

Innovation in the Construction Industry



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Introduction to Innovation

Every innovation is a change but not every change is an innovation. It seems there is no clear definition of the concept of an innovation and in fact many different definitions are available. The following are some of the definitions occasionally given by experts:

- “Innovation is the process through which firms seek to acquire and build upon their distinctive technological competence, understood as the set of resources a firm processes and the way in which these are transformed by innovative capabilities” (Dodson and Bessant- 1996)
- “Innovation means the application of new knowledge to industry and includes new products, new processes and social and organisational change” (Firth and Mellor - 1999)
- The process of innovation is a rhythm of search, selection, exploration and synthesis, cycles of divergent thinking followed by convergent thinking. (CEM study pack).

However, the general concept is that something new, a product or process, is created and put to use. Understanding the client’s needs is most important in the business world, since the value of innovation in those industries depend on the actions of clients and are largely initiated by clients. Innovation can be defined as a future-directed activity and a mentally constructed shadow of future competition scenarios.

Innovation in General:

According to Weyrich, sustaining innovation in a business organisation requires an understanding of the company’s core competencies, an innovative corporate culture and a systematic approach. The process involves the innovation phase, the implementation phase and market penetration phase.

Successful business owners continually innovate with regard to internal systems and processes in order to create and sustain a source of competitive advantage. There are many industries which are not in a position to survive in the market without innovation. For instance, in computer technology, software developments improve more frequently with new innovations. The automobile industry, pharmaceuticals industry and electronic industry are more vulnerable. However, in many industries, there are some discoveries found by chance. The introduction of penicillin is a good example. In the construction industry, these discoveries are very rare. Most are based on hard work with proper management of knowledge and creativity

Innovation in the construction industry

In 1997, the British Property Federation’s survey of major UK construction clients showed that more than a third of clients were dissatisfied with the performance of professional construction service providers in co-ordinating teams, design and innovation, providing speedy and reliable service and providing value for money.

Often the construction industry sector is blamed for being over conservative and low in innovation. The long delivery time when compared to most of other industries seems to be the main reason for the industry being less innovative and creative. The clients need to see the final product on the target date or even before and most clients reluctant to pay extra money for any innovative activities. This hinders the possible innovative or creative thinking of the people involved. Many other industries allow time for their workers to indulge in innovation. For instant, 3M famously allows their development staff up to 15 percent of their working time to pursue “personal projects” that are not necessarily related to their work. The result is a stream of new products.

In the current scientific world, innovation in most businesses depends on the knowledge management of the organisations. This encourages many writers to focus on verity of theories to identify and manage tacit (gain through experience) knowledge, explicit (quantified and systematic) knowledge, etc. From the literature, it seems that most US and European companies have adopted knowledge management strategies and are actively using them to further their businesses. Following are comparisons of some of the sub-topic areas on which many industries have been focusing, to improve innovation and identification of where the construction industry stands.

Factors inhibiting innovation:

Focus on a firm's habitual activities and core capabilities is both advantageous and disadvantageous to a company. The requirement of breaking free of the past which inhibits innovation has been identified. The power of the present and experience needs to be used for improvement, instead of inhibiting organisations from developing dynamic problem solving techniques. The automobile industry in Japan is a good example. They always encourage their workforce in innovation and provide environments to implement all creative ideas. The survival of the software industry also largely depends on continuous innovative processes.

Unfortunately, it seems the employers of the construction industry have not been encouraging enough of innovation. Even though innovative thinkers are engaged in the construction process, most project environments inhibit this, mainly due to time and cost constraints.

Implementation and integration of innovation:

Integration of knowledge among many individuals including users and integrating users into the process of production is valuable in many industries. Some areas of the construction industry also practice this to some extent by involving the client's teams in the conceptual design process. However, during the detailed design process and construction process, this integration seems to be poor. Inability to recognise the final product and the cost of changes also contribute to this. For instant many housing development projects are developed based on designers' requirements or client's initial concept. Intermediate involvements of the users are minimal in general.

Creativity and innovation:

Mainly focused on the link between creativity and

innovation. Under this heading are identified the different levels of knowledge that organisations have which can be used for change-management and problem solving. It also focuses on the importance of identifying and codifying knowledge to help organisations become more creative and innovative. The knowledge management professionals in many industries now focus on this idea, with the software and automobile industries especially focused on these different levels of knowledge. They focus on innovations from all levels of those involved in the process and encourage them through reward systems, such as publishing their work in company magazines and the like.

In the construction industry these procedures are followed at the top range of the process. For instant the Architects, Engineers and similar others are rewarded for 'Best Design', etc. by professional bodies and government authorities. However, creativity at the other levels is mostly ignored. The foremen, site engineers and workers are not encouraged for innovation and creativity in many instances. Generally in construction projects the site crew is rarely authorised to use or propose different construction techniques or even slightly deviate from the design drawings. One reason for this is risking the responsibility of the design engineers with unauthorised changes. However, some companies, especially the ones from developed countries, identify the importance of these site-level innovations up to some extent.

Generally, the knowledge of the contractors and suppliers is not properly used at the design stage. They can support by providing ideas of easy constructability as well as on the usage of high quality and cost effective materials, construction techniques, etc.

Problem Solving:

Innovation and creativity in solving problems are essential for continuing project success which generates ideas in many ways from people both inside and outside the assigned teams. The involvement of the work force for problem solving is a good technique to encourage innovation and creativity since this forces them to store and retrieve the details of previous experiences to use as a base for the new problem solving approaches. The automobile industry, especially in Japan, seems to have been using this method on their way to success. Industries like tourism, air ticketing and sales and marketing widely use spontaneous problem solving methods and outcome

feedback to the management through a bottom-up information system.

In construction, we mostly see a top-down information system, which does not encourage innovation and creativity. The workers involvement or use of their comments based on practical problems are rarely incorporated into the design management process. However, with the advent of globalisation, the current trend seems to encourage this bottom-up information system. For instance, some hotel and residential development projects encourage new ideas based on customer comments mainly due to competition in the market environment.

Experimentation and innovation:

This is a widely used technique in many industries producing pharmaceutical and chemical products. The construction industry has not widely experimented on cost effective materials, different construction techniques and efficient usage of plant and labour. The flexibility of managers on constructive mistakes, support for experimentation and motivation of innovation can improve the employee's lateral thinking.

However, the issue related to the construction industry is the time and cost constraint due to the nature of the industry. Many clients are unwilling to accept additional costs or late completion of their projects for the sake of the development of the industry. I feel that it is the responsibility of professional institutes to implement these activities through their professionals without large damage to the clients. Model housing is a good example of experimentation in the industry.

Prototyping:

Is a very useful innovation of software products related to construction industry. It allows the facility to widen innovative thinking without any real construction and to get the feeling of how the real product appears. The method is very cheap and trials of different proposals incurs almost zero cost. However, many professionals in this part of the world (M.E.) are still not fully utilising this facility and are more comfortable with traditional methods in dealing with changes.

Systematic learning for innovation:

Many industries in the current competitive world focus on the systematic learning of previous experience for future use. The current professional education system

also encourages this by introducing many methods of proper record keeping such as the use of construction related database softwares. However, there is generally less focus on these matters especially during post contract administrations. However, some construction companies use these methods as guidance for the tendering exercises.

Organisational learning through stepwise process of innovation:

Organisational learning is vital for progressive development in this competitive world. Single loop learning (concentrate on symptoms of problem) encourages new knowledge to improve the quality and efficiency of existing operations. Double loop learning (seek out deep causes) encourages new practice in an organisation which involved more innovative thinking in many business industries. The construction industry has been adopting this to a much lesser extent than many other industries.

The dynamics between individual and organisational learning:

They are mainly the interaction of individual learning to organisational learning process. The process involves the cycle of conversion of leaning between individual and organisation between tacit and explicit knowledge. In general, the process involves the four stages of socialisation (share individual's tacit knowledge), externalisation (tacit knowledge articulated into explicit knowledge), combination (create new abstract knowledge system called invention) and internalisation (convert explicit knowledge back to tacit knowledge).

However, this method cannot be adopted exactly as it is due to very nature of construction. During the construction itself, many different groups enter the process from time to time. For instance, specialist teams like project management, structural, construction management finishing and MEP engage during different stages of the construction phase.

Intelligence and innovation:

This is developing and relating organisational intelligence to innovation. In the current industry, there are instances where organisational intelligence is not encouraging innovation since most employees are engaged on a temporary or project basis. Many companies do not expose their know-how to other parties. For instance,

many construction companies share internal cost details with selected employees in different stages. This inhibits industry innovation. Activities due to climate change and global warming have large impacts on the construction industry. The recent tsunamis and cyclones are prior warning to the industry.

Memory-based knowledge management:

The idea is to facilitate the required flow of information. In order to face the competitive world, companies need to focus on experiments in line with their commercial needs. In the construction industry, cohesiveness among teams is vital and at the same time the responsibility of sharing information is more important. These innovative patterns are adopted by some companies by arranging gatherings, aiming for socialisation with other project team members. It also emphasizes sharing positive experiences as well as negative. In some parts of the world, however, this is impractical due to cultural barriers and the nature of the industry. In the Middle East, these social events are minimal among construction teams. Some reasons are the huge numbers of people involved in the process and the swift nature of developments, as well as the involvement of different nationalities.

Continuous innovation:

As the name suggests this is the process of continued focus on innovation. The world's leading companies have been adopting this pattern. The construction industry has enough chances for continuous innovation with the technical development. In the Middle East, Dubai was recently at the peak of its construction industry, which encouraged innovation in order to meet targets. In other areas of this region we notice some relatively less innovative products.

Knowledge brokers and continuous innovation:

There are professional undertakers who facilitate innovation and provide advice to increase innovation and creativity in any industry. In the construction industry providing solutions to existing problems is vital. In the construction industry, this process seems to still be in premature stages even though some professional institutions constantly monitor and provide solutions. Collection of information at all levels seems to not yet be identified properly. It seems that until recently, even most key players in the construction industry had not taken effective steps to continue innovation and development of the industry.

Conclusion

Often the construction industry is criticised as being overly conservative and low on innovation. One reason identified by researchers is non-financing for research and development due to cost-control measures. In today's construction environment of globalisation of markets, intensification of competition and growing complexity of relationships with clients, suppliers, contractors and employees, organisations find that they need to innovate to survive and succeed

The discussion demonstrated why the construction industry seems less innovative than other industries. It is generally recognised that construction industry is slow in adoption of technical innovations compared to many other industries. By definition most construction projects are innovations initiated by the demands of different clients which have specific requirements. The main problem with the industry is non-integration of innovative ideas acquired in one project to the next project and the knowledge acquired is not properly managed for the benefit of the industry.

However, most leading firms in the field have identified the requirement of innovation and diversifying from the traditional practices. Knowledge management has come to the fore as a leading device for the process. The traditional role of information managers has converted with the information and communication technologies available by integrating with the design and construction process.

There are some industries like pharmaceuticals in which innovation is forced by the society's needs. Similarly, computer and information technology-related industries need innovation for survival. Therefore it is clear that the construction industry has been labelled as less innovative than many other industries and now it is moving ahead with many new innovations with identification of potential and proper concerns on knowledge management. The recent encouragement to build a knowledge-sharing culture in construction project teams will be of benefit in changing the construction industry into being more innovative than some other industries.

The existing infrastructure and building stocks may not be equipped to cope with the predicted implications of the changes in the global climate. Therefore, no matter how lacking in innovation the industry was, the time

has now come to rethink and apply effective measures to promote innovation and creativity in the Construction industry.

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White, Frost and others -v- Chief Constable of South Yorkshire and others [1999]

The House considered claims by police officers who had suffered psychiatric injury after tending the victims of the Hillsborough tragedy.

Held: An employer has a duty to protect his employees from physical but not psychiatric harm unless there was also a physical injury. A rescuer, not himself exposed to physical risk by being involved in a rescue was a secondary victim, and as such not entitled to claim. Primary victims are 'victims who are imperilled or reasonably believe themselves to be imperilled by the defendant's negligence'. Lord Steyn: "(T)he law on the recovery of compensation for pure psychiatric harm is a patchwork quilt of distinctions which are difficult to justify ... In my view the only sensible general strategy for the courts is to say thus far and no further. The only prudent course is to treat the pragmatic categories as reflected in [case law] as settled for the time being, but by and large to leave any expansion or development in this corner of the law to Parliament. In reality there are no refined analytical tools which will enable the courts to draw lines by way of compromise solution in a way that is coherent and morally defensible. It must be left to Parliament to undertake the task of radical law reform."