

NETWORK OF CONSTRUCTION CREATIVITY CLUBS

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This paper presents the results of the activities of the Network of Construction Creativity Clubs (NCCC), which was a one year project funded by the Engineering and Physical Sciences Research Council (EPSRC) in the period January-December 2000. The NCCC was initiated by the Association of Researchers in Construction Management (ARCOM) as an academic/industry network for disseminating the innovations. A standard template was used to collate information on 80 innovations which were presented at the NCCC events across United Kingdom. An analysis of the collected information offers an insight into the environment which supports the innovations. The paper also presents the lessons learned about the conflicting interests in disseminating the innovations, and it provides an insight for the management and funding of similar projects in the future.

Key words: dissemination, innovation, networks

INTRODUCTION

Many national governments have adopted a proactive role in defining the goals and policies for sustainable development and innovation in different sectors of economic and social life. Concerning the construction industry, the United Kingdom government policy has been outlined in several documents such as 'Rethinking Construction' (DETR, 1998) and 'Building a Better Quality of Life: A Strategy for More Sustainable Construction' (DETR, 2000). Regarding innovations, the report 'Rethinking Construction' asserts that the project process can be radically improved by fostering innovative methodology. The innovations are categorized under the headings of product development, project implementation, partnering the supply chain and production of components.

Governments use a range of policy measures to support and promote innovations in the construction industry. Dissemination of knowledge on innovative practices in the UK construction industry should take place as a phase in the implementation of wider government policy in this sector. The UK's Foresight programme was first announced in the 1993 White paper "Realizing our Potential". Its aim is to identify opportunities in markets and technologies which will enhance the nation's prosperity and quality of life (DTI, 1997). Development of learning networks and creating a culture of innovation, were two of the panel recommendations aimed to sharpen the construction industry ability to respond to changing market conditions and improve its competitiveness (DTI, 1997).

The Construction Industry Research and Information Association (CIRIA) has produced a study which aims to identify the factors necessary for the implementation of learning networks (Holti and Whittle, 1998). The study identifies two main types of learning networks, broker (i.e. a network which represents its members collectively to customers, suppliers and other stakeholders) and thematic (i.e. a network which brings

its members together so that they can pursue some common agenda and learn directly from each other) (Holti and Whittle, 1998). The NCCC was created as a thematic network which brings together academic and construction industry practitioners, and promotes a culture of innovation.

In the last three decades governments in developed economies have been placing greater emphasis on measures to support small and medium size enterprises (SMEs) which are a potent vehicle for the creation of new jobs, for regional economic regeneration and for enhancing national rates of technological innovation (Rothwell, 1986). One of the NCCC objectives was to provide opportunities for SMEs to present their innovations to other industry members and academia.

NETWORK OBJECTIVES AND RESULTS

Four regionally based construction creativity clubs (CCCs) were established to serve as a focal point for construction sector innovation in each location:

The Southern CCC was led by the Department of Construction Management at the University of Reading, and the Department of Construction Management at the South Bank University.

The Midlands CCC was led by the School of Architecture at the University of Central England, the School of the Built Environment at Coventry University, and the School of Engineering and the Built Environment at the University of Wolverhampton.

The Northern CCC was led by the School of Construction at Sheffield Hallam University, the School of the Built Environment at Liverpool John Moores University, and the Department of Surveying at the University of Salford.

The North East and Scottish CCC was led by the Department of Building and Surveying at Glasgow Caledonian University, the Department of the Built Environment at the University of Northumbria, and the Department of Civil Engineering at Strathclyde University.

Each CCC relied on regional industry and academic networks to identify the innovations and to encourage the participation of SMEs in putting forward examples of innovative practice from their areas of expertise. The NCCC offered an opportunity to innovators from the industry and academia to communicate their knowledge directly by presenting them at events. Each NCCC event usually had a main theme which encapsulated the common link in the presentations. The selection of themes offered the possibility of including topics which are dominant in the construction industry today. Questions and discussions between the presenters and the professionals from the SMEs participating at the event followed all presentations. The events have been an opportunity for networking, and this has been further supported through the NCCC web site by publishing contact addresses of the companies and organizations who present their innovations (www.ce.strath.ac.uk/nccc).

The regional CCC's organized up to 6 meetings over a 12-month period. By the end of December 2000 the clubs have organized 23 events with the participation of 80 presenters. Summaries or complete presentations were also published on the NCCC web site. A standard template was used to collate information on innovative companies/organizations and their innovations. The majority of innovations will be published in a book.

The individuals drawn to the NCCC meetings were typically enthusiastic professionals, from all areas of the construction sector. Following on from this, the structure of meetings and events was informal so that connections were made, innovations and ideas shared, developed and improved upon. The benefits of these events include:

Providing opportunities for the discussion of innovations in business (e.g. a typical event showcases the innovation; evaluates the reasons for its success; and considers its relevance to participants and a wider construction sector application).

Providing opportunities for networking to take place e.g. to facilitate the flow of ideas from one area of business to another.

Providing a framework for cross fertilization of ideas.

To SMEs: Exposure to different innovations and being part of a growing culture of innovation in the industry and an opportunity to 'partner' innovations together.

To individuals: Exposure to innovators, seeing how they work, what motivates them etc. This benefit is expected to be transdisciplinary in that the CCC's are open to a wide range of disciplines connected to the built environment.

To academic partners: Exposure to innovative companies and individuals who welcome ideas drawn from research. The academic partners also benefit by being exposed to research and innovation mechanisms being used in other higher education institutions.

Audience levels were approximately 20 SME representatives per meeting. The network as a whole attracted over 500 business participants, and exposed them to innovation and shared ideas, that may improve the performance of their companies. A newsletter has been produced to profile events and innovations. The NCCC web site offers a complete listing of 80 innovations, companies and academics who presented them, and a summary of the presentations which have been made available so far.

NCCC events have been a forum for sharing information on innovations between academia (31% of presenters), industry (61%), professional organizations (3%) and government initiatives (5%). Architects, engineers and consultants (18%), and contractors (18%) formed the largest group of presenters from the industry. However, many other sectors of the construction industry and related professional areas were interested in presenting their innovations as well, e.g. developers, material suppliers, public investors (NHS), building services, manufacturers, software developers, accountants, insurance, research institutions. EU and UK professional organizations, and UK government initiative for support and dissemination of innovations (M⁴I) have presented their programmes which support innovations.

BACKGROUND AND PROFILE OF INNOVATIONS

An analysis of the types of innovations presented at the NCCC events shows that improvements are taking place not only in the construction industry, but in the areas related to this sector (e.g. insurance, marketing) as well. The highest number of presentations was about environmental impact management (8 presentations), procurement (7), and contracting and partnering (7). Sustainable technologies, safety and risk management, construction process, and financial management were topics of four presentations in each area. Three presentations covered each of the following topics: training, team-working, energy efficient design, innovation in SMEs, general

case studies of innovations, liability legislation and insurance, government initiatives for improvements to the construction industry, and IT in information strategy plan. Product standardization, product innovation, innovative housing, and virtual reality were topics of two presentations in each area. One presentation covered each of the following topics: feedback on innovations, social issues, marketing, developing opportunities, design and productivity, asset management, performance measurement, quality control, virtual organizations, and IT in estimating.

Competitive advantage is being sought in addressing issues of sustainable construction through building design, construction process and building management. The efforts in improving the efficiency of the industry focus on new types of procurement, contracting and partnering, the application of IT, and training with regard to new technologies and team-working. The variety of other presented topics illustrates the development of innovative approaches and solutions in all areas of the construction industry and related fields.

The complete information has been collected on 35 of 80 presentations. The analysis shows that the ownership of the companies/organizations presenting their innovations was as follows: 48% are privately owned, 29% come from public sector, 11% are part of corporation, 6% are Plc, and 6% could not be classified in these categories (Figure 1). The figures on financial turnover of the companies/organizations presenting their innovations could not be completely provided because 9% of them withheld the information as confidential, and further 31% of organizations belong to public sector (universities, NHS) (Figure 2). Among those who provided the information 11% had a turnover of less than £150,000, 3% between £150,000 and £500,000, 11% between £500,000 and £1 M, 36% over 1 M, and 28% of them are public organizations (academic, NHS) whose financial turnover was not provided.

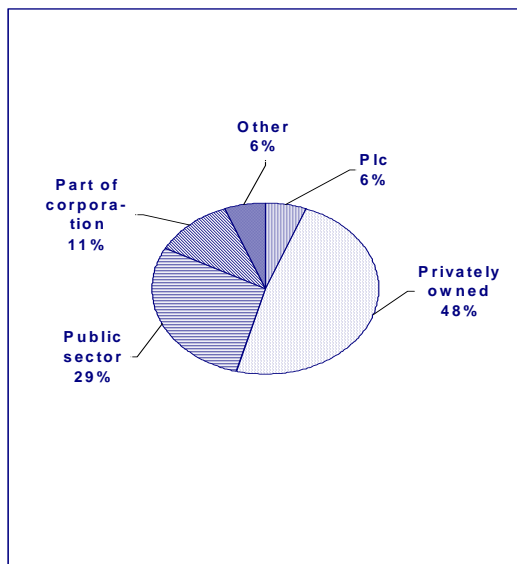


Figure 1: Innovation ownership

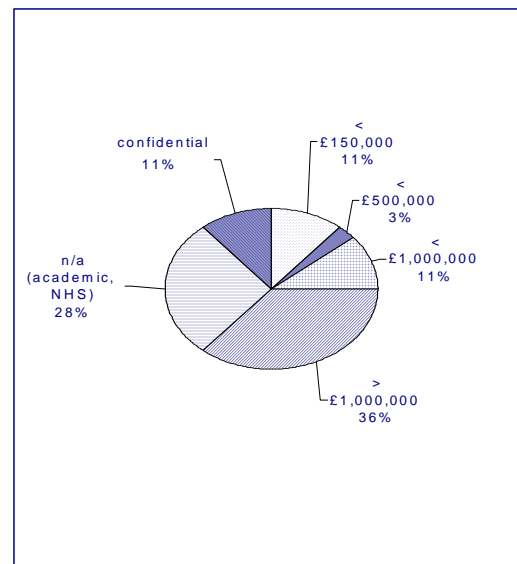


Figure 2: Financial turnover

Among the 35 companies, 19% have less than 10 employees, 8% have between 10 and 50 employees, 8% between 50 and 100 employees, 8% between 100 and 250 employees, 6% between 250 and 1,000 employees, 29% over 1,000 employees and 22% not provided this information (Figure 3). The readiness of small and medium size

companies to develop and promote their innovations shows the importance placed on innovative approaches in order to achieve competitive advantage.

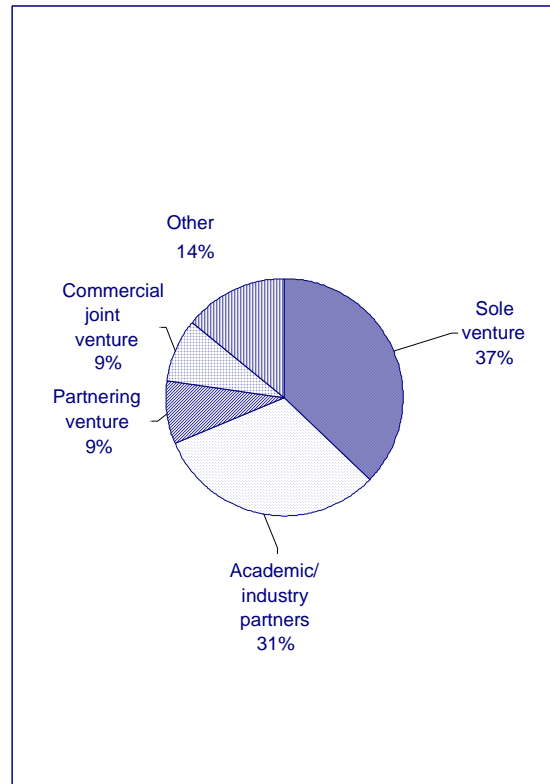
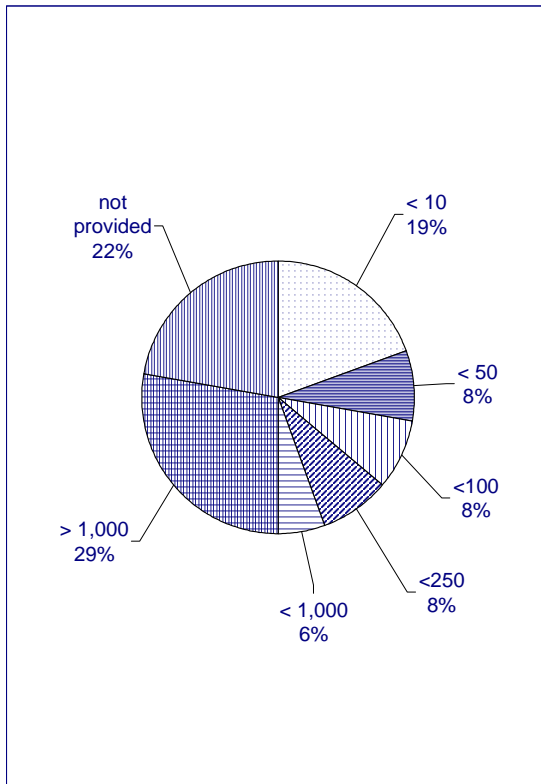


Figure 3: Number of employees

Figure 4: Partnership mechanism

Partnering in developing innovations features in 17 of the 35 companies who provided this information. Number of partners varies from 1 to 14, and in one case there are over 150 partners. In 37% companies/organizations the innovation was undertaken as a sole venture; 31% formed academic/industry partnerships; 9% joined in partnering ventures; 9% opted for commercial joint ventures; and 14% formed other partnership relationships (e.g. non-commercial public-private partnership) or partnering could not be formally defined (e.g. government initiatives) (Figure 4).

Lead companies provided 100% of funding in 17 out of 35 companies/organizations. The innovators identified the origin of innovations as one or more of the following: needs of the site, needs of business, needs of industry, needs of client, needs of market, research initiative, competition (e.g. for sustainable housing), and personal beliefs/ideas on business operation. Although the innovators were asked to put the origins of innovations in order of importance (e.g. 1 for most important, 2 to second in importance, etc.), some of them have assessed that the origin of innovation can be equally attributed to all or a few of them as the most important cause (Figure 5). The needs of client were the most important origin of innovation, followed by the needs of the industry, needs of business, research initiative, needs of market, needs of site, or a combination of several of these needs. Design competition (put forward by the client) and “somebody’s idea” have also been mentioned as the most important origin of innovation.

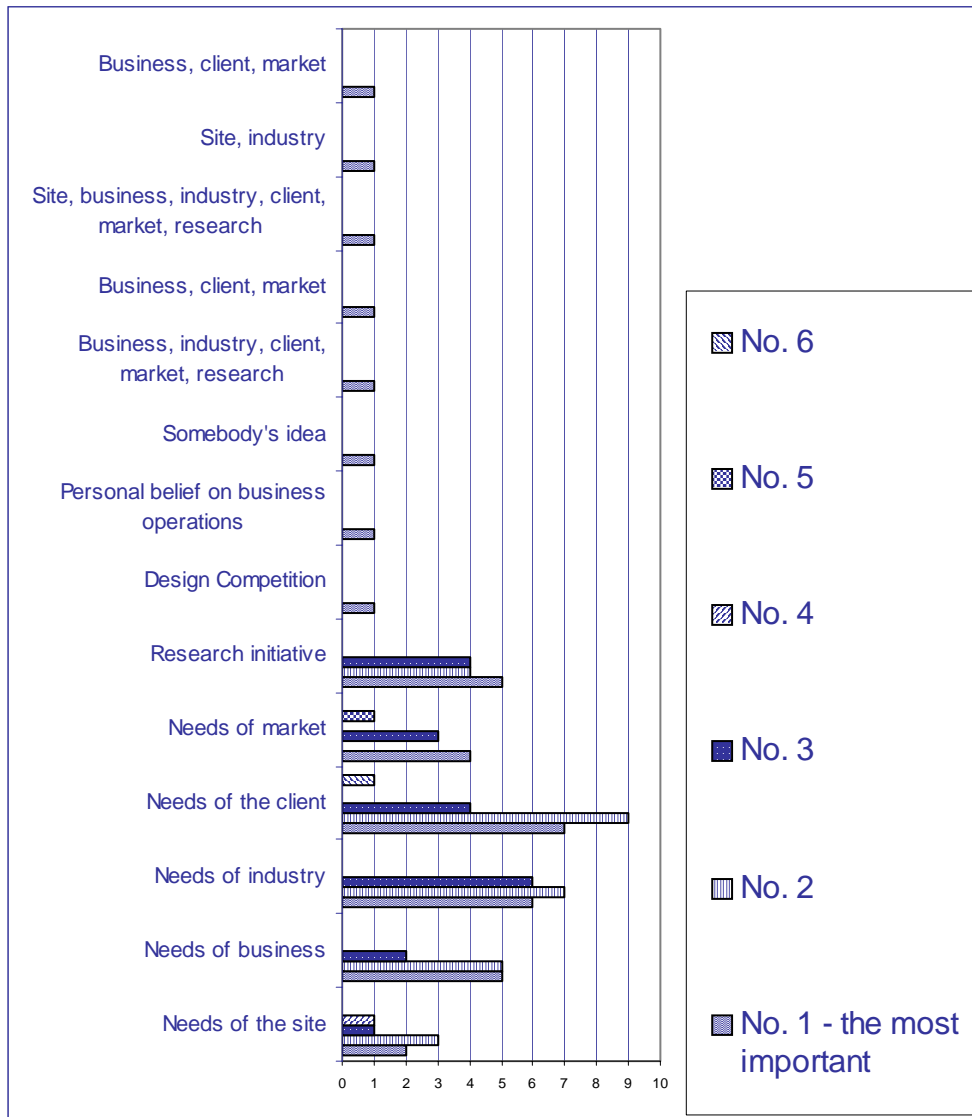


Figure 5: . Origin of innovations

The main drivers of innovations (Figure 6) were identified as follows: client requirements, followed by enhancing competitiveness, internal efficiency, embracing IT, university research, sustainability of construction industry, government policy, combination of these factors, or personal interest and research. Innovators perceive that the following groups will benefit from their innovations (in order of importance): clients, the wider industry, the innovative company, partnership organizations, subcontractors, the company’s workforce, all stakeholders, local community, and users (e.g. tenants).

Among 35 companies who provided the information, 68% declared that their innovations are not subject to patent. When asked if they encountered any difficulties in the conception, development and implementation of the innovation, 26% of innovators said that there were no difficulties, and others listed various difficulties caused by the type of invention, regulatory, technical, financial, or human factors.

With regard to the dissemination of innovations, 57% of companies have a dissemination structure in place (21% in the lead company, 16% within the

partnership, 8% for subcontractors, 18% for clients, 21% for wider industry and 16% for other groups).

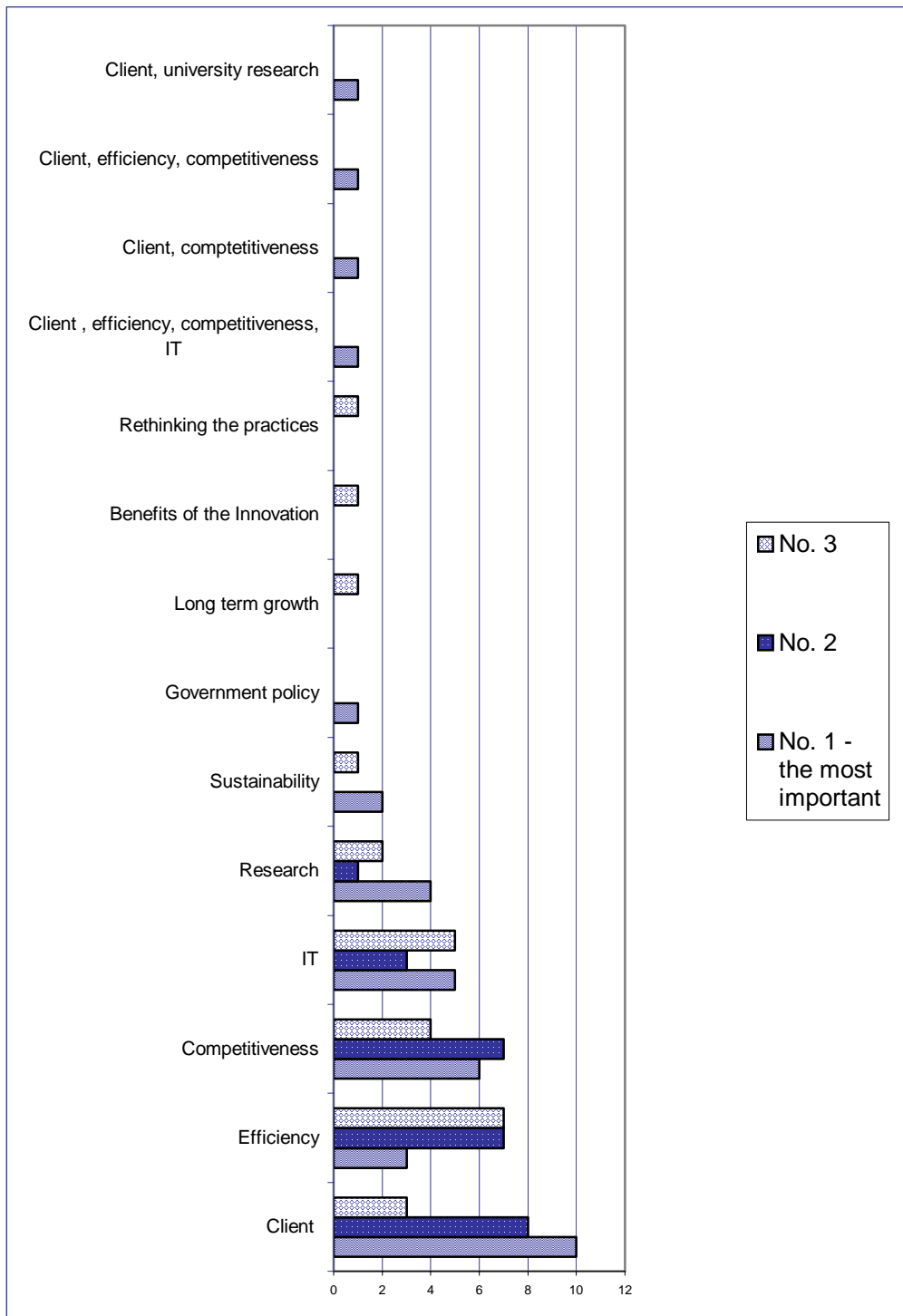


Figure 6: Drivers of innovation

The reasons for not having a dissemination structure were identified as one of the following: lack of funding (6%), no active policy (11%), because the innovation is not transferable (12%), because the innovation is specific to the business (23%), because normal sales channels are being used (12%), because industry ignores the experience of other countries (6%), because it is not appropriate (6%), and because the innovation is perceived as a competitive advantage (12%). The innovations are assessed

transferable to clients (21%), partners (11%), subcontractors (15%), wider construction industry (27%), other sectors (19%) and other groups (5%).

LESSONS LEARNED ABOUT A NETWORK MANAGEMENT

Dynamism of the whole process of identifying the innovations which could be presented, and of organizing the events did not leave enough time for completing the questionnaires about the innovative companies/organizations and their innovations ahead of the events. However, this should be a requirement in organizing future similar events. This approach will guarantee that the information needed for research is collected and that it is comprehensive in order to enable an analysis of the background and environment of innovations. The importance of such research is in providing feedback which can influence cultural change towards support of innovations and improvements in the construction industry.

Most of the presenters provided the material for publishing on the NCCC web site in Power Point format. Although a general idea about the innovations can be understood in this way, there are several disadvantages in providing only Power Point presentations for publishing on a web site, and they are as follows:

Downloading time of Power Point presentations is significantly longer than of conventional web pages. Web site visitors are not attracted by this feature.

Power Point presentations tend to offer fragments of statements or sentences. This manner of communication is acceptable at live events when presenters complement Power Point presentations with comments. However, the comments are not provided along with the web site Power Point presentation, and the understanding of the presented material is more difficult.

The advice would be to require from presenters a summary of their presentation in a similar way as it would be for a book. A template web page with titles (e.g. challenges, innovative approach and solutions, implementation, benefits, and future development; contact names and addresses) and space for selected illustrations could be prepared ahead of the presentation.

The advantages of using live events, web site and book about innovations as an additional and far reaching dissemination route should be emphasized in the communication with companies/organizations. In order to contribute to the cultural change which will support innovations and their dissemination in the construction industry, the innovative companies must be informed about the importance of research in innovations. Their contribution to this research is in providing the necessary information, and thus enabling the researchers to give feedback on background and environment of innovations. Without this feedback, a comprehensive picture about supporting and managing the innovations will not be available to wider industry. Without such an understanding, innovations in the construction industry will remain more or less sporadic and accidental, and the industry as a whole might be less competitive in the global market.

CONCLUSIONS

The completed innovation pro-formas were obtained for 35 innovations. Key points of the analysed information can be summarized as follows:

Presenters at the NCCC events were from industry (61%), academia (31%), professional organizations (3%) and government initiatives (5%).

The highest number of presentations was about environmental impact management (8 presentations), procurement (7), and contracting and partnering (7).

Among those who provided the information on financial turnover, 11% had a turnover of less than £150,000; 3% between £150,000 and £500,000; 11% between £500,000 and £1m, 36% over 1 M. Further 28% belong to the public sector, and 11% withheld this information.

Regarding the number of employees, 22% of organizations did not provide this information, 43% have less than 250 employees, 6% less than 1000, and 29% more than 1000 employees.

Different types of partnering in developing innovations feature in 17 of the 35 companies who provided this information.

Lead companies provided 100% of funding in 17 companies, while 18 of them obtained funding from additional sources.

The needs of client were the most important origin and driver of innovation. Thus, the innovators perceive that the clients will be the main beneficiaries of innovations.

Among the companies who provided the information, 68% declared that their innovations are not subject to patent.

While 76% of companies encountered a range of difficulties in the conception, development and implementation of their innovations, 26% did not have any difficulties.

With regard to the dissemination of innovations, 57% of companies have a dissemination structure in place. The main reason for not having a dissemination structure was identified as 'the innovation being specific to the business' (23%).

The largest percentage of innovators (27%) consider their innovations to be transferable to a wider construction industry, clients (21%), other sectors (19%), subcontractors (15%), and other groups (5%).

The network and research achievements of the NCCC, despite the complexity of co-ordination of activities across 4 Regional CCCs, over a comparatively short time frame of 12 months, can be put down to a range of critical success factors, which include:

A well-developed proposal, corresponding project plan, and methodology for collection of information on innovations.

The enthusiasm and hard work of the National and Regional network co-ordinators.

The willing support of 'host and club' Universities within each Regional CCC, and the benefits generated from being able to plug into their industry networks.

The availability of support from other organizations such as the UK Network of Centres for the Built Environment.

Participation in a number of events by National Construction Initiatives such as the Construction Best Practice Programme and the Movement for Innovation.

The willingness of industry to present and showcase their innovations, and the interest shown by event attendees.

The availability of the EPSRC grant funding, which took away the commercial pressure to generate income to support activities. This allowed the Regional CCCs to focus on the implementation of the NCCC's aims and objectives, at the outset.

The downside to this success is that the NCCC's EPSRC grant funding came to an end, with it proving to be almost an impossible task to secure the minimum £50,000 per annum required to keep the concept going as a UK wide network. There are lessons here for funding bodies and industry, because such initiatives have immense and accessible value in providing learning environments and methods for knowledge exchange. The problem is that somebody has to be willing to foot the bill to sustain this value, through grant funding or sponsorship. This is particularly the case given the levying of sizeable user fees (e.g. hundreds of pounds), on the NCCC's smaller business participants, would serve to exclude them from similar networks in the future.

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