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SCHOOL OF THE BUILT ENVIRONMENT

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Foreword

Welcome to the 11th International Postgraduate Research Conference (IPGRC13), which is hosted by the School of the Built Environment, at the University of Salford Media City Campus. The school currently has over 250 postgraduate researchers engaging in Full Time, Part Time, Professional Doctorate, Split Site and on-line doctoral programmes, enjoying a vibrant and multicultural research environment with researchers from diverse backgrounds.

This conference creates a wonderful vehicle for researchers from Salford and other parts of the world, to share their research passion and outputs and network within a professional and friendly environment, with high profile academics and leaders within the built environment.

This year’s conference brings together participants from a broad range of UK universities, Ireland, Denmark, Brazil, Netherland, Russia, Egypt, Libya, Qatar, UAE, Saudi Arabia and Iraq. The conference received 214 abstracts, 125 papers submission, while 97 papers and 17 posters have been accepted under the following themes:

- Business, Economics and Finance
- Design and Urban Development
- ICT, Technology and Engineering
- People, Skills and Education
- Property and Project Management
- Sustainability and Environmental Systems

These themes bring to the surface the diverse nature of Built Environment research which contributes toward and challenges, timely issues facing the construction industry and stakeholders involved within academia and industry.

On behalf of School of the Built Environment, and the conference co-chairs & organisers, we wish you an enjoyable and fruitful experience and thank you and your sponsors for your attendance and for making this conference happen.

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Employee-Driven Innovation: A Brave New World in the Build Environment’s Project Organisations

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Abstract

The build environment are often characterised by the fact that product and process knowledge are closely related to, and irregular driven by, individual employees. Therefore, a methodological approach to involve employees in development is seen as an advantageous way to be more innovative. Employee-driven innovation (EDI) could be such a methodology to implicate the spoken and tacit knowledge of the employees that would strengthen the innovative capabilities of the project organisations. To investigate the theoretical field around EDI a literature study was conducted. The overall objective was to develop a theoretical framework based on the field of EDI and related methodologies. This research resulted in two main findings. First; identification of the overall themes of the EDI field of research. Second; definition of an overall framework of methodologies to conduct EDI in project organisations. Furthermore this research aims to derive a framework that is transferable to other types of organisations.

Keywords

Employee-driven innovation, Innovation management, Knowledge management, Literature review, Project organisations.

Introduction

The build environment is frequently challenged by the fragmented and project based structure, lowest-cost tender selection, prescriptive specifications and adversarial relationships. This often results in projects with cost and time overruns and consequently dissatisfied clients. This situation is also considered a main reason for the low level of innovation (Manley and McFallan, 2006)

Innovation is no longer only a task for specialists and R&D departments. According to de Sousa et al. (2012) more than 80 percentages of every innovation produced today are generated from smaller incremental innovations. Hence the main potential lies in the smaller innovative steps that often are driven by the creativity of the workforce, when existing products, processes or services are optimised or reinvented (Dorenbosch et al., 2005). Involvement of employees has been a research topic for some years, but it has never been formalised in terms of a theoretical or practical framework (Bakker and Demerouti, 2008). Innovation depends on a system that can process the initial idea from individual creativity through a group level which will
handle the variety of obstacles in adoption to dissemination and implementation of the idea (de Sousa et al., 2012).

In project lead organisations within the build environment the product and process knowledge are closely related to individual employees. This knowledge is often very difficult to identify, hence difficult to collect, share and utilise across the organisation. To succeed, a systematic framework or methodology such as EDI, which features tools for managing structure, culture and methods in project organisations, would be beneficial. EDI is not a well documented field of research in general innovation literature and is, therefore, often seen in a greater innovation context, in which it often is de-emphasised contrary to product and process innovation (Høyrup, 2010).

The main objective of this research is to answer the following research question (RQ):

*Which areas of the field of EDI and related methodologies should be integrated in a framework that can be adapted to fit project organisations in the build environment?*

The RQ was answered through a literature study. From the study a base of evidence was generated. This base called the A-list of articles was further reviewed and analysed to identify the overall themes of EDI and the related tools and methods. The development of the specific framework of tools and methods are out of the scope of this article.

**Method**

The literature study is structured in three phases. Firstly, the most significant keywords related to conducting EDI were identified. The keywords were selected based on prior experience obtained through research within the fields of construction management and innovation, and through discussions with research colleagues. The keywords identified were; employee, innovation, management, construction management, project organisation, management control systems.

Secondly, a systematic approach to identify and form a base of evidence was conducted. This phase was guided by the steps followed in Pittaway et al. (2004) and Levy and Ellis (2006). Through a citation database review, the following citation databases were chosen; *Web of Science, Business Source Premier, JSTOR* and *ABI ProQuest*. Search strings formed by combinations of keywords were applied to the aforementioned citation databases. This resulted in a list of 300 journal articles. The articles were divided according to their relevance:

- The A-list represents articles of high relevance and the full articles are included in the review and analysed (109 articles)
- The B-list represents articles of some relevance, but with more doubtful empirical data. (82 articles)
- The C-list represents articles with little relevance or articles that have a more conceptual approach or background of the topic. (109 articles)

The final selection of the A-list articles was conducted based on the following quality criteria; *theories robustness/state-of-the-art, the use of data, implementation potential, and potential transferability/ generalibility*. This step entailed that the articles in the A-list were separated in an A+ and an A list. The main reason was the large amount,
but also the process of ranking the articles gave this natural selection on the A list articles. The A+ list contained 46 articles and the A list 63.

Third phase was coding themes in the A+ list articles using the analytical program NVivo. NVivo was utilised to generate a general impression of the themes that emanated from the articles in the A+ list. The themes that emanated from the coding are illustrated in table 1.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Articles</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovative organisation</td>
<td>17</td>
<td>37</td>
</tr>
<tr>
<td>Innovation management</td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td>Knowledge management</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Employee motivation</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Human resource management (HRM)</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>46</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

**Methodological implications**

One methodological challenge was that the term innovation is quite ambiguous. Hence a clear definition must be applied. This research used the following definition on innovation:

“Innovation is the process of making changes, large and small, radical and incremental, to products, processes, and services that results in the introduction of something new for the organisation that adds value to customers and contribute to the knowledge store of the organisations.”: O'Sullivan and Dooley (2009, p. 5)

The keywords forming the basic search string, employee and innovation are often considered buzzword, which resulted in a large number of citations. Therefore, the selection criteria had to be very rigid to narrow down the number of citations to integrate in the A-list.

Another challenge was the limitation in the systematic approach, where some of the preferences in the search process are related to a preferred publishing discipline; books, journal articles, e.g. Thus through the attempt to narrow down the search, the contribution from some of research field e.g. sociology or architecture could be overlooked.

**Findings**

The articles were reviewed according to themes (cf. Table ) occurring from the NVivo analysis focusing on indentifying methodologies to form a framework for conduction EDI in relation to the RQ.

Innovative organisations

From the acknowledgement that individuals cannot drive an organisation towards innovation by themselves, this research emphasise an organisational culture formed by the sum of employees. Dobni (2008) define innovative organisations as:

- They are competitive innovators in that they continue to break through to the next level because they are constantly defining it.
They understand that the foundation of innovation is based on the sum of the employees; the way they act, do and think allow the organisation to be innovative.

They are rooted in a culture that is proactive and market driven, and the employees all feel and know, why they are on the top of the game.

They made decisions and changes in the past to become more innovative, that at the time required sacrifices but ones they benefit from today.

Innovative organisations are better in utilizing the internal resource to define, engage and pursue emergent opportunities.

Organisations, who decide to focus on innovation as a part of the culture and competitive advantage, have to be aware that it is a comprehensive process of change. Implementing innovative approaches just for the sake of innovation and branding can be damaging for organisations (de Sousa et al., 2012). By highlighting the importance of innovation and defining the innovative behaviour in an innovation strategy, an organisational culture can foster innovation (Hartmann, 2006).

When competing in a knowledge-based society innovative organisations are enhancing their competitiveness, contrary to those who are persistently holding on to old industry traditions. In organisations that emphasise innovation, shared leadership is needed because of the complex nature of this process, especially at group and organisational level (Carmeli et al., 2006). Ideation and brainstorm activities are often considered the easy part, since ideas and creativity often emanates from individuals. The challenging part of innovation is to develop and implement a system to turn creativity into a profitable business (de Sousa et al., 2012).

It would be obvious for organisations, who strive to be more innovative, to just employ more creative and talented employees. This could possible lead to a short-term increase in creativity. But to be sustainable creative talents need colleagues or partners with business knowledge to comment, sell, adopt and implement the ideas. Hence one of the most important assets for organisations, who are changing to be more innovative, are innovation or creative management that recognise and promote existing talents and their ideas (de Sousa et al., 2012). Commercialising ideas into corporate profit requires persistence and discipline, and the overall effectiveness depends on the top managements abilities to balance between corporate creativity and efficiency (Leavy, 2005).

A pitfall for innovative organisations is that they tend to focus too much on specific innovation practices and policies, and not enough on the organisation philosophies and values that are the foundation of the innovative culture. According to Leavy (2005), there are four organisational or climate-setting factors that are fundamental to innovative success:

- Placing people and ideas at the heart of the management philosophy
- Giving people room to grow, to try thing and learn from their mistakes.
- Building a strong sense of openness, trust and community across the organisation.
- Facilitating the internal mobility of talent

These four elements will support the generation of an organisational climate, where creativity and initiative can flourish, and talent and ideas circulate freely.
For an organisation to innovative it requires a balance between play and discipline, practice and process, creativity and efficiency. Hence the upper management must define the right balance on at least three levels; in the innovative process, between the primary functions in the organisation, and in their overall approach to corporate management (Leavy, 2005).

**Innovation Management**

Earlier studies on innovative behaviour have focused on incremental, process-related innovation at the shop-floor level of organisations. Innovative work behaviour has, therefore, merely been considered as extra-role behaviour that is not usually recognised by the formal reward systems of an organisation (Tuominen and Toivonen, 2011).

In research literature it is well documented that ideas are considered the raw material for innovation, hence the importance of generating an adequate number of ideas are significant (Adams et al., 2006). Innovation management abilities are related to project management. Managing innovation requires persons who commit themselves to a project or an idea, they have to be enthusiastic and motivated to support and promote. According to Mansfeld et al. (2010) innovation managers must possess the skills of the two roles champion and promoter. The champion support innovation through enthusiasm, confidence, persistence, and the managerial skills to assemble the right team. The promoter either; possess the technical knowledge to advance or further develop the ideas, possess the necessary hierarchical power to drive the project or apply the needed resources, or has the organisational network and influence to support the idea. Mansfeld et al. (2010) define these skills and different roles in the general management role as an innovator, the person or character that can push the innovation to succeed.

When managing innovative employees, Kleysen and Street (2001) have identified five dimensions of innovative behaviour that innovation management should support and encourage; opportunity exploration, generativity, formative investigations, championing, application. They all play an important part in making innovation a part of business as usual, representing the activities as implementing, modifying and routinising. A challenge in relation to encourage the employees to be creative is that the management must carefully distinguish between expected, encouraged and non-expected behaviours according to role and employment. But if the management is aware of the variety of innovative behaviour, the innovative processes would be more effective (Tuominen and Toivonen, 2011).

In high-risk design projects stage-gate models are often used as a management tool to control the development of the projects (Onarheim and Christensen, 2012). Adams et al. (2006) have elaborated a framework containing seven categories with different areas of innovation measurement. The areas are:

- **Input** measured by people, physical and financial resources, and tools.
- **Knowledge management** measured by ideation, knowledge repository, and information flows.
- **Innovation strategy** measured by strategic orientation, and strategic leadership.
- **Organisation and culture** measured by culture, and structure;
- **Portfolio management** measured by risk/return balance, and use of optimisation tools
• **Project management** measured by project efficiency, tools, communications, and collaboration
• **Commercialisation** measured by market research, market testing, and marketing and sales.

These categories and areas of measurement could be considered a balanced scorecard for innovation management, with a balanced set of KPI's that can provide an indication of an organisation’s readiness or ability to manage innovation (Adams et al., 2006).

Radical innovation projects and incremental innovation should be managed in different ways (Subramaniam and Youndt, 2005). Radical innovation requires more creative, out-of-the-box thinking, and more skilled employees to directly improve innovation performance. When implementing incremental innovation approaches human capital plays a less central role, but cannot be neglected due to the importance of information and knowledge sharing (Lee et al., 2011). The human capital are materialised in the employees knowledge. One of the most essential perspectives of EDI is the principle of involving internal and already paid resources with an existing knowledge on organisational domains (Onarheim and Christensen, 2012). To generate and maintain employee commitment and motivation requires suitable managerial actions. Some of the essential mechanisms to trigger such commitment and motivation are; communication, recognition and rewards, participation, and symbolism (Kesting and Ulhøi, 2010; Hartmann, 2006).

Idea evaluation and selection are crucial in innovation projects. One method related to EDI is voting schemes involving both decision-makers and employee participants (Onarheim and Christensen, 2012; Cousin, 1998). But one of the challenges in ideation and creative processes is that the creators of or contributors to an idea tend to hold their own contributions higher than other ideas. Hence the relation between the idea owner(s) and the decision-makers on which ideas should progress must be carefully considered (Onarheim and Christensen, 2012). On the other hand, employees could keep their ideas to themselves, if they anticipate that someone else will get the credit. When the employees contribute to the ideation and their idea is selected, it is essential that the management support the employees in championing their ideas and creating a no-blame culture (Tuominen and Toivonen, 2011; Manley and McFallan, 2006). de Sousa et al. (2012) emphasise that instead of measuring the profit related parameters, intangible measures as; employee or customers satisfaction, training in innovation tools, skills acquired, or the existence and use of a formal system of idea management, can be much more important as success parameters.

**Knowledge management**

Knowledge-sharing amongst the employees in an organisation is essential if the organisation strive for an innovative culture. Knowledge management (KM) is driven by people not technology, therefore elements such as social activities, culture, sharing and learning are keys to apply KM (*O'Dell and Hubert, 2011*).

KM is considered an integrated part of innovation in a model that could be defined in the three phenomena (Mireille and Wim, 2005):

• individual and social learning at the workplace (transforming existing information into knowledge),
• knowledge creation (creation of new knowledge), and
• innovation (transforming knowledge to added value)

Intellectual capital is one of the most essential types of knowledge resources used by learning organisations. Intellectual capital is more recently defined broadly in three central themes; human capital (employees knowledge), structural capital (organisational systems), and social capital (cultural and social structures) (Lee et al., 2011). KM involves the creation, sharing, validation, utilization, and management of tacit and explicit knowledge (Bonnie and Monica, 2007; Thite, 2004). One obstacle for knowledge-sharing is unwillingness to share knowledge that could be triggered, if the employees realises that knowledge is power, whereas some might withhold their knowledge to pursue personal interests (Bonnie and Monica, 2007).

One of the most important processes of knowledge-creating organisations is coding implicit and tacit knowledge into explicit knowledge, and transforming it into ideas that potentially could develop and optimise the organisation (Mireille and Wim, 2005). Through a case study Mireille and Wim (2005) found that three important aspects of a knowledge-creating organisation are:

• the role of the supervisors and managers
• knowledge sharing and reflective learning
• rotation of valuable employees

The challenge for the KM is managing the processes that ensures that the right knowledge, reach the right people, at the right time (O'Dell and Hubert, 2011). One pitfall when applying KM is to force a cultural change of the organisation in preparing for a KM program. If the employees are encouraged to focus actively on knowledge sharing and interdisciplinary collaboration, the organisational culture will often change as consequence of the employees’ new behaviour (O'Dell and Hubert, 2011). Three enablers in applying a KM program are; lead by an example, brand KM through communication, branding, recognition and rewards, and make KM amusing (O'Dell and Hubert, 2011).

**Employee motivation**

Understanding what makes knowledge employees motivated to innovate in organisations, has been a managerial issue for some time (Amar, 2004) As mentioned, innovation is no longer just a phenomenon for specialist and R&D employees. The employees possess the hands-on experience with the daily working processes. Hence they possess the knowledge to contribute to upgrading of working processes, optimising communication channels, the use of computers, and development of new product or services. Employees should be encouraged to innovate on a daily basis, as innovation must address the operational issues that arise all over the organisation, and are important to stay ahead of competitors (Cousin, 1998). Job satisfaction and motivation for the participants in development projects can be created through EDI, as they feel involved. Onarheim and Christensen (2012) did a survey after completing a EDI development project, where the participating employees emphasised the process as motivating, inspiring and exciting for the participant, with several request for using involvement of employees broadly in projects. Allowing for autonomous work stimulates employees to develop, refine, and test new ideas, as it entail a higher degree of responsibility in projects (Hartmann, 2006). An award scheme is an

Motivation of knowledge employees can also be accomplished by the presence of the right antecedents. Based on the assumption that employees find assignments exciting, they get motivated, according to Amar (2004) three motivation sources could be:

- job (job character)
- outcome (rewards, punishment)
- organisational system (policies, practices, culture)

Hence, if managers want to keep the employees motivated and excited, they can imply antecedents into these sources. Some of the antecedents are related to (de Sousa et al., 2012; Adams et al., 2006):

- employee autonomy
- available information and communication
- reward system
- education or training
- system of authority
- participation in decision-making
- team cohesion

**Human resource management**

The contribution and input to innovation are moving towards a broader range of employees. Dorenbosch et al. (2005) defines the phenomenon “On-the-job Innovation” or innovation work behaviour (IWB), where they emphasise the potential advantage in involving the general workforce. Innovative work behaviour is considered complex and are somewhat dependent on commitment-oriented HRM practices. IWB can be separated in four interrelated behavioural activities:

- problem recognition
- idea generation
- idea promotion
- idea realisation

The first two activities are related to creativity-oriented work behaviour and the final two are related to implementation-oriented work behaviour (Dorenbosch et al., 2005). The key elements of commitment-oriented HRM are to stimulate the desired employee behaviour and attitudes, by establishing psychological relations between organisational and employee objectives (Dorenbosch et al., 2005). Boselie et al. (2001) have developed a scale to measure to what extent a HRM system is high or low commitment-oriented. The scale measures the five aspects:

- employee participation
- wages
- training and development
- information sharing
- supervisor support
Through a larger survey Dorenbosch et al. (2005) investigated the perception on how job design and HRM can effect creativity and IWB. They found some indication on that employees who consider HRM as being commitment-oriented feel more ownership for work issues beyond their direct assignments, thus contributing in a higher degree to IWB. In relation to job design, the survey showed that more flexible job designs offer better conditions for IWB, as the flexible frames broaden the scope of work beyond the assignment directions. Flexible job designs creates more room for development and ideation, hence more creative freedom in the problem-solving and commitment to the employees’ own ideas.

Employee’s human capital and HR practices have a positive effect on innovation (De Winne and Sels, 2010). A combined strategy of valuing and managing human resources can significantly strengthen innovation performance. In their research De Winne and Sels (2010) further emphasise that good management of resources in general is important and should not be neglected. The strategy should simultaneously strive to attract and invest in highly skilled employees and implementation of an intensive HRM. (Manley and McFallan, 2006). From an economic point of view, investment in intensive and sophisticated HRM practices is only justified, if it is cost-effective in the long-term (De Winne and Sels, 2010).

Discussion and Conclusion

Through the systematic review on EDI, a sufficient base of evidence was identified to give an overview of the research topic. Through the themes indentified, the objective was to form a base of evidence for developing an overall theoretical framework, with each theme holding a number of tools and methods to conduct and implement an EDI process. When organisations begin implementing innovative processes it is important to initiate the following activities:

- Definition of an innovation strategy and the innovative behaviour that places people and ideas at the heart of the management philosophy, giving people room to grow to try things and learn from their mistakes and building openness and trust across the organisation.
- Finding antecedents to commit and motivate employees
- Defining the balance between play and discipline, creativity and efficiency
- Customisation and implementation of a system or structure to process ideas to sustainable solutions and profit
- Implementation of commitment-oriented HRM to create more ownership for work issues amongst the employees

The most important methodologies found in this research that should be adapted in a framework were, Innovation management, KM and HRM. Managing the innovation requires focus on motivation, communication, commitment, recognition and participation. Innovation management also concerns ensuring the involved employees contribute and not keep the ideas to themselves through rewards and recognitions to the owner of the idea. Followed by an evaluation and selection of ideas, where the suggested tool is voting schemes. It is important for the managers to reflect on the possibility that the various types of innovative behaviour can be integrated in several stages of an innovation process.
Ideation is based on the knowledge of the employees. The most essential type of knowledge resource is intellectual capital that broadly consists of human capital, structural capital and social capital. Managing knowledge is centred on coding implicit and tacit knowledge amongst the employees and facilitation of the processes that allow this knowledge to transform into ideas. Hence KM are to a great extend dependent on the managers ability to create explicit knowledge from the employees’ implicit knowledge. One of the most important skills of managing innovative group dynamics is to know when to leave organisation hierarchy out of the process, and when to bring it back again (Leavy, 2005). The leading challenge for innovative organisation is maintaining the balance between innovation and efficiency, as they grow and develop.

The findings in this research are considered as generic as they can be adapted to other types of organisations than project organisations. Future research should develop a specific framework of tools and methods that could be fitted into an innovation process model to control innovative projects and processes in the build environment’s project organisations. Further, areas of measurements can be an indicator on an organisation’s current and continuous development abilities to conduct and manage EDI.

References


