Innovation in Small Construction Firms

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Abstract
This paper provides an interim report on an eighteen month research project in the UK involving in-depth case and action research studies of seven small construction companies to understand the role and significance of innovation for them.

The work has so far resulted in a model of the factors relevant to innovation and a model of different levels of innovation linked to typical company-types and market conditions. The second phase of the project will involve action research and the plans for this will be outlined.

Introduction
The capacity and ability of construction firms to successfully innovate is viewed as central to enhancing the performance of both individual firms and the construction industry as a whole. Small to medium sized enterprises (SMEs) form a substantial proportion of the UK construction industry, with some ninety per cent of companies employing less than ten staff. Improvement in the innovation performance of SMEs is thus any important priority.

This paper presents interim results of a project focusing on innovation in small construction firms. The paper is structured as follows. First, the project aims will be outlined. Second, key results will be given. Finally, the focus of next phase of the project is set out.

Project aims and methodology
The eighteen month EPSRC/DETR funded ‘Innovation in Small Construction Companies’ project has three principal objectives:

• To clarify the meaning of innovation in small construction forms, in terms of
  o The motivation to innovate, and
  o The appropriateness to innovate
• To explain how small construction firms can effectively and efficiently create, manage and exploit appropriate innovation
• To deliver practice-based models, tools and techniques that support the creation of fertile environments for appropriate innovation; and

The collaborative project involves seven small construction firms, comprising three contractors and four professional service firms ranging from eleven to twenty-six staff.

Key results so far
What is appropriate innovation?
The project team debated the meaning of innovation and consensus was found to support the following definition¹:

“An innovation is the effective generation and implementation of a new idea which enhances overall organizational performance.”

This definition provided the project team with the necessary consistent focus to undertake and integrate case studies looking at innovation in each of the seven construction SMEs.

What are the key types of innovation?
The case study phase revealed three distinct types or levels of innovation: techno-structural, market and network. Key characteristics of these types are given in Table 1.

Table 1: A typology of innovation

<table>
<thead>
<tr>
<th>Type</th>
<th>Techno-structural</th>
<th>Market</th>
<th>Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation</td>
<td>Efficiency</td>
<td>Effectiveness</td>
<td></td>
</tr>
<tr>
<td>Impact (Complexity)</td>
<td>Low</td>
<td>Middling</td>
<td>High</td>
</tr>
<tr>
<td>Market Context</td>
<td>Competitive</td>
<td>Negotiable</td>
<td>Integrated</td>
</tr>
<tr>
<td>• External Business Structure</td>
<td>Short-term explicit contracts focussed on price</td>
<td>Short-term, negotiable contracts focussed on quality</td>
<td>Long-term contracts (formal and informal)</td>
</tr>
<tr>
<td>• Capabilities</td>
<td>Simple, industry-specific</td>
<td>Complex, adaptable industry-specific</td>
<td>Tacit, firm-specific</td>
</tr>
<tr>
<td>• Internal Business Structure</td>
<td>Closed hierarchy and close supervision</td>
<td>Flexible divisions, trust-based working relationships</td>
<td>Flat, open, and informal structures</td>
</tr>
<tr>
<td>• Strategy</td>
<td>Short-term, adaptive</td>
<td>Short- to medium term, differentiate</td>
<td>Longer-term, relationship-specific</td>
</tr>
<tr>
<td>Learning Context</td>
<td>Single-loop learning</td>
<td>Double-loop learning</td>
<td>Triple-loop learning</td>
</tr>
<tr>
<td>Examples</td>
<td>QS system</td>
<td>ROM card</td>
<td>Partnership</td>
</tr>
<tr>
<td></td>
<td>Mobile phone</td>
<td>Property development</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital Camera</td>
<td>Commercial redirection</td>
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</tbody>
</table>

The relationship between the different types of innovation is shown in Figure 1. The basic argument is that the higher the level of innovation (shown on the left hand side of the Figure), the greater the potential beneficial impact of innovation (shown in the middle portion of the Figure). The ability / opportunity to innovate at a higher level is seen as a function of firm and market constraints. This is illustrated on the right hand side of the model. The ability / opportunity of innovate at a higher level is diminished the greater the degree of firm and market constraints. For example, a SME competing on price alone in a low-margin sector will tend to be constrained to Level 1 innovation. More exceptionally that firm could move towards a less constrained market by investing in a Level 2 market innovations. However, a SME involved in a long-term partnering relationship is more able to pursue Level 3 innovation.
What are the key organizational factors influencing innovation?
The case studies identified key organizational elements relevant to innovation in SMEs, and are shown in Figure 2.

The rationale and operation of the model is as follows. A SME’s organizational processes and the abilities of its human resources form its core competencies, and thus form the basis of its competitiveness. The SME’s organizational structures allow for the specialization and co-ordination of tasks and work flows and are there central to the appropriate packaging and leverage of the firm’s capabilities; while the business strategy is provides the overall strategic focus which directs the evolution of the firms structures and competencies. The links between the four elements emphasise the complex, dynamic and systemic nature of the firm.

What is the process of innovation?
In small construction firms, the process of innovation was found to be fundamentally ‘organic’ (or cumulative) rather than systematic; usually reactive rather than proactive; often undertaken unconsciously; and usually co-incidental to a more pressing concern: the improvement of performance. Figure 3 illustrates a simple, generic model of the innovation process, based on the case study material.

Figure 3: Process of innovation

Innovation is triggered either by changes in the balance of external, market forces or by changes in the balance of internal forces. These changes typically include the threat of competition from rival firms, the emergence of new and unrealised market opportunities, changes in business philosophy, changes in management structure, improved capabilities, and cash flow problems. The process of innovation begins by identifying an idea and an action plan to solve the problem or realise the opportunity. Generation and implementation of an appropriate idea requires the resolution of various issues, and is assisted by the often-intuitive assessment of usually qualitative data on the performance of the innovation. The process varies in complexity according to its use and development of the firm’s existing resources, processes, skills, and structures. Once implemented the idea may contribute to changes in external and internal forces, which trigger further innovation.

Aim of next phase
The next phase of the research is action research, which is taking a specific innovation in each of the companies as the focus. The project researchers will be working closely with the SMEs to enhance their internal ability to better create, manage and exploit the innovation. A key objective of this phase is to develop appropriate performance management systems and indicators to monitor and evaluate the impact of the innovation.

Conclusion
The work has so far resulted in a definition of innovation, which has provided the integrating focus to develop both an organisational and a process model of innovation in SMEs and a model of different levels of innovation linked to typical company-types and market conditions.