

WHY DON'T (OR DO) ORGANIZATIONS LEARN FROM PROJECTS

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Abstract

Many different types of organizations use projects to accomplish specific tasks, especially tasks that involve innovation. However, research demonstrates that there are often problems associated with both learning within projects and learning transfer from projects to the wider organization, important if the project learning is to become organizationally institutionalized. In this paper we explore and explain the mechanisms linking project and organizational learning through a meso-level study of project-based learning across different organizational contexts. We identify how a key issue explaining the project learning and project learning transfer is the extent to which project activities are embedded within the roles, routines and practices of the organization. In doing this we identify different types of embeddedness of projects and demonstrate the facilitating and constraining influence of these different types in different organizational contexts.

INTRODUCTION

The need for learning and innovation is often given as the major reason for firms to deploy projects and project teams as a way of organizing work tasks (DeFillippi and Arthur 1998; Sole and Edmondson 2002). Project work, it is argued, confers a relatively high degree of decision autonomy and discretion on those actually performing specific tasks, allowing organizations to respond more flexibly and more speedily to external demands. Project work is seen as particularly useful in contexts typified by rapid changes in markets and technologies (Allen, 1996). Following this logic, organizations in both service and technology-based sectors are increasingly structuring work around projects and project teams (Huber 1999; Zenger 2002).

However, the evidence that organizations are actually better placed to learn through project work is extremely ambivalent. On the one hand, projects are found to be rich and fertile sites for organizational learning (Ayas and Zeniuk 2001; Lindkvist 2005). On the other hand, there is just as much evidence that projects often fail because there is little learning within the project (Newell et al. 2006) and, moreover, that organizations consistently fail to learn *from* projects, as attested to by the tendency to 'reinvent the wheel', repeat mistakes and fail to transfer lessons from one project to another (Prusak 1997). Thus, even where significant learning is generated within projects, there are often

difficulties in capturing or translating this learning into new routines and practices at the level of the organization (Scarborough et al. 2004).

In this paper we seek to explore and explain the reasons for this ambivalence in the literature – put simply, to explain when learning occurs in projects and when organizations do and don't learn from their projects. In developing our argument we follow a significant amount of earlier work which sees learning as an iterative process comprising action and reflection. Taking this view, organizational learning is defined as a process of changing organizational actions through new knowledge and understanding ((Fiol and Lyles 1985). As Edmondson puts it 'an organization can be said to change when its actions have been modified as a result of reflection on new knowledge or insight' (p.128) (Edmondson 2003b). The emphasis on action as well as reflection aligns well with the epistemological position, taken here, of knowledge and learning as situated in social practice (Lave and Wenger 1991). Thus organizational learning is seen as grounded in, and arising from, the highly localised, interpersonal and variegated practices of organizational members who work together in subgroups and teams (Edmondson, 2003). This means that the locus of learning is not with some reified, monolithic organization, but instead, lies in the pluralistic practices of subgroups and teams within the organization. Nevertheless, the extent to which learning at this local level is shared across the organization is an important consideration that cannot be ignored in the context of project-based learning because so much of this learning does not readily transfer, as our empirical analysis will demonstrate.

In making this distinction between learning within and learning from projects we go beyond most existing research on learning in project settings, which usually focuses, either on learning within project teams, or on learning from projects to the wider organization. Relatively little research focuses on the processes linking learning within projects to learning in the organization or, as indicated tends to conflate these two processes. This reflects, first, a tendency to see projects in isolation from their organizational context – a view reflected in studies which counterpose projects with traditional notions of organizing, suggesting that a project is like 'a one night stand' (Meyerson et al. 1996)(p. 167). Second, though, there is a more general tendency for theories of organizational learning to address, discretely, micro individual-level or macro organizational-level issues (Hardy et al. 2003). Yet, if organizational learning derives from the localised learning that occurs through project work, then it is important to develop meso-level theory to explain how learning within projects and project teams becomes translated (or not) into learning from projects to other parts of the organization (Rousseau and House 1994). Moreover, it is important to understand how the organizational context influences the ability to generate and transfer learning from projects (Bresnen 1990). One might reasonably expect, for example, that where organizations are designed predominantly around project work, then mechanisms for transferring learning from projects will be relatively well developed.

This paper aims to explore and explain these mechanisms linking project and organizational learning through a meso-level study of project-based learning across

different organizational contexts. In particular it addresses the questions of: What are the mechanisms that support learning from projects to the wider organization and what are the barriers to such learning? How does the organizational context, in particular whether it is project-based or not, influence both learning within projects and the ability to transfer learning from projects to the organization? Here, a key issue is the extent to which project activities are embedded within the roles, routines and practices of the organization. Previous work has suggested that such embeddedness tends to constrain learning at project level, but there is only limited evidence on its effects overall.

These questions are addressed through a detailed qualitative study of learning in 13 focal projects across 6 organizations. In the next section we summarise different explanations of project-based learning to date. This draws attention to discontinuities between project practices and organizational practices that may constrain learning. This is followed by an empirical analysis of project-based learning from which we identify patterns linking such learning to different forms of organizational embeddedness. We conclude with observations on the need to properly locate projects within their organizational context – rather than viewing them as isolated entities – if we are to fully appreciate the possibilities and constraints of learning in this arena.

VIEWS OF PROJECT-BASED LEARNING

Projects can be seen as the activities clustered around specified work tasks where there has been an allocation of resources and roles (e.g. a project manager) by a sponsoring organization to that task (Arthur et al. 2001). Research has recognised the importance of projects as sites for learning, both within projects (intra-project learning) and from projects to the wider organization (inter-project learning) (Kotnour and Vergopia 2005). Reflecting this, there is now a growing literature aimed at understanding ‘project-based learning’ – defined as ‘the theory and practice of utilizing real-world assignments on time-limited projects to achieve mandated performance objectives and to facilitate individual and collective learning’ (Arthur et al. 2001, p. 5). Project-based learning is thus defined as encompassing learning within projects (intra-project learning or exploration) and also learning from projects to other projects (inter-project learning or exploitation) and to the wider organization (Scarborough et al, 2004); albeit few studies link these two processes. The need to distinguish these two processes has been illustrated by the studies that have demonstrated how project learning is very difficult to transfer (Prencipe and Tell 2001). In our empirical research, we will consider the extent to which learning was achieved in projects as well as the extent to which this learning was transferred to other parts of the organization.

In understanding the problems of transferring learning from projects it is important to take into consideration the characteristically temporary, fluid, time-bound and discontinuous nature of project work. This means that there is a need to theorise project-based learning in its own right, as distinct from team learning. For example, work on

team learning has highlighted such critical factors as shared goals (Senge 1993), mutual trust, psychological safety (Edmondson 2003b) collective or group-level reflection (Argote 1999) and stable membership (Moreland and Argote 2003) as significant elements of learning in teams. Yet these elements may have limited applicability to projects where members change or meet infrequently, goals are diverse, or trust is hard to establish.

Also, project work as compared to team work tends to have greater ambiguity and diversity because of the cross-functional nature of the work. Whilst projects typically entail formal role responsibilities, goals and deliverables - they usually have a project manager and deadlines, for example - the boundaries of membership and role identities (i.e. who belongs to 'the team') are often not that clearly defined and/or not all that apparent to members of the project. For example, projects in construction typically involve site managers and construction engineers working alongside an extended range of other engineers, tendering experts, planners, and external subcontractors and architects. Different individuals (and organizations) enter and leave the project at different points in time, depending on particular issues that arise and project members often work on several projects at once. As such, the individuals involved do not necessarily see themselves as part of a (psychological) team, and group goals, mutual interests and common understanding do not develop because there is no shared practice that unites project team members. This is very different to the ongoing functionally-based team where common understanding and shared goals are likely to exist because participants are involved in a shared practice.

Our research therefore addresses the distinctive characteristics of project work that may make learning and the transfer of such learning problematic. In developing our understanding of this problem, we next consider the learning mechanisms which may be applicable to project work.

LEARNING MECHANISMS AND PROJECT WORK

In discussing such mechanisms, the work of Zollo and Winter (Zollo and Winter 2002) on dynamic capabilities is an important reference point. Zollo and Winter (2002) identify three mechanisms which can contribute to the creation of a dynamic capability - 'a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness' (p. 340). The lowest level mechanism is informal experience accumulation, which refers to the tacit accumulation of experience by individuals over time and the use of that experience to improve practice in an incremental fashion. It is essentially an individual trial and error learning process that accounts for the learning curve (Gavetti 2005). In relation to enhancing learning from projects, experience accumulation would refer to the reliance on individuals moving from project to project, taking their accumulated experience with them that could then promote collective learning on the particular project they were assigned to. Thus, if an individual was in a project where

learning from a previous project was relevant they could then use this in the context of the new project.

Relying on experience accumulation, however, according to Zollo and Winter (2002) is not the most effective way to build up a dynamic capability. Rather they suggest that knowledge articulation is a more effective mechanism for doing this. Knowledge articulation is defined as the 'deliberate process through which individuals and groups figure out what works and what doesn't in the execution of an organizational task' (p. 341). Knowledge articulation thus occurs when teams make a cognitive effort to enhance their understanding of the causal links between actions and outcomes – in Edmondson's (2002) terms they engage in collective reflection to gain insight. Moreover, the final, and highest level, mechanism to develop a dynamic capability is knowledge codification - 'Knowledge codification is a step beyond knowledge articulation' (p. 342), allowing the knowledge to be accessed and used by others sometime in the future and not dependent on personal networking. In relation to project learning, these three mechanisms can be associated with increasingly sophisticated ways of trying to ensure that learning within projects is translated into organizational learning – having the capability to use learning from projects in other contexts where this knowledge is applicable. While Zollo and Winter recognize some of the costs associated with codifying knowledge, which explains why so much knowledge is not codified, they nevertheless argue that it can help support the development of dynamic capabilities and so be useful in contexts where such dynamic capabilities are important – in other words, in rapidly changing environments where projects are common.

As with other models of organizational learning, critical mechanisms in this dynamic capabilities model incorporate both the behavioural processes of 'learning by doing', as well as more deliberate cognitive processes of 'learning by reflecting' (Sole and Edmondson, 2002; Senge, 1993). The dynamic capabilities model is particularly useful in the context of our study of project-based learning because it highlights both critical mechanisms for learning from projects to the organization, and the need to relate these to characteristics of the task (in our case project tasks). Thus, Zollo and Winter argue that the effectiveness of the defined mechanisms for building capabilities is influenced by task frequency (how often a task is repeated), task heterogeneity (does the task have the same characteristics on different occasions) and causal ambiguity (are the links between actions and outcomes clear (Huber 1999; Lindkvist, 2005).

FROM PROJECTS TO ORGANIZATIONAL LEARNING

Many existing accounts of organizational learning tend to view it as a, more or less smooth, cycle involving the conversion of knowledge from one type or level (e.g. tacit, individual) to another (e.g. explicit, collective). Nonaka's (1994) knowledge creation 'spiral', or Kolb's (1984) earlier 'learning cycle', typify this kind of approach. Although the importance of one-off learning events is acknowledged (e.g. Zollo and Winter, 2002), the general presumption is that there is some basic continuity across tasks within the

organization which provides the conditions for organizational learning. Based on these assumptions, Edmondson (2002) states that ‘the collective learning process in an organization is inherently local’ (p. 142); indeed she equates organizational learning with team learning. She is able to equate team and organizational learning, because her focus is on functional team learning, which will be more continuous and cumulative than project-based learning¹. However, when the focus is on project learning, the conflation between local level learning and organizational learning becomes more difficult to sustain. In the context of project learning, equating local project learning to organizational learning ignores how learning at this local level may or may not be shared at a higher organizational level; learning *within* project teams may not translate into learning *from* project teams that can enhance organizational learning.

In exploring these issues we can draw upon Crossan et al. (Crossan et al. 1999) who develop a 4-phase model of the organizational learning process (the 4I model), with interpreting (reflection) and integrating (action) happening at the group level and integrating and institutionalizing happening at the organizational level.

Institutionalizing is ‘the process of embedding learning that has occurred by individuals and groups into the institutions of the organization including systems, structures, procedures and strategy’ (p. 1090). One contribution of the 4I model, therefore, is identifying a path through which project-based learning may ultimately be transferred to, and embedded within, the wider organization.

However, the path from individual and group learning to organizational learning is only part of the story as far as project-based learning is concerned. As previous studies have shown, such learning only rarely accumulates directly into organizational learning. Significantly, the one illustration which Crossan et al. provide of their 4I journey begins with the intuition of a CEO – suggesting that this form of organizational learning may be restricted to a relatively small group of leaders and managers. One implication of such observations is the possible extent of what might be termed ‘lost learning’ – that is, learning which is generated from, but not re-applied to, organizational tasks. For example, Edmondson (2002) notes that ‘even when teams learn effectively, team learning may not translate to organizational learning’ (p.130)

THE EMBEDDEDNESS OF PROJECT-BASED LEARNING

A second important contribution of the Crossan model, therefore, is its emphasis on what is termed the ‘dynamic nature of organizational learning’. This refers to the interplay between the feed forward of learning from individuals and groups, on one hand, and the constraining effect of previously institutionalized learning on the other. This dynamic leads, as they note, to ‘a tension between the embedded, institutionalized learning from the past, which enables it to exploit learning, and the new learning that must be allowed to feed forward...’ (p. 530). Here they highlight the impact of

¹ Edmondson did include project teams in her sample but the majority of the teams were functionally-based teams

organization structures which have ' a strong impact on who talks to whom' (p. 533) and rules and routines which 'impede the assimilation...of new learning' (p. 533).

In addressing the embeddedness of projects and project-based learning, we recognise that the existing literature tends to polarise between two broad perspectives. One broad perspective tends to highlight the 'situated' nature of learning . This perspective draws on several different theoretical strands, including 'activity theory' (Engeström 1993) and studies of communities of practice (Lave and Wenger 1991). The implications of this perspective are to highlight the intertwining of knowledge and learning with the development of activity systems, communities and social practices (Tsoukas and Vladimirou 2001). As Gherardi et al. put it: "To know is to be capable of participating with the requisite competence in the complex web of relationships among people and activities" (Gherardi et al. 1998) (p.274).

In contrast to the situated perspective, the other broad perspective can be characterised as involving a cognitive view of learning (Huber 1991). This approach highlights changes in individual cognition, including perceptions, attitudes and behaviour, as the characteristic form of learning within organizations . In this approach, project-based learning occurs through a range of cognitively-oriented processes which include; the eliciting of existing knowledge through team member expertise and their social networks (Ancona and Caldwell 1992), transforming such knowledge through a range of activities including the integration of disparate forms of expertise (Okhuysen and Eisenhardt 2002), reflection on and articulation of experience (Ayas and Zeniuk 2001), and, finally, the diffusion of the knowledge created, 'embrained' in the heads of project team members (Huber 1999) as they move on to new roles or projects within the organization, or to be made available as 'lessons learned' or 'after-project reviews' stored on company intranets or databases (Kotnour and Vergopia 2005).

Project-based learning, however, poses a challenge for both of these perspectives. Thus, the relevance of the situated perspective, for example, is diminished to the extent that projects transcend existing social and organizational contexts, bringing together individuals from a variety of different social groupings. In this stylised sense, projects run orthogonally to communities of practice in that they are generally seen as involving highly time-bounded social interaction, discrete forms of non-repeatable activity, formal objectives and one-off tasks (Wenger and Snyder 2000). They thus typically lack the community-building effects (e.g. through strong ties, continued participation, common identities) found in localized, ongoing and more routine work activities (Gherardi et al. 1998). But, while this contrast points to differences in the way in which people learn within CoPs and projects respectively, it is too simplistic to say that project work and communities of practice are wholly distinct spheres. After all, projects emerge out of and feed back into the embedded social practices of mainstream work organizations. Moreover, project work often involves assembling temporary groupings of individuals from a range of functional or disciplinary backgrounds. Whatever practices and relationships these individuals develop at project level, they may also retain a wider

social affiliation and identification which is underlined by the consciously temporary nature of their endeavour.

Similarly, in our review of the literature we recognized the value but also the limitations of the cognitive perspective on project-based learning. This perspective suggests that learning will be generated, if at all, not through the sharing of practice amongst an emergent community, but rather through the reflection stimulated by diverse practices amongst a focal project team (Ayas & Zeniuk, 2001). However, the emphasis which this perspective places on learning within a team (e.g. Senge, 1993; Sole and Edmondson 2002) does not always correspond to the experience of learning within a project. Whilst clearly projects and teams frequently overlap, as discussed previously, the characteristics of projects are not necessarily the same as the characteristics of teams. Psychological definitions of a 'team' emphasise characteristics of shared identity and continued psychological commitment to team membership where behaviour within the team is shaped by mutual interests and group-level norms. In contrast, project work is often very temporary, fluid, interrupted and distributed.

LEARNING UNDER CONDITIONS OF EMBEDDEDNESS

The arguments above suggest that understanding project-based learning within an organizational context requires a deeper analysis of the conditions of embeddedness and their implications for processes of learning. The term 'embeddedness' is used quite widely in the existing literature, but with a variety of meanings. In the arena of economic sociology, for example, it refers to the way in which economic activities are embedded in social relations (Granovetter 1985). Others use the term to denote the impacted qualities of knowledge – thus the knowledge of the firm is seen by some writers as embedded in organisational routines, work practices and networks of human relations (Kogut and Zander 1992; Nelson and Winter 1982).

Our use of the term in this paper, however, reflects our previous discussion of 'institutionalized learning'. Thus, in discussing the embeddedness of projects we are describing the extent to which project activities are dependent on institutionalized knowledge, roles, routines and practices. Although this clearly overlaps with ideas on the embeddedness of knowledge, our emphasis here is on the temporal and recursive features of learning, rather than its tacit or explicit qualities which are highlighted in other studies. The advantage of this particular view of embeddedness is that it places project-based learning within the wider ambit of organizational learning. As other studies have suggested, these different forms of learning may be 'nested' such that organizational learning may substitute for project-based learning and vice versa. The embeddedness of projects, in this perspective, reflects the importation of organizational learning into projects through the taken-for-grantedness of established routines, norms and practices.

The need to address this form of embeddedness is further underlined by the Crossan 4I paper discussed earlier. This paper argues that organization structure, rules and routines

– the fruits of institutionalized learning – tend to inhibit what is termed ‘feed forward’ learning. A number of authors have reinforced this view, arguing that embeddedness is antithetical to some forms of learning. Thus, embeddedness is seen as encouraging adaptive rather than generative learning. Also, in the organizational psychology literature, behavioural routines are seen as leading to ‘mindlessness’ (Ashforth and Fried 1988)(Gersick and Hackman 1990). Likewise, Akgun et al. argue that ‘fixed routines can diminish chances of (project) success because the team cannot integrate new information....effectively.’ (Akgun et al. 2003)(p. 75).

However, despite this evidence that the organizational embeddedness of project work is important, there is little analysis of the different forms it may take, and the ways in which it may influence learning at both project and organizational levels. The need to address such embeddedness may have been neglected because many studies of project-based learning to date have, not surprisingly, focused attention on organizations whose mainstream activities are mostly or entirely project-based – as is the case in sectors such as engineering, construction, aerospace and parts of the media (Hobday 2000). Project-based organizations are seen, then, as a distinctive form of organization. Hobday (2000), for example, describes organizational forms in terms of their configuration, contrasting ‘pure’ project-based organization with a continuum of other structural designs, including functional and matrix forms. He takes the central defining feature of project-based forms as being the adoption of the project as the primary mechanism for focusing the main functions of the firm (Hobday 2000: 874). In project-based organizations the majority of work occurs within highly decentralised, loosely coupled project teams, operating with significant degrees of autonomy, and focusing on the completion of tasks and deliverables to predefined deadlines, sometimes working closely with clients. Project-based forms are associated with higher degrees of self-organization, albeit within certain parameters, and higher degrees of learning than would be found within more bureaucratic or market-based forms (Lindkvist, 2003).

Whilst there is a growing amount of work on project-based organization, there is also considerable debate about whether ‘pure’ forms of such organization exist and, if they do, whether they are sustainable. Both Zenger (2002) and Foss (Foss 2003) for example, argue that hybrid organizations are inherently unstable and tend to drift towards more internally coherent bureaucratic or market based forms. Organizations using cross-functional teams, for example, often continue to use hierarchically-based incentive systems and, so, drift towards more bureaucratic forms of control (Zenger, 2002; Barker, 1992). In contrast, Robertson and Swan (Robertson and Swan 2003) in their study of professional services, found that project-based forms of organization can continue to be sustained for significant periods of time, provided that incentive and monitoring systems support group work and that control is exerted through cultural and normative, rather than bureaucratic or market based, mechanisms. Yet, regardless of whether ideal or ‘pure’ types of project-based form exist, it is evident that many organizations that routinely deploy projects to complete tasks are not ‘pure’ project-based organizations. More typically, they will display some kind of internal ‘hybrid’ or matrix management

structure which combines project work with work organized around functional or divisional specialization, thus mixing elements of both market and hierarchical governance (Zenger, 2002). Within these matrix forms, some organizations (i.e. project-based) will privilege the project dimension whilst others will privilege the functional/divisional dimension (Lindkvist, 2005; Knight, 1977; Bresnen, 1990).

We do not seek, in this paper, to resolve this debate. However, it does alert us to the need for any study of project-based learning to address, not only the nature and characteristics of projects and work practices within projects, but also the form of organization in which project work is embedded. This aspect is missing from current work on project-based learning. More significantly, it is quite likely that there will be differences in the ability of organizations to learn from projects, depending on whether they are primarily project-based or not. For example, where projects are a secondary form of organizing to mainstream (e.g. functional) organizational practices, then it might be difficult to capture and transfer the knowledge and learning they produce, either because this is not seen as relevant, or because the mechanisms are not in place to capture and appropriate learning within the rest of the organization. However, the converse is also possible. Where projects are the dominant form of organization, project teams may enjoy significant autonomy which means they can easily become disconnected and uncoordinated, so not being able to benefit from the knowledge and learning produced within other projects (Hobday, 2000). Lindkvist (2005) for example argues that in order for project-based organizations to learn effectively, then there need to be mechanisms in place – which they refer to as ‘competence networks’ - linking learning at project level to the accumulation of learning and experience in the wider organization.

The discussion above, and the lack of existing evidence, suggests a need for exploratory research to examine the embeddedness of project-based learning in organizations with characteristically different forms. In this paper, we use Knight’s (1977) earlier classification of different models of matrix management which draws from Galbraith’s (Galbraith 1974) original work. This places organizational forms along a continuum that allows organizations to be compared according to the influence of projects (and project managers) in the organization. He describes three basic models, labelled as the ‘*co-ordination*’, ‘*overlay*’ and ‘*secondment*’ models which we can associate with different degree of embeddedness for project-based learning. In the co-ordination model, the functional dimension of the matrix structure dominates. Project staff are formally attached to, and work within, functional departments but procedures are used to ensure cross-departmental collaboration. In the overlay model, reporting and control relationships are balanced across the project and functional departments (akin to the ‘classic’ grid form of matrix). Finally, in the secondment model, the functional influence over projects is limited to a ‘support’ role – providing, for example, the ‘home base’ for staff moving between projects (Bresnen, 1990).

By addressing these different organizational contexts in the following analysis of our empirical data, we aim to contribute to the debate on project-based learning by identifying the different forms of embeddedness which may influence such learning.

METHODS

The empirical study was an exploratory qualitative investigation of project-based learning across different kinds of organizational setting. As Edmondson (2002) notes “qualitative research is a useful methodology for investigating phenomena that are not well understood” (p. 131). The aim of this kind of exploratory study is not to test predefined hypotheses, but, rather, to look for patterns in the data that might shed light on the phenomena of interest. Since we were interested in the dynamics of learning, the study incorporated a longitudinal study of project-based learning in different kinds of organizational setting.

Research setting

The empirical study was an investigation of 2 specific projects in each of 6 organizations (in one company data were collected from three). The organizations in the sample, and the choice of projects, were selected to maximise the comparative advantage afforded by variance around certain similar features (Eisenhardt 1989). Thus, the organizations in the sample were similar in key respects but, at the same time, they varied significantly in terms of the key issues of concern here, notably their projects and project practices, and organizational form. Therefore they provide useful contrasting poles to anchor an analysis of project-based learning (Pettigrew, 1985).

The 6 organizations selected for the study are summarized in Table 1, together with the focal projects in each. Organizations were similar in that: each had been in operation for at least 30 years; each was large in terms of numbers of employees (minimum 1300) and annual revenue or sales (greater than £900 million); each was a major subsidiary of an international organization (with the exception of the NHS Trust which was a national subsidiary); each had some form of matrix management which deployed projects alongside functional and divisional specialization; and each had a regional headquarters that had identified learning from projects as a significant organizational issue (hence their agreement to participate in our study) but had not formally developed an organization-wide ‘Knowledge Management’ or ‘Organizational Learning’ strategy. There were also major differences between these organizations, designed to provide variation across project practices and contexts. Thus 3 were private and 3 were publically owned and each operated across different sectors (construction, utilities, automotive, biosciences, health, services). More importantly, they represented organizational forms that varied in terms of the dominance of project work, operating to either a *coordination model* (NHS Trust and Mailco), an *overlay model* (Autcoco and Bioco) or a *secondment model* (Waterco and Constructco) (Knights, 1977; Bresnen 1990).

Projects were selected for similarities and differences, in so far as possible following guidelines for theoretical sampling (Glaser and Strauss, 1967). The point of access in each company was management at the Regional Headquarters who indicated specific projects for our study, based on guidelines set by the research team. Since we were interested in project-based learning issues that might have broad applicability to the organizations concerned, we asked each organization to provide us with 'typical' projects but where they also felt there were some opportunities for learning and where the project brought together representation across different functions in the organization². Given variation in the major work being carried out across organizations in different sectors, this naturally resulted in projects of differing duration ranging from 6 months (e.g. in the case of small scale construction projects) to 6 years (e.g. in the case of automotive product development and major capital investment projects), with the average being around 18 months. All projects had a formally appointed project manager, an approved project plan, and allocated resources and comprised individuals with different functional 'homes' within the organization. However, we recognized the difficulties in comparing projects at different phases of their life cycle (Leonard-Barton, 1990), and so requested projects that were around mid-cycle in terms of their own projected plan. Projects differed in terms of scale and complexity with some being repeats, or modified repeats of earlier similar projects, and others being novel innovation projects. This was to allow us to look for patterns relating project task characteristics (i.e. heterogeneity, causal, ambiguity, and frequency – Zollo and Winter, 2002; and autonomy – Lindkvist, 2005) to project-based learning. However, it also meant there were differences in terms of how projects were organized (e.g. the subdivision of tasks, the dispersion of members, the degree of interdependence between tasks and the involvement in the project design and planning of external organizations). Although this means that the effects on project-based learning arising from project organization may be confounded with those arising from differences in organizational form, we attempted to tease out these differences by, first, selecting 2 projects in each organization, and, second, selecting projects that involved multiple (more than 3) organizational functions.

Data sources

Data sources included semi-structured interviews, project documentation, some on-site observation of project work, and focused workshops involving regional and project managers in each organization with members of our research team. Triangulation of sources is important for exploratory research as it allows emerging issues to be explored from different perspectives and provides opportunities for cross-checking emerging findings and concepts (Eisenhardt, 1989; Sole and Edmondson, 2002; Glaser and Strauss,

² In one case (Constructco), it became apparent that the project (Park Grange) offered very few opportunities for learning (it was a very simple, quick project by a team that had just finished an almost exact replica) and so asked for a third project. However, we have included all three since each does provide useful insights into project-based learning.

1967). Data were collected over an extended period involving a minimum of 2 separate visits to the organization over an 18-month period (or depending on the duration of the project). Whilst not longitudinal research in any classic sense (we could not follow projects over their entire lifecycle, for example), this longitudinal element was important in helping us to understand the processes involved in project-based learning, and in particular the dynamics between learning within and learning from projects (Pettigrew, 1990).

Interviews. The major source of data was semi-structured interviews aimed at better understand the ways in which learning was seen by project members to be occurring (or not) within and from projects. Interviewing was chosen because of aim of our study to be sensitive to the context in which learning and knowledge transfer is based (Argote, 1999; Szulanski, 1996). The limits to generalizability involving a relatively small set of cases are well documented. However, the value of the methodology lies in its ability to provide rich insights and directions for future inquiries. Interviews were held with project managers and various project team members, representing the different functions and stakeholders involved in focal projects. In some cases (e.g. Hip Clinic) it was relatively easy to identify a focal project team for interview. However, in others cases, project membership was extremely fluid, shifting, and sprawled across different locations. This meant that interviewees had to be identified through 'snowball sampling' as the project progressed, beginning with the project managers and working outwards to identify other relevant members. In all projects interviewees had different roles and responsibilities, and/or worked in different locations, thereby providing a broad perspective on project-based learning and cross-project knowledge transfer. In total, 147 interviews were carried out (with a minimum of 9 for each project). Interviews lasted, on average, one hour and fifteen minutes.

At each interview, the researcher gave a brief example of knowledge transfer to help the respondent understand the phenomenon of interest. Questions in the interview then followed pre-designed protocol. This was developed based on a detailed literature review of project based learning and on issues raised at a 'kick-off' workshop in which senior managers from each company discussed project-based learning issues. The interview protocol thus addressed: the development of the project plan and objectives; the timeline and progress of the project; the learning goals of the project as a whole and of individual project members; the learning felt to have been accomplished within the project by individuals and their teams; the mechanisms used to acquire knowledge for use within the project; the mechanisms deployed to share knowledge and learning within the project; the mechanisms deployed to capture and transfer knowledge and lessons learnt from projects (including experience accumulation, articulation and codification mechanisms) (Zollo and Winter, 2002), and the perceived effectiveness of these; examples of changes in behaviour and practices within the project that had occurred as a result of learning; and examples of any changes in organizational routines and practices that had occurred directly from learning at project level. The questioning

around behavioural examples, concrete stories, and specific outcomes, as well as perceptions and beliefs, is important in grounding insights about 'typical' learning behaviours in complex organizational contexts (Sole and Edmondson, 2002). Most interviewees had experience of working in other projects within the same organization and so were also able to comment on broader organizational and group norms around sharing knowledge and learning within and across projects, as well as on the extent to which the issues encountered in the focal project were typical of other projects in the organization.

Documentation, observation and workshops. Project documentation (both electronic and hard copy) was collected for each project, where possible. These data included project archives, project development plans, process charts and time schedules, minutes and actions from project meetings, risk assessment reports, examples of laboratory notes, project review reports and 'lessons learnt'. These documents were complemented by a limited amount of on-site observation of project working when the research sites were visited (with the researcher typically spending at 2 to 3 days on site in each visit). Data collection also entailed 3 separate focused one-day workshops (at 3 months, 12 months and 22 months into our project) involving our research team and 2 representatives of each of principle organizations and projects involved (typically including the project manager). These workshops provided important opportunities to present, test and verify our interpretation of findings as they emerged. They were also important forums for collecting more data through informal discussion, and for identifying other potential interviewees and further access points.

Data analysis

As is typical in inductive studies, data analysis was an iterative process in which the data was constantly revisited and progressively refined (Eisenhardt, 1989). The earlier stages provided preliminary analysis to guide later stages (Sole and Edmondson, 2002). To aid in data consistency, the interview data was initially coded based on a coding scheme developed by the research team using NVivo. Data coding involved the research team searching the data for regularities and patterns and then recording these key words and phrases to represent topics or themes which became the categories for further study (Bogdan & Biklen, 1992). Within each category, if inconsistencies occurred among the data that was collected, third party sources were consulted for clarification. Triangulation across the different sources of primary and archival data revealed a high level of data consistency. On completion, each case study was re-analyzed to develop the conceptual insights presented here. While there were no hypotheses a-priori, patterns emerged from the data reflecting the major mechanisms influencing project-based learning and the interplay between learning within and from projects.

Given limitations of space, in the analysis that follows we do not provide detailed accounts of each project but instead select examples of activities and that provide us

with the clearest example of the particular issue or the most contrast. This approach has been used by others to good effect (Wastell, 1999; Orlikowski, 1993).

DISCUSSION

It was clear from our study that project work generated much learning amongst project participants. This seems related in part to some of the characteristics of project work. Such work, as compared to routine organizational tasks, is more temporally bound. Whereas organizational tasks (e.g. decision making, administrative tasks, and operational routines) are relatively open-ended and continuous, the project work in our study was both time-pressured and time-paced (Lindkvist et al, 1998). Even where projects were relatively long in duration (as, for example, with the automotive design project), they typically comprised multiple phased subprojects or 'gateways', each with their own time-driven goals, milestones and deadlines. This had significant implications for learning. The emphasis on milestones and deadlines triggered constant dialogue and compromise among project members between what is sufficient – or 'good enough' – and what is optimal to achieve performance. Deadlines, therefore, induced learning within projects by encouraging individuals, faced with non-negotiable goals, to rethink problems and perform quick 'mean-ends' analyses before acting (Lindkvist et al., 1998; Gersick, 1995). As Lindkvist et al. put it "metaphorically speaking, a deadline generates recurrent glimpses of light, like the lighthouse, breaking darkness and making more global concerns visible" (p. 947). The learning within the projects therefore sometimes involved 'corner cutting', compromise and limited learning, even while at other times it led to creative improvisation and significant learning.

However, while project work was undoubtedly a stimulus to learning, the analysis of our sample also indicates that the embeddedness of projects within their organizational context is an important influence both on the level and form of learning that is achieved within the project and the extent of learning that is transferred across projects. To develop this point further, we begin by discussing the relative success of the different learning mechanisms deployed within our sample. As outlined in Table 1, there were significant variations in the extent to which our case organizations deployed formalised project management, project information management and project review systems. A significant finding here is the extent to which the deployment of different learning mechanisms was itself embedded within the organizational context. Thus, we find that secondment (project-based) and overlay type (matrix) organizations used formal project management and information mechanisms routinely, as compared with co-ordination (functionally –based) organizations which had few if any of such mechanisms in place. Conversely, both the co-ordination organizational contexts had a specialized unit whose role was to support project work – the transformation unit in NHS Trust and an internal KM consultancy unit in Mailco. Having this type of unit was unique to these functionally structured organizations. It seems to reflect the dominant organizing principle in such contexts – adding a specialized unit or function when a new problem, i.e. the lack of support for cross-functional project work, is recognized. Others have

suggested that this logic of organizing is common in this type of context. For example, functionally organized firms added quality functions or units in response to external pressures to improve quality (Bolwijn and Kumpe, 1990). In neither of our cases was this functional unit particularly helpful in supporting the cross-functional project work in the absence of strong involvement and commitment from the functions themselves. In the overlay and secondment contexts this type of dedicated unit was not present, and instead reliance was placed on company-wide project management tools and practices.

The use of information and project management tools seems to have increased the embeddedness of projects within the secondment and overlay contexts— essentially they provided a script which was to be followed to complete tasks in a set sequence. For example, in Constructco, the standard construction methodology was written down in what was described as ‘the bible’. Similarly, in Waterco, there was a formal project management methodology that could be followed when the project was ‘on plan’. The project management methodologies were slightly less developed in the overlay contexts and were very under-developed in the coordination type contexts.

The differing role and importance of these tools highlights a further important finding from the research. Although all projects hit obstacles at some point in their cycle, such problems seemed to be handled more effectively within secondment contexts – i.e. contexts where projects were more embedded. There are a number of possible explanations for this finding, but a key feature seems to have been the greater ability of these more embedded projects to improvise around established routines and practices. For example, in Constructco, there were typically problems on-site that had not been anticipated by the tender team, so that the site team had to find ways to deal with the problems, such as needing to build on contaminated ground. The fact that these unanticipated problems in the plans were a frequent occurrence meant that the site team was not really fazed by them - those involved had learnt how to ‘muddle through’.

In the overlay and especially the coordination contexts, problems seemed to present more of a challenge because such improvisational muddling through was more difficult. Sometimes, there were few or no established routines and practices to work with. For example, when the transfer of care project hit obstacles, rather than seeking to find ways to overcome these obstacles, those involved in the project did nothing to try and recover the situation so that the project simply drifted aimlessly for a period. It was possible for the project to drift in this way because there was limited formal commitment to project roles, which was not the case in the secondment context.

Thus, we find that the learning and accumulated experience which is embedded in organizational routines and practices may sometimes act as an enabler of improvisational learning. This finding is in line with previous studies (Feldman and Pentland 2003), which have suggested that organizational routines are not inflexible per se, highlighting the ability of actors to innovate around such routines. Brown and Eisenhardt (1995), for example, theorise that learned routines shape improvisation in new product development. Likewise, Miner et al. argue that ‘the result of prior learning,

organizational memory, shapes the skilful and fruitful improvisation of novel performances' (Miner et al. 2001)(p. 304).

This is not to say that the embeddedness of projects did not have a constraining effect on learning. Although it enabled improvisation, this form of learning is particularly difficult to articulate and codify. This seemed to have a paradoxical effect in our project sample. Project embeddedness tended to be greatest in secondment and overlay organizations, and as a result the latter tended to have more elaborate mechanisms in place to support a review of project-based learning. However, embeddedness was also associated with improvisational forms of learning which are more difficult to capture and codify, and arguably less useful even when captured. Thus, paradoxically, the greater efforts to codify experience seem to have correlated with the importance of less codifiable forms of learning. Certainly, in the secondment and overlay contexts, the majority of interviewees indicated that they did not carry out post-project reviews systematically. This restricted the capacity to collectively learn within the project team and greatly limited knowledge articulation and codification:

"They do do a formal handover but it is not given enough credence in my opinion. It is very low priority it is all about getting the job done and going on to the next one and not really learning lessons from where they have gone wrong in the past." (Senior QS in Constructco)

"The nature of a review usually is what has gone well, and what we have achieved. It tends not to focus on where the problems have been and the things that have not worked well and where things could be changed or done better or altered. There is some of that but I would say fairly little and probably fairly little of that actually gets documented in a formal way within a project process which is a shame I think" (Section Manager in Bioco).

Nor did they, in the secondment and overlap type contexts, use the KM databases that were in place to seek out knowledge from past projects that might be useful to them in the current project:

"I personally probably would not go searching endlessly because the K.M. system is fairly hard work to find everything you want on it there is a lot of information in there and it is not easy to find concrete detail. So it is not an easy tool to use and therefore you would generally probably not put too much effort in trying to find it" (Engineer, Waterco)

"If I need to find good information I would not go to the PARC [the KM system) system - that is the first place I would not go" (Senior Scientist); "Whether they actually look for them (on PARC) or not I would say is probably doubtful. Because there are so many documents on there that I think that even if it was documented I would be surprised if many if any people actually looked at them and read them" (Section Manager, Bioco).

Clearly, while formal mechanisms were in place in these two organizational contexts they were not perceived to be very effective for facilitating learning within the projects nor transfer between projects. The transfer of learning between projects, even in the secondment type of context was ad hoc and largely reliant on experience accumulation. There was little evidence that project reviews were undertaken, even where they were part of the formal methodology for the project, so that formal collective reflection and learning was largely absent. And secondly, even where lessons learned had been captured and stored on a KM database, these databases were rarely used.

The findings here thus suggest that knowledge articulation and codification as learning mechanisms may have limited value unless effectively linked to mechanisms of diffusion. They may also support an observation reported by Haas that knowledge gathering by project teams could be detrimental to project performance if it creates information overload (Haas 2006).

Although experience accumulation is, according to Zollo and Winter, the lowest level mechanism that supports learning, this was the primary mechanism described and valued by our project participants. Experience of working in cross-functional project contexts was particularly prized:

“The only best practice you have got is the best practice from the experience of the people that are there on site. And there is no way of tapping into what might be better practice from somebody else who is working on a different site” (D&B Coordinator, Constructco)

“There is a wealth of information as I have seen within the company, some very knowledgeable individuals that can answer issues almost immediately that have taken several other individuals who have not had the experience and the exposure many weeks to resolve. And I have actually seen that happen. When we have got the really key personnel at the right place at the right time discussing the appropriate problematic issues they have come up with a solution that has had a significant saving to the company by that individual being present” (Engineer, Waterco).

The reliance on experience accumulation over articulation or codification as a learning mechanism had important implications for the organizations in our sample. For one, it seemed to make project performance highly dependent on assembling individuals with the right forms and levels of experience. Some organizations – for example, Waterco – recognised this by ‘cherry-picking’ project members for particularly important or challenging projects. For another, it meant that knowledge was not readily transferred from one setting to another. For example, in the IT Bioco project, a problem arose because those involved had not sufficiently tested the software before rolling it out. Knowledge of the requirement for pre-implementation testing was available in the organization, but this did not percolate through to project members.

ANALYSING EMBEDDEDNESS

Based upon the coding and data analysis described previously, we identified three major sources of variance in the embeddedness of the projects in our sample: structural, cognitive and mission embeddedness. These different forms of embeddedness can be compared with Szulanski's three major sources of knowledge 'stickiness'; i.e. arduous relationships, absorptive capacity and causal ambiguity (Szulanski 1996).

Structural embeddedness

The structural embeddedness of project work denotes the extent to which it is influenced by or incorporated within the established roles, routines and communities of practice of the wider organization. As outlined in Table 1, such embeddedness was a feature of most of the projects in our sample, encompassing; the reproduction of established organizational practices and divisions of labour within projects and teams; the utilization of standard project management practices, and reliance on pre-existing organizational routines for governance and coordination. The extent of such embeddedness was linked to organizational form – i.e. projects in secondment organizations were more embedded than those in coordination-type firms. In Constructco, for example (a secondment organization), projects were typically divided between a specialist group located at regional headquarters who carried out initial tenders for the contract, and a multifunctional highly autonomous site team, co-located, who worked with a range of subcontractors, architects and engineers on the construction work. This is typical of the secondment model deployed in construction firms. In contrast, in Mailco (coordination type), the composition of the projects reflected the heavily functional structure of the firm, with the projects typically being divided amongst specialized sub-teams and loosely coordinated only through the project plan.

Cognitive embeddedness

If structural embeddedness defines a project's indebtedness to wider organizational roles and practices, cognitive embeddedness defines the extent to which project members are able to draw upon pre-existing skills and knowledge in carrying out their project tasks. High embeddedness denotes a situation in which, as described by Huber, 'all of the knowledge necessary is brought to the team in the minds of the members, or is embedded in other within-team repositories such as equipment or procedures.' (Huber 1999) (p. 71). Such embeddedness influences the scope and extent of project-based learning by providing ready-made solutions to the challenges experienced in the project.

Projects which are less cognitively embedded may be more likely to reflect on their practices and to seek new solutions to their challenges. Fiol (1994), for example, associates learning with a shift in the 'cognitive frames of reference' attached to a project. Fiol (1994) argues that 'organizational learning...involves the development of new and diverse interpretations of events and situations...also involves developing enough

consensus around those diverse interpretations for organized action to result' (Fiol 1994) (p. 403).

The ability to develop new interpretations within a project context has been linked to a variety of factors (Arthur et al. 2001). For example, the diversity of backgrounds, cultures and worldviews of project participants is seen by some writers as a stimulus to learning by reflection. Thus, the tensions between different backgrounds are seen to 'ignite processes of deeper mutual (self) understanding and reflection' (Grabher 2002a). Similarly, the time-bounded nature of project work is seen by some writers as conducive to the emergence of reflective practices – both because they avoid lock-ins into particular cognitive or aesthetic patterns (Grabher 2002b), and because they create a 'rationalistic break' which encourages reflection before action (Lindkvist et al. 1998).

However, diversity and time pressures also need to be linked to the embeddedness of project formations. We noted in some of our secondment organization projects, for example, that project membership was diverse in terms of functional skills but that little learning was generated, as these projects worked to a detailed project plan and conformed to a strict pre-defined division of labour.

In our sample, we found that cognitive embeddedness was greatest in the secondment and overlay contexts. Because organizations in these contexts typically worked with a functional or craft-based division of labour, such cognitive embeddedness supported the individual's accumulation of experience across different projects. However, as there was a high level of change in participants from one project to another, what was embedded in this way was primarily the specialized functional or craft experience of the individual. Only rarely did experience accumulation occur at the whole project level, and this was when project participants remained the same across projects. One example here was the Redby project at Waterco when the same team was engaged across two projects which posed challenging, but similar tasks. Similarly, in Constructco, there were a few examples of where they had kept a site team together so that accumulated experience and learning could be reused:

"Prologis actually wrote a very nice letter to our regional director saying that his team had done very well here and we would be very pleased to have them on the next phase" (Site Agent).

In the secondment contexts, cognitive embeddedness at least supported (and reflected) the accumulation of individual project experience. In the coordination contexts, however, projects lacked cognitive embeddedness and project tasks were fragmented and dispersed across multiple organizational units. In this context, there were few people available who had prior experience of working on cross-functional projects. Moreover, those involved in the project tended to have more allegiance to their functional department, than to the project. For example, in one of the Mailco projects, tasks were divided up on a very functional basis, and there was very little interaction between those involved in the different functions. This created major problems when

inevitable interdependencies were present, for example when there was a need to jointly negotiate with a client.

Mission embeddedness

As described previously, Zollo and Winter (2002) suggest that it is the nature of project tasks themselves (their frequency, heterogeneity, and causal ambiguity) which helps to explain the relative effectiveness of different learning mechanisms. The emphasis on task characteristics is supported by other writers. Hsiao et al., for instance, suggest that tasks involving 'linear complexity' and individualized work practices are most amenable to the codification of knowledge. In contrast, such codification is difficult where tasks involve 'interactive complexity' and require 'collective problem-solving practices embedded in a reciprocal mode of collaboration' (Hsiao et al. 2006).

However, as indicated in our previous discussion, the learning within and from projects may be less a question of the relative codifiability of the experience than the extent to which it is embedded within established practices and routines. In this respect, the forms of learning which take place (or fail to take place) may be explicable not so much in terms of whether a project is inherently novel or routine, but whether it is seen to be novel or routine in relation to established organizational practices. This brings into sharp relief the degree to which the mission of the project is 'framed' in terms of an established organizational repertoire (Whipp and Clark 1986), and how far that framing is embedded in the shared understandings of the project participants (Ivory and Vaughan 2008).

Mission embeddedness is particularly important for projects because the time-paced nature of project work emphasizes the tyranny of the prevailing 'definition of the situation'. Project members thus tend to operate to a 'logic of consequentiality' (i.e. which actions will produce the quickest acceptable outcomes) rather than a 'logic of appropriateness' (i.e. which actions will produce the optimal outcomes in the long term - Lindkvist, 2005). This has implications also for individual performance and identity. As Robertson et al (2003) put it, in project-based organizations, '*you are only as good as your last project*'.

Such embeddedness seems to explain why even those projects (typically within the secondment and overlay contexts) which had formal post-project learning mechanisms in place failed to contribute to them. As respondents indicated:

"We don't do it (end of project review). You can always criticize people for not doing those sort of things well enough because they are at the end of the projects and there is always something else you have to do which is more urgent"(Engineer, Waterco)

"Occasionally people will come by and they will ask for lessons learnt but when you are struggling with a lot of issues a high level workload and not a lot of resources to be honest lessons learnt get prioritised at the bottom of the list and if you do anything on lessons

learnt it is really only five or ten minutes worth of effort" (Vehicle Engineering Manager in Autoco)

Here, we note that the project is defined not as a learning entity but as a vehicle for delivering other outputs. As Edmondson puts it, the project has adopted a 'performance frame' not a 'learning frame' (Edmondson 2003a). In temporal terms, the mission of the project is defined not in relation to the organization's future but to deliverables in the present. This finding coincides with those studies which point to the contradictions between organizing in projects to meet short-term, task objectives and the longer-term adaptive requirement of organizational learning processes (Ekstedt et al. 1999). Similarly, some writers argue that increasing reliance on project work may be positive for individual learning but antithetical to the development of community and collective action which are central to organizational learning (Tempest and Starkey 2004). This helps us to understand why others have suggested that, far from being the vehicles of creativity they are presented as in the literature, projects can create barriers to change and innovation, by privileging short-term task performance over long-term knowledge accumulation (Gann and Salter 2000).

The forms of embeddedness described above provide a useful analytical framework for exploring the scope and extent of project-based learning. This is not to say that the categories described above are hard and fast in practice. Indeed, the existing literature provides numerous examples of the interplay between these different forms. At one extreme, we can identify projects whose work is entirely contained within and reproduces the practices of a particular community of practice. Here, the structural embeddedness of the project is closely associated with cognitive embeddedness. This kind of association is documented in a recent paper by Thompson who describes the development of project working within the 'E-Futures' sub-unit of a large multinational (Thompson 2005).

At the other extreme, we can identify more eclectic and freewheeling projects, where a lack of structural embeddedness correlates with low cognitive and mission embeddedness. Brown and Duguid for example, in describing one such group note how; ' . . . in getting the job done, the people involved ignored divisions of rank and role to forge a single group around their shared task, with overlapping knowledge, relatively blurred boundaries, and a common working identity.' (Brown and Duguid 2001) (p. 127). Clearly, this kind of project may provide an arena in which learning is associated with the emergence of a group affiliation and social motivation (Sense 2003). This may include a new repertoire of routines, words, tools, ways of doing things, stories, gestures, symbols, and actions which have become part of its practice (Wenger 1998).

Looking at these extremes alone, however, tends to reinforce a stylized view in which projects are either innovative or routine by their nature. In contrast, we have argued here that by focussing on their different degrees of organizational embeddedness - i.e.

not treating projects as isolated entities, or simply as teams – we may be able to get a better look at the factors which enable or inhibit project-based learning. An important illustration of this point which emerges from our study is the significance which some studies attach to autonomy as an enabler of learning and innovation in projects (McGrath 2001). Some writers see such autonomy as coming into conflict with wider organizational demands. Sydow et al., for example, argue that a ‘recurring dilemma..within project-based organizations is between the autonomy requirements of project participants and their embeddedness within organizational and interorganizational settings that demand integration of project activities within organization command and control routines...’ (Sydow et al. 2004) (p.1476).

But despite the significance attached to it, our own study found that the formal autonomy of projects – i.e. the extent to which they were self-managing within the parameters of their pre-defined goals – was not actually a predictor of learning and innovation. Some of the most ‘routine’ projects in our sample actually enjoyed high levels of autonomy in these terms – such autonomy being enabled by their embeddedness in established organizational routines and practices.

CONCLUSIONS

Emphasizing the organizational context for project work has a number of advantages. For one, it enables us to relate the learning which takes place within projects to other sources of learning in organizations. These include the individual learning of project participants, the group learning of the project team, the learning of wider communities of practice, and ultimately the organizational learning through which new practices and routines become part of the mainstream operations of the firm. In addition, locating projects within their organizational context also highlights the variety of roles which projects may play depending on the strategy and structure of the organization.

This focus on the organizational embeddedness of projects was important in explaining the limited ‘feedforward’ of learning from projects to the wider organization. As we found, much of what is learnt in a project, goes no further than the project itself, or at best, is transferred through individuals moving on to new projects or through personal networks. Our empirical material indicates that only occasionally does learning from projects lead to more institutionalized levels of organizational learning (Crossan et al., 1999). Thus, even though we agree with the idea that organizational learning arises from local, practice-based collective learning (Edmondson, 2002), project learning does not always (or even often) translate directly into organizational learning. This is because projects are distinct from more traditional, functionally-based teams. Unlike the learning that arises within more functionally oriented teams, which involve ongoing organizational tasks that are therefore automatically enhanced through this learning (Edmondson, 2002), project work is more typically discontinuous from organizational practice.

However, while much previous work has seen embeddedness as a constraint on project-based learning, our study has also highlighted its role as an enabler of learning in some instances. As we noted, the embeddedness of projects in secondment organizations provided a platform for improvisational forms of learning. Admittedly, such learning is difficult to articulate and codify, and thus primarily benefits the organization through the individual accumulation of experience rather than higher-level forms of learning. However, we also found that some projects which were less organizationally embedded encountered serious problems due to a lack of improvisational learning. This suggests that the problems of transferring the learning from projects due to their embeddedness need to be counterbalanced by a recognition that such embeddedness is sometimes a more effective means of exploiting knowledge.

TABLE 1: PROJECT CHARACTERISTICS AND OUTCOMES

Project	Project activity	Project embeddedness	Organizational learning mechanisms	Learning outcomes
<i>SECONDMENT ORGANIZATIONS</i>				
CONSTRUCT CO <i>- Thurk</i>	Logistics warehouse construction on contaminated land	Framed as a 'repeat project'. Emphasis on achieving standard project management practices.	Project mgmt & project information management tools. Project reviews & lessons learnt at project level.	Experience accumulation by individuals.
<i>- Railair</i>	Construction & redevelopment of international air/rail interchange station & public transport links	Framed as a challenging and prestigious project. Wide range of partners and stakeholders from outside the usual range.	KM database Regional Engineering Managers with limited KM roles	Experience accumulation by individuals linking to previous and future projects. Knowledge articulation limited to site itself – focussed on avoiding errors.
<i>- Park Grange</i>	Logistics warehouse construction	Framed as 'another shed' – highly routine project. Repeat project allowed same team to be employed.		Experience accumulation by individuals and team

				across projects.
WATERCO <i>- Redby</i>	Replacement of filter beds with construction of activated sludge treatment plant	Linked projects framed as highly challenging technically, and unique in scale. New governance arrangements developed with contractor. Continuity in project team.	Project mgmt & project information mgmt tools Project reviews & lessons learnt at project level & between project phases.	Experience accumulation by individuals and team. Knowledge articulation across projects.
<i>- Asbestos</i>	New water treatment process for removing asbestos	Initially framed as 'a mundane little project'. Lack of experience in this field. Multiple external partners involved - new procurement strategy facilitated integrated approach to project management.	KM database	Experience accumulation by individuals and groups within local sites or fields.
OVERLAY ORGANIZATIONS				
AUTOOCO <i>- Facelift</i>	Facelift of an existing vehicle	Project linked to a new collaborative programme with other firms. Framed as a unique challenge; 'making that up as we go'. Defined project team and established product development process.	Project mgmt tools for product development. Top management strategy to learn about processes used under former ownership.	Knowledge codification from previous projects linked to standardization drive by company. Emphasis on avoiding errors.
<i>- Generation</i>	New '3 rd generation'	Framed as technically challenging and an opportunity to learn from previous	Lessons learnt & project reviews -	Experience accumulation by

	vehicle	programme owner. Integrated project membership but multiple organizational owners and systems requiring unique solutions.	not used systematically. KM database	individuals, and from previous programmes. Knowledge articulation limited by intra-organizational boundaries.
BIOCO <i>- Platform</i>	New platform technology for chemical screening	Framed as a novel project – first to involve two different R&D groups. Integrated and co-located project team. Multiple collaborators outside firm. R&D focus in terms of scientific deliverables and limited application of project management techniques e.g. re time management, reviews	Project mgmt tools for product development. Just introducing project information mgmt systems. Project reviews at project level - rarely used.	Knowledge articulation limited primarily to scientific outputs. 'Required' project review not performed.
<i>- System</i>	Internal management information system for development projects/products	Further development of previous IT application, building on IT infrastructure but viewed as 'out on its own' by project members. Project members dispersed geographically and from different functional backgrounds. Led by an IT Project manager, but little project management discipline.	KM database	Experience accumulation by individuals.

<i>COORDINATION ORGANIZATIONS</i>				
NHS TRUST - Hip clinic	Process reengineering of paediatric hip dysplasia service	Defined as a 'transformation project' and facilitated by change management team. Range of medical specialisms involved. Leadership role by consultant. Little use of project management techniques.	No project/project information mgmt tools Transformation team but with focus on service delivery.	Experience accumulation. Knowledge articulation.
- Care Transfer	Integrated protocol for hospital discharge	Wide range of stakeholders across health and social services. No defined project membership. Project manager isolated. No project management discipline. High turnover amongst those involved.	No formal project reviews No KM database	Little or no learning. The project 'slipped off the agenda'.
MAILCO - Intercent	International Mail Centre design & construction	Not developed as an integrated project. Framed as a 'multi-strand' project. Little continuity in project membership. Tasks allocated by functional specialism. Affected by restructuring of the organization.	Former internal consultancy function with KM responsibility but now disbanded Formal project reviews	Formal knowledge codification through lessons learned but little re-use. Limited experience accumulation.
- Outsource	Strategic review of in-house services group & outsourcing	Framed as a unique and highly political project with strategic implications. No standard project mgt approach. Lack of experience within company. Project membership based on assemblage of disparate experts and external consultants. Multiple strands within project, little communication between them.	KM database	Knowledge articulation or codification by KM team of limited effectiveness. Limited accumulation of experience by individuals.

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