

## THE INTERNATIONALISATION OF CONSTRUCTION BUSINESS THROUGH E-COMMERCE: A THEORETICAL EVALUATION

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### ABSTRACT

This paper presents a theoretical framework to evaluate the potential role of electronic business (e-business) in the internationalisation of firms associated to the construction sector. Although the importance of the Internet in supporting business applications and attaining competitive advantage through e-business process is widely acknowledged, little is done by the way of research to study the relevance of e-business adoption in the context of construction internationalisation. Understanding internationalisation of construction is important as construction firms make an important contribution to economic growth and Gross Domestic Product. The aim of this paper is to conduct a literature based theoretical exploration to discuss the potential role of e-business systems in supporting internationalisation of construction firms. It explores the factors that drive e-business adoption and its impact on the emergent supply-chain models. This paper contextualizes internationalisation of construction using a mix of supply chain paradigms embedded with e-business tools. These tools are classified into two categories namely (1) inter-organisational (vertical) business systems, and (2) intra-organisational (horizontal) business systems. The paper concludes by identifying the potential role of different e-business systems in assisting internationalisation of construction businesses.

Keywords: e-commerce, Building Information Modeling, Internationalisation

### 1. INTRODUCTION

Globalisation and regionalisation offer firms in the construction industry the opportunities to expand into international markets. International business is characterised as any form of transactions taking place across national borders for the purpose of satisfying the needs of individuals and organisations (Rugman and Collinson 2009). A number of construction firms already operate in international markets, trading their design services (Reina and Tulacz, 2010a) and construction services/products (Reina and Tulacz, 2010b). International business of design firms, across multiple markets in multiple countries, amounts to significant monetary value. Internationalised design firms are active in following markets: building (US\$8,504.6M), industrial/petroleum (US\$ 21,351.0MIL), manufacturing (US\$ 404.1MIL), transportation (US\$8,985.5 M), power (US\$4,469.6 M), hazardous waste (US\$ 2,090.4 M), water (US\$ 2,755.7 MIL) and sewer/waste (US\$ 1,762.8MIL) (values are in US for the year 2010-Source Reina and Tulacz, 2010a). The international contracting business, operating across multiple sectors, is larger in monetary value than design business. The active contracting markets include: building (US\$ \$86.0 BIL), industrial /petroleum (US\$ 112.0 BIL.), manufacturing (US\$ \$3.8 BIL.), transportation (US\$ \$112.3 BIL.), power (US\$ 35.7 BIL.), hazardous waste (US\$ 0.8 BIL), water (US\$ 11.2 BIL.), Telecommunication (US\$ 2.7 BIL) and sewer/waste (US\$ 6.3 BIL.) (values are in US for the year 2010-Source Reina and Tulacz, 2010b).

Internationalising a business involves complex processes. Numerous tools and techniques are on offer to assist firms to make internationalisation business decisions- including whether to enter an international market, how to enter international markets and how design the best-fit business model (See Rugman and Collinson, 2009; Howes and Joseph 2003). However, the operational success of an internationalised business is contingent upon the effectiveness of the business model. The key factors, that are inter-related,

transactions” (Kauffman and Walden, 2001, p. 3). In essence e-commerce is a ‘process of buying, selling, transferring, or exchanging products, services, and/or information via computer networks, including the Internet” (Turban et al., 2010, p. 4).

The application of e-commerce is not only about replacing paper trails with digital alternatives, but it implies more than that. For an example e-commerce use delicately interconnected electronic tools (e.g. computer networks, telephone, e-mail, electronic data interchange, internet, online collaborating tools and electronic funds transfer) to support open network and establish virtual communication between many parties without requiring physical contact (Froehlich et al., 1999)- making it attractive for international business.

## 2.2 Fostering internationalisation by leveraging e-commerce capabilities of supply chains

According to Porter’s (1990) Competitive Advantage Theory, five major factors contribute to the success of a company in terms of utilization of resources to create a competitive advantage. They are, demand conditions, presence or absence of supporting suppliers, degree of rivalry, threat of new entrants and threat of substitutes. As indicated previously, firms competing as supply chains’ to deliver its products and services to clients via effective flow of material, plant, people, finances and information will acquire significant competitive position (Lambert 2000). The early or effective embrace of e-commerce to support international business can enable the company to establish a competitive advantage (UNCTAD 2004).

In the context of a construction project supply chain, consultants, project managers, contractors, sub contractors, suppliers, manufactures, all also be involved in a number of other project supply chains. Construction project supply chains are some what different to manufacturing supply chains. Project supply chains are from with loosely coupled and are temporary. However, as an exemption when a group of firms develop long-term relationships among themselves as an informal consortium to deliver projects in a particular country and/or sector (e.g. specialist healthcare, mining infrastructure in Indonesia), the consortiums supply chains becomes more stable and permanent. Ayers (2002) proposed a number of supply chain paradigms that enables to contextualise how e-commerce applications can assist effective supply chain operations.

The ‘*procurement paradigm*’ focuses on the procurement process across the supply chains and associate suppliers. The primary focus is improving the cost effectiveness of procurement process generally associated to the upstream supplier base. The ‘*logistics and transportation paradigm*’, is focused physical movement of the products and services. This is a key paradigm for firms that manufacture and distribute products: that is planning, implementing, condoling the efficient flow and storage of goods and services and related information from the point of origin to point of consumption. Logistics paradigm addresses the outbound, downstream side in much the same way the procurement paradigm addresses inbound operations. The ‘*information paradigm*’ is focuses on improving information flows within the company (vertical integration) and across supply chain (horizontal integration). This is assisted by integrated information systems, enabling effective flow of information to help improving coordination and cost of mistakes occurring due to lack of timely/accurate information. The ‘*strategic paradigm*’ is focuses on aligning the strategic goals to supply chain design and execution and has a long-term orientation. This is viewed to improve the market share and profit while cost is secondary (Ayers 2002). The paradigms are not mutually exclusive, and supply chain design can and need to encompass a mix of these paradigms for business success.

On a complementary note, studies found that e-commerce can assists success of internationalisation through the relatively low cost business operations (Chai and Pavlou, 2004; Gong et al., 2007), enhancing the pace business operations (Luo et. al., 2005) and improving information communication among all participants (Wang et.al, 2006). E-commerce can reduce the cost of transactions for most businesses

services to its customers. SS1 supply chain can be more integrated and more permanent than construction project supply chains - that are fragmented and temporary. Most of the specialist suppliers to the construction industry, could source their suppliers from different countries and manufacture in a cost effective geographical locations, and market the products internationally. Based on the nature of the business and supply chain design, variety of e-commerce tools can be adopted by businesses to be competitive.

### 3. INTERNATIONALISING BUSINESS THROUGH E-COMMERCE CONTEXTUALISED THROUGH CONSTRUCTION PROJECT SUPPLY CHAINS

The effective management of information is a key factor in improving the quality, cost efficiency and shortened delivery times in any construction projects. In such an information-rich environment the implementation of a coherent supply strategy powered with e-commerce tools is vital for organisations that are thriving to be competitive (Dikbas and Scherer, 2004). McAfee (1998) has pointed out that information fragmentation contributes for information delays and distortions.

**Table 1: Ecommerce in construction internationalisation of construction business**

E-commerce feature (Laudon and Traver, 2009)		Construction internationalisation focus (Ayers 2002)
Ubiquity – e-commerce technology is available everywhere (at home, at work, via mobile) at anytime (servicing 24 h a day, 7 days a week).	→	Assists- 'information paradigm' supply chain paradigm and overcomes working with people in different international time zones.
Global reach – the technology reaches across national boundaries around the world.		
Universal standards – create one set of technology standards (internet based) that is common, inexpensive, global technology foundation for business to use.	→	Assists- 'strategic' paradigm to develop relationships through online environment and share complex business ideas between suppliers and customers in host countries.
Interactivity – the technology works through interaction with the user. Consumers/suppliers are engaged in dialogues that dynamically adjust the experience to the specific requirements.	→	Assists- 'information and strategic' supply chain paradigms and enables easy alignment of information technology and flows. This provides firms to align their information and technological systems, reducing barriers for strategic alignment of information.
Richness – video, audio, text message are integrated into single message.	→	
Personalization/Customization – the technology allows personalized message to be delivered based on individuals or groups characteristics.	→	Assists – 'procurement' paradigm by developing relationships with suppliers and reducing supply cost by sharing accurate information.
Social technology – the technology enable user content creation and distribution and support social networks.	→	
Information density – the technology reduced information costs and raised quality. Information becomes plentiful, cheap and accurate	→	Assists- 'logistic' paradigm by providing accurate information on stock requirements and lead timeframes.

Eight unique features of e-commerce technology as discussed by Laudon and Traver (2009), discussed in Table 1, reinforces the ability of e-commerce technology to assist in effective internationalisation of construction business. It is evident that the features of e-commerce assists in improving the supply chain operations of any business, including international business. Although, ecommerce appears to significantly assist the supply chains dominated by information paradigm, they can also significantly assist

**Table 2: Ecommerce in construction internationalisation of construction business**

Internationalisation environment- interaction between multiple political, legal, cultural, technical systems		
Paradigms	Type of Ecommerce	Ecommerce Tools (Horizontal or Vertical)
Information Paradigm	G2B and G2C B2C	e-Government portals (H) Customer Relationship Management Systems (H)
Strategic Paradigm	B2B	Building Information Modeling (H & V) Online Document Management (H & V)
Procurement Paradigm		Enterprise Resource Planning Systems (H & V)
Logistics Paradigm		Warehouse Management Systems (H & V) Logistics Management Systems (H & V)

Each firm in a project, based on a firm's core business and the inbound/outbound operations, will have distinct supply network. This will impact on the dominant supply chain paradigm(s) and ecommerce tools aiding such paradigms. Supply chain connections in construction projects are underpinned by complex relationships that very based on the procurement method, making it difficult to generalise atypical ecommerce approach to internationalising construction businesses. However, firms in the construction sector tend to be agile to cope with varying project supply chain needs. Table 2 identifies the key concepts that assist to align supply chain design to ecommerce tools.

Each firm's outbound operations are managed by Customer Relationships Management (CRM) systems, whereas inbound operations are Enterprise Resource Planning (ERP) systems. Each firm has to manage their information technology systems that support ecommerce within the organisation (vertical systems) and across the supply chain (horizontal systems). Some of the ecommerce tolls enable both operate at horizontal (supply chain wide) and vertical (which in the organisation) enabling more integrated solutions.

#### 4. DISCUSSION AND CONCLUSIONS

E-commerce allows a company, regardless of its size, types of business and nationality, to create an effective international business. The construction sector firms can internationalise their business through export or FDI mode using an agile supply chain, embedded with e-commerce capabilities. However, the business model for entry could differ based on the core business and the inbound and outbound operations. This paper argues firms can conceptualise their internationalisation via embedding ecommerce to their supply chain. Based on the dominant supply chain paradigm (strategic, information, procurement, logistics) underling the firm's business mode, firms can choose their ecommerce approach (B2B, B2C etc) and tools (CRM, ERP FIM etc). Firms also need to be conscious about the need for both effective inter company wide systems (Vertical) and intra company/supply chain wide system. However, the successful usage of e-commerce to support internationalisation is faced with a lot of challenges. The asymmetry in e-commerce distribution seems to be caused not only by various levels of economic and socio-technical infrastructure, political and legal factors, but also by cultural aspects to adopt e-commerce across nations. These have been recognized as major issues in the internationalisation of e-commerce (Kshetri 2001). E-commerce can only be utilized competently at an utmost level if the employees and all clients have good ability to make use of the technology (Johnson et al., 2002). Thus, an ideal usage of e-commerce for international business activities requires some efforts and careful planning from the respective business.

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