entity to perform various roles and responsibilities (Goodman and Chinowsky 1996). Sharing up-to-date information between participants leads to reduction of errors and time delays and consequently facilitates more effective and efficient productivity and ultimately improves collaboration and teamwork. However, the current construction industry is facing costly progress delays due to inaccurate and untimely communications amongst project team members. Often vital information is 'lost' to the degree that information needs to be re-entered, or hardcopy manuals and drawing documents need to be reproduced to have rapid access to the required information to perform some of their tasks (Weippert, Kajewski and Tilley 2003).*

**Key Words:** - OECD, ICT, E-Business, E Comers, Response activity.

## **1. Introduction: -**

Electronic commerce or e-commerce has been defined in several ways. The Organization for Economic Cooperation and Development (OECD) defines e-commerce as 'the electronic exchange of information that support and govern commercial activities including organizational management, commercial management, commercial negotiations and contracts, legal and regulatory frameworks, financial settlement arrangements and taxation' (OECD, 1999). A different perspective on the definition of e-commerce is presented by Kalakota and Whinston (1997). They view ecommerce as a production process that converts digital inputs into value-added outputs through a set of intermediaries.

The definition of e-commerce is not static (Kosiur, 1997) and depends on the adopted

perspective. According to Kalakota and Whinston (1997), from a communications perspective, e-commerce is the delivery of information, products/services, or payments via telephone lines, computer networks, or any other electronic means. From a business process perspective, e-commerce is the application of technology toward the automation of business transactions and workflows. From a service perspective, e-commerce is a tool that addresses the desire of firms, consumers and management to cut service costs while improving the quality of goods and increasing the speed of service delivery. From an online perspective, e-commerce provides the capability of buying and selling products and information on the Internet and other online services. This paper adopts this wider definition of e-commerce.

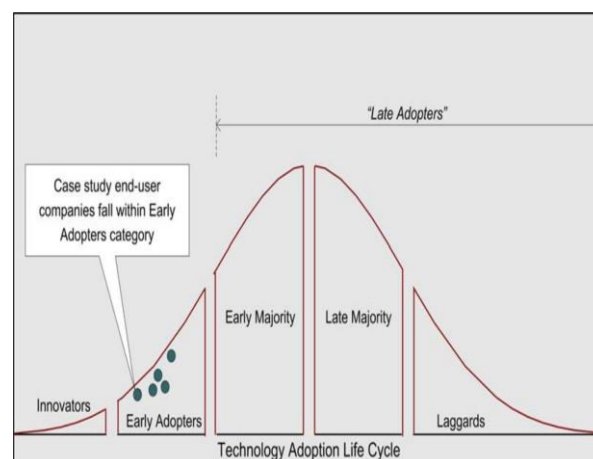
## 2. Objectives: -

- To study on e-commerce in the construction industry, including the current use of IT and electronic transactions.
- To work on e-commerce in the construction industry by integrating AR & VR for the Real Estate.
- To Integrate E-Commerce in the Construction Industry
- To Combine the Map Explorer Feature to the Construction Industry.

## 3. Literature Review: -

Journal of Associate Professor Peter Stewart, Head of Department RMIT University Department Of Building and Construction Economics, Melbourne, Victoria. The Role of E-Commerce Systems for the Construction Industry. (2000)

E-commerce is being used extensively in other sectors of the economy, and examples include airline booking systems, Internet banking and online shopping malls. Some of these applications are more obvious to the public such as electronic banking. Banking on the Internet has grown rapidly, and customers can now access services such as balances, account transfers, bill payment, loan applications and investment planning. These developments have relied on the existence of a large market, a variety of services, and a need to store and communicate consumer data without having to rely on third parties. Obviously, the market place in which our profession operates is not a mass market but the remaining two drivers have important implications for the profession. A recent report in the UK suggests that if the construction industry adopted E-Business then they could expect to save up to 2.3% of building costs and reduce completion times by 15% (BuildOnline 2000). If savings of this magnitude could be realised in Australia, then it would deliver significant benefits for contractors, professionals and other stakeholders.



**Figure1-Technology Adoption Life Cycle**

Indian Journal Of Science And Technology, Vol 9(32), Doi: 10.17485/Ijst/2016/V9i32/98655, August 2016 Issn (Print): 0974-6846 Issn (Online): 0974-5645. E-Business In Construction Industry: Opportunities And Challenges By Tisha Meriam Cherian And L. Aravindh Kumaran.

**Background/Objectives:** Construction industries are today in faster mode with the advent of ICT and other technologies to enhance productivity and competition. The purpose of the paper is to elucidate the benefits, opportunities and challenges of Information and communication Technology (ICT) and E-Business in Indian construction industry. **Methods/Statistical Analysis:** This paper focuses on the theoretical framework from previous literatures, magazines, reports and books. The literatures are studied in detail to gain imminent knowledge on E-Business practices in construction industries. **Findings:** New technology using ICT and E-Business brings changes in construction industries. ICT applications improve work flow and communication in diverse levels of organization. ICT and E-Business are important to both large and small enterprises facilitating integration and collaboration with business partners, suppliers and customers and also to make electronic transactions. It provides service to customers, helps in delivering and receiving purchases and orders at a great speed, decreases the inventory time, cost and reduce obsolescence. In current scenario, Indian construction companies are started adopting speedy communication tools to get efficient work done. System maintenance, security and lack of software knowledge are the few challenges in E-Business usage in construction industry. **Application/Improvement:** Collaborative and complete coordination is required for the success of E-Business in construction industry

**Effective Applications of E-Commerce Technologies in Construction Supply Chain: Current Practice And Future Improvement** Patrick X.W. ZOU, Dr. Faculty of The Built Environment, University Of New South Wales, Australia. (2013)

The development of e-commerce technologies in relation to construction management have been improved significantly in the recent years and are perceived as a mainstream to improve productivity and information flow as well as communications. However, until now, not much evident research has been conducted to pursue successful applications of e-commerce technologies to the construction supply chain. This research aims to understand the current state of e-commerce technologies applications in the construction supply chain and provide recommendations for future improvement. Both survey and semi-structured interviews were conducted with the construction supply chain members to obtain sufficient and useful research data. The results showed that while everyone agrees on the importance of implementing e-commerce technologies in the construction supply chain, the major barriers lie with the reluctance or inability of the subcontractors/suppliers to adopt the technologies and lack of in-house technical expertise as well as lack of integrated information management systems. The results also showed that increased awareness of company's objectives and more User-friendly, cost-reduced, standardized and integrated e-commerce systems, together with a positive organizational culture on top management supporting continuous IT training and learning and knowledge-sharing are needed in order to promote better use of e-commerce technologies.

#### **4. Problem Statement: -**

Companies across several industries (including construction) are increasingly leveraging the Internet to achieve competitive advantage (Cheng et al., 2003). Internet Based tools such as project extranets are being used to manage construction projects. Such tools can be used to monitor, control, manipulate and store project information and to make it available to all participants of the construction supply chain (Alshawhi and Ingirige, 2002). Examples of

Internet-based tools include a computer-mediated tendering system for services or contracts, purchasing of materials via the Internet by a contractor, project extranets for project management, and specifying products online by a manufacturer (ITCBP Intelligence, 2002). All these tools can be encompassed under a single banner of e-commerce tools for construction as they facilitate trading, exchange of data and information, and automation of the business processes and workflows (Kalakota and Whinston, 1996).

Research studies (Ruikar et al., 2001; Paper 1, Appendix A) and recent publications (Stephenson and Turner, 2003; Laudon and Laudon, 2002) have documented the possible benefits and business opportunities for companies using ecommerce tools such as project extranets. In spite of these documented benefits the UK construction industry has been relatively slow in the uptake of these tools in their day-to-day workings (ITCBP Intelligence, 2003). A survey of the UK construction industry, undertaken by the Construction Products Association (CPA, 2000), predicted that by 2005, 50% of the industry's business activity would be undertaken using ecommerce. However, another survey carried out a year later by the same organisation indicated a considerable reduction in these projected figures to 22%, which is less than half of what was initially predicted, indicative of a much slower uptake than anticipated. The construction industry stepping back from the initial 'dot-com fever' was seen as the main reason for this change (CPA, 2001). Additionally, some other factors that have also contributed to this slow uptake are:

- E-commerce technology is relatively new and there is limited availability of information or feedback on its performance on previous construction projects;
- As with most technologies, it can be difficult to gauge the quantitative return on investment (ROI) from using new technologies such as e-commerce.
- The teething problems and changes in working culture and practices which are required, initially, with the adoption of any new technology, very often deter new users.

## **5. Key findings of the paper: -**

### **5.1 Case Studies and Findings: -**

This section presents the findings of case studies conducted to examine the impact of specific construction e-commerce applications on the business processes of the end-user companies. They are classified under several headings namely: the drivers to the adoption of e-commerce tools, process implications, and benefits and barriers to e-commerce adoption.

### **5.2 Drivers of E-Commerce Technology Adoption:-**

Different factors can influence the adoption of technologies such as e-commerce within construction organizations. From the case studies it was seen that:

- Technology adoption can be either management-driven, client-driven, market-driven or project-driven
- Case study end-user companies fall within the early adopter's category of the technology adoption bell curve
- In the majority of the case study companies, the use of e-commerce tools was driven by the company's management as a strategic decision to improve business performance and support innovation, except in supplier companies where the use was driven by the main project contractor;
- Case study end-user companies believe that e-commerce tools are the way forward.
- Innovative technologies such as e-commerce are viewed as the primary differentiators that set companies apart from their competitors reflecting their drive towards innovation.

## 6. Benefits and Barriers for E-Commerce Adoption

The benefits and barriers to the use of e-commerce tools to facilitate construction processes are well documented in several research projects (Shelbourn, et al., 2002; Steele and Murray, 2001; and Motawa, et al., 2001). For the case studies, the end-user companies were presented with a list of possible benefits and barriers to the use of ecommerce tools. The end-users were required to identify the benefits and barriers from this list. Further, they were also asked to state any additional benefits or barriers not included in the list. The next two sections present these findings.

### 6.1 Benefits

The following are the benefits of using e-commerce tools that were identified by the end-user organizations:

- E-commerce tools such as project extranets enable better communication between project stakeholders and provide an environment suitable for partnering;
- Such tools facilitate faster information flow across the supply chain thereby reducing response times;

The electronic exchange of project data and documents eliminates the need to physically re-key in information, thereby saving time and making the resulting process more efficient;

- E-commerce tools result in faster and cheaper document processing

### 6.2 Barriers

The following are the end-user perspectives on the barriers to the adoption of ecommerce:

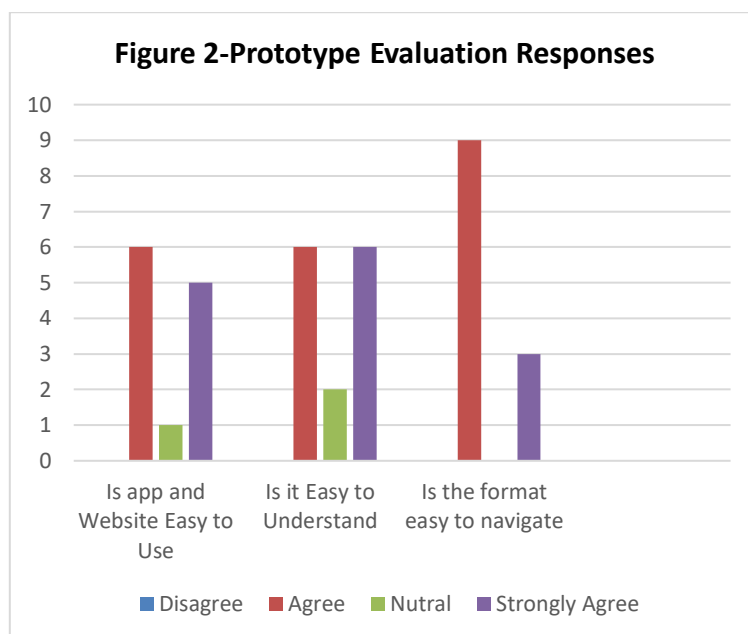
- Most end-user companies identified issues related to management buy-in and cultural issues as the major barriers to the adoption of e-commerce within the construction industry;
- End-user companies do not consider legal issues and security issues associated with Web-based applications such as e-commerce tools as major barriers to their adoption;
- Although security is high on the agenda for most end-user companies, it does not deter the wider usage of the tool, and concerns are often based on long-standing misconceptions rather than reality;
- The current lack of standards for interoperability and version control problems are classified as medium level barriers by end-user organizations;
- For the case study organisations cost is not a major concern, as these companies view themselves as forward-thinking visionaries and market leaders, who want to keep abreast with technology, whatever the cost;
- Cost was identified as a possible deterrent for adoption amongst SMEs (Small and Medium Enterprises);
- The sheer magnitude of e-commerce tools available in the market is considered an issue as each of these tools has different interfaces, functionalities and may also use different terminology. This poses the end user companies not only with the problem of getting acquainted with multiple interfaces, but also understanding the different terms and functions of each application;
- The 'immediacy' that the Web demands is an issue that can put undue pressure on staff e.g., most e-commerce applications such as project extranets, have a project page that alerts staff to take action (sometimes immediate), however, it is not always possible for staff to address these issues instantly (even though the system may prompt them to do so);

## 7. Evaluation Findings: -

The web-site and android prototype was evaluated by an independent panel of reviewers including individuals and industry practitioners. Out of a total of eight individuals and seven industry practitioners who agreed to evaluate the prototype, twelve returned their

completed evaluation forms (seven individuals and five industry practitioners).

Figure 2 presents the results of the evaluation in the areas of prototype use, understanding, navigation and errors.



Reviewers were also asked to highlight aspects of the prototype that impressed them most or fell short of expectations. All the reviewers were impressed with the presentation of the e-readiness reports and thought that the prototype reports were easy to understand and effectively highlighted the areas of e-readiness that companies needed to address. In their view the user-friendliness and the simplicity of the application would make it acceptable for use in the industry. To quote one of the industry reviewers' comments, 'the report generated from the questionnaire. The questions are generally quite comprehensive and well structured'. Further, the evaluation findings highlighted that the prototype application addresses all aspects that construction companies need to consider to achieve e-readiness, and then gives a rapid appraisal of where an organization is in respect of its e-readiness. The overall evaluation results show that none of the evaluators thought that there were any parts of the application that fell short of their expectations. However, a few suggestions were made to further improve the application.

## 8. Conclusion: -

This paper presents the findings of case studies conducted to examine the impact of specific construction e-commerce applications on the business processes of the end-user companies. They are classified under several headings namely: the drivers to the adoption of e-commerce tools, process implications, and benefits and barriers to e-commerce adoption. It is concluded that the expanding market for E-commerce is simply too big to ignore for any business.

By combining ecommerce to construction industry, it will help increase in national output (GDP) by 2.7%, Aggregate employment would increase by 0.5%, Real Estate investment would increase by 4%.

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