

# **LEVERAGING IT-BASED COMPETITIVE ADVANTAGE: UK INDUSTRY PERSPECTIVE**

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## **ABSTRACT**

It is widely acknowledged that the UK construction industry has invested in IT as an integral part of its core business. However, there is also ample evidence to indicate that this investment has repeatedly and systematically failed to deliver the anticipated benefits, and it is argued that the investments are still predominantly sporadic and inward looking. Whilst the industry appears to understand the strategic benefits that can be realised through IT, the precise mechanisms through which these can be leveraged to maximise the likelihood of their success is not yet fully understood. In this context therefore, organisations need to be in a state of 'readiness', in order to have the capability required to effectively absorb IT enabled innovation into its work practices. 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. This survey covered three main areas of: strategic benefits of IT; critical elements that lead to the realisation of these benefits, and the drivers behind these investment decisions. 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, Organisational Readiness, Process, People, Strategy*

## **CHALLENGES FACING THE CONSTRUCTION INDUSTRY**

The Construction Industry is one of the largest contributors of wealth creation to Europe's business economy, accounting for 9.7% of gross domestic product (GDP) and almost 60% of gross fixed capital formation. In this context, sustainability, competitiveness and growth of this vital sector of the economy can only be sustained through the pursuance of knowledge and innovation. With respect to the latter, this has historically been driven by rapid developments in information technology (IT), specifically the ability to capture, store, analyse/manage and exchange data. Therefore, in a knowledge-based industry such as construction, it is vital to have early access to knowledge-based tools, together with an IT infrastructure that can handle media-rich services. Thus, in order to remain competitive, construction firms will need to fully embrace this technology (BERR, 2008).

This was reinforced by a recent European task force study on IT competitiveness and uptake (European Commission, 2006), which emphasised the importance of IT based innovation in bringing productivity improvements and competitive advantage to industry. Evidence also suggested that higher productivity growth rates observed in the United States (US) and Europe's other global trade partners benefitted from greater use and integration of IT in all segments of the economy. Notwithstanding this, it is also important to acknowledge that industries have not always been in a position to capitalise on the investment in terms of productivity growth (OECD, 2003).

In the context of IT and the construction industry, whilst several success stories can be highlighted, particularly over the last ten years, they are mainly focused on technical operations such design, planning, estimating, etc. In addition, there has been a good growth in the uptake of collaborative environments, for example. These applications are designed to manage and control projects' documents among partners and to provide up-to-date information on their progress. However, although these applications bring value to projects, their role in contributing to organisations' competitive advantage is minimal. Whilst, a 'technology push' approach may bring about 'first comer'

advantages to organisations, implementing IT applications to create competitive advantage can only be leveraged by improving businesses processes, in line with management objectives, using IT as an enabler (Alshawi, 2007). In today's economic constraints, competitive advantage can be achieved by focusing on issues such as providing high quality services and products with minimal cost, having a flexibility to predict and respond to market needs and efficiently managing resources. These can be realised by embracing IT to enable streamlined business processes which not only make organisations operate efficiently but also allow them to effectively build their knowledge base and gaining competitive advantage.

At large, however, there is ample evidence that IT based business systems, such as MIS, ERP, business databases, etc., have failed to bring about a competitive advantage to organisations in spite of the large investments over the past decade. Previous studies in the area of "IS/IT failure" have shown that over 70% of IT investments did not meet their performance objectives. Other failure stories are reported in many publications such as in Burns (2008), Business Wire (2008) and Alshawi (2007). In construction, Salah (2003) showed that 75% of IT investment in business oriented systems did not meet its intended business objectives. Furthermore, some of these projects were abandoned, significantly redirected, or 'kept alive' despite business integration failures. 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. Basu and Jarnagin (2008) stated that business executives did not fully recognise the full functionality and value of technology to the business, nor did IT personnel possess an understanding of the business and its strategic objectives. This resonates with the findings by Goulding *et al.* (2007) regarding the importance of understanding technology adoption and diffusion issues, and with findings by Mata *et al.* (1995) concerning investment uncertainty.

This paper presents and discusses the outcome of a unique survey which was carried out in the UK to assess the thinking of

executives towards IT investments for continues improvements and competitive advantage. It first explains the background to the challenges mentioned earlier by briefly discussing the complex relationship between business processes, IT, people and the work environment. It then addresses the need for organisations to develop IT capability prior to IT investments. The paper then explains the survey in detail, ending with the identified gaps, which are currently facing the industry in this area.

### **Business Dynamics and Technology**

In light of increased competition, many organisations have started to use IT not only for performance improvement and cost reduction, but to also open up new markets and/or gain a niche advantage over their competitors. In this respect, executives who hold a better understanding of IS/IT are more able to align IS/IT strategies to their business strategies in order to exploit and leverage innovative business processes. This alignment process requires a careful and balanced approach between the level and complexity of the enabling technology, and the required level (expected) process change within the organisation (Gajendran and Brewer, 2007). Achieving this balance is a difficult process which requires highly skilled professionals who fully appreciated the strategic needs of the business and the benefits and functionalities that advances in IT could bring about to achieve the business strategy. The interrelationship between the dynamic nature of business and the supporting IT infrastructure can best be described through a five-layer conceptual model, which identifies how each of these five layers influences the effective selection, development and implementation of IS/IT (Alshawi, 2007).

### **Building IT/IS Capability**

Organisational capability requires the careful development and deployment of specific organisational competencies to achieve business drivers (Peppard, 2008). In the context of IS/IT, organisational capability embraces many facets, not least, highly flexible skills sets, an acute awareness of change, flexible management structures, well-articulated process improvement schemes, clear business goals, and an advanced flexible IS/IT infrastructure that is aligned to deliver corporate goals. Process improvement is shown as the core competence that an

organisation needs to develop to achieve the sought IS/IT capability. This in turn needs people with the necessary skills and power to implement process improvements. However, improvements often require management consent and approval, which requires the organisation to instil an environment that can facilitate the proposed change through activities such as motivation, empowerment and management of change. Therefore, the high level of integration between the three elements can be enabled by a flexible and advanced IS/IT infrastructure (Alshawi, 2007). The first two elements (people and process) are the key to change and improvements, while the other two elements (IT infrastructure and work environment) are enablers, without which the first two elements could not be realised. Therefore, this requires an environment where people are motivated, empowered and made aware of the expected change.

### **Business Process and IT**

Business process and the IT infrastructure within companies are ostensibly governed and augmented by the organisation's culture and work practices. For example, communicating site information to the head office in one contracting organisation can significantly differ from one organisation to another, and may even differ from one site to another within the same organisation. Predominantly, the more streamlined and effective these processes are, the more efficient the organisation is. However, careful alignment of IS/IT can help reshape business processes, and facilitate the flow of information between processes. This could be either local or globally-distributed processes with ensured availability of instantaneous and consistent information across the business (Croteau *et al.*, 2008).

### **People and IT**

Literature on organisational change has often cited the paradigms of change at several layers, be it individual, team, group, or at corporate level. Ultimately, organisations need to be able to successfully adapt themselves to new situations; and this cannot normally be accomplished without the influence and support of its constituent members. Thus, wherever the need for change is recognised within an organisation, and wherever the precise nature of such change is formulated, eventually it will be up to the

“people managers” to create the right environment for change to occur. This means that “people managers” have a key role to play in the management of change in organisations. In this situation, organisations therefore need to find out how to release the ‘creative energy’, intelligence and initiative of people at every level, as resistance to change can be somewhat counterproductive. Consequently, in order for any business improvement to be successful, new behavioural patterns consistent within that of the business improvement initiative must be developed (or business performance will not improve). In this respect, effective change to organisational culture and structure is considered to be an essential ingredient of IS/IT augmentation, such that the literature regarding the importance of the role of people and organisational culture in delivering successful IS/IT systems is paramount (Arendt, 2008).

### **Work Environment**

The work environment is often considered to be the main enabler of the process and people elements, and is often described as the *esprit de corps* of the organisation (Taylor, 1993). This can however be influenced by several factors, the most notable of which are: committed leadership, empowerment of employees, communication, process vision development, project management and process-based team formation (Al-Mashari and Zairi, 2000). From an employee empowerment perspective, this can be an effective factor that can influence the success of any IS/IT implementation, as it promotes self-management and collaborative teamwork principles (Peansupap and Walker, 2005). Communication of change is a vital component of the implementation process, yet is considered one of the most difficult aspects to achieve (Lloyd and Varey, 2003). Teamwork can leverage many advantages, such as facilitating interactions between functions, and speeding up the redesign process, through to creating a learning environment in which team members are encouraged to share knowledge and expertise (Lou and Alshawi, 2009; Wong, 2007).

## **E- READINESS**

The “acceptable” level of IT that can be successfully utilised in an organisation, i.e. ensuring its business benefits are realised, depends on assessing a range of critical issues needed to ensure a balance between the organisation’s readiness (mainly factors required to adapt to the proposed change) against the level and complexity of the proposed IT (which often hinders or limit success). This balance often includes many issues such as: capital expenditure, resource availability, organisation’s maturity and readiness, culture and vision, and available IS/IT skills. In this context, the term “e-readiness” is coined to measure the degree to which an organisation may be ready, prepared, or willing to obtain benefits, which arises from the digital economy. It is concerned with 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 IT over the past decade of which a large percentage did not meet their intended business objectives.

## **RESEARCH PROBLEM**

In light of the aforementioned challenges, and in order to bring about construction IT-based innovation to contribute to the industry’s competitive advantage, it was crucial to identify the current e-readiness knowledge gaps of the industry’s core decision makers. Thus, a survey was carried out to “assess the state of executive thinking towards IT investment for continuous improvement and competitive advantage”. In this respect, 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.

### **Research Design and Structure**

The primary aim of the work was to assess the awareness and understanding of key industry investment decision makers on the strategic benefits that IT could bring to their organisation along with their success factors. The methodology adopted to achieve the aim was through a questionnaire, which was based on the maturity framework. The latter is an established method for gauging their capability against established standard practices and identify their level of readiness move to higher levels of maturity (Klimco, 2001). To this end, the questionnaire was designed to determine the position of each category of respondents within the maturity ladder associated with the construction domain. This questionnaire was developed with domain experts and based on the critical elements for the success of IT-based systems and the drivers for IT investment (Figure 1). The critical elements (IS/IT strategies; business process management and re-engineering, 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:

- |                                  |   |
|----------------------------------|---|
| A. IT Investment                 | A.1 Information Technology investment and success |
| B. Critical Elements for Success | B.1 IT Strategies                                 |
|                                  | B.2 IT and Business Process Reengineering         |
|                                  | B.3 IT Skills and Competence                      |
| C. Drivers                       | C.1 Drivers and Inhibitors for IT Investments     |



## C.2 Impact of Advanced Technology

### C.3 Financial Impact

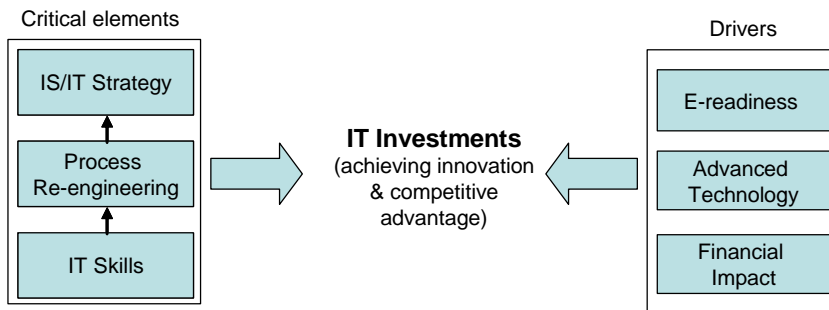


Figure 1: Survey Construct: Principal Design Elements

### Questionnaire Design and Population Sample

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, 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 IT in bringing about innovation to their organisations, the following question was administered. The five options identified in Figure 2, represent five different maturity levels for this particular indicator, it starts from "IT can not bring about innovation and competitive advantage" through to recognising that "IT needs organisations to have good management practices prior to IT

implementation (e.g. TQM, BPR, Benchmarking, etc)”. Thus, the latter reflects the understanding of the strong relationship between IT and business processes, i.e. in order to bring about IT-based innovation, organisations need to have good process management practices. These choices represent progressive level of maturity; hence, each choice already embeds its preceding choices. The questions were based on the following sections:

- A) *IT Investment*
  - A.1 Information technology investment and success
    - A.1.1 Awareness
    - A.1.2 Cost vs. Investment
    - A.1.3 IT and Business Process
- B) *Critical Elements for Success*
  - B.1 IT Strategies
    - B.1.1 IT Strategies
    - B.1.2 Role of IT Department
  - B.2 IT and Business Process Management
  - B.3 IT Skills and Competence
- C) *Drivers*
  - C.1 Drivers and Inhibitors of IT Investments
    - C.1.1 Drivers of IT Investment
    - C.1.2 Inhibitors of IT Investment
  - C.2 Impact of Advanced Technology
  - C.3 Financial Impact

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: contractors, and 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. In addition to the questionnaires, semi-structured interviews were held with organisational leaders in relation to the issues of the questionnaire. Where it was possible, respondents were ‘taken through’ the questionnaire to ensure full understanding and fulfilment of the survey.

	<i>1995 thinking</i>	<i>2007 practice</i>	<i>2007 thinking</i>
a) Can not bring about innovation and competitive advantage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Can bring about limited business improvements focused on operational level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Needs high IT awareness across the organisation supported by a good communication strategy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Needs IT skills and competence across the organisation along with board representation e.g. Chief Information Officer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Needs organisations to have good management practices prior to IT implementation (e.g. TQM, BPR, Benchmarking, etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Figure 2: Sample questionnaire.*

### **Response rate**

The survey received 109 responses [representing a 54.5% return rate] made up of 57 contractors and 52 consultants. The number of replies by executives was 37% (40 respondents), and IT/innovation directors 63% (69 respondents). Further disaggregation of these responses identified that around 20% were contractor executives (22 respondents), 32% contractor IT/innovation directors (35 respondents), 31% consultant IT/innovation directors (34 respondents), and the remaining 17% were consultant executives (18 respondents). Statistical analysis (T-test and Z-test) 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 a 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.

### **FINDINGS**

A holistic view of the data reveals 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 hindered 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) IT Investment; B) Critical Elements for Success; C) Drivers; D) Other Findings.

## **A) IT Investment**

### **A.1 Information technology investment and success**

Although, the industry is aware of the strategic benefits of IT, it has not yet been attained.

#### **A.1.1 Awareness**

There is overwhelming evidence that the industry has moved away from investing in IT to reduce costs at an operational level. Industry executives are thinking towards delivering value to customers and/or achieving strategic business objectives. Although 100% of Contractors' and Consultants' CEOs believe that IT investments should aim to improve organisational performance, deliver value or contribute towards organisational strategic objectives, only 77% of them believe that this is currently implemented in today's practices. No less than 70% agreed in 1995 that IT investment should be aimed at improving operational bottlenecks and specific business processes, while over 95% believe that investment in IT should aim to improve organisational performance, provide value-added services and contribute toward organisational strategic objectives in their 2007 thinking.

### A.1.2 Cost vs. Investment

The industry is shifting from thinking of IT investment as being a “cost” endured at a project level, to being an “investment” at an organisational level. In this respect, 100% of respondents did not believe in project-oriented IT investments. In this context, Contractors’ CEOs and IT Directors seem to think alike (less than 2% variance), today and in their future thinking. However, both Consultants’ CEOs and IT Directors seem to vary in their thinking (14% variance), today and in their future thinking. The study shows that in 1995, around 75% believed that IT investments were project oriented and have short-term business improvements. This changed, with over 80% believe that IT investments should be used for innovation and creating/realising core business capabilities, and around 75% is thinking of using IT to add value to products and services or to bring about business innovation across the organisation in 2007.

### A.1.3 IT and Business Process

Although industry executives appear to be fully aware that IT-based innovations require IT/process management skills and competence across their organisations, the results indicate that this is not being practiced. Thinking in 2007 shows that over 85% of respondents think that IT/process management skills and competences are essential elements for achieving IT-based innovation and competitive advantage, while less than 30% have grasped the needs for IT skills across the organisations with a CIO representation on the organisation’s Board of Directors. In contrast, less than 10% seem to have considered business process re-engineering for their IT investment.

## **B) Critical Elements for Success**

### B.1 IT Strategies

Although the industry realises the importance of IT strategies to achieve innovations, this has not yet been achieved.

#### B.1.1 IT Strategies

Internal business improvement appears to be currently the main motive and driver for IT strategies. Where, 100% of respondents agreed that IT strategies must be considered in today’s practice. Furthermore, 88% of contractors’ CEOs and IT Directors believed

that business and IT strategies must be aligned. The contrast could not be clearer, with only 20% recognising the importance of IT strategies to businesses in 1997, but over 85% agreeing ten years later. Although around 85% believe in the importance of IT strategies to leverage corporate goals, only 63% think that there should be an alignment with the business strategy. In practice, 70% of respondents seemed to focus their IT strategies on internal business improvement, or to deliver their business strategies.

#### B.1.2 Role of IT Department

The role of IT departments has been transformed from providing technical support to engaging in business improvement and strategy. In today practices, only 5% of Contractors' saw no role for IT Departments in their organisations. Furthermore, contractors' and consultants' IT Directors (57% and 50%, respectively) appeared to be driving for Board representation. Thinking in 1995 is represented by 85% believing that either there was no role for IT Departments or their role was limited to the provision of technical support; in 2007, around 55% think that Heads of IT Departments should be on organisations' Board of Directors, therefore contributing to business decisions, and around 70% of respondents seem to believe that IT Departments are already engaged in business improvements and/or their Heads are member of Board of Directors

#### B.2 IT and Business Process Management

The importance of aligning IT with business process management/re-engineering was highly recognised, but was not yet being practiced. There was also strong evidence to suggest that industry Executives believed in the alignment of IT with process re-engineering – only 45% believed in the importance of BPR in 1995, while over 95% endorse the importance of it in 2007 and over 80% of respondents think that Business Process Re-engineering should be aligned with IT. In practice, however, only 45% seem to have considered it and 45% seem to accept altering business processes to match the proposed IT.

#### B.3 IT Skills and Competence

The industry recognised the need for IT skills and competence within organisations, but has not yet utilised this for innovation.

Industry executives seemed not only to recognise the need for IT skills across the organisation, but also the need to develop the necessary competence, especially if IT-based innovation and competitive advantage was to be realised. The study has also shown over 85% believed that IT skills and competence was crucial for achieving business improvement; of which 58% believed that IT was a key factor and had to be developed across the organisation.

## **C) Drivers**

### **C.1 Drivers and Inhibitors of IT Investments**

IT investments are predominantly driven by “value” but are inhibited by the state of readiness of organisations.

#### **C.1.1 Drivers of IT Investment**

Drivers for IT investments are mainly related to bringing value to products and services through the provision of advanced communication and working environments. 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 2007, the industry is seen to have moved away from driving its IT investments to win new projects; only 28% still practicing it, while 70% believe that IT investments should create communication or work environments to improve business within the supply chain and 70% seems to be authorising IT investments to improve communication with their partners.

#### **C.1.2 Inhibitors of IT Investment**

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). Less than 10% believed that the lack of success of IT investment (mainly within competitors) was the main inhibitor, while over 73% seemed to believe that current IT investments are influenced by the IT readiness and organisational change and 88% thought that IT readiness and organisational change would be the main concern in the future in

2007. 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'.

### C.2 Impact of Advanced Technology

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. In this respect, 95% of contractors' CEOs thought that advanced technology is currently taken into consideration in new IT investments. In 1995, 71% believe that decisions on IT investments were either influenced by clients (at projects level) or by technology that were beneficial to competitors; while in 2007, about 80% think that technology should be continuously investigated (internally) for competitive advantage. In practice however, 45% seem to consider new technology based on advice from their IT Departments, e.g. to address "ageing services".

### C.3 Financial Impact

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. 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. Thinking in 2007 sees the view on "pure" financial returns on IT investment is radically changing; only 23% currently appeared to be practicing it, and less than 10% were "worried" about it. Over 55% believed that IT investment should be primarily driven by corporate goals. On the other hand, only 23% seemed to be practicing it, and only 10% were concerned about financial risk of "failure".



## **D) Other Findings**

Although, there is overwhelming evidence that the industry is fully aware of the strategic benefits of IT, it seems to be rather conservative on its implementation and perhaps not in a position to take risks.

### **D.1 Strategic use of IT**

- There is strong evidence to suggest that the industry is moving away from investing in IT to reduce cost – the focus is more on bringing business improvement at organisational level;
- Evidence indicates that the industry is fully aware of the strategic benefits of IT across the organisation, rather than benefits to individual department or project (Investment in IT are moving from individual applications to organisational systems);
- Industry executives think that IT investment should focus on achieving corporate goals in the future; a clear shift from project focus;
- There is four-fold increase in the use of IT to create/realise core business capabilities compared to the 1990's;
- The industry is aware of the need to investigate new technologies to deliver competitive advantage, but is not yet doing this.

### **D.2 RISK AND STRATEGY**

- The industry seems to be rather conservative on the implementation of IT, i.e. it does not seem to be in a position to take risks;
- There seems to be no clear commitment from industry to invest in IT to meet the expectation of its executives;
- Although the industry is aware of the importance of IT strategies, these are not currently well-practiced;
- It seems that the industry wishes to minimise the risk of IT investments through partnering contracts.

### **D.3 Skills and Competence**

- There is a clear understanding for the need of IT skills across the organisation rather for individual departments or projects if IT based innovations are to be achieved;

- The industry is highly aware of the need for building up IT competence across the organisation;
- Industry executives realise the strategic role of IT departments in the future, compared to their current technical and supportive role.

#### D.4 Contractors versus Consultants

- Consultants seem to be more client/value focussed, whereas contractors were more organisation focused;
- Contractors were seen to invest less in IT;
- A large proportion of contractors still view clear financial benefits as a priority, even though they did not think that this should be the case;
- Contractors seemed to be highly involved in addressing technical problems rather than focusing on competitiveness and innovation.

## **DISCUSSION: THE MAIN GAPS**

Although the high level of maturity in today's thinking of Chief Executives is very encouraging, there is clear reluctance amongst the Chief Executives to put their thinking into practice. The main question therefore is what needs to be undertaken in order to aid the realisation of this gap? There is no illusion that the level of complexity of today's IT strategies is significantly higher than that of the previous decade, and that climbing the ladder of maturity tends to follow an exponential curve rather than linear path.

### **Perspectives: Chief Executives vs. IT/Innovation Directors**

Whilst examining the way forward, it is imperative to appreciate the difference in the perspectives of the Chief Executives and IT Directors. Statistical analysis shows that the responses by all four categories of managers (Contractor Chief Executives and IT Directors, Consultant Chief Executives and Directors) are on the whole similar. However, there are some minor variations, for example: a general overview suggests that Contractors exercise more caution than Consultants in their current practice, but are slightly more radical in their thinking today. Furthermore, in practice, Consultants seem to consider more fundamental sources

of drivers and inhibitors for their IT investments. This includes organisational readiness and change management issues. In addition, in a few cases IT Directors in both Consultant and Contracting organisations tended to display a slightly higher level of maturity in IT than their respective Chief Executives. This applies to their assessment of today's practice as well as thinking. For example, unlike many Consultants, a considerable number of Contractors insist on having a clear financial benefit from IT investments, and yet, a larger proportion of them believe in the driving role of IT to achieve corporate goals. This seems to be the case for the Chief Executives as well as the IT Directors. Furthermore, unlike their Chief Executives, IT Directors of Contracting organisations have shown slightly less appreciation towards the benefits of process management and reengineering, and continuous improvement.

### **IT/Innovation Directors**

Research findings confirm that over the past decade, IT Directors have repositioned their role from operational and functional managers to strategic partners, by providing advice on technology and how IT can be aligned with core business objectives. Their current thinking indicates their desire to be visionary and assume a more active role in driving and shaping their organisations' strategy. However, this has not been the case in practice. Other significant points to note are that there are instances where the IT Directors have failed to take the necessary initiatives. Their preoccupation with the traditional service provision often inhibits them from engagement at the strategic level, and is therefore somewhat deterred by the added responsibilities that come with their new enhanced role. For example, in some instances, IT Directors lack the knowledge required for partnering with senior managers, and feel the need to acquire senior managerial skills that they are deprived from developing in their traditional role.

Other causes include a general lack of confidence to take a more active role in driving forward the business strategy. On the other hand, many visionary IT Directors cherish the opportunity to go beyond alignment of IT and business strategies, and attempt to exert positive impact on the latter, thus contribute towards enhancing the organisation's overall competitiveness. If undertaken systematically, over time, the alignment and positive

impact will become coupled into one set of roles. IT Directors tend to find it frustratingly difficult to forge partnership with their Business Directors. Indeed, external research in this area has identified a lack of senior management commitment as the main barrier to the implementation of a proactive IT strategy. To this end, the culture gap between the IT Directors and Chief Executives has manifested itself in many forms, which can inhibit the full exploitation of IT. However, evidence from this report shows that the Chief Executives are visionary and progressive, albeit reluctant to move things forward. Thus, the reasons for this gap need further investigation. Indeed, the proximity of the visions of the Chief Executives and IT Directors is a powerful tool for IT Directors to build constructive relationships with their respective senior management, and could empower them to develop an in-depth understanding of the business priorities of the organisation, while at the same time, help executive directors appreciate the potential role of IT to transform business processes and performance. This opportunity would help assist them to develop a common set of shared values by bridging the knowledge/culture gap.

### **Chief Executives**

Chief Executives often have to deal with a myriad of conflicting issues especially where resources are involved. Therefore, deciding and making investment decisions is not only a major challenge, but also the implementation these decisions and the sustained management of the investment (including capping total expenditure to the initial investment) poses an equally daunting prospect riddled with uncertainty and risk. The reluctance to embrace risk arises from the fear of system failure at potentially all levels, ranging from the data itself, through to user acceptance and organisational fit. There are also considerations external to the organisation of how to reconcile the political, cultural and organisational issues in such a way that they are also compatible with the external environment, e.g. clients, the supply chain, etc.

In this respect, the relationships between internal units and trading partners and the need to develop fresh relationships with new technology/service providers can also impinge on investment decisions. Notwithstanding these issues, this survey has identified that the majority of senior managers take a balanced view of the

benefits of a progressive approach to IT against the adverse consequences of ‘improper’ implementation or the misappropriation of ‘over-hyped’ risks. Executives are cognisant of ‘the way it should be’, and are also aware that the migration towards full exploitation of IT within the industry is paramount. If the trend in thinking continues over the next decade and is extrapolated into the future, then this provides a very optimistic picture of IT maturity for the construction industry. In this respect, evidence from this survey shows that in the majority of cases, both Chief Executives and Directors:

- Clearly recognise the benefits of shifting the attention to corporate goals;
- Believe in adopting a proactive approach to the exploitation of advanced technologies to support the IT strategy that is developed in alignment with business strategy;
- Realise that concurrent consideration of IT and process management/reengineering and orientation towards the supply chain is needed;
- Believe that they can gain competitive advantage by adding value to products and services, developing core capabilities through IT investment and organisation-wide IT skills, and adopting appropriate management practices including representation of the IT director on the Board of Directors.

## **GAPS TO BE ADDRESSED**

This survey presented for the first time a strategic study into the thinking of construction industry executives/directors and 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’. Therefore, a number of crucial issues need further exploration and understanding in order to help the industry move things forward, these being:

- While the industry clearly recognises the strategic benefit of investments in IT towards business improvement (and ultimately competitive advantage), why is this not evident in the current practice of their investments?;
- Although the benefits of aligning process improvement and reengineering with investments in IT appears to be widely recognised, why is this not also being practiced?;
- There is a need for organisations to be ‘ready’ in order to realise the full strategic benefits from IT prior to investment. However, developing an understanding towards progressing to the state of “readiness” is still lacking – this needs to be further assessed, particularly:
  - The development of the concept of IT maturity in construction organisations with specific focus on organisations’ soft issues; people, business process and work environment. This would lead to the development of an “e-readiness” model as a management tool to assist managers to plan and manage change towards maximising IT-based innovation and competitive advantage;
  - To assess organisations’ competitiveness by acquiring and managing the capability of employees (intellectual capital) through streamlined business processes, along with the appropriate enabling working environment and IT infrastructure.
- The need to further understand the concept of organisational readiness, which requires investigating and comparing (benchmarking) the strategic IT focus and thinking of other industries/sectors;
- The need to further appreciate the precise nature, relationship, and benefits of research and development on investment decisions in relation to new and advanced technologies in order to facilitate business improvement and ultimately achieve competitive advantage.

## **CONCLUSION**

The results from the study 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 strategic study assessed the thinking of construction industry Executives/Directors to report on the gaps that need 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 study shows that the construction industry is progressively maturing over time in its understanding of the strategic benefit of IT investment towards business improvement and in 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. 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. 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 readiness) in order to realise the full strategic benefits from IT prior to investment, i.e. organisational e-readiness.

Whilst the results from this study demonstrate a high level of awareness regarding the strategic benefits of IT to achieve innovation and competitive advantage, there is however a lack of unanimity and agreement between CEOs and IT directors on how best to achieve these benefits in their organisations. Furthermore, there is a clear misalignment between “what the industry thinks is necessary” and “what has actually been practiced”. This

intransigence highlights the clear deviation from “what needs to be done” to achieve IT-based innovation and competitive advantage, to one that is somewhat *laissez faire*, and relatively risk-free. This is evident in that IT strategies are often inward looking, financial return on investment is still an important factor (particularly among contractors), business process management/reengineering is still not being aligned with IT, IT skills still seem to be developed for internal business improvement as opposed to across the organisation. These issues are also reinforced when investigating the triggers for IT investments further. Moreover, the main inhibitors to IT investment seem to be the lack of “know-how” or mechanisms that can guide managers to successfully absorb new technologies into their work practices towards achieving competitive advantage. In addition, being proactive to continuously investigate and invest in new technologies does not appear to have a significant impact on decisions regarding investment as much as the need to replace existing “ageing systems”. While the industry appears to clearly understand the strategic benefits that can be realised through IT, which, with some degree of confidence, is in line with “best practice” in other industries, the mechanism to realise these benefits and maximise the likelihood of success of IT investment is not yet fully understood. This is not uncommon among other industries, and indeed among the IT community, which highlighted such a problem down to several organisational factors, mainly: people and process; the enabling work environment; and the IT infrastructure.

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