

# READINESS ASSESSMENT PROCESS PROTOCOL FOR E-BUSINESS INITIATIVES IN CONSTRUCTION ORGANISATIONS

Micah. P. Vines<sup>1</sup> and Charles .O. Egbu<sup>2</sup>

*School of Built and Natural Environment,  
Glasgow Caledonian University, Scotland, G4 0BA, UK*

The construction industry is a fragmented one, with any one supply chain comprising of temporary coalition of multiple organisations that are usually based in multiple locations. E-business is being increasingly recognised as an effective means of integrating this temporary coalition of organisations and their business processes to effect product conception, design and delivery in a seamless way and improve product value. It can also enable multiple organisations in the supply chain to effectively combine their organisational knowledge assets as a “unitary organisation” to successfully lead to effective project outcome. Organisations in other industries like manufacturing, automotive and the financial sector have already benefited from implementing e-business initiatives in their business processes. Therefore construction organisations may wish to consider and exploit best practice from these industries; with a view to adopting/adapting this into their own business needs to provide innovative strategies to improve organisational performance. This paper will present and discuss a framework for a simple e-business readiness assessment process protocol, which is part of an on-going doctoral programme that is intended to guide construction organisations who are considering e-business initiatives in their business process. It will particularly highlight the issues of organisational culture, structure and business strategy, knowledge management initiatives and choice of technology and integration of supply chain at each phase of the e-business readiness assessment. The paper concludes that an established and on-going knowledge management strategy is vital for the success of any e-business initiatives in construction organisations. This area of work has limited empirical work done, so there is ample scope for more work in this area.

Keywords: culture, e-business, construction, knowledge management, readiness assessment process protocol.

## INTRODUCTION

The emergence of e-business is fast transforming organisations and industries. E-business relies on the development of new business strategies based on existing and new networks. The digital connectivity allows multiple supply chains to form supply networks that have significant potential to improve the business value for stakeholders within the supply networks. The application of information communication technology (ICT) tools is becoming increasingly important to enable businesses to carryout their business processes on-line.

---

<sup>1</sup> [m.vines@gcal.ac.uk](mailto:m.vines@gcal.ac.uk)

<sup>2</sup> [c.egbu@cgal.ac.uk](mailto:c.egbu@cgal.ac.uk)

This provides a significant challenge for construction organisations to rethink their existing business strategies. It also provides opportunities for exploiting technology effectively to improve business performance.

The construction industry is at the throes of embracing e-business initiatives to effectively revolutionise some of the processes which it employs in developing product concepts, design and delivery of projects to meet clients' desired requirements (Vines and Egbu, 2003). E-business initiatives provide opportunities for multiple partners to integrate their organisations via virtual networks. This provides a common platform for which interorganisational knowledge can be harnessed and combined to produce a synergy to impact upon product and service delivery (Vines and Egbu, 2003).

Organisations wanting to thrive on the economic wave in the information age and competently exploit their knowledge assets should consider embracing e-business as an important area of their business processes (Malhotra, 2000; Skyrme, 2001). Having said that, it must be emphasised that in the construction industry, it is not practical for the entire business processes to be transferred on-line. However, a practical and realistic assessment needs to be carried out to determine the internal and external business relationships which can be transferred on-line without causing significant operational and functional complications to the organisation. The application of e-business enables organisation to keep in touch and be informed of project progress in real time and also allows transactions to be executed speedily with minimum errors. This connectivity offers fast, flexible and cost-effective ways of doing business.

## **METHODOLOGY**

This paper is produced from an on-going PhD project investigating how organisations in the construction industry can capitalise on their 'knowledge assets' through e-business initiatives. The outcome of this paper is based on findings from extensive literature reviews and 17 interviews with 15 construction organisations who are implementing some form of e-business initiatives in various aspects of their business. The presentation in this paper is meant to bring to light the importance of e-business readiness assessment process protocol which is intended to provide a framework to assess the current state of organisations interested in adopting e-business and provides a roadmap for their readiness assessment for any e-business initiative. The protocol shows which aspects of the organisation need to be considered and in what order of importance in order to successfully and effectively implement an e-business initiative.

## **E-BUSINESS IN THE CONSTRUCTION INDUSTRY**

The E-business involves the conducting of any business transactions between multiple business partners to increase business value and increase profit margin (Skyrme, 2001; DLC, 2002; Chaffey, 2002). The primary aim of e-business is to increase market share and supply chain efficiency through appropriate application of organizational knowledge which creates new value in the products and services supplied (Kafentzis *et al*; 2004). Secondly it is to improve the organizational efficiency by integrating organizational processes through the application of information and communication technologies (ICT). This will make the organisation agile and responsive to internal and external demands without significant increase in capital costs and other resources. The spectrum of e-business application within the construction industry ranges from, e-collaboration, e-commerce/e-procurement (buying and selling of products), e-tendering, e-auctioning and e-learning. The major application of e-business currently

employed in the industry is e-collaboration. This is because of the nature of projects which involves multiple parties involved in a project in any given time and the need to exchange large volumes of important information and knowledge for project execution. E-business leading to actual transactions is still at its infant phase within the industry.

## **BENEFITS FOR IMPLEMENTING E-BUSINESS INITIATIVES**

The appropriate application of e-business in construction organisations can bring many tangible and intangible benefits (DLC, 2002). It can relieve staff from carrying out work processes, which can be semi or fully automated (Riberio, 2001; Chaffey, 2002). This can in turn allow the human expertise to be relocated to other areas where their knowledge and skills can be fully utilised to add value at important value chain points along the product and service value chain. Automation cuts out intermediary processes that are known to increase the time lags within the organisation's business processes (e.g., material ordering cycle) that could reduce turn around time for exchanging information/ knowledge and delivery of products and services (Chaffey, 2002; Kong *et al*, 2000; Cheng *et al*, 2001). There is an acceptance that the application of e-business will enable business integration thus allowing organisations to be able to share and access information and knowledge in real time. This is believed that it could have a significant impact upon delivery of products and services to customers (Riberio, 2001; DLC, 2002; Cheng *et al*, 2001; McIntosh and Sloan, 2001). The advantages of e-business initiatives for construction organisations include the facilitation to effect;

- Transaction management;
- Improve business efficiency within the organisation and the supply chain;
- Newmarket development;
- Reaching new market segments.

These benefits are important for construction organisations to consider if they want to fully exploit their organisational knowledge. It allows organisations to appropriately 'package' their knowledge assets to explore other related or new market segments without increasing investment in resources on new business ventures. The application of e-business to integrate the supply chains could increase transactional efficiencies leading to reduced cost and increase value to stakeholders (Riberio, 2001; DLC, 2002; Cheng *et al*, 2001; McIntosh and Sloan, 2001). It also could give opportunities for cross-organisational knowledge to merge to produce a synergy which can impact the supply chain business processes. This could lead to market innovation. The synergy of organisational knowledge assets and e-business was addressed by Vines and Egbu (2003) as an important consideration for KM and e-business in construction organisations.

## **CHALLENGES FACING CONSTRUCTION ORGANISATIONS TO IMPLEMENT E-BUSINESS INITIATIVES**

The challenges facing construction organisation in embracing e-business are multiple. These include organisational culture, structure, strategy and inability to identify new business trends, application of knowledge management initiatives to sustain e-business processes and lack supply chain integration and commitment.

### **Cultural Barrier**

The organisational culture is a major hurdle in the construction industry as reported in various literatures including Egan (1998). The industry is accustomed to procuring products and services through physical face-to-face people interaction. The concept of applying e-business to effect the processes of procuring products and services are still not widely embraced. This requires the re-organisation of the way the industry carries out its work processes. It requires changing the working practices and mindset of the employees to apply new tools and techniques as part of their day-to-day work. There needs to be a change and drive from the top management down to the shop floor levels to see organisational culture change to adopt e-business as part of the businesses operation (Vines and Egbu 2003). Investment in time and resources require long term commitment and leadership with vision if cultural barriers are to be successfully overcome.

### **Structural Barrier**

The other major challenge is the existing organisational structure. Most construction organisational structures are hierarchical in nature. This creates several layers making it very difficult to adopt and implement e-business. The hierarchical nature of business was identified in some instances which restricts internet access by putting a 'blanket stop' on all employees at the operational level. This basically hinders e-business to be executed. It is at the operation level that the organisational knowledge is applied/deployed to realise a business outcome. The positive change in organisational culture would affect the organisational structure, making it more conducive to conduct business on-line. The challenge therefore is to make the organisational structure become more flat which will allow communication to flow horizontally and vertically easily to speed up decision making process.

### **Business Strategy**

Establishing and appropriate business strategy of the organisation is also a challenge when considering e-business. Our project revealed that most organisations do not have any organisational strategy that includes e-business as a key initiative in taking the business forward. Most of these organisations lack the understanding and appreciation of the full benefits associated with e-business. This obviously impacts upon the resource allocation and top management support when making any attempts to introduce or expand on existing e-business initiatives. There needs to be an inclusion of e-business strategy into the overall business strategy (Chaffey 2002; Turban *et al*, 2000). If the top management defines e-business as one of the key areas of strategy to take the business forward to explore other market prospects, there is a high chance of buy-in from the wider organisational members including the supply chain members.

### **Inability to identify and capitalise on new trends**

The inability of organisations to identify new and emerging trends is a major challenge that needs overcoming. New technologies bring with them the ability and unintended consequences to reconfigure the business landscapes causing extreme competition or threatening industries and market segments to face extinction. While the construction industry may not face extinction, organisations could lose their market share and eventually become extinct if they fail to adopt ICT to effect e-business. The nature of conducting business can change as customers are heavily influenced by the introduction of new ICT technologies. As the technologies become commonplace in households and organisations, clients are becoming more intelligent and their value expectations are constantly changing.

There is no doubt that there are many processes within the construction business value chain where e-business can be successfully implemented to increase business value as new trends unfold (DLC, 2002; Ribeiro, 2001). The spotting of these trends requires organisational alertness and agility to 'think outside the box' and position itself to take advantage of these new and emerging trends.

### **Lack of supply chain integration**

Another major setback to the construction industry embracing e-business is due to the lack of supply chain integration caused by the temporary coalition of project operating at different levels of capability (Andrew *et al.*, 1998). Lack of commitment from all members of the supply chain to integrate their business processes to trade electronically was also highlighted as a key hindrance or challenge to e-business uptake within the construction industry. A fully integrated supply chain on a common operating platform is important for e-business initiatives (Cheng *et al.*, 2001; Craig *et al.*, 2003).

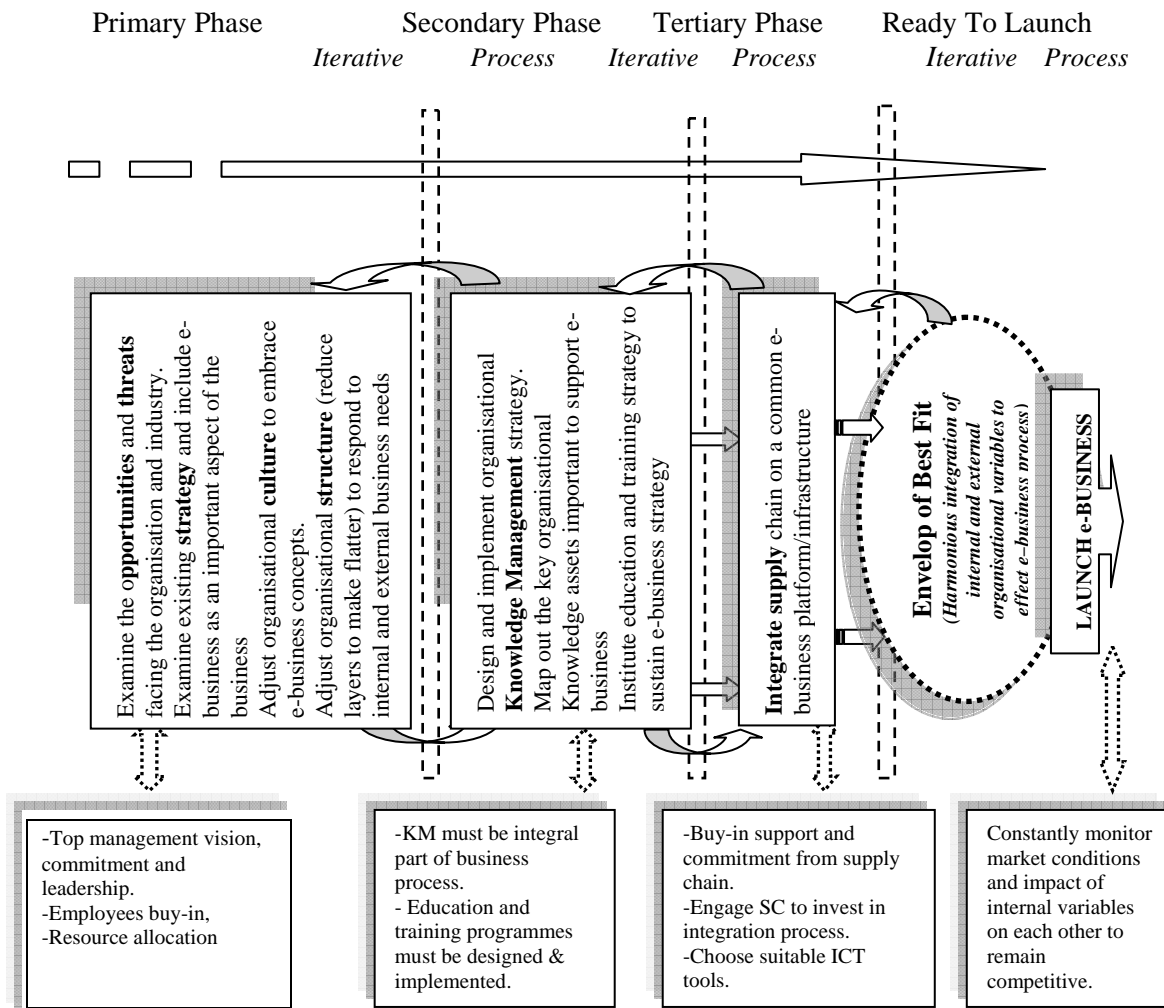
## **PROPOSAL OF AN E-BUSINESS READINESS ASSESSMENT PROCESSES PROTOCOL**

From our on-going research project, it was recognised that many construction organisations did not know where to start and how to start making an assessment and case for e-business initiative within their organisations. This provided a challenge to develop an e-business readiness assessment process protocol to help organisations to evaluate their readiness to engage in e-business.

The e-business readiness assessment process protocol which is proposed here is graded into a 'three phase process' i.e. the primary phase (organisational environment), the secondary phase (the organisational knowledge and technical infrastructure) and the tertiary phase (external stakeholder identification and integration).

It is anticipated that this will help to diagnose the strengths and weakness of the organisation as to what are its readiness capability are in each area of consideration. It will enable the organisation to concentrate its efforts on where it needs to improve the prospects of successfully launching and sustaining an e-business initiative.

The variables in each phase of the e-business readiness assessment protocol are measured by their readiness rating scale from 1 to 5 which starts from 'not conducive at all' to 'very conducive' respectively. Readiness rating scales from 1 to 3 will not qualify the organisation to proceed onto the next phase because even if the organisation embarks on an e-business initiative, the chances of increasing return on investment may be affected significantly. On the other hand, a variable that has its readiness rating level at 4 or 5 is ready to implement e-business and there is therefore a high chance that the organisation can become successful in its e-business strategy. A lower score would imply that even if the organisation proceeds with implementing e-business, it may not be able to effectively exploit it and accrue much of the benefits of conducting business on-line.



**Figure 1: Three-phase e-business readiness assessment process protocol.**

Readiness rating for variables in each phase (1-5)

1. Not conducive at all;
2. Not sure;
3. Just ok for matching competition;
4. Conducive;
5. Very conducive

**Primary Phase**

At the primary phase, when considering implementing an e-business, it is important that the organisation should investigate the market(s) it is operating in and the opportunities and threats confronting the organisation due to the impact of technological advancement. The level of opportunities and threat facing the organisation will determine whether the e-business can be implemented to overcome the threats and exploit these opportunities. Variables identified as keys factors are rated for their conduciveness in supporting e-business in the primary phase. These include organisational culture, structure and strategy conducive for e-business.

All factors in this phase are ranked to determine their conduciveness to support e-business. Any factor that scores below 4 indicates that more work needs to be done to improve the organisational performance in this area before e-business can be launched. All factors in each phase should score a rating of 4 or above to enable an organisation to progress to the next phase. This assessment can be done in parallel with other phases and it is an iterative process.

### **Secondary Phase**

The secondary phase measures the conduciveness of the KM strategy that is in place to support e-business initiatives. It is very vital that the KM assessment rating is 4 or above. The conduciveness of the KM strategy in place will indicate its ability to sustain an e-business initiative after the launching. Any rating below rating 4 needs the organisational effort to improve its rating before making a launch. This is very important because for any e-business launch to remain successful there must be a knowledge management initiative in place (Fahey *et al*, 2001; Maholtra, 2000; Skyrme, 2001). Knowledge management initiatives mobilise the resources for exploitation through the medium of e-business (Fahey *et al*, 2001; Maholtra, 2000; Skyrme, 2001).

### **Tertiary Phase.**

At the tertiary phase, supply chain integration is the key to maximising the full benefits of implementing e-business. Conduciveness of supply chain integration should be ranked at 4 or above. This will enable the supply chain to operate as a single entity over the internet to meet demands as and when required effectively. The supply chain integration enables organisational knowledge to be exchanged effectively that could to produce synergy to meet business demands (Craig *et al*, 2003; Vines and Egbu, 2003). It is worthy of note that e-business readiness assessment protocol only provides a framework to help organisations interested in assessing their readiness and it is still at its initial development phase. The assessment in different phases can progress simultaneously but the order of consideration of importance is presented in Figure 1.

## **ENVELOP OF BEST FIT**

The concept of an 'envelope of best fit' is defined as the 'conduciveness of an organisation where the internal mechanisms to support e-business processes are compatible with supply chain integration to effect profitable business outcomes.' The envelope is an artificial intangible state liken to a balloon skin responding to internal and external air pressure. It can be inflated or deflated depending on the external business environment and supply chain integration. It is always fluctuating depending on how the internal variables impact on each other and are adjusted to meet the demands placed on the organisation and its supply chains. The collapse of one variable can significantly introduce an imbalance into the readiness of the organisation thus affecting its ability to exploit the benefits of e-business. The maintenance of the 'envelop of best fit' is vital to sustain the internal organisational competencies and conduciveness to meet changing business landscapes. This could help to make the organisation agile and responsive to opportunities and threats confronting it when conducting business on-line.

## **IMPORTANCE OF AWARENESS, EDUCATION AND TRAINING FOR E-BUSINESS**

Over 80 % (14 out of 17) of the interviewees in the 15 participating organisations indicated that the lack of proper awareness through education and training initiatives will not place organisations in a proper position to implement e-business initiatives. It was recognised and acknowledge that education and training are key enablers for organisations to continuously renew and update their collective employees' knowledge base; its vision and business strategy; its awareness of the industry and market segment; knowledge about its customers, supply chain and knowledge about the company's overall business processes. These are vital when considering an e-

business initiative. Organisations recommended that education and training should be regarded as investment programme and not as an organisational expense as is generally the case. The impact of investing in organisational awareness, training and education can place an organisation in an advantageous position to exploit its e-business potential.

## **KNOWLEDGE MANAGEMENT FOR E-BUSINESS**

It is important to realise that KM plays a vital role in helping to identify deficiencies in organisational skills and competencies (Malholtra, 2000; Skyrme, 2001; Stewart, 1998; Vines and Egbu 2003). The absence of KM initiatives within construction organisations is recognised as a major barrier to effective and sustainable implementation of e-business. Knowledge management enables the identification of softer non-technical concerns and can help to design training and awareness programmes for the organisation. The present challenge is to make organisations appreciate the benefits of KM in their organisation and then design and implement a KM system that best works for the organisation as there is no one size fits all. An appropriate and effective application of KM would play a significant role in making sure there is a seamless integration of the people and processes with the appropriate technical infrastructure for e-business initiatives. Without this integration and on-going support, it will be difficult to implement any successful e-business initiatives.

## **CONCLUSION**

The paper noted that the emergence of e-business is fast transforming organisations and industries. E-business is thriving on the advancement of ICT technologies and the successful exploitation of knowledge as its key resource (Stewart, 1998). It depends on the development of new business strategies based on existing and new business networks. Construction organisations stand to benefit from the advancement of technology if it can harness the power of technology to exploit its vast knowledge assets to improve its business processes. The paper has presented a three-phase e-business readiness assessment process protocol to help construction organisations assess their readiness before embarking on e-business initiatives. It is anticipated that the model will help organisations assess key areas or variables which are important for consideration when thinking about conducting business on-line. The proposed e-business readiness assessment protocol is simple and can be applied to test organisational readiness in any sector of the construction industry.

The challenges facing construction organisations from taking up e-business have also been highlighted in this paper. The major challenges are addressed in the primary and secondary phases of the e-business readiness assessment protocol.

These include organisational culture, structure, strategy and inability to spot trends which brings threats and opportunities (DLC, 2002) and lack of KM initiatives. The paper also highlighted that for organisations to conduct e-business successfully and in a sustainable manner, it is important that knowledge management programmes are implemented to enable organisational knowledge assets to be fully maximised (Egbu and Botterill, 2001; Leonard-Barton, 1995; Malholtra, 2000; Skyrme, 2001) via e-business initiatives. The importance of ongoing awareness through education and training was highlighted as a key for on-going organisational knowledge assets renewal and updating to enable organisations to remain competitive. When all these factors and their associated sub-variables are assessed using this model, an organisation can see whether it is ready to launch into e-business. There is little empirical work done in this area and there is room for more work to be carried out.



## REFERENCE

- Andrew, A; Roger, F; George, N, and David, N (1998). The changing role of builders merchants in the construction industry supply chain. *Construction Management and Economics*, 16, pp.351-361
- Chaffey, D (2002). *E-business and E-commerce Management*. Essex, GB, Pearson Education Ltd.
- 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 Management*. 14. pp. 68-90
- Craig, N; Tong, M. T and Vines, M (2003). EDMS as a tool for Organisational Learning and Knowledge Management within Construction Supply Chains. *Proceedings for the First Scottish Conference for Postgraduate researchers of the Built and Natural Environment-PRoBE*, Glasgow Caledonian University 18-19 November, 2003. Edited by C.O Egbu and Tong M. K.L, Glasgow Caledonian University. Pp.225-234.
- Davies Langdon Consultancy (DLC), (2002). *The Impact of E-business in UK Construction*. Department of Trade and Industry. Great Britain.
- Egan, J, (1998). *Rethinking Construction*. The Report of the Construction Task Force. Department of the Environments, Transport and the Regions. London
- Egbu, C. Bates, M. Botterill, K (2001). The Impact of Knowledge Management and Intellectual Capital on Innovations in Project-based Organisations. Leeds, Centre for Built Environment. Internal Report, Leeds, UK.
- Fahey, L; Srivastava, R.; Sharon, J.S. and Smith, D.E. (2001). "Linking e-business and operating processes: The role of knowledge management". *IBM Systems Journal*, Vol. 40, No. 4, 2001.
- Kafentzis, K; Mentzas G; Apostolou D and Georgolios .P (2004) Knowledge marketplaces: strategic issues and business models. *Journal of knowledge management*, Vol. 8 No1.
- Kong C.W; Li H and Love P.E.D. (2001). An e-commerce system for construction material procurement. *Construction Innovation* Vol.1, No. 1, pp43-54.
- Leonard-Barton, D (1995). *Wellsprings of Knowledge: Building and sustaining the Sources of Innovation*. Boston, Harvard Business School Press.
- Malhotra, Y. (2000). "Knowledge Management for E-Business Management." *Information Strategy: The Executive's Journal* 16(4): 5-16.
- McIntosh, G and Sloan, B, (2001). The Potential Impact of Electronic Procurement and Global Sourcing within the UK Construction Industry. *Proceedings of 17<sup>th</sup> Annual Conference of the Association of Researchers in Construction Management*. Reading University. UK. ISBN 0953 4161 6X pp. 231-239.
- Nonaka, I and Takeuchi, H (1995). *The Knowledge Creating Company*. New York. Oxford University Press
- Ribeiro, F.L and Henriques, P.G. (2001). How Knowledge Can Improve E-Business In Construction. *2nd International Postgraduate Research Conference in the Built and Human Environment*, University of Salford, Blackwell Publishing. pp.889-403
- Skyrme, D. J (2001). *Capitalising on Knowledge: From e-business to K-business*. Oxford, Butterworth-Heinemann.
- Stewart, T (1998). *Intellectual Capital: The New Wealth of Organisations*. London, Nicholas Brealey Publishing Ltd

Turban, E; Lee. J; King. D and Chung. M.H (2000) *Electronic Commerce: A Managerial Perspective*. Prentice Hall. New Jersey. ISBN. 0-13-975285-4

Vines. M and Egbu. C, (2003). The Role of Knowledge and Knowledge Management in Harnessing the Potential of E-business for Construction Organisations. *Proceedings of the Third International Postgraduate Research Conference in the Built and Human Environment*, 3-4th April, Escola Superior de Actividades Imobiliarias (ESAI), Lisbon, University of Salford. pp.511-519.