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INVESTIGATING LEARNING IN CONSTRUCTION ORGANIZATIONS

Suyanto Mahdiputra[1], Dr Bob Giddings[2], Keith Hogg[3] and Michael Daws[4]

School of the Built Environment, Northumbria University, Ellison Building, Ellison Place, Newcastle upon Tyne, NE1 8ST, UK

Learning in construction has received scant attention within extant theories of generic organizational learning. One of the apparently distinct characteristics of construction organization is that its business mainly runs through projects. In contrast, the origin of the organizational learning concept mainly stems from routine-based organizations. The present study investigates how these theories are applied in the construction domain. To be more specific, it focuses on contracting organizations that engage with the UK performance enhancement initiative known as *Constructing Excellence*. The paper summarises the theoretical perspective on the current state of knowledge about this topic and the full methodology to be adopted. In overall terms, the methodology takes a multifaceted approach involving six major stages. The first phases of this process are now complete. It takes the form of a business audit relating to the type and size of projects currently being undertaken and how the project teams are managed. In themselves, the results contain new empirical data that has informed the direction of the rest study. Two general groups of construction companies were identified: general contractors and specialist/subcontractors. Each of these groups has a different tendency for how they manage their project teams. The former tends to reform for each new project, while the latter favours staying together. The initial premise is that each of these practices implies different learning mechanisms. Further study and analysis will depart from these initial findings.

Keywords: construction companies, learning organization, learning mechanism, organizational learning, project-based learning.

BACKGROUND

It has been suggested that construction organizations face greater challenges than ever before. A mixture of increasing market forces, product changes, client demand, user concern and legislative pressure requires construction organizations to perform more efficiently. The ability to learn faster than competitors may be the only source of sustainable competitive advantage (deGeus 1996, 1999). Paradoxically, within the construction sector, learning seems not to be widely achieved. Critiques have constantly reminded the industry of the cost and schedule overruns experienced by construction projects all over the world (*ILO* 2001, Bon & Crosthwaite 2000).

Within the UK construction industry for instance, concern about the performance of the industry in terms of ability to deliver projects, on budget, on time and to a satisfactory quality has been expressed repeatedly by many scholars and practitioners,

[1] suyanto.mahdiputra@unn.ac.uk
[2] bob.giddings@unn.ac.uk
[3] keith.hogg@unn.ac.uk
[4] michael.daws@unn.ac.uk

for example, Latham (1994), Egan (1998) and Flanagan *et al.* (1998). Further evidence of dissatisfaction is provided by recent questionnaire surveys of construction clients carried out by the Construction Clients' Forum (1999 & 2000). For that reason, researchers have tried to identify the causal factors that are responsible for dissatisfaction (e.g. Nkado & Mbachu 2001, Ahmed & Kangari 1995, Kärnä 2004). Although there are issues of dissonance between reality and clients' perceptions (Nkado & Mbachu 2001), most of this research confirms the problem of knowledge gaps between clients and contactors. However, these are not addressing the fundamental problem, learning deficiency among the construction players.

If learning is to be promoted within the construction industry, it may be useful to gain knowledge of successful learning practices from other industries. This can be achieved through a study of generic organizational learning that has been primarily developed from the routine-based organizations, and could be integrated into project-based construction organizations.

Introduction to the Concept of Organizational Learning

Organizational learning as a research domain is now fully established (Easterby-Smith *et al.* 2000: 783). It has attracted interest from a great range of disciplines ranging from management science, psychology and organization development, to sociology and organization theory, strategy, production management, cultural anthropology, human resources and marketing (Bapuji & Crossan 2004, Lipshitz & Popper 2000, Clegg *et al.* 1996, Gilley *et al.* 2001, Starkey *et al.* 2004, Huber 1991, Levitt & March 1988, Easterby-Smith *et al.* 1999, Argyris & Schön 1996, Dodgson 1993, Easterby-Smith & Lyles 2003, Easterby-Smith 1997, Chiva & Alegre 2005). Despite the overwhelming number of published works in this field, many studies are still based on theoretical analysis and conceptual analogy (see Crossan & Guatto 1996), and hence lack practical verification and empirical support. It is only recently that research has begun to embrace the empirical sphere (see Bapuji & Crossan 2004). Moreover, the mainstream of the research still seemingly focuses around the context of routine-based organizations, while other realms such as the project-based construction sector, lack of significant research. Only in a few instances has construction appeared in the literature, for example Barlow & Jashapara (1998), Kululanga *et al.* (2001, 2002), Bresnen *et al.* (2004) and Styhre *et al.* (2004). Empirical research, and particularly within the construction industry, will help to shape the development of this emerging field.

This research project aims at contributing to this rather absent niche area of research. The study is focused on contracting organizations that engage with the UK performance enhancement initiative known as *Constructing Excellence*. It is part of a PhD study funded by the School of the Built Environment, Northumbria University. In overall terms, the study investigates how construction companies learn from their projects. Hypothetically, this would involve a chain of events in which a project team would need a mechanism to embed its knowledge into the company and then the company would need a second mechanism by which to inform new project teams. These guiding hypotheses will be tested through a multifaceted approach involving six major stages of the research process, as detailed in the methodology section.

The contents of this paper report is an interim report on a 3-year research project based in the North East of England. First, an introduction of the concept of organizational learning has been presented. This is followed by a review of the state of current knowledge and debate on organizational learning theories in relation to

construction. In the methodology section, full research strategies are highlighted. Next, based on the current findings, further analysis of the initial data is presented. This is followed by the development of research scenarios that were outlined in an earlier paper (Mahdiputra, Giddings, Hogg and Daws 2005). The paper concludes with a roadmap, which illustrates how the next phases of the research are being directed.

BRIEF SUMMARY OF LITERATURE REVIEW

The term *organizational learning* stems from Cyert & March (1963), who use it to describe the adaptive changes of organizational routines based on the experiences of the organization. In 1965, the word *organizational learning* appeared for the first time as the title of a publication (Cangelosi & Dill 1965), although this term was used more to describe the dynamic of individual and team learning. Today, the buzzwords of organizational learning have become a common language in both academic and business environments. However, when it comes to the essence of the learning level (individual versus organizational), current literature is still much dominated by the individual-focus view, which has somewhat shifted in meaning from the original concept of Cyert & March (1963). This is perhaps due to the great influence of Argyris & Schön's (1978) work, which used an individual learning metaphor to describe the process of organizational learning.

Organizational Learning Paradigms

Every scientific inquiry starts with a set of conjectures concerning the phenomena being studied. This is what is called a *research paradigm* (Kuhn 1962). With regard to organizational learning theories, there are predominantly two prominent contesting paradigms. One paradigm presumes that organizational learning is more or less similar to the process of individual learning in an organization (Argyris & Schön 1978, Simon 1991, Dodgson 1993) known as the 'learning *in* organizations paradigm'. The other presupposes that organizational learning can exist in its own right (Hedberg 1981) known as the 'learning *by* organizations paradigm' (Lipshitz *et al.* 2002). For the purpose of this research, the paper embraces the second paradigm. In this view, the phenomenon of organizational learning is understood as 'learning *by* organizations' not 'by individuals *in* organizations'. Consequently, the focal point of analysis in this paper is at the organizational level. To be more specific, this paper focuses on various learning mechanisms at the corporate level.

Organizational Learning Mechanisms

In simple terms, organizational learning mechanisms are the tangible organizational sub-systems that are intentionally established to facilitate organizational learning. These mechanisms function as a bridge by which to connect learning of individuals *in* an organization into learning *by* organizations. Their forms can be structural or procedural. There are a great number of instances of such mechanisms appearing in the literature (for example, Kululanga *et al.* 2001, Prencipe & Tell 2001, Franco *et al.* 2004, Roth & Kleiner 1998, Amstrong & Foley 2003). Table 1 presents some key learning mechanisms that are relevant to construction companies, as suggested by the literature. It can be seen from the table that project learning involves different mechanisms from organizational learning.

Table 1: Organizational learning mechanisms in various forms

Locus of learning	Learning processes				
	Pre-learning systems	*Experience accumulation*	*Knowledge articulation*	*Codification/ Storage*	*Dissemination/ Distribution*
Project Learning	• Project operating procedures • Strictly observed overlap for departing/ arriving members • Project information system	• Pre-project meeting • Developed groupthink • Project team communication • Informal encounters • Inter-project visits • Onsite information exchange • Project team exposure	• Project planning meetings • On-site project meetings • Post-project review • Project evaluation • Project progress meetings • Inter-project-meetings • On-site problem solving	• Project plan/audit • Milestones/ deadlines • Meeting minutes • Case writing • Project history files • Intra-project 'lessons learned' database • Learning histories • As-built drawings • Project progress reports • Project final reports	• Inter-project correspondence • Inter-project personal exchange • Project quality cycles • Staffing shift from project to home organisation
Organisation Learning	• Allocated resources available for learning • Flexible organisation to allow mobility of employees • Reward system • Established informing system • System for control mechanism • Reporting system • Evaluation system • Formalized relationship with boundary system • Reward system • Employee feedback system	• Informal organisational routines, rules and selection processes • Departmentalisation and specialisation • Benchmarking (internal & external) • Imitation • Induction programs for new members • Staff development /on-the-job training • Re-use of experts • Professional-based networks • Inter-company based networks • External & internal seminars • Initiative of individual learning • Partnering • Corporate mentoring • Environmental scanning	• Project manager camps • Knowledge retreats • Professional networks • Knowledge facilitators and managers • Personal reflection • Error corrections • Joint project research • After-action reflection • Review from success & failure • In-house research improvement programs	• Drawings • Process maps • Project management process • Lessons learned database • Job descriptions • Routines • Standard operational procedures • Rules & regulations • Artefacts • Diary • Reporting system • Individual systems design • Individual memory • Embedded experience • Formal learning procedure • Sub-contracting agreements • Engineering contract	• Communities of practice • Information technology • Regular formal & informal meetings • Story telling • Informal communication • Updating & coordinating meetings among various teams • Job/role rotations • Trade shows and exhibitions

Framework for Investigating Learning in Construction Organizations

Construction organizations may be almost unique when compared with other industries. Glenn Ballard and his associates consider construction as a type of project-based industry (Ballard *et al.* 2001, Ballard 2005). In project-based organizations, the strong emphasis of management effort is given to managing projects. This may in turn also have an inbuilt effect in the way they accumulate useful knowledge and thus affect their learning practice (Bresnen *et al.* 2004). Therefore, simply copying and pasting a learning concept developed from routine-based industries may not be

applicable to project-based organizations (Bresnen & Marshall 2001). One of the apparently distinct characteristics of construction organizations as business institutions is that the *factory* (production site) is virtually never in the same place for the production of each different product. The principal approach of much management in this context is based on a one-off production philosophy. In fact, the concept of projects in different locations may be the factor that actually makes the construction industry unique (Dubois & Gadde 2002, Groák 1994). The next sections examine the theories of projects and their significance in terms of hindering or enhancing learning.

Theories of Projects

Projects as a form of temporary organization are normally created in order to fulfil a specific purpose. Their existence is pre-eminently bespoke and crucially time bounded (*cf.* Loch 2002). Incorporating these two distinctive features, the Project Management Institute (PMI) defines the project more precisely as "a temporary endeavour undertaken to create a unique product or service". *Temporary* means that every project has a definite beginning and a definite end, and *unique* means that the product or service is different in some distinguishing way from all other products or services (PMI 2000). According to Koskela & Howell (2002), the implicit theory of the project that underlies the present practice of project management is based on the transformation view. From this perspective, a project is conceptualized as a transformation of inputs to outputs. The key principle is that the total transformation of a project can be decomposed hierarchically into manageable and well-understood sub-transformations, i.e. from total transformation into parts, and finally into *tasks*. Tasks are therefore the central unit of analysis of a project.

Contextual View of Projects

One way of analysing the potential for learning from projects to become organizational learning in permanent organizations is to adopt a contextual understanding of projects. Returning to the current state of knowledge, past research on projects has been largely dominated by a perspective in which projects were generally seen as singular entities. The primary interest has been in the structures and dynamics of individual projects (*cf.* Engwall 2003). Thus, the project has been conceptualized as a lonely phenomenon, independent of history, contemporary context and future (Kreiner 1995). Moreover, the traditional concept of the project focuses on mechanistic approaches, seeing projects as *objects*, or *mini-machines* (Anderson & Larsson 1998), purposefully intended for task solving, and concerned merely with planning and control in order to reach a predefined goal. In other words, the management of projects is simply to do with the process of planning, organizing, directing and controlling company resources to achieve specific goals in a short time-span. However, contemporary thinking on projects leads to investigation from an *actor's* perspective. In this paradigm, projects and their contexts can be seen as social construcs made by actors, situated in a specific historical and social context, and continuously open for reconstruction (*cf.* Vaagaasar 2005).

Some literature appears to have approached projects from this perspective, for example Grabher (2002, 2004a, 2004b), Lundin & Midler (1998), Blomquist & Packendorff (1998), and Engwall (2003) among others. Probably the most relevant aspect is the notion of *project ecology,* introduced by Gernot Grabherthis (2002, 2004a, 2004b). By disentangling the constitutive layers of project ecology, i.e. the *core team*, the *organization*, the *epistemic community*, and the *personal networks*,

Grabher (2004a) further analyses how learning possibly takes place within each layer. Project ecology represents a heterarchic form of social organization that, despite dense patterns of interaction, is less systematic and less coherent (*cf.* Grabher 2002). It also denotes an ecology of organizational logics and individual identities, values and loyalties.

The evolution of learning in project ecology starts from the project site, and the actors are members of the core project team. The *core team,* as Grabher (2004a) argues, represents the basic organizational unit and the elementary learning arena of projects. It embodies temporal continuity and is responsible for the process of learning during the course of the entire project. The second analysis is learning within the organization level. By subsequently moving from the core team to the *organization*, the analysis shifts from the level of the individual project to learning that accrues from the management of a portfolio of projects, i.e. learning that occurs at an organizational level.

Grabher (2004a) further argues that the actual locus of learning from a project extends beyond the boundaries of the individual organization. The next context of learning shifts to the *epistemic community* level. This community involves all project participants who contribute to the production of knowledge to accomplish the specific task. From construction companies' point of view, the members of this community are the sub- contractors and suppliers that take part in the project work.

The following context of learning resides within *personal networks*. While the aforementioned three loci of learning (i.e. core team, organization and epistemic community) represent the temporary organizational layers, personal networks continue to hold the knowledge of projects. Although these latent networks can be activated to solve project-specific problems, they typically remain in the project background and sustain the ongoing learning processes of the individual project members. For further accounts of networks and latent organizations, see Starkey *et al.* (2000), Wittel (2001) and Grabher (2004b).

Such contextual approaches to projects can also help to understand the paradox of learning in construction companies. The nature of the construction project is commonly claimed to be responsible for the difficulty in taking advantage of lessons learned from projects to benefit their organizations in terms of avoiding a tendency to 're-invent the wheel' (Prusak 1997). The commonly cited explanation is that knowledge tends to reside in individuals, which makes it difficult to transfer into organizations. However, in a contextual view, it is argued that because knowledge is situated in a specific social and historical context, it cannot be transferred easily (Asheim & Isaksen 2002, Asheim 1999). According to Asheim & Isaksen (2002) knowledge is bound to individuals and, partly embedded in local patterns of interaction. They further suggest that such knowledge can best be acquired by locating the learning actors in geographical areas where learning processes takes place. Moreover, organizational learning needs the presence of learning mechanisms as a locus for the learning process (Kululanga 2001). These arguments recognize the role of learning mechanisms in facilitating organizational learning.

In summary, this section elicits two important elements that need to be considered when studying organizational learning in a project-based construction organization. These are task management and learning mechanisms. Task management is essentially related to how learning can bridge both routine work in an organization and specific

tasks in a project. Learning mechanisms, on the other hand, are both formal and informal infrastructures that can facilitate this learning.

METHODOLOGY

The overall purpose of the research is to study how construction companies learn. This will involve the examination of various learning mechanisms practiced by construction companies in order to facilitate the capture of learning generated from projects and to transfer that learning into future projects. As part of the process, the generic principles of organizational learning, as highlighted in previous sections will be tested against the practice of construction companies. The objectives will be to evaluate the current generic models in terms of their applicability to construction companies and then to generate a specific model for the process of project-based construction organizational learning.

To realize these aims, the complete research process has been designed to follow six major stages. In the *Review of the Current State of Knowledge,* an extensive literature search has been carried out to establish the theoretical underpinning of the research. It is based on the generic theories of organizational learning, supplemented by a small number of construction-specific research studies. One of the outcomes of this process was the development of a framework for benchmarking organizational learning performance (see Mahdiputra, Giddings, Hogg & Daws 2005). This is followed by fieldwork studies in the form of a *Business Environment Audit*.

The samples for the study were selected from the active members of the North East *Constructing Excellence* initiative. The reasons for a focus on this targeted population were twofold. First, it helps to set the boundary limit, geographically. Second, it is intended to overcome the problem related to the variable nature of the construction sector in terms of companies' profiles and turnover. Exceptional companies that have invented their own learning traditions hardly exist within the industry. It is expected that the active members of *Constructing Excellence* would probably represent the few construction companies that possess good learning practices. For that purpose, these selected companies have undergone an audit process to establish their business environments, i.e. position in the market, typical procurement experience, external and internal business context and in particular, how they manage themselves. As a result, this screening process retained a group of 30 comparable companies that will be engaged in the full primary *Data Collection* process. This is in accordance with sample sizes set out in the Central Limit Theorem. The nature of data collection itself will be multifaceted and dependent upon the learning mechanisms in practice.

The *Data Analysis* will determine the extent of engagement with organizational learning key performance indicators derived from the review of the current state of knowledge. 20% of companies that exhibit greatest correlation will be involved in the model building stage via case study methodology. In *Model Building,* the learning processes undertaken by these high achieving companies, in terms of their learning performance, will be tested against the generic organizational learning theories to build a construction-specific model. The model will then be *tested* on the 20% of companies that exhibit least correlation. Figure 1 illustrates how this screening process is undertaken.
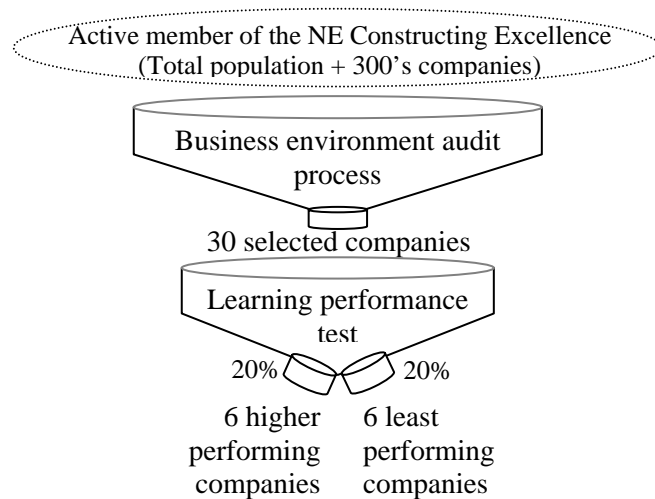
Figure 1: Illustration of screening process for samples selection

PRELIMINARY FINDINGS AND DISCUSSION

Analysis of the responses to the Business Environment Audit revealed some interesting findings. Although samples were exclusively drawn from the North East region in terms of where their offices were located, it was acknowledged that they might work beyond this area. The data shows that as much as 30% of companies extended their area of activity to other areas of the UK. The activities with which they engage are equally distributed, between the *public* and the *private* sector.

In general, these companies fall into two categories of activity. First, there are general contractors, and secondly, specialist contractors or subcontractors. It is interesting to note that these two groups of companies seem to have had different preferences in terms of how they manage their project teams. The general contractors group tends to reform their project teams for each new project. This can be understood as each new contract has different requirements, so the composition of the team needs to be readjusted. General contractors seem to be more in need of flexibility. The advantage is that they may be more responsive to new clients' requirements. However, the drawback may be the fact that they might face problems with bringing learning from projects into organizations. The well-known reality is that the members of a project team, who hold the knowledge of a project, disperse upon completion of a project. Egan (1998) in his prominent report emphasizes: "a team that does not stay together has no learning capability and no chance of making the incremental improvements that improve efficiency over the long term" (Chapter 4, Paragraph 67).

As for specialist contractors, they are in favour of maintaining their project teams and staying together for the next project. This can also be linked with the nature of their repetitive style of work. In this way, they may have developed patterns of procedures that require only minor adaptation for each new contract. This group of companies has the advantage of learning from projects. However, from a long- term perspective, this can also be a downside. While such specialist companies can be extremely skilful in their specialization, in time this specialization might no longer be required by the market.

CONCLUSIONS AND FURTHER ACTIONS

This paper has reported the work in progress half way through a 3-year project investigating learning in construction. Some reflections on the current state of the literature on organizational learning have also been presented, followed by the development of frameworks for measuring organizational learning performance. This has been done by exposing two important issues that are specific to the construction environment, i.e. task organization and learning mechanisms. These are the two elements that will be investigated further during the next stage of the research process.

At the present stage of analysis, a Business Environment Audit has been completed and has generated 30 selected companies that fall characteristically into two specific groups, i.e. general contractors and specialist subcontractors. It is expected that these two dissimilar groups have their own traditions in managing organizational learning practice, and thus a case worthy of study. Exploring them will provide substantial knowledge about the nature of how construction companies learn. Initial findings have indicated a positive accordance with this premise. Albeit only a part of ongoing major research, this paper paves the way for some immediate reflections on how the next stages of the research will be directed.

The Way Forward

The next stage of the study will be the primary data collection. Companies selected from the Business Environment Audit will be involved in this process. First, these companies will be tested against their learning performance using a proposed model of the organizational learning key performance indicators. The outcome of this test will be a list of companies sorted on their degree of learning performance. The top 6 (20% of total) will be involved in the model building stage through in-depth case studies. At the heart of this procedure is the selection of a certain number of high performing companies, from which their learning practices can be studied and analysed. This will lead to the development of a construction-specific organizational learning model. It will involve the examination of task organization in relation to learning, and the identification of learning mechanisms that allow project teams to transfer their learning from projects to their organization. In the same vein, there should be other secondary mechanisms by which organizations inform new project teams. A representation of how a project-based construction organization learns will be demonstrated in this best practice model. The final procedure of the research will involve model testing and refinement.

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