

THE POTENTIAL IMPACT OF ELECTRONIC PROCUREMENT AND GLOBAL SOURCING WITHIN THE UK CONSTRUCTION INDUSTRY

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There is an ever-increasing amount of applications for Information Technology (IT) for use in procurement systems in all forms of business. This paper describes the role Electronic Procurement and Global Sourcing techniques can play in the United Kingdom Construction Industry. E-Procurement is not new as a concept in industry as it has been apparent in one form or another for around 30 years. Such forms have included Electronic Data Interchange (EDI) which is still used but is increasingly being replaced by Internet-based tools as the technology makes advances. Internet E-Procurement offers the prospect of Global Sourcing, in that normal restrictive boundaries can be crossed offering the advantage of world-wide human, material, energy and capital resources. Procurement methods in the construction industry have been changing from the traditional Competitive Tendering system to that of Design and Build or Management Contracting. For the construction industry, E-Procurement can complement these methods and offer the construction industry the advantage of improved buying standards, improved buying efficiency, increased business profile, opening new markets and the opportunity to avoid and manage risks.

Keywords: electronic procurement, global sourcing

INTRODUCTION

The construction industry is unique in comparison to other industries. It has its own characteristics that relate to its structure, production process, physical characteristics and composition. Hillebrandt and Cannon (1990) suggested that these characteristics fall into four main groups:

- The physical nature of the product and the method of production;
- The structure of the industry, including the relationship between the main groups in the industry and their interaction in the construction process;
- Determinants of demand, why clients invest in building and construction services;
- Methods of price determination, i.e. tendering and competitive bidding.

The construction industry does not have a good record of completing projects on time (World Bank, 1990) and is often criticized for poor management which gives rise to a picture of intuitive decision-making based mainly on experience in a situation of uncertainty. This sequential arrangement of works leads to the general build-up of a large number of task organizations, which become temporarily, although not

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simultaneously, part of a larger project organization (Morgan and Morgan, 1990). The involvement of many organizations in one project provides a strong basis for conflicts during the construction process, largely due to domain of consensus, accessibility of information, interdependency of tasks, and individual performance (Fisher, 1989). An early survey by Onyango (1993) found that in the UK, 52% of all construction projects ends with some type of claim. With this adversarial nature, it has led to poor communication and inefficient information practices that have contributed to the emergence of dysfunctional supply chains (Love *et al.*, 1999). The construction industry is therefore seen as rather inefficient and combative. There is scope throughout the construction process for improvement although presenting new techniques that will be accepted can present a problem due to the rigid nature of the industry. Procurement is present in most areas of the construction process and by making this function more efficient, the whole industry should benefit. Two methods by which procurement may be improved are by Electronic Procurement and Global Sourcing.

CONSTRUCTION PROCUREMENT

Within construction, procurement is defined as “the organization structure adopted by the client for the management of the design and construction of a building project” (CBP, 2001). According to the Royal Institution of Chartered Surveyors (1996) the client’s prime role is to establish a structure for the management of the project and to make sure that it works. In practice, it is generally recognized that the client will not be fully competent with all the intricacies of the construction process and will seek guidance from a reliable, skilled source.

The choice of procurement strategy can play an important part in the way that the construction process flows. Yisa *et al.*, (1996) argues that despite the popularity of the use of competitive tendering it does not encourage innovation and that it leads to fragmentation in the industry. It is therefore important that the choice of procurement strategy suits the project that it is to be used for. Abdel-Meguid and Davidson, (1996) have highlighted the correlation between the choice of procurement strategy and cost and time over-runs.

Procurement strategies may include (RICS, 1996): Traditional; Design and build; Management; Design and manage; Construction management; and Partnering. The choice of procurement strategy is dependent on the type of project, contractors’ method of work and the clients’ preference. Design also plays an important part as this can dictate the contractors working conditions thus the contractor may not be compatible with the work ahead. Careful consideration is required so that the construction work can flow as well as possible. Once the strategy has been chosen, different procurement options are then apparent for the contractor. For the construction process, material, labour, plant etc. must be sourced in order for the work to be carried out. With making use of Information Technologies, this can be done more efficiently and thus gain cost and time savings.

THE ROLE OF INFORMATION TECHNOLOGY IN CONSTRUCTION

Information Technology (IT) has a pivotal role to play in improving communication and co-ordination in construction by acting as an enabler of change (Love, 1996). IT is defined as “the use of electronic machines and programs for the processing, storage,

transfer and presentation of information" (Bjork, 1999). This includes the use of e-mail, computers, software, networks, and even telephones and fax machines. These recent technologies have the capacity to have a profound impact on how organizations operate on a daily basis (Rivard, 2000). Construction is one of the most information-dependent industries (Futcher and Rowlinson, 1999) amongst others, with its diversity of forms of information which include detailed drawings and photos, cost analysis sheets, budget reports, risk analysis charts, contract documents, planning schedules. The amount of information generated and exchanged during a project lifetime can be substantial, even for a small-sized construction project. It is essential that the information exchange can be managed as efficiently as possible.

In 1995 the UK Department of the Environment IT Strategy for Construction clearly defined the lack of perceived business case for IT investments as a major obstacle to effective adoption and application of the technology in the sector. The problem of identifying IT costs and benefits is neither new nor unique to the technology of the sector. It is a global problem experienced in all types of business sectors and organizations (Hochstrasser and Griffiths, 1991).

Some construction companies regard the use of evaluation techniques as a 'ritual of legitimacy' and they are often considered as being more costly than the value that they generate (Andresen, 1999). Currie (1995) argues that organizations merely use such techniques to support business decisions that have already been made. Powell (1992) furthermore recognizes the political dimension of IT investment, addressing the issues as to why firms or individuals may wish not to engage in the formal evaluation of IT projects. Other organizations adhere strictly to formal appraisal techniques developed from economic analysis.

The influx of IT into the construction process also creates problems. According to Barret (1993), rapid advances in IT at that time posed both threats and opportunities to the construction professions. Barrett argued that there is the danger that the professionals will become unnecessary as IT makes expertise more widely available, possibly through expert systems. It is possible to make phone calls, link up with computers anywhere, manipulate existing data, and make quick and accurate responses to clients' requests (Moodley, 1994). Efficient market forecasts and political and economic predictions are now easily available as a result of developments in IT. Consequently, information on new projects is easily accessible to a greater number of competitors than it was before. Project information can now be obtained through electronic media and print media, either in the form of advertisements or news items.

For the construction industry to take full advantage of IT, it must make the fundamental change to become an information environment. Kashiwagi (1999) gives the following requirements of an information environment:

- The technology to process data into information. The technology must have the capability to handle a changing database without redesign of the technology. This eliminates systems that have a set order of decision processes;
- Performance information databases that are shared between facility owners, constructors and designers;
- Education of the construction industry participants on performance information and how to use it to increase construction performance.

Kashiwagi goes on to argue that this type of environment would have the following advantages:

- Eliminate all non-value added construction/ design activities and functions;
- Identify a performing facility system that leads to a reduction of risk;
- Allows total competition (pre-qualifies in the same step using performance information) and allows performing constructors to receive a fair profit;
- Motivates constructors to continuously improve.

As with any business environment, the advantages that IT can offer are very attractive but it is the changes required to reap these benefits that pose the greatest challenge for the construction industry. By implementing IT into the construction process, most areas can become more efficient and thus benefiting the whole industry. Within procurement, especially through the construction process, two techniques that may be improved with the use of IT are Electronic Procurement and Global Sourcing.

ELECTRONIC PROCUREMENT

A method of using IT within the procurement process, which is gaining momentum, is known as 'Electronic Procurement'. The concept of E-Procurement has been around in one shape or form for about 30 years. Until recently, due to the growth of the web, it has mainly been in the form of EDI. This still exists, but is becoming increasingly replaced with internet-based methods such as Virtual Private Networks (VPN) or extranets. The major benefit usually claimed when implementing E-procurement is reduced costs. Any such savings go straight to the bottom line and are therefore in a different category from the benefits gained from increased turnover (McTaggart, 2000). There is also reduced transaction costs through electronic procurement which provides immediate cost savings that are relatively easy to document (Fitzgerald, 2000). In the UK, the government has been one of the main driving forces behind the surge towards electronic procurement. In a recently published white paper entitled 'Modernizing Government' it was stated that 90% of government procurement should be electronic by March 2001. In April 2000, the Office of Government Commerce was set up and charged with saving £1 billion from Whitehall's procurement bill, a goal that was thought at the time to be highly realistic (Huber, 2000).

One of the driving forces behind the emergence of this area has been the development of new technologies for electronic data transfer (Baldwin *et al.*, 1999). The most widely recognized method is that of Electronic Data Interchange (EDI). EDI can be linked to the purchasing and distribution functions with the use of the appropriate software that supports design activity and controls production processes (Moore, 1998). EDI involves the computer-to-computer exchange of business documents in a standard, machine processable format between and among inter-organizational trading partners (Emmelhainz, 1993). Internet EDI allows the automation of the whole supply chain (i.e. the synchronization of the demand, supply, and production from the raw material supplier to the ultimate product consumer) and extends the boundaries of Intranets so that they transform themselves into Extranets. The strongest case for Internet EDI has been established by cost savings (Smith, 1996).

As stated by the RICS (1996), when choosing a procurement strategy, the three crucial criteria are time, cost and design. The client has then to decide on the relative importance of each and then base their strategy on the most important criteria. With the use of E-Procurement and the cost savings associated with this, the client can then take cost out of the equation and choose between time and design.

According to Andersen *et al.* (2000), the use of IT in the construction process can benefit the procurement process in three typical ways: efficiency benefits, effectiveness benefits and performance benefits. These basic categories were developed to provide a new framework for measuring the benefits of IT in construction. The categories were developed from the issues raised from a recent research project undertaken by the UK Construct IT Initiative (Construct IT, 2000).

The efficiency benefits quoted include:

- Reduced storage requirements;
- Reduced transaction times;
- Reduced transaction costs;
- Improved delivery scheduling.

The effectiveness benefits quoted include:

- Maintain competitiveness capacity;
- Faster response to supplier quotations;
- Ability to provide instant price quotations to clients.

The performance benefits quoted include:

- Improve external access to stock levels and price information;
- More effective identification and assessment of new suppliers.

Electronic Procurement has the capability to make a positive change within the construction industry. The reductions in cost and time are major benefits in the construction process as well as the benefits from improved relations with suppliers. It has worked well in other industries and to a certain extent for the construction industry with the use of EDI.

GLOBAL SOURCING

In the course of an organization's daily commerce, purchasing is an inevitable task that is responsible for materials moved from suppliers/ vendors to manufacturing facilities (Zeng, 2000). Mihaly (1999) estimates that between 50% and 70% of a manufacturing company's potential value is in purchased items; even for service industries, half of their services are purchased from other companies. Therefore, an organization's profit is determined and defined by its purchases to a large extent, and purchasing has been considered one of the key drivers for a company's survival and growth. By opening a company up to a global market, it should be able to improve its market position and competitiveness. For this policy to be effective, the company's first task is to search for overseas suppliers capable of satisfying their needs. Min and Galle (1991) conducted a survey that found that several sources of information about potential suppliers are utilized, of which the most popular are private sources such as professional contacts, trade journals, directories, trading companies, and import brokers. Global sourcing has been defined as "the efficient use of world-wide human, material, energy and capital resources" presenting different strategies for developing relationships abroad (Hefler, 1988).

When considering the procurement practices for a construction project, there is more scope for procuring at a global level rather than at a local level. Globalization is now a

fact of business life in that the prime players are now aware of it at all sizes of firms (Herbig and O'Hara, 1996) and in construction this has also become an important factor. Webster and Wind (1972) define organizational buying as "the decision making process by which formal organizations establish the needs for products, and identify, evaluate, and choose among alternative brands and suppliers." In a construction project, the main contractor, with the approval of the client, has many of these decisions to make. Whether it be materials, labour or plant, the contractor has to make these choices in relation to time, cost and design (RICS, 1996), whilst still returning a profit. Generally, for a contractor to source abroad, it is more likely to be for specialist items such as design or finishes.

Frear *et al.* (1992) state that there are many reasons to undertake a global sourcing strategy. Reasons include improved competitive position, global attitude, lower prices, enhanced company image, better availability, better quality, higher level of technology, better terms of delivery, take advantage of advanced technology abroad, negotiability, geographical location and government assistance. As previously stated, construction procurement has three main criteria, time cost and design. Global sourcing can provide a means to help intertwine these criteria. The global marketplace enables the contractor to gain maximum value for money without sacrificing quality. This is similar for time as the vast choice available increases supplier's competitiveness and therefore they must provide a better service. With time and cost reduced, design can then flourish without the threat of overruns and running over budget.

Whilst it may be beneficial for contractors to source globally, there are variables present over which the contractor has no control. These are known as environmental factors and can severely limit an organization's ability to do business internationally (Lamb *et al.*, 1992). These factors include social/ cultural conditions, economic conditions, technological developments and political legal systems that differ in separate parts of the world. It is therefore necessary to have a good knowledge of these foreign trade zones and therefore reduce any risks. Zeng (2000) has also highlighted several obstacles such as transportation delays, foreign exchange fluctuations, travel costs, quality assurance, language, paperwork, inspection procedure, contract terms, culture/ customs, political stability, trade barriers, company integrity, and nationalism. Due to all of these obstacles it is important to select an efficient strategy and to do all the necessary research.

In Europe, environmental factors do not play as great a part due to the European Community and the creation of the single market, with at present 15 Member States. With the elimination of trade barriers and tariffs there has been significant changes in procurement practices (Herbig and O'Hara, 1996). It is thought that from an average of 35 pieces of paperwork for cross border trade, this will be reduced to 2. This will also have the knock-on effect that transportation issues will become a less critical factor. The end consumer will benefit from this because by being exposed to a wider range of goods and services, suppliers and manufacturers will become more aware of price and quality. Manufacturers will also have more options in relation to their suppliers, which until now has not existed.

Hefler (1988) identified the three most commonly used global sourcing strategies as:

- Working with qualified suppliers who have been approved by the appropriate governing body;

- Joint ventures with a separate organization overseas whose skills can complement their own with a view to sourcing a certain quota from them;
- 100% equity investment where the organization can acquire a company in order to gain an advantage abroad.

The type of global sourcing strategy depends on a number of factors such as company capability and resources, availability and resources of suppliers or partners, projected sourcing volumes and variability, and the degree of integration of offshore sourcing with other operations. The most attractive aspect of global sourcing for an organization has been the lowering of costs. Due to regional variations, less expensive labour, less restrictive work rules, and lower land and facility costs have encouraged companies to look for foreign options. As early as 1991 the lowered production costs was the main motivating factor for 33% to 50% of companies employing global sourcing (Fagan, 1991).

To implement a successful global sourcing strategy, it is important to understand the different stages in the development of the strategy and the information sources about overseas suppliers. Monczka and Trent (1991, 1992) classify the international procurement process into four phases:

- Phase 1: domestic purchasing only;
- Phase 2: foreign buying is based on need, where companies use subsidiaries or other corporate units for international assistance and designate domestic buyers for international purchasing;
- Phase 3: foreign buying as part of procurement strategy, where companies start establishing international purchasing offices; and
- Phase 4: integration of global procurement strategy and assign design, build, and sourcing to specific world-wide business units.

The use of a global sourcing strategy should enhance the competitiveness of the UK construction industry. The world is effectively becoming smaller in business terms due to advances in IT, thus competition on the UK construction firms will intensify. It will become normal to utilize the global marketplace rather than stick to the domestic market.

FUTURE RESEARCH

There is a need for research to be undertaken to find out the actual state of affairs in the United Kingdom and the opinions of the construction professionals towards Electronic Procurement and Global Sourcing. The authors anticipate that this would include an electronic survey with the aim of finding out to what extent the main UK contractors are using Electronic Procurement and Global Sourcing, which methods they are using and their opinions on present and future use of these techniques. There is also the potential to identify the social costs and benefits regarding global sourcing such as environmental factors due to haulage.

CONCLUSIONS

The construction industry is unique but plagued with conflict, disputes and inefficiency. These problems may lead to construction professionals being wary of new techniques as they have been slow to learn lessons from other industries in the

past. In recent times the business world has been revolutionized with the continuous utilization of Information Technology. The construction industry has realized this, albeit later than other industries, and is utilizing it in everyday operations. Procurement has always been an integral part of the construction process, yet as with all the industry, seems reluctant to move with the times. EDI has been used but with the dawn of Electronic Procurement the scope for a massive leap forward is present, especially in terms of material, plant and labour. The cost savings have been well documented and this is a key factor in any construction work.

In business terms, the world is becoming smaller and smaller due to Information Technology thus creating a global marketplace. Global sourcing is now an important part of many organizations' daily operations as they have seen the benefit of looking further than their personal homeland. There are several benefits from doing this and they all ultimately can be broken down to time, quality and cost. If the construction industry can change from their traditional methods of sourcing and utilize the global marketplace, the industry may increase efficiency and competitiveness as well as increasing profits. The main challenge for the United Kingdom construction industry is to fully embrace Information Technology and then to reap the benefits.

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