Organisation E-Readiness: People and Process – Success of Collaborative Environments in Project Management

Eric Choew Weng LOU and Mustafa ALSHAWI

Research Institute for the Built and Human Environment,
University of Salford,
Greater Manchester M5 4WT,
United Kingdom

E-mail: e.c.w.lou@salford.ac.uk; m.a.alshawi@salford.ac.uk

Abstract
Collaborative environments for construction project management are widely accepted as becoming an essential element to address construction business improvement. However, there are still many failures in adopting it. Various cases studies has shown people and process in organisations as critical success factors; not technology. Organisations can address this issue further through the ability to measure electronic readiness (e-readiness) of their organisation, enabling them to adopt and use the available ICT to improve their business strategies and performance, and services to customers. E-readiness reflects organisational soft issues such as business processes, management structure, change management, people and culture.

Keywords:
Collaborative Environments, Construction IT, Critical Success Factors, Extranets, E-Tendering, People, Process

1 IT-based performance in construction

The UK government, industry and clients are all seeking to bring about change in the construction industry to improve quality, competitiveness and profitability and to increase value to clients Alshawi and Ingirige (2003). Over the past decade, the implementation was carried out through initiatives such as the Construction Task Force, the Government Construction Clients Panel (GCCP), the Construction Clients Forum (CCF) and Constructing Excellence (CE). These initiatives have also contributed to the Egan report’s recommendations (Egan, 1998) in securing a culture of co-operation, teamwork, and continuous improvement in the performance of the industry.

In a recent study by a European task force on ICT sector competitiveness and ICT uptake highlighted the importance of ICT based innovation in bringing productivity improvements and competitive advantage to industry. It showed that since the mid nineties there is a constant decline in labour productivity which is mainly attributed to the lack of ICT related investment. Evidence shows that higher productivity growth
rates observed in the US and other world trade partners of Europe are resulting from greater use/integration of ICTs by all segments of the economy. For example, productivity growth in the US has been mostly driven by ICT-using services sector. (European Commission, 2006) However, industries have not been in a position to capitalise on the investment in terms of productivity growth (OECD, 2003).

In Construction, it is widely accepted that ICT is becoming an important element of any organisational infrastructure, particularly to address construction business improvement. For small businesses, standalone applications such as e-mail, presentations and report writing are seen to be essential components for running any business. For larger organisations, the picture is more complex where ICT infrastructure plays a key role in supporting core business functions. However, there is ample evidence that ICT have failed to bring about a competitive advantage to organisations in spite of the large investments over the past decade. A large percentage of systems have failed to achieve their intended business objectives. In a recent study which was carried at the University of Salford in the area of “IT failure” have shown that 75% of IT investments did not meet their performance objectives (Salah, 2003). Such projects were abandoned, significantly redirected, or even worse, they were “kept alive” in spite of their failure. The cost of funding such projects and the missed opportunities of not benefiting from their intended capabilities constituted a tremendous loss for organisations. This dissolution in the strategic benefits of ICT is currently forcing many construction organisations not to invest in IT for any competitive advantage but for the reasons of bringing efficiency and effectiveness to business processes.

This fact can severely hinder the UK construction industry to use ICT in gaining productivity improvement and sustainable competitive advantage which is critical to maintaining its position nationally and internationally. This is particularly true in the light of the continuous challenges that the industry is facing such:
(a) Globalisation of the marketplace due to productivity improvements and advantages in economies of scale, some foreign firms are capable of competing with local firms on price, quality and delivery.
(b) The economical forces which affect the client organisations.
(c) Increases in project complexity which is reflected by the large number of specialists who have to communicate with one another for efficient project execution.
(d) The need to achieve faster results with the given resources, hence placing severe time pressures on the entire project team.
(e) New procurement practices such as Private Finance Initiative (PFI) and partnering have started to influence business strategies of organisations.
(f) Client sophistication which is becoming a major driver for productivity improvements in construction.

2 Collaborative Environments (Extranets)

Collaborative environments present an environment whereby various construction professionals could come together and meet in a similar environment. These environments present a standard platform for various project partners to communicate, exchange data and information, data storage and replication, archiving and much more.
Most of all, it initiates a drive for IT integration through data and information interchange and reuse.

The massive growth in collaborative environment concepts brought the scenario of individual and islands of development, partly caused by the fragmented nature of the UK CI. Many collaborative environment vendors were introduced into the industry, among large vendors are such as BIW Technologies (http://www.biwtech.com), 4Projects (http://www.4projects.com/) and BuildOnline (http://www.buildonline.com/). Other vendors include Cadweb (http://www.cadweb.co.uk/), ProjectVillage (http://www.projectvillage.com/), Integration (http://www.integration.arup.com/), Viecon (http://www.viecon.com/) and many more. Fragmentation of the industry also brought smaller providers servicing the niche markets in the CI.

The main driver of collaborative environments is to gain competitive advantage – through improved work processes; more efficient information sharing and reuse; better returns on investment; create strategic partnerships and “win-win” culture; availability of project information management strategy; improving buildability and whole life costs with the supply chain; public and private initiatives. (Alshawi and Ingirge, 2003; Jackson, 2004; Pavlov and Aleksandrova, 2003). Harnessing IT in the organisation will provide the competitive advantage over competitors, which is a crucial goal and vital task for many organisations today (Hedelin and Allwood, 2002). Having the edge equates to a longer and a more extensive cliental, not only in the UK but around the world. Computing usage incorporates better efficiency, speed, accuracy and effectiveness in everyday business processes and management – data is collected and used as information, collective information are analysed as intelligence for the organisation (Amit and Zott, 2001; Sulankivi, 2004). Collaborative environments also present the ability to share and reuse information in the industry overcomes various problems in accuracy, reliability and cost. The establishments of standard data exchange, such as the XML (eXtensible Markup Language) and IFC (Industry Foundation Classes), help provide the common interface for file and data sharing and reuse, publish, download and upload, and other exchange processes (Alshawi and Ingirge, 2003). The CI community always demands better returns on investment. Project information strategy seeks to generate an agreement on how a single project will produce, exchange and manage its information so other participants in the project could benefit from improved sharing and reuse of information (Neef, 2001). Dramatic improvements in IT cost, infrastructure and performance are leading the changes in organisational strategy, structure, process, distribution channels and work. The management will how have better ROIs in IT in the organisation than ever before. With the increase in project size, there are more resources, thus, larger investment could be invested in more sophisticated computing systems and approaches. This could be justified with improved productivity and performance over the life of the project.

Perhaps the largest barrier to collaborative environment adoption is the construction community (people), not the technology – lack of awareness; no quantifiable measurements or indicators of success; limited skilled workers; transparency in the CI; poor cross-disciplinary communication; fragmented supply chain; poor industry standards for information interchange (Alshawi and Ingirge, 2003; Martin, 2003). Again, CI finds it difficult to accept change or a new work environment or even
cooperate with other organisations in the industry. Overwhelmed in their traditional mindset, industry players are reluctant to adopt or consider changes to everyday processes, therefore, pay less attention to the advantages and benefits of IT (Sun and Aouad, 2000). To date, there are no recognised quantifiable methods to measure and quantify the benefits of IT systems in organisations, reflecting the perception of IT of being 'complicated' is causing the necessary risk. Transparency of work processes in the CI remains questionable; project information is not being shared, resulting in waste of knowledge, resource and intelligence (Jackson, 2004; Sulankivi, 2004). Poor communication has also often been identified as a bottleneck for performance improvement and it also re-enforces the confrontational and blaming culture. Poor data and information exchange standards from different developing standards prevents computer systems from 'talking' to each other and the exchange of information and data is virtually impossible (Mould and Starr, 2000). This issue is being widely discussed across all industries, the CI included.

3 Managing Project over the Web

Web based developments have created an impact on project collaboration in industry. According to the Computer Weekly (2007), project collaboration has been well received in the construction industry, as it has long suffered from complex supply chains involving architects, builders, designers and engineers. Therefore, a lot of web-based service providers in the construction industry have focused their attention on developing this area of competence.

Alshawi and Ingirige (2003) addressed the area of web-based development, noting that communication plays a vital role in solving problems in project management. Scanlin (1998) also pointed out that communication consumes about 75% to 90% of a project manager’s time, therefore, information needs to be current, and available ‘on demand’. Biggs (1997) also lists communication as the root cause of most project failures, but highlighted that the latest web-based solutions can link with email, or collaborative software which can reduce the incidence of people-related issues. Deng et al. (2001) point out that the extensive physical distance between project participants extended over national boundaries is the main cause which can lead to delays in decision-making. Wide communication problems, ranging from delays, through to distortion of the message, can result in cost and time overruns in projects. Furthermore, the dismissive nature of expenditure on making long distance telephone calls, facsimile transmissions etc, have made the project management community in construction look for more viable alternatives.

Although there are limited contacts between the top executives, it is the knowledge workers who collaborate more regularly on day-to-day running of the project. Most of the collaborative IT tools, such as email and web-based tools etc. are widely being used by the knowledge workers (middle level managers). As a result of this emphasis on communication, new technologies have been developed for networking, information sharing, database management systems, etc. However, in contrast to the manufacturing and retail industries (where most of the new developments have taken place), the overall construction industry has shown a relatively slow up-take of web-based technologies to improve its practices (Building, 2001). This situation is changing however, as more and
more firms in the construction industry are starting to realise the benefits of improving communications between project participants - which can lead to improved cost efficiency, better quality and improved competitive advantage.

It is expected that the Internet will be used to leverage even greater potential to project managers over the next five years. The Internet is increasingly providing a conduit for rapid information transfer, so messages not only can reach the recipients more speedily and accurately, but are also traceable to the sender (which is increasingly being used for contractual reasons). This ease of transmission can also save money for construction companies, especially when having to communicate with overseas construction entities, as the cost of providing and maintaining Internet provision is often much less than couriering documents or continual international direct dial (IDD) telephone usage. Internet provision also provides other benefits, especially when high data volumes are expected, as it does not have restrictions on locations, time or different computer operating systems.

The rapid evolution of communications technologies is making distributed projects increasingly more viable (Ly, 1997). Project participants are often widely dispersed, yet they can be coordinated by sophisticated tools. The increasing availability and the usage of the Internet by small to very large-scale construction organisations have enabled project management to be performed over the web.

4 Critical Success Factors: Process and People

Construction organisations and professionals are aware of the benefits and advantages of collaborative environments through many high-profile success stories (4projects, 2008; BIW Technologies, 2008). However, when new software or new processes are introduced in any organisation, it is only natural for the employees to be cautious and afraid of their jobs; employees will fear responsibility and process changes (Lou, 2006). The main attributes of the high percentage of systems failure are rarely purely technical in origin. They are more related to the organisational ‘soft issues’, which underpin the capability of the organisation to successfully absorb IS/IT into its work practices, in this context, collaborative environments. IT is still, in many cases, being considered by the management of organisations as a cost cutting tool (owned and managed by their IT departments). This ‘Technology push’ alone, even though to some extent is still dominating in many industries like construction and engineering, will not harness the full business potential of IS/IT and thus unable to lead to competitive advantage. Although the implementation of a few advanced IT applications might bring about ‘first comer’ advantage to an organisation, this will not last long as it can be easily copied by competitors. It is the innovation in process improvement and management, along with IT as an enabler, which is the only mechanism to ensure sustainable competitive advantage. This requires an organisation to be in a state of readiness which will give it the capability to positively absorb IS/IT enabled innovation and business improvement into its work practices.

People are the determinant force, deciding the success or failure in the uptake of e-tendering and collaborative environments. When the individual is willing to change,
there will be the willingness and aspiration to try new things, explore new horizons. With top management support, presence of a champion among employees and a motivated manager, this will drive the desire to try and change from the old ways. (Neef, 2001; Retik and Langford, 2001). Employee behaviour towards collaborative environments and e-tendering could also be reflected into the Maslow’s hierarchy of needs – the individual process; the interpersonal process; the organisational structure and dynamics.

Organisations must be process-led and not technology-led – organisations must not implement new technology into current processes but allow technology to be absorbed into the current organisational processes. Radical process changes may break existing organisational processes, crippling the organisation. Introducing new technology will incur changes. Employees may have to change the way they work to suit technology, inciting work inefficiency, disorganisation, low morale, no motivation, and some may be fear for their job security (Beise, 2004; Deng et al., 2001; Lou, 2006).

In an attempt to find the impact of the business processes and people issues on the successful uptake of collaborative environments, a number of case studies of construction projects were undertaken with a building contractor, project management consultants and engineering consultants. All cases are based in the UK, using collaborative environment software as the case study. The analyses of the cases show that collaborative environment solution is welcomed by most employees in the selected organisations. Employees welcome the changes as it improve productivity, ensure work efficiency and less repeating work through data and information reuse. This enables organisations to handle more jobs in a single timeframe with this new system.

4.1 Process
The finding of this study reveals the potential critical success factors for the business process issues in the implementation of e-tendering in collaborative environments:

<table>
<thead>
<tr>
<th>Potential Critical Success Factors for the Process Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes must be process-led, not technology-led.</td>
</tr>
<tr>
<td>Alignment of collaborative environments implementation strategy to project team strategy;</td>
</tr>
<tr>
<td>Never change the entire work process to suite technology or software solutions;</td>
</tr>
<tr>
<td>Conduct self-evaluations before change;</td>
</tr>
<tr>
<td>Conduct change through change strategies – Business Process Reengineering, Change Management, etc.;</td>
</tr>
<tr>
<td>Alert to current research and development methods for better business processes.</td>
</tr>
</tbody>
</table>

4.2 People
On the people issue, the following potential success factors were found critical in the implementation of e-tendering in collaborative environments:
### Potential Critical Success Factors for the People Issue

- Motivation of employees;
- Interest in IT of employees;
- Work satisfaction of employees;
- Prior experience with collaborative environments;
- Employee attitude towards collaborative environments;
- Presence of a “champion”;
- Level of top management support;
- Security of job – technology does not replace human processes;
- Internet access and type of availability;
- Adequacy of training;
- Adequacy of resources;
- Employment of the younger generation – more interest, training and focus on IT;
- Proven computing technology and capabilities of the collaborative environment solution;
- Proven to improved efficiency and productivity in work of the collaborative environment solution.

### 5 E-readiness

It is important to implement the right ICT solutions for the right processes, to the right degree with right timing. Individuals and the organisation must be prepared and be ready to changes to come. Striking the right balance is a goal which all organisations and countries are striving to achieve. Therefore, national leaders and industry chiefs need to continuously assess the position of their organisations. Every country is different; every organisation is different; and every country of the organisation operates in is also different. It is believed that successful e-business and e-commerce can take place if, and only if, emergent initiatives are built on robust foundations of readiness (Alshawi, 2007; Waseda University, 2007; UN, 2008). The notion of e-readiness means different things to different people, in different contexts, and for different purposes. As a result, a large gap exists between ideas and concepts on one hand, and practical applications and implications, on the other (bridges.org, 2005; Economist Intelligence Unit, 2007; UN, 2008). Gaps also exist between new expectations and capabilities in place (World Economic Forum, 2007).

Much of today’s e-readiness initiatives are driven through the private sector. However, various consulting and research councils have set initiatives to promote e-readiness in the national and organisational levels; each contributing towards the realisation and empowerment of e-readiness for nations and organisations. Among the leaders in this initiation are the United Nations, World Bank, Economist Intelligence Unit, World Economic Forum and Asian Pacific Economic Cooperation (APEC).
E-readiness as a global agenda is not a new proposition; however, e-readiness as an organisational agenda is still in its infancy. Achieving e-readiness for built environment organisations, by its nature, will be a very challenging task. The industry is well known for being traditional and fragmented, not easily moved by technology and change. As the world becomes more dependent on e-commerce and reliance on electronic transactions, the industry do not have a choice but to change and move forward. However, this change must come at a gradual pace.

6 Summary

Although the implementation of a few advanced IT applications might bring about “first comer” advantage to an organisation, this will not last long as it can be easily copied by competitors. It is the innovation in process improvement and management, along with IT as an enabler, which is the only mechanism to ensure sustainable competitive advantage. This requires an organisation to be in a state of readiness which will give it the capability to positively absorb IS/IT enabled innovation and business improvement into its work practices.

The term “e-readiness” is coined to measure how “ready” are organisations to adopt and use the available IT to improve their business performance and services to customers. It reflects the organisational soft issues such as business processes, management structure, change management, people and culture. The importance of organisational e-readiness to successfully embrace IT into work practices is gathering pace both in academia and industry due to the large investments in IS/IT over the past decade of which a large percentage didn't meet their intended business objectives.

Organisations need to rethink their processes, structure and work environment in the light of the advances in IT in order to harness the value of technology in achieving sustainable competitive advantage. The need for “forward looking” management tools to measure the current capabilities of organisations in the relevant areas and to predict the required level of organisational change becomes critical. This is an area which is highly under-researched and needs focused efforts to develop tools, guidelines and methodologies in order to help organisations to effectively transform their work environment into dynamic ones where IT-based innovations underpin business improvement and sustainable competitive advantage. Understanding e-readiness can enable organisations to enter new markets – aware of both the revenue potential and the possible bottlenecks to growth. Future research shall take on a measured approach to help the organisations to be e-ready – a practical framework to measure the readiness levels of organisations.

7 References


Economist Intelligence Unit (2007), The 2007 e-readiness rankings. Raising the bar, Economist Intelligence Unit (EIU) Research Reports.


RIBA - Royal Institute of British Architects (2008), The RIBA Plan of Work Stages 1999. [Date accessed 07/07/2008].

Salah, Y. (2003), IS/IT Success and Evaluation: A General Practitioner Model, PhD Thesis, Research Institute for the Built Environment (BuHu), University of Salford, UK.


