
UNDERSTANDING INNOVATION FOR SUSTAINABILITY WITHIN THE AUSTRALIAN BUILDING INDUSTRY: AN EVOLUTIONARY SOCIAL LEARNING MODEL.

Geoffrey Binder¹

ABSTRACT

This paper argues that within the context of the building sector, inter-organizational relationships are determinants of innovation. To explain the workings of these relationships and their dialectical nature, an evolutionary social learning model is proposed that draws on Vygotsky's (1978) developmental psychology, Bourdieu's (1977) concept of habitus, and Wittgenstein's (1958) insights. A case study of the development of a tool designed to make builders select more sustainable building materials is analyzed to illustrate how the social learning model developed here allows an understanding of innovation. The "EcoSelector" was the tool developed to guide the builders in their selection of materials. The model provides managerial and behavioral insights into groups or individuals seeking to implement innovations in general, and sustainability innovations in particular.

KEYWORDS

innovation, social learning, sustainability, Schumpeter, building industry, habitus

INTRODUCTION

This paper uses an evolutionary social learning model to evaluate "innovation" (Landau, Rosenberg & National Academy of Engineering 1986; Nelson, Mowery & Fagerberg 2005) especially within the context of green building. This model attempts to resolve the lack of a satisfactory theoretical understanding of change (Caldwell 2006). A case study of the development of a tool designed to make builders select more sustainable building materials is analyzed to illustrate how the model allows an understanding of innovation.

We begin by introducing the debates within the innovation and building literature which are identified to elucidate how innovation has been conceived. Second, an Australian case study, drawing on the first-hand experiences of people involved in the development of a tool designed to make a particular master-planned community (MPC) more "sustainable"¹ is presented. Third, an evolutionary social learning model of innovation is described. Finally, the model is used to analyze the Australian case study. In doing so, it demonstrates its ability to understand innovation.

Conceptions of Innovation

Innovation is a widely used but elusive concept. Definitions of the term are often circular or *ad hoc* and rarely get further than the commonsense understanding of "using something new" (See Gann 2000). Within the building industry the issues of "sustainability" and "innovation" can have moral undertones, couched in terms of what "they" need to do to become more environmentally prudent and/or to be more customer-focused (Barlow 1999; Barlow & Ozaki 2003; Burdock et al. 2001; Crabtree 2006; Dewick & Miozzo 2002). But just what innovation actually is, or what is required to facilitate or cause it to happen, is, at best, disputed, but most often ignored or treated as a black box (Landau, Rosenberg & National Academy of Engineering 1986; Nelson, Mowery & Fagerberg 2005).

The debates within the literature revolve around three themes. First concerns the form of innovation. Is innovation a continuous iterative process (Brannan et al. 2008; Jørgensen, Boer & Laugen 2006) or is it a discontinuous and radical phenomenon? (Schumpeter 1934, 1939) Is innovation bounded, happening within closed systems, or boundless?

¹School of Global Studies, Social Science and Planning, RMIT University, geoffrey.binder@rmit.edu.au.

(Harty 2005) These debates underpin the second theme, which questions where innovation happens. These range from creative and/or entrepreneurial individuals (Mostert 2007; Schumpeter 1934, 1939; Watson 2007), individuals interacting, groups, and complex multilevel systems (Watson 2007), creative cities (Berry 2005), knowledge clusters (Pohoryles 2007), networks (Considine & Lewis 2007; Dewick & Miozzo 2004; Garcia-Lorenzo 2006; Marceau 1999; Pittaway et al. 2004), and particular governance structures (Johns, O'Reilly & Inwood 2006). If there is a conclusion that can be reached regarding this literature, it is that innovation is ubiquitous.

The third theme is broadly *behavioral*, which encompasses attitudes and responses to innovation at the individual, group, and contextual levels. The *individual* factors include being open to new ideas and sustaining them (Ross 1974), the role of tacit knowledge (Howells 2002), how peoples' roles, positions, and self-definitions affect their responses (Considine & Lewis 2007), the freedom and readiness to take risks (Lassen, Gertsen & Riis 2006), and whether strong leadership does or does not foster innovation (Benn, Dunphy & Griffiths 2006). *Group* factors include active group learning (London & Sessa 2007), cooperation (Alves et al. 2007), and collaboration (Kaltoft et al. 2006; Middel, Boer & Fisscher 2006). *Contextual* factors include the role of necessity and/or how crisis can drive innovation (Benn, Dunphy & Griffiths 2006; Krozer & Nentjes 2006), complexity (per se) (Mitleton-Kelly 2006), performance-based regulation (Greig 1992; Krozer & Nentjes 2006), direct involvement by Government, or the freedom of the market (Landau, Rosenberg & National Academy of Engineering 1986), the "right" time vis a vis wider debates that may facilitate or retard opportunities (Dudley 2005), and the readiness of organizations (Holt et al. 2007) and industry (Crabtree & Hes 2007).

This literature implies that innovation can be a function of seemingly countervailing forces. Assuming that innovation can be deliberately pursued, which of these orientations or attitudes is necessary for innovation? Are all, or a set of them implicated in innovation, and, if so, which ones and why? One is left to conclude that innovation is difficult, but why remains elusive.

The Importance of Innovation

One of the earliest and most significant engagements with the concept of innovation was that of Peter Schumpeter (1934; 1939, 1962), who placed the phenomenon at the centre of his model of economics. Schumpeter proposed that innovation is what

incessantly revolutionizes the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism. (Schumpeter 1962, p. 83, original emphasis)

For Schumpeter, innovation is the creative implementation of the new that takes place against a resistant background of path-dependent everyday activity, the circular flow (Schumpeter 1934). Although Schumpeter identified this key contradiction; business as usual or business anew, the mechanisms that he proposed which embodied this contradiction were problematic. Schumpeter identified resistance to change as belonging to a type of person—all of those that are habituated to the circular flow. Schumpeter saw this adaptation as being both positive and negative:

The very nature of fixed habits of thinking, their energy-saving function, is founded upon the fact that they have become subconscious, that they yield their results automatically and are proof against criticism and even against contradiction by individual facts. But precisely because of this they become drag-chains when they have outlived their usefulness. (Schumpeter 1934, p. 86)

Schumpeter made a convincing case regarding habit and its role in daily activity. However, he defined resistance as inflexible existing conditions, and/or a fear or disapproval of the new. Yet, no compelling rationale was provided that might explain the significant difficulties that change engenders. Both of these conditions are unsatisfactory. As far as inflexible existing conditions, while this may be true for part of a market, there are more often than not high risk-takers that will deliver services that others may not. Indeed, it is hard to conceive of a market that does not operate without companies that service it,

who make it their business to exploit innovative opportunities, and are protected from the possible failure of the particular proposed innovation by extracting high returns or having a large customer base. As for a fear of or disapproval of the new, today's rampant consumer culture stand in stark contrast to this claim.

Nevertheless, there is resistance to change, but this is not about being stuck in a rut, rather it is about being actively engaged in resisting change for a particular reason. Similarly, it will be argued below that the pursuit of change is not simply a personality trait or an act of will, but a function of trying to create an adaptation to a particular context. Before returning to these theoretical issues, an example of innovation by a land developer operating in the mass-volume housing market in Victoria, Australia, pursuing sustainability will be discussed.

THE CASE STUDY

Method

The research was conducted as a part of a project completed in collaboration with VicUrban, the Victorian State Government's land development agency, which was designed to examine how inter- and intra-organizational relationships effected decisions regarding their sustainable housing estate, Aurora. An ethnomethodological approach was used (Garfinkel 1967). From February 2006 to June 2008 the researcher had unrestricted access to VicUrban's documents and personnel, and conducted a series of formal and informal interviews with staff and stakeholders involved in the development of the EcoSelector, a sustainable building materials selection tool. The formal interviews were conducted using a set of standard open-ended questions designed to elicit the personal experiences of the interviewee (Patton 2002). A document analysis was conducted and the interviews were transcribed verbatim and read for thematic content (Patton 1987). There was a complex interplay between the researcher's understanding of the process, the data collected, the literature, and the development of the theoretical model of innovation, outlined herein (Kvale 1996). Space restricts an elaboration of extent of how these relationships played out, but it is important to note that

research can never be neutral (Foucault & Gordon 1980) and, in fact, is co-constructed via elaborate socially sanctioned procedures that create particular understandings derived from extraordinary processes (Horner 2003). The following narrative is an amalgam of stories and documents—a “making sense” of the development of the EcoSelector. Draft excerpts of the narrative were sent to the interviewees who were invited to critique or veto the use of their story.

A Tool for Change: The EcoSelector

The EcoSelector² is a building and landscaping materials selection tool that was developed specifically by VicUrban for their Aurora Estate. Aurora is a staged development, due for completion in 2023, which, on completion, will comprise 8000 houses. Aurora is VicUrban's sustainability “showcase.” VicUrban defines sustainability broadly, having adopted and developed a triple-bottom-line policy framework. This framework is articulated through VicUrban's Sustainability Charter which is used to evaluate proposals, design projects, and measure the performance of their developments (VicUrban 2006). The EcoSelector dovetails with the Sustainability Charter, addressing the specific issue of the impact of building materials on the environment.³

The EcoSelector was designed specifically for the Aurora project to provide the builders with information about the environmental benefits of more sustainable building materials, where to source them, and whether there was a cost difference. The EcoSelector addresses two related phenomena, the way builders think about sustainability and how they do it, which are the activities of building. Indeed, it is evident in the story of the development of the EcoSelector, described herein, that the resolution of its two purposes, as a means of consciousness raising and/or as a means of changing practice, helped shape how it was intended to be used, and the manner in which the builders have had to comply to it, and why organizations external to the project sought to intervene.

Discussion of the purpose of the EcoSelector, as with other issues mentioned by its developers, took place within a particular context that afforded particular constraints and opportunities. These resistances and encouragements define both the “problems” that the EcoSelector designers addressed as

well as the scope or level of innovation that could be achieved.

The constraints included dealing with an industry that is driven by assumptions regarding the operation of markets and consumer choice and is defined by economic pressures that are resolved through Fordist manufacturing and assembly processes. Furthermore, sub-contractual relations define the way the industry operates, from the professionals who design and engineer the estates and houses, to the trades-people who assemble them. The land development industry is highly stratified (Charter Keck Cramer 2006). VicUrban and its predecessors manage their work by contracting in required expertise to undertake specific tasks.

The opportunities for the EcoSelector included growing community awareness of unsustainability, in part driven by local experiences of prolonged drought and bushfires, and by global issues, such as the growing recognition and acceptance of climate change. These changes in the *Zeitgeist*⁴ contributed to the issue of unsustainability being taken up by governments and professionals.

There are several relationships that affected the outcomes of the development process for the EcoSelector. The primary relationships were those arising between VicUrban, the designers of the EcoSelector, RMIT University's Centre for Design (CfD), and the builders, whose behavior was to be changed. There were other pre-existing relationships that were changed by the outcomes. These are those between the builders, their suppliers, and the building products manufacturers. Furthermore, there were relationships that were engendered by industry representative bodies that intervened in an attempt to change the outcomes. These interventions drew in the State Government and its departments, who also influenced the outcomes.

Pursuing Innovation

The creation of the EcoSelector can be seen as confluence of forces, embodied in the actors that came together in a particular place that provided a particular opportunity. That place was the Urban and Regional Land Corporation (URLC), one of two government statutory authorities that would later be amalgamated to form VicUrban in 2003. The other

organization amalgamated to create VicUrban was The Docklands Authority.

The URLC's Aurora project provided the *raison d'être* for the EcoSelector. But Aurora has its own genesis, as did the URLC (eg., Troy 1978). The story of Aurora as a sustainability showcase does not start with the rational "let's build our sustainable future there". Instead, Aurora came about because there were significant problems associated with its development. These arose from the difficulty of connecting it to Melbourne's existing sewage and storm-water infrastructure. It was the decision to invest in on-site facilities to manage effluent and water that led a small team, with the support of the chief executive officer, to be encouraged to "push the boundaries" regarding what might be achieved in a sustainable master-planned community (MPC). There had been a shift in the practice of dealing with storm-water with many recent MPC's having significant storm-water retention systems. The idea of having local sewage treatment and, as it transpired, reuse, as a part of a more holistic approach to water management, was a "logical" progression. However, it was also the context that allowed a small team of professionals, in 2003, to explore ideas for sustainability that were gaining currency.

Contexts for Innovation

The URLC's Aurora project management group (APMG) worked with a team of about 25 consultants who set out to rewrite what a MPC could be. Their goals included six-star energy efficiency (the current State mandate is five-star),⁵ smaller, correctly-oriented lots for passive solar design, extensive on-site water management and reuse, and sustainable materials. All of this was to be done within the paradigm of a typical privately-funded, -designed, and -built MPC.

At the same time several other government agencies and private companies were working on other sustainability projects. For the EcoSelector story, an important example was the EcoHome project, supported by the URLC (and its successor, VicUrban), Metricon Homes, the Building Commission, Origin Energy, City West Water, Melbourne Water, Sustainable Energy Authority of Victoria (SEAV), Hassell Architects, and the CfD. This project examined the

implementation of sustainable urban design principles into a conventional suburban “spec” home. The house was designed and built in the outer-western suburb of Deer Park in Melbourne, and continues to be evaluated.

Dr. Dominique Hes of the CfD, who would later lead the EcoSelector development process, presented the EcoHome project to the Aurora project team at the URLC. Also present was Barton Williams, of the SEAV, who would become a key figure in the EcoSelector story as a driver of sustainability within VicUrban. Barton was advising the URLC on getting the Aurora houses to a six-star energy rating, but he had a greater vision, as did many of the other people involved in the Aurora project. Jill Lim, a member of the APMG, said that the consultants were unusually excited by the project, with many senior staff attending meetings that would normally be attended by more junior personnel.

The relationships during the period 2003 to 2005 can be described as a coming together of like-minded individuals, supported by their respective organizations, to tackle the issue of a sustainable MPC. The brief for the EcoSelector was drafted in this context, but it had a contradiction embedded in it which would be a source of disagreement later on. The contradiction was that the project brief, titled,

Development of an Embodied Energy and LCA⁶ Framework

included the following guidelines:

To provide guidance to the builders.

And that,

Builders that participate in this housing project will be required to adhere to a strict set of sustainable building design guidelines.

Here, then, are potentially two different purposes for the tool: to provide guidance (advice) or to provide a strict set of guidelines (rules). However, the view of the APMG and the CfD was that the primary function of the EcoSelector would be consistent with the “provide guidance” purpose, educational. The tool was seen to be a resource that builders could use to select materials that were more sustainable than those that they normally used. This

purpose helped inform the initial design for the EcoSelector—know as the flip-chart. However, the alternative purpose, that of providing strict guidelines, would eventually transform the EcoSelector into a scoring assessment tool.

The CfD’s attitude to their work on the EcoSelector was profoundly shaped by two phenomena. First, the budget was a modest \$10,000. However, the way the project was envisioned meant that this was believed to be more than adequate:

We propose a \$10,000 retainer program where we will invoice every 3 months based on the hours spent talking to builders, organising further workshops, and developing the guide. This could be settled by an MOU⁷ or an exchange of letters. We do not envisage that all the \$10,000 will be required but this will allow a structured resourced framework to develop the project.

Tasks that will be carried out as needed:

- talking to builders—hotline
- adding and updating the guide
- answering questions
- working with the government stakeholders on the toxicity and biodiversity issues
- working with manufacturers
- workshops as needed
- developing and maintaining the website⁸

Had a full commercial life-cycle analysis (LCA) based tool been developed with the involvement of the appropriate industry, government and non-government stakeholders, a budget in the order of \$500,000 to one million dollars would have been required. Furthermore, the current Director of the CfD, A/Prof Ralph Horne, estimates that the basic tool, as supplied, should have had a budget of \$50,000, and to have an extensively peer-reviewed and industry-linked tool nationally with selector-level information, \$200,000 would have been appropriate.⁹

It is clear that the CfD saw their task as information gathering and sharing, and facilitating better communication between the builders, architects, and building product manufacturers. To this end,

workshops were organized where manufacturers could showcase their products to the Aurora builders. Dr Hes saw these workshops as a highlight of the project, although she thinks that they could have been more successful had the building company's product specifiers been present too, not just their Principals.

The second phenomenon that profoundly shaped the EcoSelector was the commitment of the people involved. It is a feature of the development of the tool that the personnel and the organizations involved had a commitment to the overarching concept. From the EcoHome presentation to the URLC and the SEAV, through to the expert panel drawn together to design the EcoSelector, all were, at the very least, sympathetic to the idea if not out-right devotees.

This idea of information-sharing guided the overall methodology that the CfD used to develop the EcoSelector. A group of experts was called in to "workshop" the idea. It was this group that came up with the basic structure of the EcoSelector which was to break down a house into its main assemblies—floor, framing, roof, etc.—and identify the main materials and products that might be specified for each. Substitute products were then identified that would be more sustainable. In keeping with the idea that providing choice was the critical role for the tool, information was provided regarding cost implications, the reason that the preferred product was better, and where it could be obtained. The products were assessed against one or more of four unsustainability criteria: embodied energy, resource consumption, toxicity, and biodiversity, depending on which were most relevant. For example, embodied energy was not considered when rating paints, but toxicity was. Similarly, biodiversity was the key criterion used to judge timber.

The flip-chart's was visually designed to facilitate easy-use. For example, the products that were considered the most sustainable were printed against a green background to facilitate quick identification. A builder could flip to the relevant section, have their eye drawn to the preferred product by the green background, identify the environmental rationale, get an approximate cost variation, and be provided with the name and phone number of the supplier. However, the EcoSelector would change

significantly from this quick and easy-use format. It became a more formal document that necessitated engagement with a compliance regime.

With the amalgamation of the URLC and the Docklands Authority into VicUrban in August 2003, many of the URLC people left, possibly as a result of a change in the management style of the new organization, which was more command-oriented. For example, the nostrum "if I can measure it, I can manage it" became prevalent. While relying on measurement can be criticized because of the "rubbery" nature of the numbers and problems associated with objectification, what is important here is that this attitude became part of the organizational culture and was embodied in the EcoSelector. This meant the EcoSelector gained a scoring mechanism where points were allocated to each product. These points were a function of the assessment of its sustainability credentials. This radically changed the purpose of the EcoSelector from being an educational tool to being a hurdle requirement for planning approval. As a result, each proposed house at Aurora currently requires a report, based on the EcoSelector, which shows that it meets a minimum score of 80 points. This total is obtained by adding the scores of the six divisions within the EcoSelector. Points are awarded based on the type of material selected and must be at least 90 percent of the total "element".

Fighting for Innovation

The idea of "a minimum standard" reoriented the EcoSelector from guide to requirement. This shift opened the door to criticism from industry bodies that felt threatened by, what they perceived as, unwarranted regulatory discrimination against their products.

As a guide, the flip-chart was indicative rather than absolute. For example, it was, at best, indifferent to Australian native hardwood timbers, having the "green" flooring option being concrete with recycled aggregate and waffle pods.¹⁰ Furthermore, although it identified FSC-certified¹¹ timber as being acceptable, no non-plantation sources are available in Australia and plantation sources are limited. Thus, all Australian native hardwoods logged from forests were not included. With the shift of the EcoSelector from guide to requirement, the timber

industry saw it as a threat to its market, arguing that they were being discriminated against, despite their use of government-regulated forestry management practices. The timber industry representative, Victorian Association Forestry Industries (VAFI), was particularly troubled by the perceived bias in the EcoSelector against the use of Victorian native hardwoods. This debate raged from 2004, embroiling VAFI, VicForests, and the Timber Promotion Council in a protracted dispute with VicUrban and the CfD. Also involved were the Department of Primary Industries, Department of Sustainability and Environment, Sustainability Victoria, the Building Commission, and the Minister for Major Projects.

The pursuant imbroglia saw criticism of: the methodology used by the CfD, the sustainability of the State governments' hardwood harvesting policies and practices, scrutinizing of the relative merits of two different timber certification schemes, and accusations regarding restrictive trade practices.¹² This issue was resolved by the recognition of certified timbers (Wallis et al. 1997) in the EcoSelector, although it is interesting to note that while FSC timbers are specified, AFS timbers are "allowed" but not yet specified.¹³ In a return to the original brief for the Aurora Materials Selector, the idea of life-cycle assessment is now firmly back on the table,¹⁴ with a working group examining the issue from an industry-wide perspective, not just that of one project.

To summarize, there is a constant interplay between competing agendas in this story. There was the early didacticism preferred by the CfD, and the new managerialism at VicUrban, exemplified by the "if I can measure it, I can manage it" attitude. The outcome of this relationship opened the door to other forces, like the timber industry which, in turn, embroiled other government bodies. These events took place against a growing consciousness regarding unsustainability by the community, professionals, and government. This interplay of forces saw the EcoSelector go from being an easy-to-use guide to a hurdle requirement for builders. These forces were also responsible for changing the way in which the EcoSelector would be used. For example, early prohibitions against the use of rainforest timbers at Aurora have gone although their use is still discouraged. Other fine-tuning also occurred. Up until recently

the minimum score for the flooring could not be met by a timber floor, even if the timber specified was not harvested from forests. This has now changed. What occurred was a series of often unforeseen interactions resulting from the actions of various people with particular interests. This led to the EcoSelector not only changing but being a catalyst for further industry-wide investigation and possible change.

(RE)THEORISING INNOVATION

The story of the EcoSelector is illustrative of Schumpeterian innovation at two levels. First, there is evidence of resistance. The timber industry was hostile to the EcoSelector because of a perceived threat to its member's livelihoods. Also there were subtler resistances. The CfD was not happy with the reorientation of the EcoSelector from "guide" to "requirement". However, neither of these were a function of a fear of the new nor being stuck in a rut. The timber industry fought to protect their interests and the CfD saw their role as being of most benefit, in the long term, if they could change the builder's values using education.

Second, there are clear "entrepreneurs" in the story. However, they are not one or two willful, intuitive individuals making leaps of faith (Schumpeter 1934). They are many "fellow-travelers" who exploited their context by setting and implementing agendas for change. It is noteworthy that the CfD's preference for an educational rather than mandatory tool is indicative of path dependency on their part; located within a university, one expects a commitment to education rather than to compulsion.

Thus, in the EcoSelector story there is evidence of a struggle to innovate that took place within a particular context that was not only enabling but also engendered particular resistances. But the question remains: how are we to theorize this struggle for innovation? Clearly it was political—competing interests sought to influence the outcome. The VAFI was convinced that the process for developing the EcoSelector had been captured by the Wilderness Society,¹⁵ seeing evidence for this in a "lack of methodological rigor" on the part of the CfD. However, the lack of rigor has another, more plausible, explanation. The CfD intended to educate the builders. As such, CfD provided builders with information

rather than a definitive “best” product based on a full LCA. While the initial brief for the project specified doing an LCA, this was not funded, or attempted. The CfD was left “flat-footed” on this issue and “cobbled together” a response to this issue by claiming that they used a Delphi methodology.¹⁶ This claim appears to be retrospective, having never been mentioned in the initial project brief and, is plausibly, a defensive response to an attack on the EcoSelector by VAFI. Hence, there are elements of a battle where the combatants take turn in responding to threats. Resistance is a shifting phenomenon; a response to a perceived or actual threat. In some ways this aspect of the struggle around the EcoSelector is obvious given the historical antipathy of the timber industry and the environmental movement. However, this fight—which continues to this day regarding timber certification—is peripheral to the primary function of the EcoSelector—to change the behavior of the builders. Furthermore, there were other unexpected effects of the EcoSelector.

The EcoSelector was specifically designed for a particular project, the Aurora Estate. Yet, it is used by architects who have no role in Aurora or Vic-Urban, but found out about it. Other, less targeted effects included the changes to some manufactured products and supply of others, previously unavailable on the local market.

Changing the behavior of the builders at Aurora was the overt function of the EcoSelector. Although there were some initial implementation problems, the builders did not resist. However, this is not to say that they were converts to environmentalism and adopted the most sustainable options. Although the builders interviewed thought it was a good idea to pursue sustainability, none of the more sustainable products or processes in the EcoSelector that required changes to pre-existing building practices were adopted. In addition, there is no evidence to support the proposition that the builders were reluctant participants. One of the builders, who quit the project after two years of work with no return, did so for financial reasons and still believed in Aurora’s sustainability goals. Furthermore, although some builders have transferred Aurora specifications to other estates, others have not. To understand these anomalies, an explicit elaboration of the proposed theoretical model follows.

An Innovative Model

The model proposes that innovation is best understood as learning or adaptation, which is a socio-cultural process. Vygotsky’s (1978) model of development proposes that humans develop through a dialectic relationship with superior others. Importantly, he described the nature of the relationship required for development to occur, the zone of proximal development (ZPD), which arises when a child, who has previously acquired appropriate foundational skills, is presented with a new lesson. Language and meaning are acquired through reciprocal interaction by developing (adapting) individuals who build on already learned skills.

The process of social adaptation habituates the individual. These habituated “lessons” are the socially-determined forms of activity, meaning, and language of a given group.¹⁷ Bourdieu’s (1977) concept of habitus alerts us to the fact that our class, gender, and other identifying attributes, once habituated, establish our tastes, values, practices, and predispositions. However, there is a tendency for habitus to be considered overly deterministic; conceiving of humans as enculturated automata. Nevertheless, this can be resolved if we consider the use of habit.

As Schumpeter (1934) noted, habit has an energy saving function; we do not have to think about everyday activity, we do not have to ask ourselves what our values are before deciding on how we should respond to an issue, we do not have to ask our family what we like to eat when we want “soul food”. We do not have to think about the bio-mechanics of walking prior to taking a step, nor, if I am a carpenter, do I need to consider or test the force of the hammer-blow required to drive a nail home. We are all masters of a myriad of activities that we deploy without thought every moment of the day. The pay off of not having to think-to-act is attentiveness—being able to respond to and to seek extra-ordinary changes in our social relationships. Not having to attend to the complexities of everyday existence frees us two-fold: it enables attendance to unexpected changes in our material, cultural, and social surroundings, and it allows us to engage in activities that extend our abilities. These activities include, but are not limited to, being creative and innovative.

Another aspect of habit is that it engenders faith. To be able to act habitually requires faith that the

activity we are doing is not risky. If we could not rely on habit to be safe, it would be maladaptive. Wittgenstein (1958) frames this problem in the context of rules and, although it is clear that we have rules that we follow blindly, we are not subservient to them (Sharrock & Dennis 2008).

Wittgenstein (1958) demonstrated that while we *may* doubt, there are things that we tend not to doubt. To summarize, we are culturally inscribed so that we can act in culturally appropriate ways. However, our habituation does not induce stagnation rather it frees us to attend to and create change. Thus, change is not akin to random mutation but is bounded by the possibilities of our habitus. Habitus provides individuals with particular, socially shared and derived practices and values. However, there are a plurality of habitus that are a repository of all existing practices and values. A powerful source of adaptation is introducing a practice or value from one habitus to another. This is innovation.

Schumpeter rightly put innovation centre-stage when considering economic growth. However, Schumpeter's defined the process in terms of individual differences rather than relationally. This approach leads to the construction of villains and heroes in the Schumpeterian world; those who strive for change and those that who resist it. The model, elaborated herein, offers a more subtle analysis of innovation, based on a problematic that is relational through which actors, habits, and the process of change are socially constructed and played out. There is, however, a final piece of the puzzle; the social construction of context.

The contexts that we are habituated to, to use an ecological metaphor, can be conceived of as niches. Niches are the necessary relationships that sustain, define, and challenge life physically and culturally. Our relationship to our niche is defined by the activity systems that we inhabit and to which we are habituated. The particular activity systems that we are exposed to depend on the social and cultural positions that we are born into and/or adapted. These activity systems enable the satisfaction of basic needs, like food and shelter, but also define gender and class, and shape our professional identities, otherwise know as communities of practice (Wenger 1998). The sum of these activities defines our sense of self, our identity, and, conversely, who

and what we are not. As well as defining what we like, our habituated relationships define what we do not like. Thus, niches are not merely theatre-like stages on which to act, they are resistive, facilitative, and agentive.

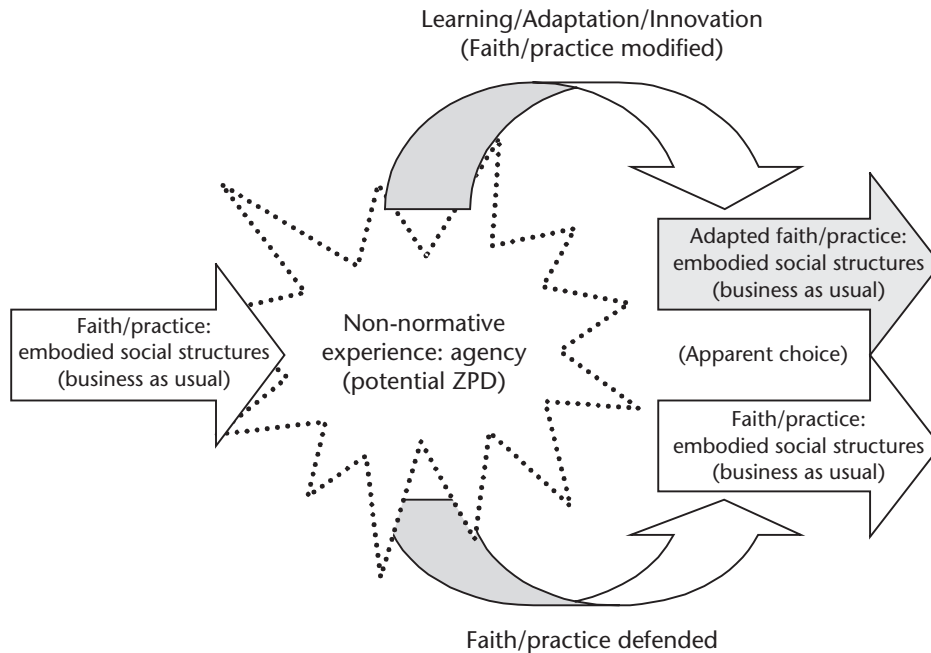
The facilitative function of our niches redefines the Schumpeterian "rail embankment". Although the rail embankment causes the train to travel a particular route, it could be used innovatively—as a ramp for a motor-cyclist to jump over the track. Our niches provide particular affordances that we may or may not use. They engender both habit and innovation. However, how we respond to a particular affordance, although fundamentally open-ended, is likely to be dealt with as we have been trained/habituated to use it. How we respond to the rail embankment is a function of our relationship with it—for example, as a train passenger, or as a dare-devil. And, as Schumpeter noted, most of us tend to be passengers, rather than dare-devils.

Niches are also agentive in as much as we may need to respond in a non-habitual way to changed relationship. Change can arise from acts that are intentional and purposeful, unintentional and still purposeful, or unintentional and without purpose. Nevertheless, the intent or purpose of the actor is not important. Rather, what is important is that the change in the relationship demands a response beyond habit. Agency, in its basic form is simply a response to change in a habituated relationship. Hence, agency exists within a relationship, rather than in a person. In this sense Innovation is a social or relational phenomenon.

Because niches are relational, they are not bounded; they are multi-dimensional and overlapping. A person's habits are made up of numerous activities, all of which are a function of relationships with others; setting the conditions of the habitus.

Agency is a response to, or instigation of a change in a relationship. However, while our niches are dynamic, our responses to them are fundamentally stable and habituated. Everyday we operate in a "business as usual" state—doing things that do not require attentiveness. These activities have the status of faith; "knowing" they are true and correct, without having to think about them. When a change in a relationship is encountered there is potential for change in the habitus (see figure 1).

FIGURE 1. The potential adaptive role of agency.



Applying the Model to Innovate to the Australian Building Industry

The literature implies that innovation is ubiquitous and difficult, yet, paradoxically, elusive. Schumpeter built his economic theory around innovation and, although he identified habit as a significant brake on innovation, his analysis was restricted by the proposition that individual differences account for the relational nature of innovation. The social learning model, developed herein, proposes that we are habituated to particular social niches that define likely responses to particular challenges, either defending what we already do or building on what we “know” to be right. From this perspective, innovation is the agentic pursuit of further adaptation to a particular habitus. As such, innovation is a socio-political phenomenon, pursued and resisted by groups defined by their different habitus.

Evidence for this model is found in the development of the EcoSelector. There was a clear agenda for change. This agenda was not that of an entrepreneur. Rather, it was that of people whose habitus included an awareness of, and professional commitment to, sustainability. The individuals at the CfD,

VicUrban, and its predecessor, the URLC, provided a space for the expression of this habitus, which allowed for the conceptual framework for Aurora to be developed. Other professionals, with similar beliefs joined because of the fit between their habitus and the proposed project. They attended meetings that, for a more run-of-the-mill project, they would not have. Hence, there was an alliance of different organizations that pursued innovation for sustainability.

The EcoSelector was perceived as a threat by forest industry’s representatives. As a result, they fought to preserve their habitus, activities, and daily practice. Interestingly, the builders did not view the EcoSelector as a threat and complied with its requirements. However, they did not pursue the most sustainable options. Although the builders were prepared to change, the chances they made did not shift their practice. They were able to comply with the EcoSelector by replacing a less sustainable product with a more sustainable one. This meant that, although the supply-chain changed, the builders practices did not. A more sustainable brick replaced a less sustainable one, less toxic paints are used, but the builders do not, for example, use different techniques.

Although the EcoSelector suggested superior products and systems, like a compressed strawboard interior wall system, these were not adopted. To do so would have required a significant change in a range of existing practices, from design and specification to installation. Because this product required changes to the habitus, it was not adopted. Other “small wins” occurred with some suppliers. A door manufacturer made a rainforest-timber-free range, which had not been available. Changing the type of timber within the frame of a door is also easy as it does not require activities that go beyond the manufacturer’s habitus. Another manufacturer, who made less toxic craft board also changed in keeping with their habitus. They were making formaldehyde-free craft board in Australia, but not selling locally. As a result of the craft board being specified in the EcoSelector, it came onto the local market.

This model also accounts for the unforeseen adoption of the EcoSelector. The architects who found out about the EcoSelector and asked to use it, although having nothing to do with VicUrban or the Aurora project, had a habitus concerned with sustainability and the built environment. This orientation made them eager for tools like the EcoSelector, even if they were not specifically designed to meet their needs. This adoption is indicative of the agentic pursuit of innovation to extend our abilities.

Where change for sustainability fits with existing habitus it will be pursued, or at least, accepted. However, changes that are not constant with habitus will be resisted. For those targeted by the EcoSelector, the builders, there is evidence of some change. However, the boundary conditions of their habitus, in particular minimizing financial risk, meant that they did not engage in sustainability for sustainability’s sake.

CONCLUSION

The model developed in this paper elucidates some of the issues raised in the literature regarding innovation. The form or scope of innovation is not limited by an arbitrary boundary, like a market or economics, but is a function of the perceived adaptability of the particular innovation facilitated by a particular habitus. The limits of a particular innovation are not set by innovators but by the habitus of others. The intent of the EcoSelector for the green building environment was to change the builders. From this per-

spective it is a bounded phenomenon. However, one cannot predict who might find the innovation useful. The issue of boundaries, when considered from a relational perspective, makes little sense as this presupposes an edge condition. Innovation is not a thing; it is the process of adaptation. It was the agency of the architects who had nothing to do with Aurora that saw them find and use the EcoSelector.

The literature identifies a range of factors involved in innovation. These can be accounted for if considered to be a function of the resistance to, and pursuit of, countervailing habitus, afforded by a particular context. The initial development of the EcoSelector was smooth. There was agreement about its form and purpose. This agreement changed when the focus of the EcoSelector was shifted from educational to prescriptive purposes within the new management culture at VicUrban. This change engendered significant resistance from industry bodies that perceived the EcoSelector as a threat to their habitus. In this case study there is evidence of tacit knowledge,¹⁸ cooperation, risk taking, necessity, the importance of self definition, collaboration, performance-based regulation, a readiness of the organizations involved, strong leadership, and “good” timing. But are these discrete phenomena that can be deliberately deployed to engender innovation? No, they are relational phenomena that are elicited by the innovation process. They are not things. They are the responses of actors using the tools at their disposal, which are a function of, and deployed to, extend or protect their habitus.

Innovation is a universal phenomenon, driven by the dialectics of life. These relationships are in flux, changing over time. Timing is important and, in the case of innovating for sustainability, current worldwide engagement with this issue means that the stage for significant change is set. There has been a marked increase in public, professional, and government awareness of the need for significant change. This change, although sometimes appearing to be “just” rhetoric, is, nevertheless, a legitimate process which, like the development of the EcoSelector, starts to shift practice. This is objective change. It is yet to be seen whether the continuous innovation, demonstrated by the builders, is fast enough to address the impending environmental crisis or whether more radical change is required. It is noteworthy that

developers are now calling for regulation to force the industry to become more sustainable (Brockie 2008). In a highly stratified industry, this represents one, albeit important, shift in practice.

Implications

If actions speak louder than words, then the question of habit must be given at least equal consideration to that of rational ideas. To fail to engage with the practices that we want to change is to engender a fight. To demand change without considering practice is to moralize. High volume builders are not “bad” people. However, they, like the rest of us, are wed to their habitus. Changing to a sustainable future is predicated on adapting our currently unsustainable practices. While change is necessarily difficult, regarding sustainability and the build environment, there is much to be optimistic about.

Clearly the “time is right.” The growing chorus for change is unabated and will remain so. This means several things for individual and organizations pursuing change. First, there are “natural” allies to be found in many locations. These allies may sometimes be in the minority, other times they may have already changed the habitus of an organization—making sustainability its business. Because innovation is social, brining together like-minded individuals and organizations around particular projects is vital for innovation for sustainability to occur. This allows for “cross-fertilization” and sharing of ideas, but also allows for alliances to be forged that will be useful in dealing with the inevitable resistance to change that innovation engenders. You will know when this is happening. A thing like managers turning up for meetings when normally they would send their workers happens. Hence “networking”, professionally and socially is useful.

Second, we must take into account that people are wed to their existing practices for good reason, even if those practices are considered problematic. Effective change management requires the identification of the practices that need changing and then setting out methods for achieving their transformation. Some change does not require modifying practice, like when a less-sustainable brick can be replaced with a more sustainable one. However,

if the object of the proposed innovation requires a change in practice, it will engender resistance which will necessitate a protracted process to work through the issues that will arise.

Third, contextual conditions are boundaries that limit the possibilities for change. The nature of the Australian building industry meant that smaller builders simply could not afford the protracted design and development phase. Significant R&D can only be done by organizations large enough to absorb the costs. Similarly, because the on-site workers are removed by up to three or four tender/contract cycles, they have no understanding of the purpose of the changes being proposed by VicUrban. This means that changes had to be managed by planning processes, but such processes are managed by validation via inspection. For business-as-usual tasks, inspection is adequate, but as a mechanism to engender change, it is problematic as it is *post hoc*. One builder noted that training is vital, but was largely absent from this process.

It is impossible to foretell the consequences of change. Unexpected resistance and successes are natural. Sustainability, like any change, is not a goal but an iterative, transformative and recursive process.

Future Research

The theoretical model, developed herein, came out of a complex interplay between the ideas (habitus) that the author brought to the research, the activity of doing the research, and the ideas that the author explored during the research (other habitus). As such it has a specific focus—the development of a material selection tool for the mass-volume housing market in Australia. This narrowness is also a function of the qualitative research methodology used. Future research into the applicability of the model at different scales, such as city-wide or regional planning proposals and or policies would be of use. Also, empirical research could be conducted to validate the model. Such research could draw on implicit psychological measures (it is hypothesized that these can directly access habitus). It is also conceivable that research into the habitus of “communities of practice” would shed light on why particular sectors resist or pursue sustainability.

NOTES

1. The designers of the EcoSelector defined sustainable relative to existing building products. Thus, sustainable means an improvement in performance when taking into account the perceived problem(s) of a particular product. The criteria were: embodied energy, resource consumption, toxicity, and/or biodiversity.
2. A synopsis of the EcoSelector can be found at <http://www.vicurban.com/cs/Satellite?c=VPPage&cid=1171606213246&pagename=VicUrban%2FLayout&coaid=1163385910773>, retrieved 15/06/07
3. The EcoSelector is limited in its scope to the Aurora Estate, while the Sustainability Charter guides all of VicUrban's projects.
4. For example it was reported in the Courier Mail <http://www.news.com.au/couriermail/story/0,23739,21624334-3102,00.html> on April 26, 2007 that a CSIRO survey found 90% of 1800 Queenslanders surveyed believed climate change is an issue vital to the nation's future. Similarly an international poll found that 69% of Australians said that climate change is a serious problem requiring urgent action even if this is costly and, a further 23% said that it's a gradual problem requiring gradual steps that are low in cost. Only 8% were unsure about whether climate change is a problem, as such no steps should be taken that would have a cost.
5. <http://www.sv.sustainability.vic.gov.au/buildings/5starhousing/index.asp> accessed 02/07/07
6. Life-Cycle Assessment
7. Memorandum of Understanding
8. Outcomes from the workshop_final.doc
9. Communicated in private correspondence.
10. Waffle pods are polystyrene blocks that create voids in the slab, reducing the volume of concrete.
11. Forest Stewardship Council
12. The threat of legal action is a weapon that is being used regularly against environmental groups, even when a case may have little or no merit. See Walters 2003
13. Manufacturers can apply to have their products included in the EcoSelector
14. It is fascinating that LCA was foregrounded in early discussions during 2002 but was not actively pursued, but after the intervention of VAFI and others, is now likely to be the preferred methodology for future work in the area of materials selection.
15. The Wilderness Society has waged a long-standing campaign against the harvesting of native forests in Australia.
16. Delphi methodology is designed to aid discussions between remote or estranged people and is a facilitated round-robin process.
17. Group membership is multitudinous. We belong to different classes, genders, ethnicities, professions, churches, etc. As such, we have a repertoire of behaviours that we can deploy at appropriate socially determined events.
18. According to the model, tacit knowledge is part of the habitus.

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