E-Readiness for the UK Construction Industry – the next chapter?

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The UK construction industry over the years has invested heavily in IT to be an integral part of its core business. However, there are evidences to indicate that the investments have repeatedly and systematically failed to deliver the anticipated benefits. Together with the Department of Trade and Industry (DTI, now BERR) in this respect, a high-level survey was conducted to gauge and assess the overall awareness and understanding of the UK construction industry’s leading Chief Executives and IT Directors on this issue – particularly, to envision a way forward. Research results identify a clear paradigm shift in thinking, with respondents identifying that IT strategies are now being integrated into organisational business strategies, but, that IT investment was now being influenced by the ‘state of readiness’ of the organisation in order successfully leverage these investments.

Keywords: Construction; IT Investment; IT Success; Organisational Readiness; Strategy

1. Challenges facing the industry

The Construction Industry contributes one of the largest shares of wealth creation to Europe’s business economy; it accounts for 9.7% of gross domestic product (GDP) and almost 60% of gross fixed capital formation (GFCF), with housing being the largest single segment at 20% GFCF, thus representing 27% of the total construction output. The building construction industry consists of 1.2 million companies, 7 million direct employees and 18 million direct and indirect employees with at least half of this figure being employed by Small to Medium Enterprises (SMEs) – organisations with less than 20 operatives. From a value perspective, the construction sector is of significant importance to the EU economy, with a Gross Domestic product (GDP) contribution of 9.8% (Business Watch, 2005), and around 8% of GDP in the USA (Researchandmarkets, 2010).

However, from an investment perspective, there is ample evidence to denote that IT has failed to bring about competitive advantage to organisations in spite of large investments being made. For example, research by Salah (2003) shows that 75% of IT investments within construction organisations fail to meet their business objectives. In this respect, projects were abandoned, significantly redirected, or simply “kept alive” in spite of the failure to integrate them into organisational business. Therefore, 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 of not being able to realise the strategic benefits of IT is currently forcing many construction organisations to reconsider their IT investment decisions to procure competitive advantage. Therefore, the rate of IT not achieving its intended business objectives (IT failure) is increasing, the landscape of which was echoed by Lientz and Larssen (2006), stating that 40% of IT projects failed to deliver tangible benefits, and less than 50% were completed on-time and on-budget. Many more failure stories can be cited, e.g. Standish Group (2001), Heeks (2002), Michaelson (2006) and Xia and Lee (2004).

In an attempt to further understand the current status of industry towards IT investments, a joint study was recently carried out between Construct IT and the Research Institute of the Built and Human Environment to assess the state of Construction Executive thinking towards
IT investment for continuous improvement and sustained competitive advantage (Construct IT, 2008).

2. Research Problem

In light of the aforementioned ICT challenges facing the industry, and in order to bring about construction IT-based innovation to contribute to the improvement of the industry’s productivity, it was crucial to identify the current gaps in the industry’s core decision makers – as these decision makers either directly, or indirectly have an impact on ICT investment. In this respect, it was also important to understand the needs for change and successful implementation of IT within these organisations, in order to “Assess the state of executive thinking towards IT investment for continuous improvement and competitive advantage”.

Thus, the following objectives were identified:

1. To understand the evolving use and uptake of IT in relation to the industry’s past and current understanding of the value of IT to innovation and continuous improvement;
2. To identify the shift in executives’ thinking in terms of:
   • Understanding the role of IT for improving performance;
   • The impact of continuous innovation in technology on their enterprises;
   • Their awareness on the relationship between IT, process management and people.
3. To identify the difference in understanding of IT priorities between business executives and IT/innovation directors;
4. To determine disparities in IT awareness between contractors and consultants;
5. To identify future patterns in creating IT-based business core capabilities.

A questionnaire was developed to assess the awareness and understanding of key industry investment decision makers on the strategic benefits that IT could bring to their organisation. This questionnaire was developed with domain experts, with a specific remit of addressing the five core objectives. Therefore, the questionnaire construct was based on the relationship of decisions to critical elements and drivers of a business. The critical elements (IS/IT Strategies; Business Process Management and Reengineering, and IS/IT Skills), and drivers (E-readiness of organisations; Advanced Technology, and Financial Impact) were considered the units for investigation. These issues were then mapped to seminal literature, and confirmed through iterative consultation with industry stakeholders. From these sessions, 11 structured questions were formed under the following three headings: IT Investment (Information Technology investment and success), Critical Elements for Success (IT Strategies; IT and Business Process Reengineering; IT Skills and Competence) and Drivers (Drivers and Inhibitors for IT Investments; Impact of Advanced Technology; Financial Impact).

Within the three broad headings, each question had five options describing the evolution of maturity levels using maturity concepts (Klimko, 2001). The criteria for each level were distilled to make it ‘palatable’ and ‘relevant’ to Chief Executives and IT Directors (Alshawi, 2007), which was augmented through the following three scenarios: 1995 Thinking – How did the respondents see the answer to the question in 1995 (based on their experience); 2007 Practice – How did the respondents see the answer to the question under their current practice; 2007 Thinking – How the respondents wished to see the best answer to the question (which might be considered as indicative of future trends).

This design construct was used to help assess the progressive development of organisations, while at the same time being able to identify the gaps between the thinking of executives (awareness level), moreover, what was actually being practiced. For example, to measure how Executives thought about the role of ICT in bringing about innovation to their organisations, the following question was administered. This questionnaire was sent to the top 100 contractors by turnover (building.com, 2006) and top 100 consultant organisations (building.com, 2006a) in the UK, targeting both executives and IT (or innovation) directors. Respondents were divided into two major groupings: the contractors, and the consultants. For analysis and comparative purposes, the groupings were further separated into four different categories; contractor executives, consultant executives, contractor IT directors, and consultant IT directors. The survey received 109 responses [representing a 54.5% return rate], which was made up of 57 contractors and 52 consultants. The number of replies by executives was 37%, and IT/innovation directors 63%. Further disaggregation of these
responses identified that around 20% were contractor executives, 32% contractor IT/innovation directors, 31% consultant IT/innovation directors, and the remaining 17% were consultant executives. Statistical analysis and hypothesis testing was applied to this data in order to verify its integrity, veracity and consistency. This was also conducted on the entire data set in order to check for congruence and adverse variance relationships. Furthermore, in order to fully ensure that this data could be interrogated to an ever-finer degree of granularity, a series of short interviews and discussions took place with a representative sample of four respondents to further validate these findings.

3. Findings

The results show that construction organisations today are: starting to evaluate IT success rather than failures; less critical of the financial impacts of IT investments; acknowledging the need of IT strategies; recognising the importance of aligning business strategies with IT strategies; declaring the importance of IT skills and competence; forging ahead towards IT investment drivers; and realising the impact of advanced technologies in their organisations. They are also acknowledging the strategic nature and significance of IT, both internally and externally, whereby IT systems are now considered at an organisational-wide scope, rather than at an individual application level. Furthermore, IT strategies are now slowly being integrated into organisational business strategies, and the impact of IT technologies is now being recognised for delivering competitive advantage for the future. This is a significantly positive sign that the industry is moving forward towards utilisation of IT; most importantly, with a similar set of thinking (contractors and consultants). On the other hand, construction organisations today are seeing their IT investments influenced by the state of readiness of their organisation to successfully receive new and future IT investments. The main research findings are divided into four categories (A,B,C,D), where A = IT Investment; B = Critical Elements for Success; C = Drivers; D = Other Findings.

3.1 Drivers

IT investments are predominantly driven by “value” but are inhibited by the state of readiness of organisations. Drivers for IT investments are mainly related to bringing value to products and services through the provision of advanced communication and working. In this context, it appears that IT investments in contracting organisations are currently driven by clients (53%), while 70% of consultants appear to be seeking to improve communication and working environments with business partners. The industry seems to be cautious in their investments in IT, and is very much influenced by the level of the organisational readiness to successfully absorb IT into their current practices, and not by the level of success of similar investments in the past (whether internal or external). Past IT failures or lack of success appear to only constrain about 24% of Consultants’ CEOs; whereas, contractors’ CEOs (77%) and IT Directors (74%) believe that their IT investments are currently influenced by organisational “readiness”. The industry strongly believes in investigating new technologies for competitive advantage, but has not yet taken advantage of this. There is also a clear shift in the thinking of industry from a technology push (mainly to satisfy clients’ needs at project level) to continuously self-investigating new technologies to deliver competitive advantage – see Table 10. In this respect, 95% of contractors’ CEOs thought that advanced technology is currently taken into consideration in new IT investments. Financial return on IT investment was still being practiced in spite of industry Executives thinking otherwise. Furthermore, although industry executives’ thinking was pointing towards delivering corporate strategic goals, improving cost effectiveness was still dominant in practice – see Table 11. In addition, in today’s practice, more than 40% of contractors still believed that IT investment should only be considered if there are clear financial benefits. While the other 60% would only invest if it improves cost effectiveness or is driven by corporate goals.

4. E-Readiness

The concept of electronic readiness (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; UN, 2008). Gaps also exist between new expectations and capabilities in
place. In discussing the diversity of e-readiness definitions, it is observed that the term “e-readiness” represents the multiple levels of information and Communication Technology (ICT) development, and the exact definition of what constitutes e-readiness is still open for debate. To provide a holistic overview, a few thoughts are outlined to help this discussion. For example, the World Information Technology and Services Alliance (WITSA) states that an e-ready country requires consumer trust in e-commerce security and privacy; better security technology; more trained workers and lower training costs; less restrictive public policy; new business practices adapted to the information age; and lower costs for e-commerce technology (WISTA, 2004). The community assessment of e-readiness by the Center for International Development, Harvard University (CID, 2007) describes an e-ready society as one that has the necessary physical: integrated current ICT throughout businesses, communities, and Government; strong telecommunications competition; independent regulation with a commitment to universal access; and no limits on trade or foreign investment. Following these themes, e-readiness can also be defined as the aptitude of an economy to use Internet-based computers and information technologies to migrate traditional businesses into the new economy - an economy that is characterised by the ability to perform business transactions in real-time, in any form, anywhere, anytime, and at any price (Bui et al., 2002). Table 1 presents a detailed literature review of the worldwide definitions of e-readiness by leading international groupings, research groups and non-profit organisations.

Table 1: Various definitions of e-readiness (adapted from Lou, 2010).

<table>
<thead>
<tr>
<th>Report</th>
<th>Definition of e-readiness</th>
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<tr>
<td>United Nations (2008)</td>
<td>This UN report assesses e-government readiness of Member States, according to a quantitative composite readiness of e-readiness based on website assessment; telecommunication infrastructure and human resource endowment.</td>
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<tr>
<td>Economist Intelligence Unit (2009)</td>
<td>E-readiness is the “state of play” of a country’s ICT infrastructure and the ability of its consumers, businesses and governments to use ICT to their benefit. The ranking allows governments to gauge the success of technology initiatives against other countries. It also provides companies that wish to invest in online operations with an overview of the world’s most promising investment locations.</td>
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<tr>
<td>Center for International Development, Harvard University (2007)</td>
<td>Readiness is the degree to which a community is prepared to participate in the Networked World. It is gauged by assessing a community’s relative advancement in the areas that are most critical for ICT adoption and the most important applications of ICT. When considered together in the context of a strategic planning dialogue, an assessment based on these elements provides a robust portrayal of a community’s readiness. The value to a community of assessing its readiness lies in evaluating its unique opportunities and challenges.</td>
</tr>
<tr>
<td>The World Information Technology and Services Alliance (WITSA) (2004)</td>
<td>The survey states that an ‘e-ready’ country requires consumer trust in e-commerce security and privacy; better security technology; more trained workers and lower training costs; less restrictive public policy; new business practices adapted to the information age; and lower costs for e-commerce technology.</td>
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<tr>
<td>Asian Pacific Economic Cooperation (APEC) (2000)</td>
<td>Readiness is the degree to which an economy or community is prepared to participate in the digital economy. Every economy, regardless of its level of development, presents a readiness profile on the global stage, composed of its national policies, level of technology integration, and regulatory practices. Readiness is assessed by determining the relative standing of the economy in the areas that are most critical for e-commerce participation. Six broad indicators of readiness for e-commerce are developed into a series of questions that provide direction as to desirable policies that could promote e-commerce and remove barriers to electronic trade.</td>
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5. Organisational E-Readiness

E-readiness within the organisation is built from the rubrics between people, process and technology (Siemieniuch and Sinclair, 2004; CID, 2007; Alshawi, 2007). In this respect, built environment organisations are no different from any other sector specific organisation. These three elements are highly interrelated; for example, developing competence in one element must be accompanied by improvement in the others for the organisation to succeed. Another example is ‘process improvement’, as this is one of the many competence issues that an organisation needs to develop in order to achieve technological capability. By default, this element also requires people with the necessary skills and knowledge to implement process improvements – the mandate of which also embodies the creation of an environment that is conducive to, and can facilitate these proposed changes. This organisational context also embraces such levers as motivation, empowerment and the management of change. Thus, it is important to encourage and support the integration between people and process through a flexible and advanced technology infrastructure. Contextually therefore, the key elements of organisational e-readiness should embrace nations’ (national) e-readiness reports, rankings, assessments and measuring tools as the building blocks. In this respect, the following subcategories are considered as key enablers of this philosophy. The factors within each element are shown in Table 2.

Table 2: People, process and technology factors within the e-readiness context (adapted from Lou and Goulding, 2010)

<table>
<thead>
<tr>
<th>People</th>
<th>Process</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership &amp; Empowerment</td>
<td>Business &amp; Information Process</td>
<td>Connectivity &amp; Reach Infrastructure (Technology)</td>
</tr>
<tr>
<td>Culture &amp; Society</td>
<td>Information Access &amp; Connectivity</td>
<td>IT &amp; Communication Infrastructure (Reliability)</td>
</tr>
<tr>
<td>Human Capital &amp; Skills</td>
<td>Security &amp; Integrity</td>
<td>IT &amp; Communication Infrastructure (Reliability)</td>
</tr>
<tr>
<td>Learning &amp; Further Education</td>
<td>Policy &amp; Vision</td>
<td>New Technologies</td>
</tr>
<tr>
<td>Promotion &amp; Facilitation</td>
<td>Knowledge Sharing &amp; Capture</td>
<td>New Investments</td>
</tr>
<tr>
<td>Change Management</td>
<td>Services &amp; Support</td>
<td>Information Infrastructure &amp; Management</td>
</tr>
<tr>
<td>Communication</td>
<td>Networked Economy</td>
<td>Interconnectability &amp; Interoperability</td>
</tr>
<tr>
<td>Capacity Building</td>
<td>Web Measure &amp; Services</td>
<td>Technology Transfer</td>
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5.1 People

People can be considered as core drivers of a business. As a collective force, they can add value to organisational e-readiness. However, they must be in place to understand organisational processes (implement change where necessary), and use technology to accelerate their efforts. People must however be led – the importance of leadership stems from its role in providing a clear vision of the future, communicating the vision, being able to involve other people in the implementation efforts, being prepared to provide sufficient commitments to the overall efforts and bearing the ability to motivate people rather than directly guiding them (Hammer and Stanton, 1995). However, culture and society within the organisation embodies the organisational behaviour and community, which in turn contributes towards organisational communication (top-down and down-up) and change management in the organisation (Diefenbach, 2007). It is therefore essential to obtain optimal human capital and skills, which in turn, is represented through the selecting right people for the right jobs, which could improve innovation and creativity (de Jong and Den Hartog; 2007). The promotion of learning is fundamental to creating a sustainable ICT workforce which supports, underpins, and integrates ICT into the organisation (MacPherson et al., 2005).

5.2 Process
Business process is a core indicator of how an organisation functions. As a general rule: the more effective the business processes are, the more efficient the organisation tends to work. Mulcahy (1990) observes, to be successful, a construction organisation must have clear objectives recognising the markets it wishes to address, services it wishes to provide, risk it may undertake, the structure it will use, the environment it will operate within, the controls it will put in place, and the returns it wishes to achieve. Therefore, capturing and disseminating knowledge provides a central organising theme for business change - seen as continuous adaptation and innovation, and concurrently tracking the outside world and internal capabilities, and linking the two together (Nanoka and Takeuchi, 1995). However, processes are not traditionally stand-alone processes, but are often interfaced with people and technology elements. For example, process incentive tasks, such as project collaboration, embody the people involved in the project, and work processes involved with technology.

5.3 Technology

The focus on technology is a major factor behind raising organisational e-readiness; specifically: managing, operating, standardising, maintaining, forecasting and investing technology is therefore seen as a core function (APEC, 2000). The management of ICT is therefore critical in order to ensure that new technologies and emergent economies are successfully leveraged. Therefore, any investment in technology must be aligned with the organisational strategic plan and corporate strategy. In this respect, this alignment can help secure competitive advantage, using ICT a core competency enabler (Construct IT, 2008). Thus, the ability of the organisation to securely store and disseminate information; encourage users to contribute and participate in sharing information; and the ability of the organisation re-use information and reward users; represents the highest stage of information infrastructure and management readiness (Boomer, 2006).

This trichotomy of factors (people/process/technology) was also evidenced by Alshawi et al. (2008) through a strategic study into the thinking of UK built environment industry executives and IT/innovation directors, on their perception of investment for ICT-based innovation and competitive advantage. Research findings highlighted a series of ‘missed opportunities’ between decision-makers. In this context, organisational ‘soft’ issues tended to be associated with people, process and the work environment. Therefore, organisations need to focus on these areas in order to develop their capabilities in order to be in a state of e-readiness (organisational e-readiness) to effectively absorb technology into their work practices if they are to achieve innovation and competitive advantage.

6. Conclusion and Way Forward

The results from this questionnaire clearly demonstrate a polarised position regarding thinking between “what the industry thinks needs to be done” to achieve IT-based innovation and competitive advantage and “how best to achieve it”. With participation of over 100 respondents from the UK’s Top 100 Contractor and Consultants, this strategic study assessed the thinking of Industry Executives, Chief Executives and IT/Innovation Directors to report on the gaps that need to be addressed. The results from this questionnaire clearly demonstrate a polarised position regarding thinking between “what the industry thinks needs to be done” to achieve IT-based innovation and competitive advantage and “how best to achieve it”. This gap is significant and needs to be addressed. From an investment perspective, investments in IT over the past decade have raised serious concerns about its contribution to the performance of organisations. These concerns have generated a growing prerequisite to more robustly link IT investments with organisational business objectives; furthermore, to measure the contribution IT has to businesses. In this context, there is a need to better understand the current status of industry towards IT investments – specifically, to identify the gaps that could hinder or act as a barrier to IT-based innovation and competitive advantage.

The construction industry is progressively maturing over time in its understanding of the strategic benefit of IT investment towards business improvement and link with achieving competitive advantage. This is evidenced by the shift in focus from a short-term project-orientated approach to one that is more business-wide with a more strategic remit.
Organisations are therefore concentrating on longer-term business improvements and realising the strategic benefit across the organisation, i.e. taking a more strategic approach to their business and IT investments that is more progressive and visionary. Furthermore, in terms of IT strategies, the focus is currently on business/process improvement, moving towards the strategic alignment of IT with business and recognition of the impact of IT Board level representation on core organisational strategic decision making. The awareness of business process management and reengineering, and the benefits of aligning this with IT is clearly shown through the shift towards a process-driven approach for improvement. Further evidence is the migration towards business-wide employee competence and skill building, creating the intellectual capabilities needed to realise the full benefits of IT investment in order to fully leverage business improvement and more towards achieving competitive advantage. It is also recognised that there is a need for organisations to be ready (organisational e-readiness) in order to realise the full strategic benefits from IT prior to investment, i.e. organisational e-readiness.

This survey presented for the first time a strategic study into the thinking of Industry Executives; Chief Executives and IT/Innovation Directors, on their perception of investment for IT-based innovation and competitive advantage. In particular, this study identified an industry-wide recognition of the strategic importance of IT investments towards competitive advantage. However, core research findings identified that a ‘gap’ exists between current thinking and actual practice in terms of ‘what needs to be done’ and ‘how best to achieve it’.

E-readiness presents a measure of the degree to which a country, economy or organisation may be ready, prepared or willing to obtain benefits which arise from the digital economy. In this respect, an advanced state of organisational e-readiness is needed for businesses to readily compete in the global open market. However, achieving e-readiness within the context of built environment requires organisations to radically re-think their people/process/technology issues in order to embrace change. For example, organisations in this sector are increasingly dependent on e-commerce, specifically with the increased emergence of electronic transactions and e-tendering. Thus, there is a strong argument that the industry needs to adopt a ‘measured approach’ in order to help them be ‘e-ready’. This e-readiness could be augmented through some form of a practical framework, which would allow them to measure their e-readiness position across the people/process/technology triumvirate.

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