

MANAGING KNOWLEDGE WITHIN THE LEADING IRISH CONSTRUCTION ORGANISATIONS: CURRENT PRACTICES AND FUTURE DIRECTIONS

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ABSTRACT

Despite the benefits which knowledge management (KM) can bring to construction organisations there appears to be a lack of understanding in relation to both knowledge and its management in practice. In the context of Irish construction, both Engineers Ireland (EI), and the Construction Information Technology Alliance (CITA) have identified KM as important to the future competitiveness of the industry.

The findings of interviews with senior management from ten of the leading Irish construction organisations are presented, having been selected as they are perceived to possess the most advanced organisational processes. Three ontological dimensions were explored; individual, project and organisational, with a view to identifying current approaches to managing knowledge. The findings confirm that these organisations lack a proper understanding of KM, yet recognise the need for a more structured, coherent approach.

The paper proposes the establishment of a strategic framework to improve the understanding of KM within the leading organisations, through a collaborative approach between academia, industry, EI and CITA. A central feature of this framework will be the development of a KM model which will be evaluated by participating organisations for its practicality.

KEY WORDS

Continuing professional development (CPD), human resource management (HRM), knowledge management (KM), Irish construction industry, strategic framework

INTRODUCTION

Construction organisations rely on the knowledge, experience and skills of their employees, to execute construction projects as efficiently as possible. The capability of an organisation to innovate and continuously improve depends upon the effective sharing and exploitation of its intellectual capital (Egbu, 2004). Knowledge management (KM) is now recognised for its potential to bring considerable gains to construction organisations, their projects and individual workers through social and technological interventions. If the construction industry wishes to improve profitability, reduce waste and inefficiency and offer better value to clients, Walker (2005) states that the industry must fully embrace KM. Essentially, there are two types of knowledge: *explicit* knowledge which can be readily codified into documented form, and can be managed as information; and *tacit* knowledge which is not easily visible or expressible, highly individualised and context specific, difficult to share and manage, (Nonaka and Takeuchi, 1995). The most valuable form of knowledge to construction organisations is tacit, accumulated experience of construction professionals, which manifests itself through

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social interaction (Kazi et al., 2005). In this context, the loss of important insights and knowledge due to high staff turnover and unwillingness to share knowledge are persistent problems which need to be addressed (Tan et al., 2005). KM is considered to be in its infancy and is seen as a recent and evolving practice for construction organisations (Robinson et al. 2005). An in-depth study by Walker and Wilson (2004: 772) revealed “*generally low comprehension and insights into knowledge management concepts.*”

In this context, this paper examines the need for KM from the perspective of the leading Irish construction organisations, current practices in managing knowledge and future directions for these organisations with KM. A review of selected KM literature is provided, followed by a background to the Irish construction industry, the methodology adopted, and research findings are presented. Based on the findings, the future direction for the leading Irish construction organisations and their adoption of KM is considered.

KNOWLEDGE MANAGEMENT IN CONSTRUCTION

Much of the early KM literature focused on technology-centred KM, neglecting the human dimensions (Egbu, 2004). Moving forward, the HRM function in organisations have a vital role to play in creating HR policies to support KM involving the development of human and social capital (Storey, 2005). It is now recognised that an integration of both HR practices and technology presents the greatest potential for advances in the field, with Jashapara (2004: 12) defining KM as: “*the effective learning processes associated with exploration, exploitation and sharing of human knowledge (tacit and explicit) that use appropriate technology and cultural environments to enhance an organisation’s intellectual capital and performance.*” In a survey of large UK construction organisations, it was found that a requirement to share tacit knowledge and disseminate best practice were key drivers of KM and a lack of time and standard work processes within organisations as the main barriers to KM (Carrillo et al., 2004). Other identified barriers to KM include lack of management support, employee resistance to sharing knowledge, poor ICT infrastructure, lack of dedicated resources, poor organisational culture, poorly articulated strategy, and difficulty in evaluating benefits (Robinson et al., 2005; Dainty et al., 2005). In considering knowledge within organisations, Nonaka and Takeuchi (1995) discuss four ontological levels of knowledge creation, individual, group, organisational and inter-organisational. In a similar vein, Jashapara (2004) discusses how learning occurs at individual, team and organisational levels, the human dimension being central to these.

INDIVIDUAL KNOWLEDGE

Knowledge workers, who are at the core of KM, should be self-starters, continually striving for creative solutions and building on their educational qualifications and experience repertoire. They must be capable of learning and making sense of large amounts of complex information and must be sufficiently motivated to seek out opportunities and design their own work, often with little direction (Storey, 2005). Motivating individuals to learn and share knowledge can be particularly difficult in pressurised environments such as construction where time for reflection is limited (Jashapara, 2004). Storey (2005) discusses the management of knowledge workers in the context of training, empowering, and rewarding them, and more specifically the role of HR in facilitating the use of available knowledge and encouraging people to learn. Training and development is considered an important aspect of KM by Olomolaiye and Egbu (2004) who cite the need to equip employees with the skills to manage their own learning and development and the development of an effective Continuing Professional Development (CPD) plan. They also propose that awareness of KM can be improved by using training as a vehicle to focus on achieving quality, creativity, leadership and problem solving. Participation in continuing education, conferences and similar CPD

activities can allow employees the opportunity to “*reflect upon their work, trade stories and ideas with co-workers, or catch up on professional theory and practice (Grisham and Walker, 2005: 554).*” The development of technical knowledge in the specialist subject area; personal transferable skills and attributes such as team working and problem solving; and general managerial skills are identified as the main areas of learning for professionals (Roscoe, 2002).

PROJECT KNOWLEDGE

Every day on construction projects, new problems are encountered and solutions arrived at which are rarely documented, the lessons learned residing only with those individuals directly involved in the problem-solving process (Kazi et al., 2005). By capturing and sharing project knowledge, the amount of reinventing the wheel and waste can be reduced, whilst improving project performance. Traditional methods for capturing lessons learned include discussion and informal meetings followed by documentation and registration on the project file (Mohamed and Anumba, 2005). In a case study of a Finnish construction organisation, Kazi et al. (2005) identified a number of social processes for sharing project knowledge such as site visits, audits, and meetings.

ORGANISATIONAL KNOWLEDGE

In attempting to manage knowledge within construction organisations, there are three key types requiring consideration; product (technical knowledge), process (procedural and regulatory knowledge) and people (identifying people with specific skills and experiences) (Egbu and Robinson, 2005). Dainty et al. (2005) identified a number of HRM strategies for knowledge sharing within a large construction organisation in Hong Kong as: informal knowledge workshops, knowledge exchange seminars, departmental meetings, site visits, summary reports, coaching and mentoring, communities of practice and an intranet. In addition to the provision of activities for sharing knowledge, “*there must be opportunity for research, innovation and divergence from the ‘normal’ course (Orange et al., 2003).*” The tension between learning anew, whilst also exploiting accumulated experience and knowledge is discussed by Jashapara (2004) who posits that such learning needs to be institutionalised at organisational level. That is, learning becomes embedded in organisational routines over time leading to changes in behaviour, systems, structures and strategies.

KNOWLEDGE MANAGEMENT MODELS

There has been a lack of KM models developed specifically for construction, one of the most noteworthy to date has been the Knowledge Advantage (K-Adv) model (Walker and Wilson, 2004). Developed in partnership with industry, the K-Adv model was not adopted by the participating organisations as it was judged to be “*too difficult to implement from the standpoint of challenging current competitive practices within organisations (Walker, 2005: 13).*” In order to gain and maintain a K-Adv organisations require a coordinated approach comprising leadership, people infrastructure and an ICT enabling infrastructure. From the perspective of HRM aspects already explored in this paper, the model offers a number of concepts which can be aligned with the HR function, most obvious being the people infrastructure. The inherent differences in culture and differing business goals make it difficult to develop a generic KM system or model applicable to all construction organisations.

KNOWLEDGE MANAGEMENT IN IRISH CONSTRUCTION

The overall output of the Irish construction industry in 2006 was €36bn, accounting for 24% of the country’s GNP, with over 12% of the country’s workforce directly employed, making it a key driver of Ireland’s economic growth over the past decade (Davis Langdon PKS, 2006). Despite this success, the Chairman of the Forum for the Construction Industry (FCI) recently

expressed deep concern over “*the conservatism, lack of innovation and low levels of R&D in what is arguably one of Ireland’s most important industries*” (Kelly, 2005). In this context, the FCI, Engineers Ireland (EI) and the Construction Information Technology Alliance (CITA) have cited the strategic importance of KM to the industry.

ENGINEERS IRELAND

Engineers Ireland, the largest professional body in Ireland, has introduced a CPD accreditation scheme for member organisations in a range of engineering-related sectors. The scheme is designed to support lifelong learning by stimulating and recognising good organisational practice in the areas of professional development for engineers and technical staff (but can also be applied to all staff members in all areas of an organisation). Organisations are required to meet the following criteria: a CPD policy, individual training needs analysis and performance management, an average of 5 days formal CPD per annum, a mentoring programme, involvement with professional institutions, and a KM system. Suggestions offered for knowledge sharing and KM include: regular briefings by staff to share technical and business knowledge, a company library, a lessons learned database, an engineering forum and an annual company symposium.

CONSTRUCTION INFORMATION TECHNOLOGY ALLIANCE

The Construction IT Alliance (CITA) was formed in 2001 with the vision of harnessing the potential of information and communication technologies in the Irish construction industry. Membership of CITA includes of over 110 stakeholders in the Irish construction industry including leading architectural, engineering, surveying, management, construction, supplier, IT and academic organisations. KM is one of the areas that CITA has identified as being important to its activities, recently establishing a KM special interest group (SIG).

RESEARCH METHODOLOGY

The research reported within this paper forms part of a wider academic study exploring KM within the leading Irish construction companies. Following a survey of the leading twenty organisations, senior managers from ten of these organisations were then interviewed in order to get an overview of current approaches to managing knowledge from both strategic and operational perspectives. Based on literature reviewed, a number of key themes relating to KM formed the basis for the interview questions at individual, project and organisational levels. Conducted in early 2006, all interviews were transcribed and manual content analysis undertaken allowing for the identification of key, substantive points and the categorization of responses (Gillham 2000).

The ten participant organisations represent some the largest indigenous construction organisations in Ireland. From the information presented in Table 1, it can be seen that there is significant disparity between many of these organisations in terms of both turnover (for 2006) and employee numbers.

Table 1: Participant Organisation Details

Company	A	B	C	D	E	F	G	H	I	J
Turnover (€m)	197	1016	206	500	120	320	440	272	220	153
No. of Employees	220	1500	281	750	220	725	3137	600	844	251

CURRENT PRACTICE

To assess current practice in relation to KM, each interviewee was questioned about a number of identified issues at individual, project and organisational level. A number of these practices are displayed in Table 2, along with an overview of membership of both EI and CITA. Encouragingly, seven are involved in EI's CPD accreditation scheme and seven are members of CITA, with six organisations involved with both bodies. In Table 2, the letter "A" beside Engineers Ireland indicates that the organisation's CPD practices are fully accredited by EI whilst "P" indicates that the organisation is at protocol stage; that is they have signed up to the scheme but have not yet had their CPD practices evaluated. Each ontological level shall now be considered with further expansion and discussion on the results presented in Table 2, along with other issues identified.

Table 2: Formal Knowledge Sharing Practices Employed

Company	A	B	C	D	E	F	G	H	I	J
Engineers Ireland		P	P	P	P	A	A	P		
CITA	X	X	X	X	X	X	X			
Individual Knowledge										
CPD Policy		X			X	X	X	X		
Mentoring		X	X		X	X	X			X
Performance Appraisal		X	X		X	X	X	X		X
Project Knowledge										
Lessons Learned					X	X				
Cross Audits					X					
Organisational Knowledge										
Workshops & Seminars	X	X	X	X	X	X	X	X	X	
Intranet		X			X	X	X		X	

INDIVIDUAL KNOWLEDGE

It was found that the five organisations that have a CPD policy in place are also part of the EI scheme. The remaining five interviewees indicated that employees were supported in their CPD endeavours, but that it was up to them to seek their own courses and opportunities. All ten agreed that the onus is on the individual to manage their own professional development. Mentoring is viewed as an effective method of sharing knowledge and experience between individuals. The main focus of the six organisations which provide mentoring is for graduates, who are mentored by more senior staff members, while organisation E provide mentoring for all staff up to contracts management level. Seven of the organisations conduct annual performance appraisals of staff whereby a senior manager sits down with an individual and reviews their performance over the previous year, using it as an opportunity to plan individuals training and development for the year ahead. Interestingly, organisation E appraise their staff under the following headings: *“job knowledge, problem solving ability, quantity/quality of work, task management, training requirements, communication skills, adaptability, business knowledge and achievement of goals set previously.”*

In terms of providing incentives for staff, all respondents viewed remuneration as the main incentive, particularly in the context of a booming industry with ample employment

opportunities. Offering staff an opportunity to progress their career was the most popular non-financial incentive, other incentives identified included: ownership of, and involvement in prestigious projects, personal contact with directors, CPD opportunities and social activities. A recurring theme throughout was that in the main, construction professionals are always keen to share their knowledge and also to learn from others. Difficulties were acknowledged in terms of the time pressures of construction projects and the migratory nature of staff in the industry.

PROJECT KNOWLEDGE

All interviewees indicated that weekly meetings are conducted during the course of construction projects where all relevant employees meet to review progress and discuss any problems. Issues such as health and safety, quality control, costs, programme, plant etc. are discussed and minuted. The meeting minutes typically remain within the project team and are not distributed to a wider audience. The main mechanism for sharing knowledge between live projects is through senior management who are involved in a number of projects and also through personal contacts between individuals on different sites. All interviewees stated that visits to other sites within the organisation are undertaken and are worthwhile in relation to actually experiencing particular issues and discussing work practices and building methods with colleagues. In all ten instances, these visits were conducted on an informal, ad-hoc basis and generally organised by individual employees themselves. Only one organisation, E, undertakes cross-auditing of other projects, *“each contracts manager will visit one of the other sites over the course of the year, and walk around with that contracts manager...so we try and share the knowledge there.”*

Upon completion of a project all organisations undertake a project review, although the extent and depth of these are varied. Organisations D and J review the project from a financial perspective only, while A, B, C, G, H and I mainly review subcontractor performance. As part of company procedures, each project manager in organisation E is required to maintain a lessons learned document throughout the duration of the project, adding relevant lessons every fortnight. At the end of the project, the document is reviewed in conjunction with relevant staff and an edited version is produced, and placed on the company's intranet. Organisation F has implemented a lessons learned database, which is accessible throughout the organisation on the company's computer network. Following a post-project review meeting, the lessons are documented in a standard template detailing the title, description and contact details for the individuals involved, and are classified based on the trade/subcontract package with which it is associated (for example cladding, glazing, foundations etc.). The lessons are then posted on the LLDB where people are supposed to refer to them when a new subcontract package commences on their project.

ORGANISATIONAL KNOWLEDGE

All of the organisations apart from J use workshops and seminars to facilitate the sharing of technical and management knowledge. The opportunity to bring a variety of employees together to meet and interact, when they mightn't necessarily do so, was viewed as valuable by all. The need to improve in the use of ICT was acknowledged by all interviewees, particularly in sharing information and knowledge between regions, offices, and sites with five organisations (B, E, F, G and I) having implemented an intranet to host organisational information. None of the companies reported using online corporate yellow pages for staff to search and find others with specific experience or skills. Although some interviewees showed interest in such a tool, a number expressed reservations about its potential use. Many felt that this kind of information was already managed by the HR function and that staff skills and experiences were well known to senior management.

Research and development (R&D) and innovation within the organisations was viewed as being ad-hoc and informal by all interviewees, although both B and G are looking to appoint someone to manage R&D. Research into new construction methods and products is undertaken on a project-by-project basis by all organisations, the capturing and sharing of experiences in this regard is poorly facilitated. The need to assimilate and disseminate external knowledge within the organisations was identified as being very important, particularly with the contractor becoming increasingly involved in the specification of materials and methods at an early stage in the construction process.

In providing an opportunity for divergence from the normal course of business, organisation E have recently established a number of working groups comprised of staff from various disciplines to explore potential solutions to recurring problems. *“We’ve covered things like site setup, corporate image, waste management, environmental management, subcontractor control, the use of small tools and plant.”* The groups are given the opportunity to *“review what we do, they then come up with a plan for what we should do, they then make a presentation to the board, and once approved it becomes part of company procedure.”* When a project has finished and organisation F are waiting to send a site manager to their next job, *“one of the things we would ask him to do is to visit all the other sites, talk to his peers and see what he can pick up.”* None of the respondents were familiar with the term Communities of Practice, and when explained to them, they were unaware of such communities within their organisations. A small number of organisations organised regular meetings for specific groups, for example organisation’s F, G and H have regular meetings for all quantity surveyors to discuss practice and share knowledge.

KM AWARENESS

All ten interviewees stated that they weren’t currently aware of a KM strategy being in place within their organisation, but many felt that the introduction of one was worth considering, and could contribute to improving the overall performance of their organisations. Both respondents E and F felt that the variety of initiatives offered within their organisations contributed to a culture where knowledge sharing was encouraged. In considering KM, respondent B commented *“there’s a huge amount of knowledge out there, but a lot of it is staying in individual’s heads or even within the project teams.”* The company recognises the need to manage knowledge and is *“something that we’re trying to do, but possibly would need more structuring.”* The need for a more formalized approach to KM was acknowledged by all respondents.

DISCUSSION

Construction organisations face significant challenges in managing and developing their intellectual capital, which now requires them to implement a formal approach to managing knowledge. At the core of KM are people, who require the development of HR policies to support their own and the organisation’s development. This has been recognised by EI who believe that the development of organisational practices which support lifelong learning of employees can contribute to productivity gains for the organisation. KM has also been recognised for its importance to industry by CITA, who have established a SIG to explore the technological aspects of KM. Against this backdrop, the current practices for managing knowledge have been investigated through interviews with senior management from ten of leading Irish construction organisations. The range of activities have been categorised into three separate ontological levels and are now discussed separately.

INDIVIDUAL KNOWLEDGE

The provision of CPD activities is recognised as having a positive effect on the sharing and development of individual knowledge (Olomolaiye and Egbu, 2004, Grisham and Walker,

2005). In seven of the ten organisations, this is closely linked to CPD activities such as provision of training and development, mentoring, and annual performance appraisals. Six of these organisations are involved in EI's CPD scheme, which appears to have a positive effect on such practices.

PROJECT KNOWLEDGE

The sharing of knowledge between live projects occurs on an informal basis, the senior managers viewing themselves as conduits for knowledge between projects. Visits by employees to other sites happen on an ad-hoc basis in all ten organisations, whilst only one organisation conducts cross-auditing of other projects. While all ten respondents indicated undertaking traditional project reviews (Mohammed and Anumba, 2005), only two formally document the lessons learned from each project, both using ICT to store and disseminate these lessons.

ORGANISATIONAL KNOWLEDGE

All interviewees recognised the value in bringing employees together in a variety of guises such as workshops, seminars and meetings to share knowledge. The presence of Communities of Practice and the use of ICT for sharing organisational knowledge were viewed by all as lacking, but areas worth investigating further. With regards to creating new knowledge, low levels of R&D capabilities were evident in all organisations which is well recognised across the industry (Kelly, 2005). Interestingly, organisation E has setup working groups, to develop solutions to recurring problems, once approved at board level, these solutions become embedded in organisational routines (Jashapara, 2004).

KM AWARENESS

The level of awareness of formal KM is generally lacking within the ten organisations, despite many recognising the need to manage knowledge. In practice, understanding of knowledge and its management has the potential to be improved, particularly in the context of the Irish construction industry, where both EI and CITA are actively promoting KM. Participation in EI's CPD scheme appears to have had a positive influence on current practices within organisations E, F and G, and to a lesser extent, B, C and H.

FUTURE DIRECTIONS

Since completing the interviews with senior management, an in-depth case study has been undertaken into organisation F, comprising a survey of professional and management staff, interviews with members of a construction project team, and a focus group with a director, the HR manager and another senior manager. In addition an interview was conducted with EI's CPD accreditation manager discussing the scheme and KM practices in other industries. To progress the agenda for KM within the leading Irish construction organisations, it is proposed to develop a strategic framework to improve the understanding of KM. This framework will comprise academia, industry, EI and CITA who have agreed to support the research going forward. Building on the research reported herein and that conducted subsequently, it is intended to explore further the role of CPD in KM. To this effect, five organisations have been selected (B, E, F, G and H), where interviews are to be conducted with HR managers, ICT managers and staff. In order to benchmark construction organisations against other sectors, EI have provided assistance in arranging interviews with HR managers from nine accredited companies in industries such as manufacturing, local authorities, engineering consultancy and utilities.

Adopting grounded theory as the research approach, all current and intended research shall be utilised in the development of a KM model for construction organisations. Upon completion of the interviews with both the construction and non-construction organisations,

theoretical sampling shall be employed to select sites for further primary research and the consolidation of the model. CPD accredited education and guidance resources shall be developed based on the model, to improve awareness, understanding, and implementation of KM within the construction context. The delivery of such resources will contribute towards the evaluation of the developed model in terms of its usefulness and credibility with industry. It is anticipated that such research will foster stronger relationships between industry and academia, further connecting theory and practice.

CONCLUSIONS

Current practices for managing knowledge at individual, project and organisational levels in ten of the leading Irish construction organisations have been identified through interviews with senior managers. These practices have been evaluated in order to assist in the development of a KM model specifically designed for these organisations. Based on this investigation, the following conclusions can now be made:

1. The need for the implementation of KM within construction organisations is well recognised, both globally and in the Irish construction industry, although uncertainty exists about how to address this need.
2. People are central to KM and the role of HRM is vital to creating a culture of knowledge sharing amongst employees and the development and implementation of KM practices.
3. The current range of practices employed in managing knowledge within the leading Irish construction organisations varies widely, although participation in EI's CPD accreditation scheme appears to have a positive influence on such practices.
4. An agenda for further development of KM now exists, through the development of a KM model with particular focus on CPD, it is hoped to lessen the gap between theory and practice.

It is anticipated that the development of a model of KM will improve the understanding of knowledge and KM in practice and contribute to the advancement of the KM research agenda in construction both in Ireland and further a field.

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