8. Innovation in human/social guise*

Susan A. McDaniel

INTRODUCTION

Innovation, in popular parlance, is aeons old – as old as humanity itself. Archaeologists, anthropologists and historians have found that some individuals in most societies, and many societies themselves, were always thinking that there must be a better way. Winnie-the-Pooh thought exactly that, as Christopher Robin dragged him by the arm down the stairs, bump, bump, bumping. Innovation, or the action of bringing in new methods or making changes, is inherently human (Fagerberg 2004, p. 3). Indeed, without continuous, relentless innovation, humans would still be living in caves and trees and eating roots and berries.

Yet, the study of innovation has, at least in contemporary times, been somewhat channelled, perhaps as much by policy as by disciplinary focus, to the study of technical change or the mechanical insertion of technical novelty into production (Fontan, Klein and Tremblay 2004). Innovation is further viewed, particularly from the perspective of policy, which has shaped the research paradigm and agenda, as 'the process of taking new ideas effectively and profitably through to satisfied customers' (McAdam, Armstrong and Kelly 1998, p. 140). Innovation studies have become largely the purview of technology experts and, in application, of management analysts. That this is hyperbole to make a point is evidenced by many of the chapters in this volume, which take innovation one step beyond where it has been in recent years.

In this chapter, innovation is viewed from a step further back, as an astronaut might see the earth from space. It is not seen as something analysed as a linear, technical process, whether incremental or radical. Nor is it seen as a process in which social context adds to the mix of other factors to enhance the technical novelty and likely success of a new product. Nor is innovation seen as something to be managed organizationally towards success and profit. It is, as the innovation literature reports, all of these and more. But here, innovation is looked at as a social process, the human dimension of which is considered throughout in order for the process of innovation to be understood. To that end, the chapter is divided into four parts. First, the

socio-historical genealogy of innovation as a social process is examined. Second, innovation as a struggle on social terrain is considered. Third, the ways in which new thinking and new conceptual approaches to innovation might open doors to new directions in research and data capture are studied. Some reflections on the next steps in the capture of data on innovation when the human/social guise of innovation is the staging ground conclude the chapter.

THE SOCIO-HISTORICAL GENEALOGY OF INNOVATION

What is innovation in socio-historical perspective? It might be instructive to begin not in the past, but in the present. Two distinctions are commonly made in the literature with regard to innovation. The first distinguishes between invention and innovation, the former being the first occurrence of an idea for a product or process, and the latter being, most commonly, the first instance of putting the new idea into practice. Currently in Canada, the process of innovation is often conceptualized as a process of commercialization, whereby a new idea is taken to market. The compression of the processes of invention and innovation/commercialization is such that the two are often blurred. Indeed, in some policy circles research and commercialization are spoken of as if they were one, with nary a pause between the two words. Inventors and innovators, with intellectual property conventions and with 'in-house' corporate research and development (R&D) divisions, have led many analysts to see the processes as contiguous, if not coterminous. However, it can be the case that invention and innovation are hugely separated in time and space. Fagerberg (2004, p. 5) calls on the compelling example of Leonardo da Vinci, who, if history tells it accurately, had invented the airplane or its concept. However, the innovation or material realization of the idea took centuries to develop. Why? Because da Vinci's invention required complementary inventions and parallel innovations of all sorts to succeed – such crucial elements as electricity and the internal combustion engine, not to mention the creation of sturdy lightweight materials, production techniques, and people who could conceive that such a thing as a flying machine could be built. Without such complementary innovations, an invention such as da Vinci's is hardly more than the stuff of fiction or the butt of jokes.

Innovation is also often schematized by type: new products, new processes, new supply sources, new markets. Lists vary. The second distinction rests not on the front end of innovation – what in fact the innovation is to do – but on what the social and/or economic impact might be expected

to be (McDaniel 2000). New products, for example, are often presumed to be unequivocal benefits in the market, even if they are untested with consumers or end-users. New processes are fretted over more because the social difficulties of job losses and the challenges of human management to make the processes work are thought to contradict the economic benefits (cost-cutting). Of course, both schematizations of innovation (as products and as processes) overlook a fundamentally important dimension of innovation, the organizational, which certainly made possible major advances in societies and economies as diverse as thirteenth-century England (Dyer 1989), the early twentieth-century United States (Chandler 1990), and Japan, Germany and South Korea in the latter part of the twentieth century (Shin 1990).

If the fundamental question of interest is how innovations occur, a little hindsight goes a long way. The tracing of the genealogy of innovation in the realm of social thought reveals that little attention was devoted to this at all until the late nineteenth century. The explanation may be simple – that there was a strong belief in social change as gradual and linear. Innovation or sudden change was regarded either as 'manna from heaven' if the change was welcomed, or as jolting and worrisome if it was not. And in societies largely resistant to 'new ways,' most sudden change fell into the worrisome category. Indeed, Schumpeter acknowledged this tendency to resistance: 'In the breast of one who wishes to do something new, the forces of habit raise up and bear witness against the embryonic project' (1934 [1961], p. 86). More on this struggle in a moment. For now, let us examine some early thinking about innovation in social guise more closely.

Initially, innovation appeared indirectly in the sociology literature, as when Tarde (1890) explained societal change in terms of the accumulation of inventions, largely borrowed from other societies, that advances the human condition. It was only when Veblen and Schumpeter turned their minds to how economic and social change occurred that innovation came into its own as a theoretical concept.

Veblen (1921 [1934]) saw technology as the key factor in economic change historically. Important for this discussion is that he saw technology as having two components: tools and 'know-how.' The latter he referred to as 'immaterial wealth,' which is, as he so eloquently phrased it, 'the indivisible possession of the community at large (Veblen 1921 [1934], p. 28). Technologies, to be effective, must be well situated in a supportive social environment that includes culture. Technologies and social environments have a reciprocal influence on each other. Veblen, however, did not use the term 'innovation' explicitly, although it is clear that there is a resonance between contemporary usage of this term and the processes Veblen described.

Schumpeter (1934 [1961] and 1950) contributed stunningly to the social understanding of innovation, and he used the term explicitly. To him, the key process is leadership in all fields of social activity. The innovator/entrepreneur is the agent who carries forward new mixes of discoveries, although he or she is not the inventor per se. Economic change, then, is brought about by human actions rather than by ideologies or social structures. Human agency enacts change. Entrepreneurs create, according to Schumpeter, new contexts through which social interventions can take place. The actor brings about change in firms, organizations or societies through transformative leadership and changed social contexts. Innovation is a system as much as it is a process (Edquist 1997).

Schumpeter connected new products and new approaches with the social actors they serve. He articulated this beautifully when he said, 'It is not good enough to produce a satisfactory soap, it is also necessary to induce people to wash' (as quoted in Marty 1955, p. 92). It is not only that new products create economic gains, or that the new, in and of itself, creates value. It is that innovation and its products (which include processes and organizational changes) interact with social lives and structures in ways that are creative of more profound and transformative change. This, of course, can result in a social environment conducive to further innovation.

INNOVATION AS A STRUGGLE ON SOCIAL TERRAIN

As mentioned previously, innovation was not welcomed nor even observed by early social theorists because change in societies was not valued. Innovation, then, was contested both on the ground by societies and in its conceptualization as a social process by theorists. The social dimensions of innovation remained largely unobserved. Innovation is a struggle on social terrain in other ways as well, however.

Once the sense of the randomness of innovation is overcome conceptually, it is possible to observe and analyse innovation as a social process, to explain how innovations occur on social terrain. Schumpeter's decidedly socio-analytical approach has three dimensions. The first is the profound uncertainty about any and all innovation ventures – whether they will work, how they will work, who will be involved, and so on. The key to success is the satisfactory convergence of the social components – for example, acceptance of the possibility that the new idea might indeed work, development of a social network or team to implement it, co-operation among people to invoke the innovation process, and so on. The second dimension is the question of timing, and the need to move an innovation through the process

quickly to ensure that someone else does not get it to market first. This intensifies the need for social co-operative efforts. The third dimension, and distinctly relevant to the consideration in this section, is the necessity to overcome inertia – the resistance to doing something in a new way – which can pose a challenge to any new initiative. In all three dimensions, the social processes of innovation are apparent, and the need for a social underlay to innovation is essential.

Innovation, in Schumpeter's conceptual schema, is the outcome of ongoing struggles on social terrain among individual entrepreneurs and against social inertia. A critical mass of firms and enterprises entered the equation with the discovery that larger firms not only are more likely to produce more of those with receptivity to new ideas, but, as or more importantly, also possess the social capacity to mobilize teams to implement new approaches. Co-operative entrepreneurship became a component of successful innovation. This entails, of course, a division of entrepreneurial labour and an agreed sense that successful innovation necessitates diverse skills and co-operative coordination of efforts.

Absorptive capacity also matters in the struggle for innovation on social terrain. Cultivating the capacity to accept and use 'outside knowledge' is key to the development of innovative firms and an innovative society. This requires flexibility in day-to-day operations that enables new ideas to be considered, and 'bench strength' in human and social capital (OECD 2001) to make those ideas operational. If new knowledge changes or challenges existing mandates, it may be missed as an innovative opportunity. The classic example is that of Xerox, which developed both the personal computer and the mouse, but decided not to exploit these innovations because they were not directly related to the photocopy business (Fagerberg 2004, p. 11).

Another broader dimension of the struggle on social terrain with respect to innovation is the ways in which societies are structured and renewed to be open to innovation and the pursuit and development of new ideas. Anyone who has ever worked in a large organization has a sense, rightly or wrongly, of the receptiveness of the leaders of that organization to new ideas. The 'why bother?' mentality, once in place, is infectious and reduces the capacity of an organization to innovate. The same is true of societies that put in place policies that can either encourage or discourage the development and implementation of new ideas. If the ostensible purposes of public investments in innovation are:

- to create new knowledge that improves the quality of life of citizens,
- to provide better training and educational opportunities, leading to more rewarding jobs and a reversal of 'brain drains' to countries that provide greater recognition of innovation activities,

- to encourage the private sector to invest in partnerships with the public sector in innovation activities to leverage innovation investment dollars, and
- to create wealth for a country and jobs for its citizens,

then it is important that a country leverage and multiply the overall level of investment in innovation by increasing educational opportunities for involved students, enhancing the competitiveness of local industry and the employment and tax revenues they create, and creating opportunities for spin-off activities which can often enhance employment opportunities for companies that are either new or not directly related to the original investment target. Policies matter to innovation propensities (Cooke and Wills 1999). The back and forth of innovation processes with policy initiatives is another dimension of the struggle of the innovation process on social terrain.

Innovation assets include all the people who work in innovation institutes and universities. This group encompasses university and college faculty and research staff, technical and administrative support staff, and graduate and undergraduate students who often do the legwork on research projects that can lead to innovation. Each of these groups of people is important and complex, and synergistic relationships among them are crucial in making the whole innovation enterprise work properly. This is another dimension of innovation as a social system (Edquist 1997).

One of the key problems with Canada's innovation system has been that only certain human resource groups have been targeted for enhancement in the various innovation programs and policies. This has left serious gaps that have caused the whole system to perform below its potential. For example, the various research chair programs are aimed at hiring new faculty members, while prestigious scholarships assist students and infrastructure programs provide buildings and research equipment. However, without technical and administrative support staff to operate the equipment, assist in student teaching and do program administration tasks, much of the investment in the other targeted resources cannot be properly utilized and the existing support staff can burn out and move to less taxing and better-paid jobs in the private sector. As a result of investment in research hardware that is often underutilized because of insufficient human resources to put it into service and operate it, researchers themselves end up as technicians; this means that they then cannot teach and mentor students fully in order to foster the innovation process intergenerationally.

Struggles between private and public sectors are yet another dimension of innovation contests on social terrain. These have many elements, including regulation issues and challenges, the degree to which public policies

acknowledge the private sector's need for return on investment, and the fuzzy articulation between research in public institutions and private-sector 'take-up.' The list is lengthy. One of the most salient struggles concerns the production of highly qualified personnel. This is the largest product of public-sector institutions of post-secondary education. It is always a struggle to match the needs of the private sector with the products of post-secondary institutions. Whether and how this could be done better is an ongoing debate. New approaches are being used, however, such as R&D partnerships between universities and private companies to train students in the areas in which the private sector needs research. One well-known and highly successful example is the University of Windsor/DaimlerChrysler Automotive Research and Development Centre in Ontario.

NEW THINKING AND NEW CONCEPTUAL APPROACHES TO INNOVATION

The encouragement of new, innovative thinking about innovation is apparent at present. The concept of social innovation (Fontan, Klein and Tremblay 2004) takes innovation into the realm of social process rather than that of technical process with social elements. As a social process, innovation can bring about broad-based social and economic change. Space and proximity matter to this new way of thinking. This is well summarized by Gertler and Wolfe (Chapter 7 in this volume). A common theme in social innovation is the centrality of learning throughout life, across networks, across countries and across regions. Another recurrent theme is the key role of highly qualified personnel at every level to implement innovations. Leadership has returned to the fore, Schumpeter would be happy to know. Legislation and policies are important in facilitating the process of social innovation, as is location.

The new conceptual approach to innovation values the role of social experimentation. Instead of a reliance on firm-level case studies of innovation, a comparative framework is utilized to increase understanding of which innovation processes work and for whose benefit. Change in organizational approaches and structures is seen as ongoing and natural. Deviance becomes normative.

Social, economic and industrial innovation merge. Social innovation can be an impetus to, rather than an outcome of, technical innovation. Social entrepreneurs may bring together and coordinate networks of information, of influence and of common interest (Landry, Amara and Lamari 2002). In an analogy with a rain forest, ideas can be thought of as trees: they bloom and are fertilized through communication and coordination with

others; this contrasts with the more hierarchical plantation model, in which they are diffused, meet resistance, find a champion and progress. It is interesting to note that the *Oxford English Dictionary* includes a botanical definition of innovation as 'the formation of a new shoot at the apex of a stem or branch . . . the older parts dying off behind.'[1] This is clearly resonant with the rain forest analogy.

THE NEXT STEPS IN DATA CAPTURE

The chapters in this volume represent a watershed in the consolidation of what is known about innovation, its motivators and impacts, from various viewpoints, with a wide international sweep and a long historical and transdisciplinary perspective. In sum, we are knowledgeable, increasingly so. What we need to know, however, to illuminate policy may not be fully captured in data. Or, more precisely, what we need to know may be partially captured by, but not *linked* to, other data that make clearer what leads to, or enhances, innovation and what diminishes the capacity for innovation. For example, the supply of skilled labour is an insufficient predictor of innovation. It must be matched with meaningful work. This opens the door to *connecting* measures of highly qualified personnel with indicators of workplace satisfaction and labour productivity. It links economic forces with social factors.

Outputs of innovation (innovation as a non-inherent good) should be linked to the larger consequences. Does innovation yield higher quality of life? How? What are the links? Can they be captured? If, in fact, innovation could be demonstrably related to higher quality of life at both the individual and collective levels, it would be an easy sell in policy terms, and the outcomes of policy could be more sharply captured, to the delight of both official statisticians and front-line policy makers. The gap between claiming, as policy sometimes does, that innovation matters and being unable to demonstrate if and how it matters to quality of life is one of the largest in innovation data capture thus far. As shown by other chapters in this volume, the theory on the linkage has been in place for some time, beginning with Veblen (1921 [1934]) and Schumpeter (1950), but policy and data capture have capitalized on it only to a small degree.

A number of chapters in this volume open doors to the capture of data on innovation in the social and economic realms, and on innovation as a distinctly *social* process. So, what are some of the next steps? Capturing innovation in more than cross-sectional surveys is needed. Two recent examples have shown clearly the perils of collecting data only cross-sectionally. In the first, cross-sectional analyses of the earnings of recent immigrants to

Canada and those of earlier cohorts found that recent immigrants earn less. However, new longitudinal analyses have found that recent immigrants initially earn less than earlier cohorts, but over time the newer immigrants catch up faster (Li 2003). The policy implications of these longitudinal analyses are profoundly different from those derived from cross-sectional analyses alone. The social implications of these findings are equally different. With the cross-sectional analyses only, it might easily be presumed either that recent immigrants are less well attuned to the labour markets they enter or, conversely, that labour markets have less absorptive capacity for immigrants now. Alternatively, it might be concluded that differences exist between the characteristics and skills of recent immigrants and those of earlier immigrants. None of these conclusions is warranted according to the longitudinal analyses. The same perils for policy and public attitudes may exist if data on innovation are only cross-sectional. The capacity to follow innovative firms, enterprises or regional clusters over time would enhance the analytical understanding of the contextual factors behind innovation, and its short- and longer-term consequences.

The second example of the dangers of collecting data only cross-sectionally comes from research on poverty. Higher incidences of poverty were found with cross-sectional data analyses than if actual lives were looked at over time. In longitudinal analyses, people's lives were found to be uneven, with episodes of poverty common. Since much existing policy is based on life-course smoothing (such as student loans or pensions, for example) rather than on redistribution of wealth, knowing what happens across lives matters greatly for informed policy directions. Again, the same could be said (perhaps even more so) for innovation over time.

A longitudinal study of innovation would be valuable for examining the shifting contexts in which innovation occurs, thrives or dies. The contributing factors and the ways in which innovations find their way into and through the marketplace in real time could be examined. In terms of human and social dimensions, such a study, even if relatively small in scale, would make possible enhanced analytical insights into the relative roles of education/training, of networks of various sorts (research, business, information), of assets both tangible and intangible, and of social capital and trust, as well as of social infrastructure such as health-care systems, cultural resources and natural environments. Various studies have found all of these social factors to be contributors to innovation, but little is known, except in historical retrospective analyses (Callcott 2001; Dyer 1989), about their relative longer-term importance and which of them matters most or least in the birth and life of an innovation. Studies of innovation policies in the shorter term have revealed that social capital has a surprising degree of importance in innovation (Cooke and Wills 1999).

Another step in enhancing analytical capacity with respect to the human or social dimension of innovation might be one or both of the following. First is an analytical study of social infrastructure in relation to innovation and productivity. It has long been known, for example, that public health insurance in Canada has been important in giving some Canadian corporations a competitive edge (Statistics Canada 2003). But the overall role of social infrastructure – for example, schools, universities, the arts/culture, quality of life, pension policies, and so forth – has not been fully assessed. Now that it is known that public infrastructure is of great importance, it would be opportune to analyse what else matters to innovation in terms of human and social infrastructure. Micro-simulations of the sort that Statistics Canada has developed may be useful in this regard as well.

Second, it seems timely to do a multi-level analysis of the social and economic factors in communities or regions that relate to innovation. Such an analysis has been done for immigrant children in cities, and for various other social issues, but not for innovation per se except in part by the Innovation Systems Research Network (ISRN), based at the University of Toronto (www.utoronto.ca/isrn), which studies firms and enterprises in regional systems of innovation. Building on this research base is an exceptionally good way to advance understanding of the contextual social and human factors in innovation in communities, regions and states.

NOTES

* The author thanks Fred Gault, Director, Science, Innovation and Electronic Information Division, Statistics Canada, for the invitation to the workshop out of which this chapter evolved. She also thanks Alexander Affleck, her research assistant at the University of Windsor, for his help with the references, and Peter Frise, Executive Director of AUTO21, University of Windsor, for sharing his reflections on innovation.

1. I am grateful to Alexander Affleck for pointing this out to me.

REFERENCES

Callcott, George H. (2001), 'The quality of life in Maryland over five centuries', *Maryland Historical Magazine*, **96** (3), 272–302.

Chandler, A.D. (1990), *Scale and Scope: The Dynamics of Industrial Capitalism*, Cambridge, MA: Harvard University Press.

Cooke, Philip, and David Wills (1999), 'Small firms, social capital and the enhancement of business performance through innovation programmes', *Small Business Economics*, **13** (3), 219–34.

Dyer, Christopher (1989), *Standards of Living in the Later Middle Ages: Social Change in England c. 1200–1520*, New York: Cambridge University Press.

Edquist, C. (ed.) (1997), *Systems of Innovation*, London: Pinter Publishers.

Fagerberg, Jan (2004), 'Innovation: a guide to the literature', in J. Fagerberg, D.C. Mowery and R.R. Nelson (eds), *The Oxford Handbook of Innovation*, Oxford: Oxford University Press, pp. 1–26.

Fontan, Jean-Marc, Juan-Luis Klein and Diane-Gabrielle Tremblay (2004), 'Innovation and society: broadening the analysis of the territorial effects of Innovation', research note no. 2004–07A, Toronto: Innovation Systems Research Network.

Landry, Réjean, Nabil Amara, and Moktar Lamari (2002), 'Does social capital determine innovation? To what extent?', *Technological Forecasting and Social Change*, **69** (7), 681–701.

Li, Peter (2003), 'Initial earnings and catch-up capacity of immigrants', *Canadian Public Policy*, **XXIX** (3), 319–37.

Marty, A.G. (1955), *Analyse critique de l'oeuvre de Joseph Schumpeter*, Brussels: Ed. Montana.

McAdam, Rodney, Gren Armstrong and Brigitta Kelly (1998), 'Investigation of the relationship between total quality and innovation: a research study involving small organizations', *European Journal of Innovation Management*, **1** (3), 139–47.

McDaniel, Susan A. (2000), 'Capturing the elusive social impacts of technology', in John de la Mothe and Gilles Paquet (eds), *Information, Innovation and Impacts*, Norwell, MA and Dordrecht, Netherlands: Kluwer Academic Press, pp. 109–21.

Organisation for Economic Co-operation and Development (OECD) (2001), *The Well-being of Nations: The Role of Human and Social Capital*, Paris: OECD.

Oxford English Dictionary, on-line edition, accessed 15 March 2004 at http://dictionary.oed.com/.

Schumpeter, J. (1934), *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*, reprinted 1961, Cambridge, MA: Harvard University Press.

Schumpeter, J. (1950), *Capitalism, Socialism and Democracy*, Cambridge, MA: Harvard University Press.

Shin, Jang-Sup (1990), *The Economics of the Latecomers: Catching-up, Technology Transfer and Institutions in Germany, Japan and South Korea*, London: Routledge.

Statistics Canada (2003), 'Public infrastructure and the performance of the Canadian economy', *The Daily*, accessed 12 November 2003 at http://www.statcan.ca.

Tarde, G. (1890), *Les lois de l'imitation*, Paris: Felix Alcan.

Veblen, Thorstein (1921 [1934]), *The Engineers and the Price System*, New York: Viking.