

SERENDIPITOUS INNOVATION: ENABLERS AND BARRIERS IN THE CONSTRUCTION INDUSTRY

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Serendipity has played a large part in the lives of many successful innovators but has been neglected from traditional neo-classical theories and models of strategy and innovation. Yet as the business world becomes more complex, uncertain and interconnected, there is accumulating evidence that innovation will be just as likely to arise from unexpected serendipitous insights as from deterministically planned innovation strategies. Building on this evidence, the enablers and barriers to serendipity in construction industry are discussed. Through in-depth semi structured interviews with thirty two leading innovators and policy makers in the Australian construction industry, these enablers are tested against the realities of practice in the construction industry. New insights are provided into the potential barriers which could prevent managers harnessing the serendipitous opportunities which lie untapped in the increasing randomness, connectivity and uncertainty which will characterize their future world.

Keywords: innovation, serendipity, risk, strategy

INTRODUCTION

Serendipity means finding something when one is looking for something else and in the context of business involves benefiting from windfalls that were not anticipated in formal business plans (Merton and Elinor 2004, Horrigan 2011). Clegg et al's (2011:33) recent critique of business strategy argued that the role of serendipity "has been largely excluded from formal strategy theory". Clegg et al (2011) showed that there is element of serendipity in the fabric of all organizations and that the neo-classical model of corporate strategy cannot accommodate this reality. This supports Mendonca et al's (2008) and Bungay's (2010) research which demonstrated that in today's increasingly complex, dynamic and interconnected business world, business strategy cannot be perfectly planned in advance as traditional theories of strategy would suggest, but has to evolve in response to continually changing circumstances. Bungay (2010) calls this alternative and contemporary approach to business strategy 'directed opportunism' and argues that the challenge for executives is to build an organization which is capable of executing strategy in a fast changing environment by balancing both high 'alignment' and high 'autonomy'.

According to Hamel (2002), traditional innovation theory also has its roots in neo-classical economics and suffers the same limitations. Hamel argues that these theories have produced 'pipeline' models which conceived innovation as a highly deterministic, scientific and pre-planned process of the type undertaken in large manufacturing or laboratory-based scientific organisations. This, he argues doesn't

Loosemore M (2013) Serendipitous innovation: enablers and barriers in the construction industry *In: Smith, S.D and Ahiaga-Dagbui, D.D (Eds) Procs 29th Annual ARCOM Conference, 2-4 September 2013, Reading, UK, Association of Researchers in Construction Management, 635-644.*

reflect how innovation occurs in service-based industries like construction or in an increasingly networked, complex and dynamic business world where innovation is as likely to arise out of serendipity and happenstances than from any formal planning process. Tidd (2006) agrees and points out that rather than try to eliminate this uncertainty and pretend it is not there, we should develop theories which accept it as inevitable to inform management practices which can manage it more effectively.

Recently, a number of researchers in construction innovation have raised similar concerns by questioning the relevance of traditional theories which promote pipeline models of innovation. For example, NESTA (2007), Abbot et al (2007) and Sexton et al (2008) have argued that these traditional models favour the type of R&D-based innovation that occurs in high-technology, product-based manufacturing type industries and undervalue the type of 'hidden' innovation that tends to occur in low-technology, service-based and creative industries like construction. According to these researchers, hidden innovations are different in a number of important ways to the types of 'planned innovations' detected by traditional innovation statistics. In particular, they do not tend to occur within the confines of one single organization, as they do in many large multinational R&D-based organizations, but tend to happen spontaneously and often serendipitously in collaborative networks of manufacturers, consultants, suppliers, sub-contractors, designers and clients and often in response to unexpected and novel problems that arise on specific projects. Given this confluence of strategy and innovation theory around the need to better understand and recognise the serendipitous nature of the innovation process, the aim of this paper is to explore the enablers and barriers to serendipity in the construction process.

ENABLERS OF SERENDIPITY

As the above argument demonstrates, the dominance of neo-classical approaches to business strategy and innovation means that there is a dearth of empirical research into the enablers of serendipity in organisation. Nevertheless, there are some interesting research projects which have begun to throw some light on this subject. For example, Tjan et al's (2012) interviews with hundreds of successful innovators and entrepreneurs revealed that serendipity has played a large part in their lives. However, while these people may appear to be lucky from the outside, this is rarely the case and their success in harnessing serendipity appears to emerge from seven common attributes: humility; intellectual curiosity; optimism; vulnerability; authenticity; generosity and; openness. According to Tjan et al, these attributes make leaders more 'attractive' or 'magnetic' to others, giving them a greater chance of being exposed to new ideas and insights which might unexpectedly create a new business opportunity. Muir's (2000:8) research supports this idea and shows how entrepreneurs increase the chances of unexpected serendipitous encounters with other people who might have a complementary idea. According to Muir, innovators and entrepreneurs don't live in straight lines but in a "zig-zag". Random interactions, casual conversations and accidental encounters enrich their lives and success is seen as "social" and depending more on relationships than what they know.

Clegg et al (2011) argues that this is an idea which challenges the notions of individualism which have traditionally driven western business teaching, theory and practice. While good strategy in the past has been seen to arise from the rigid and controlled inspirations of great individual leaders, future approaches to strategy will need to be more emergent and to be "constituted and enacted organizationally" (pp 78) in collaboration with internal and external stakeholders. Yet Clegg et al's (2011)

analysis of strategic theory also argues that management theory is currently ill-equipped to conceptualise these ideas and advise managers on how to implement this in reality. This is because the development of management theory has been largely separated from advances in sociology, organizational theory and political analysis. It follows that to be able to embrace a new approach to innovation, managers will have to learn the new language of collaboration and to understand the critical role that 'social networks' and 'social capital' play in achieving personal and business success.

Locke and Spender (2011) have taken the idea of collaboration as the basis of serendipitous discoveries. They argued that in the future, innovation will occur and at the intersection of different knowledge domains and that collaborative environments are the key to these interactions occurring. According to Locke and Spender (2011), tomorrow's breakthrough ideas will be most likely to emerge when innovators bring concepts from one field into a new, unfamiliar territory. Hagel et al (2010) concurs. Their work shows that one of the critical defining factors that distinguish innovative companies from others is that their business networks are often based on deep and trusting personal relationships and their members are drawn from diverse backgrounds.

While serendipity might seem like a random process, creative firms also realize that new insights and connections do not happen by accident and that it needs to be encouraged through deliberately structured processes. Sampson's (2011) cross-sector research shows that the defining characteristic of innovative companies was not their size or function, but a 'systematic innovation capability' which consistently delivers innovations which add business value. Systemically innovative firms back-up their intentions with resources, measure innovation outputs, encourage staff to innovate and reward them for doing so. In these companies, innovation is deeply embedded into the mindset and culture of the business and there are close collaborative relationships with supply and demand chain partners to achieve mutually beneficial outcomes. This research supports earlier work by Sutton (2001), Robbins et al (2003) and Boumol (2010) which has shown that people in innovative firms are provided with many opportunities to be exposed to new ideas and insights from outside their immediate discipline and structured forums are often set up to facilitate these interactions. These types of interaction foster innovation by increasing the chances of unexpected serendipitous insights to arise. These firms also tend to have fluid and organic cellular structures. This structure gives a company a small feel, even if it is very large. It frees people from a single business model and provides opportunities for people to nurture entrepreneurial talent where they are more able control the development of their ideas and benefit from them. To achieve this, innovative firms strategically combine different roles, capabilities and personalities to induce creative tensions in teams. And they empower people to act in ways that are not tightly constrained by traditional competencies, roles and management oversight.

BARRIERS TO SERENDIPITY IN THE CONSTRUCTION PROCESS

The above section highlights numerous organizational attributes which research indicates would enable firms to better harness the untapped serendipitous opportunities in an increasingly uncertain, dynamic and interconnected business environment. However, there has also been significant research which indicates that many of these ideas do not reflect the harsh reality of the construction industry. Prominent examples include the work of Winch et al (1998), Nam and Tatum (1997),

Manley (2006), Barrett (2008), Widen et al (2008), Brandon and Shu-Ling (2008), Sexton et al (2008), Gambatese and Hallowell (2011) and Dainty and Loosemore (2012). For example, while the importance of collaboration to innovation has also been highlighted by numerous authors in the field of construction (Leiringer 2006, Walker and Rowlinson 2008), many barriers to effective collaboration in construction have also been identified. These include: a pervasive risk transfer culture which transfers responsibility for innovation down the contractual chain to those least able to invest in it; long fragmented supply chains which separate responsibility for innovation from the market for innovation; the project based nature of construction which ensures that projects teams rarely have a chance to form long-standing relationships; the use of subcontracting to undertake work; increased workforce casualisation; a confrontational and mistrusting culture; extreme competition which creates the perception that collaboration is bad for competition; an over reliance on clients to foster innovation and; short-sighted client attitudes which put price before relationships. Fundamentally, research shows that construction is organized in a way which is counter-productive to innovation. Building production takes place through a fragmented supply and demand chain which physically and chronologically separates customers from designers, designers from builders and builders from operators. On most projects, these chains are also 'legally fragmented' by the way risks and rewards are distributed rather than being shared between project participants. According to Winch (2008) each firm in the construction supply chain compete to extract the greatest share of the value-stream flowing from the client. In theory this should be shared in proportion to their contribution to that value-stream process. However, Loosemore (1999) found, power differences between the parties ensures that in most projects value may not be extracted proportionately on this basis and this often results in confrontational relationships and a lack of collective responsibility for project success. Gann (2000) argues that this is one of the construction industry's major barriers to innovation.

METHOD

The above research resulted in the model (Figure 1) which in simple terms summarises the opposing forces which appear to enable and prevent serendipitous innovation in the construction industry.

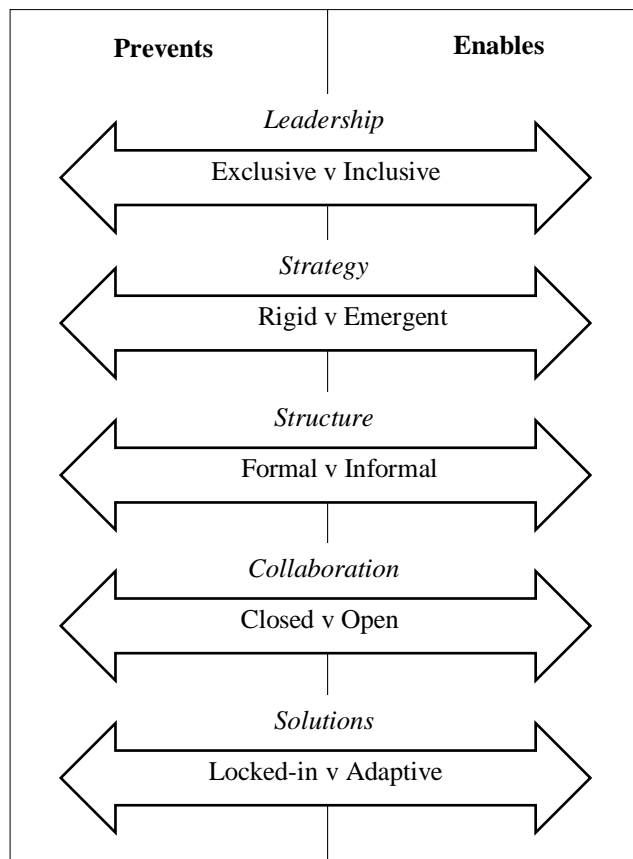


Figure 1 Enablers and barriers to serendipitous innovation in the construction industry

To test this model, semi-structured interviews were conducted with thirty two senior business leaders and government policy makers who have been influential in driving innovation in the Australian construction sector. Respondents were selected by snowball sampling from an initial set of ‘first order’ actors based on their membership of Australia’s Federal Government’s Built Environment Industry Innovation Council (BEIIC). This council was established by the Australian Federal Government to advise the Minister for Innovation, Research and Science on innovation policy regarding the construction sector. Nominations of other contacts provided a group of ‘second order’ actors who sat outside this relatively small core group but who were well known nationally for their innovative achievements. The sample was made up of senior executives from across the entire construction demand and supply chain: Government (5); Clients (3); Consultants (5); Developers (5); Contractors (6); Subcontractors (4) and; manufacturers (4). The interviews were semi structured to enable respondents to describe how serendipitous events had led to innovations in their business and what factors had been instrumental in allowing this to happen. Barriers which could prevent this from happening were also discussed. The role of narrativisation is widely recognised as being important to understanding complex organisational phenomena such as serendipity (Maclean et al. 2012). Serendipitous moments tend to occur as a result of complex events and interactions between numerous people over long periods that come together unexpectedly at a particular moment in time. However, to give some structure to the respondent’s narratives of how such events had led to innovative ideas, the enablers discussed above were used to focus the interviews around specific

organisational themes. Selected quotations from the broader narratives are provided below around these key themes.

DISCUSSION OF RESULTS

Formal business strategies

One of the main enablers of serendipity highlighted in the literature cited above is a flexible business strategy which doesn't lock-in predetermined ideas and solutions. However, there were divergent views among the respondents on how important a formal innovation strategy was to predicting innovation outcomes. For example, while some thought that it was key to "*giving people permission to innovate*" [Respondent Gov #4] and communicating that "*innovation matters*" [Respondent Con #2], others thought that statements of strategic intent alone would have little impact on people's receptivity to innovations.. "*just stating that we will innovate is unlikely to change anything. Management statements have to be backed up by leadership, culture and resources*" [Respondent Con #3]. In support of the literature reviewed above, our respondents agreed that serendipitous insights and discoveries are best facilitated by a loose and mobile business strategy which is built around their people's capabilities, desires and passions. To cope with fluctuating workloads and changing markets, most businesses have a flexible business strategy which allows them to shift and adapt to changing opportunities. Likewise, innovation tended to be an unstructured process.... "*It just happens*" as one respondent said [Respondent Sub #2].

Organic structures

The literature also argues that flexible business strategies are generally the product of organic organisational structures built on trusting supply chain relationships. Such structures are claimed to be critical in facilitating the informal connections which enable serendipitous opportunities to arise. However, most of those interviewed agreed that while this was a good idea in theory, this was rarely achieved in practice in construction.... "*At the end of the day we have to deliver a building and this takes a highly disciplined and planned approach*" [Respondent Con #4] "*there is a danger of being too utopian here - in creating a world where business are too frightened to innovate*" [Respondent Gov #1]. As one respondent argued, "*at the end of the day delivering projects is a highly pragmatic endeavour which requires detailed planning and strong accountability, discipline and reporting lines*" [Respondent Con #2]. "*If you are too open with your subbies then you can lose your competitive advantage. They will take advantage of you and put their prices up. You need to keep a competitive tension*" [Respondent Con #4].

Locking-in solutions

Most respondents agreed that firms were generally very open to new opportunities, especially in the early phases of tendering for a project. However, one of the biggest challenges in managing innovation in construction is that there are permanent business organizations managing temporary project organizations. For example, when a project is won, solutions are locked-in and innovation becomes much more difficult. Innovation during these latter phases mostly occurs out of the necessity, in solving an immediate problem on a project.. "*when you are tendering it opens your eyes and encourages you to go looking for new ideas. Serendipitous insights are much more likely to occur*" [Respondent Con #1].... "*Once we have started work on site, you*

haven't got the time to innovate. The innovation that goes on here is to solve problems that we encounter to keep the project progressing. People are incredibly creative when the pressure is on to come up with solution. But this isn't serendipity. It takes time for serendipity to happen but solutions here are needed immediately and they are much more individual.." [Respondent Con #1]. As one respondent said, *"Up front innovation is about winning the job and is driven by the need to beat the competition. But once you have the job it switches to how to deliver the project faster and more efficiently.....you can be creative up-front but innovation at a project level must be practical.....You can't have too much creativity on site since the concrete has to be poured. This is a different type of innovation – it is reactive not proactive"* [Respondent Con #3]. As another respondent explained, one of the main challenges for the industry in opening-up to opportunities for innovation was that the industry has a stable layer of executives involved in up-front planning which is superimposed on a more fluid layer of project managers involved in delivery to tight schedules and deadline.... *"the top business layer is relatively stable but underneath it is a fluid project-focused undercurrent which is highly dynamic, subject to a lot of uncertainty and unexpected problems which have to be responded to"* [Respondent Dev #5]. Both layers appear to require very different approaches to innovation. The top layer will tend to have a longer time horizon and focus on innovations which span different project boundaries. People operating at this level tend to focus on innovations which can provide a competitive edge. These can be planned in advance. In contrast, the project layer will tend to be very short-term and client focused. People operating at this level tend to focus on innovations which can deliver productivity and cost benefits to deliver the project on time and on budget.

Collaboration

In agreement with the literature on enabling serendipity, collaboration was widely seen as crucial to innovation. However, this is widely seen as being quite difficult, particularly through the construction sector's supply chains. As one respondent argued, *"Collaboration is just a word"* [Respondent Sub #4]. And as another pointed out, most clients opt for lump-sum tenders driven by the belief that negotiation means higher prices... *"More than anything else, clients want certainty of price so there is a mistaken tendency to think that this is best achieved by passing all their risk down the contractual chain which is not conducive to collaboration"* [Respondent Con #1].

Leadership

Most of the people interviewed indicated that business strategy was created and adjusted by a core team of executives which lie at the heart of their business and who have been there for many years. These people form a central *"nest"* [Respondent Con #6] which has a *"deep thirst for knowledge"* [Respondent Con #6] and which is driven by the high levels of competition in the industry and the continual need to create a competitive edge. These were the people who were considered to be most likely to be open and exposed to serendipitous opportunities. However, the opportunities that they afforded to others to be explorative were also seen to be crucial... *"Leadership is crucial. A good leader leads from the front, they give their staff the space to explore and they trust them.."* [Respondent Dev #2]. A number of respondents felt that the forgotten layer of people in the industry who were largely ignored in the innovation process were the construction workers who undertake the work on site. Interactions between site workers and managers and the potential

serendipities which could arise at this interface were largely lost through the subcontracting model of organising, which most felt damaged innovation in the industry.. *“The structure of employment in the construction industry is all about lowering costs and providing flexibility rather than being about innovation. Contrast this with the manufacturing sector where in a factory of one hundred workers there are all sorts of opportunities for them to contribute ideas and to talk to managers”* [Respondent Gov #3].

It was broadly agreed that clients play a critical leadership role in the innovation process... *“they pay for it”* [Respondent Dev #3]. However, it was also widely felt that many clients are not open to innovation or prepared to pay for it and that this reduces the sensitivity of people in the industry to opportunities to innovate... *“most clients are completely irrelevant to innovation. They have no interest in it what so ever. Unless of course it can reduce costs .. then they have a great desire for innovation.”* [Respondent Dev #3]. However, most acknowledged that there were very few *“willing”* clients who were prepared to test and prototype a new idea on their project. And there are no methodologies for valuing innovation. Submitting a con-conforming bid was therefore a major risk. As one respondent said, *“There is always resistance, because new ideas involve change and the undoing of old systems and ways of doing things. Few people want to take the risk of trying something new and failing. There is no shortage of ideas in the industry but it is the opportunity for application which is often missing. It takes a courageous person to bring a new idea to fruition”*. However, government was not seen as a solution to this problem. There was universal agreement that the primary reward for innovation must come from the market not from government incentives. *“If clients do not want energy efficient buildings then the industry won’t build them. Similarly, if a firm isn’t focused on innovation and set-up to innovate then incentives will have little impact in encouraging them to do so”* [Respondent Gov #4].

CONCLUSION

The aim of this paper is to explore the enablers and barriers to serendipity in the construction process. By drawing on contemporary theories of strategy and innovation which challenge neo-classical approaches which suppress uncertainty, a range of enablers were identified which could enable these serendipitous opportunities to be harnessed. Of particular importance was inclusive leadership, emergent strategy, informal structures, open collaboration and adaptively in problem-solving. Through in-depth semi structured interviews with leading innovators and policy makers in the Australian construction industry, these ideas were tested against the realities of organisational practices in the construction industry. While there are clearly limitations to this research in the lack of previous research in serendipity to inform the model, in the limited sample of thirty two and in the focus on the Australian construction sector, the results nevertheless produce some new and interesting insights which challenge traditional notions of innovation in the industry. In particular, to most of the respondents, many of the ideas were seen as too idealistic. For example, the ideal of organic loose organisational structures which are often advocated to drive innovation would seem to be problematic given the need to deliver projects within extremely tight timescales and budgets. Furthermore, extreme levels of competition within the industry, the subcontracting model of delivery and clients who continue to employ on lowest price, make true collaboration and open trusting relationships difficult to achieve. While these problems are well known and have been widely

written about in other contexts, these new insights provided through the novel lens of serendipity provide a contemporary reason to address them with even greater urgency.

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