Book Reviews

Understanding Novelty: Information, Technological Change, and the Patent System

Thomas Mandeville

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This is a slim volume, but it contains much between its covers. In a concise and elegant way it draws together the important strands of the emerging information-theoretic paradigm, develops a theory and applies that theory to the patent system.

The information-theoretic perspective has been a while in the making. Information has always functioned as something of a dangerous supplement in orthodox economic theory, its problematical nature veiled by assumptions of perfect distribution and availability at zero cost. Over time, as Lamberton has documented, various pioneers have lifted that veil.[1] They have sought to develop better theories of economic life by focusing on the role information plays in that life. Information economics, says Mandeville, is 'the study of people and institutions concerned with the production, communication, and consumption of information' (p. 2).

Before turning to Mandeville's main arguments, a brief outline of the structure of his work is in order. After the introductory chapter, chapter 2 provides a brief summary of the main features of a domestic patent system, as well as the international legal context in which such a system operates. A word of warning needs to be issued here to readers. Intellectual property law is a fast developing system. It is no longer true to say that in Australia computer programs are not patentable (see p. 14 of Mandeville). In IBM Corporation v Commissioner of Patents (1991) 22 IPR 417 the Federal Court upheld a patent on an algorithm designed to produce a curve on a computer screen. The Australian Patent Office (now called IP Australia) follows to some extent US Patent Office guidelines on the patentability of computer programs (an example of global regulatory harmonization within the patent system).[2] Similarly, the international dimension of the patent system has been profoundly changed by the Agreement on Trade-Related Aspects of Intellectual Property Rights of 1994, an agreement that was concluded as part of the Uruguay Round of trade talks. Most importantly, for the first time an international treaty on patents will be genuinely enforceable. None of these points affect Mandeville's arguments. In fact, they are part of a trend, which he correctly identifies, towards a strengthening of the patent system. The rest of chapter 2 sets out the conventional economic justification for the patent system and contrasts this with data on the actual workings of the patent system. This data, much of which is based on earlier work carried out by Mandeville and others in Australia, suggests that the patent system is not particularly effective in preventing free-riding, is not a major factor in determining R&D activity and does not produce information which is widely used by others in the innovation process. At the end of this chapter the reader is left with a puzzle.

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Conventional economic theory suggests on *a priori* grounds that the patent system should be much more important than the empirical evidence reveals it to be. The conventional response to the damning evidence is to say that the system ought to be strengthened. Mandeville's response is to begin a search for a better theory, a better explanation.

The search begins by examining the orthodox view of innovation and its limitations (see chapter 3). Chapters 4 and 5 develop a processual theory of innovation based on the assumption that innovation is at the heart of an information learning process. Chapter 6 sees Mandeville applying the theory to the patent system in two ways. Firstly, he uses it to explain the workings of the current system. Secondly, he draws on the theory to make some policy recommendations for the adjustment of the patent system.

The standard justification for patents and other intellectual property rights is well known. Economic agents are assumed to be rational profit maximizers. An agent will only bear the R&D costs necessary for product innovation if it can 'lock up' the R&D information that leads to the innovative product. If it cannot lock up the information, competitors move in, acquire that information at zero cost and produce the innovative product at a price below that at which the first agent did so (primarily because the competitors save on the R&D cost). In a market without protection for R&D information it is rational for agents to free-ride on the R&D efforts of others, but not rational for them to undertake their own R&D. The patent system seems, on the face of it, to provide a solution to this problem. Economic agents are given monopoly rights over the R&D information embodied in the new product. However, the duration of that monopoly is limited (normally 20 years), so that others will eventually be able to compete in the making of the same product. Thus, the patent system encourages a return to the competitive market. Further, the patent system releases the R&D information into the public domain in the form of patent specifications during the period of the monopoly so that others can make use of the information to produce non-infringing products. In this way the patent system is said to encourage the availability of useful information at zero cost, while at the same time helping to encourage the production of new information.

On the face of it, the patent system seems to present a satisfying solution to the problem of ensuring that the market works to allocate sufficient resources to innovation. The empirical problems of the patent 'solution' have been well documented by Mandeville and others. There is no need to repeat them here. Instead we shall, in the space remaining, examine the arguments that Mandeville develops against the assumptions of the conventional economic solution.

One such key assumption is that innovation is an event. Innovation occurs when a new product enters the market. Moreover, products are tangible entities. Since the focus of the conventional theory is tangible products it seems to follow that, if one can enclose those products with property rights, the market for innovation can be made to work more efficiently. Just as in the case of the physical commons, enclosure solves the problem of appropriation for the information commons.

Mandeville's analysis of these assumptions starts with Arrow's conclusion that innovation is 'about the production of information' (p. 38). Information, Mandeville argues, is 'inherently intangible' (p. 38). It may be and often is fixed in a product, but it does not follow that the information and the product are one and the same. Information-based products are tangible, but information is not. If innovation is about information rather than products, how is such information generated? The answer to this question leads Mandeville into a processual theory of innovation. Products are the culmination of complex, messy processes of innovation. Firms are no longer the key actors in these processes. The conventional view assumes single actors in antagonistic

competition with each other. Real life processes involve much more. No one firm can meet all its information needs through internal resources alone. Non-market mechanisms develop to encourage the flow of information. (Examples of such mechanisms are personal communication networks, open publication, and collaboration between technology supplying firms (see p. 75).) These mechanisms exist because individuals can see the benefits in keeping them. Co-operation amongst individuals is just as important to the innovation process as competition. Silicon Valley turned out to be one of the most important wellsprings of innovation in history because the members of the semiconductor community swapped ideas, often in bars, and shared experiences, as well as stealing ideas and people from each other. It was a milieu like no other.

The conventional economic account fails to grasp the importance of what Mandeville calls the 'richer context' of innovation (see p. 47). It also operates with an impoverished description of the attributes of information. Perhaps most importantly of all, the conventional account fails to recognize that information is subject to varying degrees of codification (see p. 50). The distinction between codified and uncodified information can be presented by means of a simple example. The recipe for the really good cake one gets from one's mother is codified knowledge. Yet following the recipe does not necessarily result in a delicious cake, because the recipe does not capture the years of experience and know-how that go into the making of the cake. Patent specifications rarely disclose what is really needed to make inventions work, which is why they are often accompanied by licensing agreements. Central to Mandeville's analysis is the claim that highly innovative industries are crucially dependent on flows of uncodified information. Less innovative industries are characterized by a greater presence of codified information. Importantly, uncodified technological information requires resources to imitate. It follows that uncodified information enjoys a certain level of 'natural protection' (see p. 93). Codified information is much more vulnerable to free-riding problems. The patent system has a role to play in helping to facilitate the exchange of codified information, but essentially it performs no useful function in the case of those innovative processes that are largely dependent upon networks of economic agents participating in flows of uncodified information. In fact, strengthening the patent system may have a negative effect on innovation, for stronger patent rights may, in fact, disrupt the fragile networks of communication upon which innovation is dependent. The present policy of expanding the scope of patentability to allow the patenting of strips of DNA or algorithms is seeing well-resourced multinationals fence off information for private, exclusive use. However, even they will not be able to do without the collective problem-solving capacity of the networks and processes that drive innovation. The problems of modern microbiology and mathematics will not be solved within the black box of the single firm, but rather by epistemic communities of scientists, mathematicians, technicians and programmers, as well as clusters of firms exchanging, sharing and perhaps stealing information. Somewhat paradoxically, strengthening the patent system may turn out to be a self-defeating exercise.

This is a book worth reading. The patent faithful will not like it. The patent attorney profession, which spends much of its time touting the virtues of the patent system, will hate it. Mandeville, however, has left them with a case to answer.

Notes and References

1. Donald M. Lamberton, 'The economics of information and organization', in Martha E. Williams

(ed.), *Annual Review of Information Science and Technology*, Vol. 19, American Society for Information Science and Technology, White Plains, NY, 1984, pp. 3–30.

2. See James Lahore *et al.*, *Patents, Trade Marks & Related Rights*, Butterworths, Sydney, 1996, paragraphs 12,555–12,575.

Peter Drahos
Centre for Commercial Law
Queen Mary and Westfield College
University of London, UK

Perspectives on Strategy: Contributions of Michael E. Porter

F. A. J. van den Bosch and S. P. de Man (Eds)

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Michael Porter's main published contributions to strategy are in *Competitive Strategy: Techniques for Analysing Industries and Competitors* (1980); *Competitive Advantage: Creating and Sustaining Superior Performance* (1985); *The Competitive Advantage of Nations* (1990); and 'Towards a dynamic theory of strategy', *Strategic Management Journal*, 12, 1991, 95–117.

To celebrate the award of an Honorary Degree to Michael Porter by the Erasmus University Rotterdam, The University Department of Strategy and Business Environment organized a seminar. Chief executives from Royal Dutch/Shell and Unilever, and Chief executives from the Port of Rotterdam and the Dutch Ministry of Economic affairs were invited to reflect, respectively, on Porter's contributions to strategies at the business, corporate, regional and national levels. Later these contributions were prefaced by very useful summary accounts, contributed by various members of the Department, of Porter's contributions at each level to the published appraisals of them, and followed by valuable essays by the two editors on how Porter's contributions over time could be related to each other and on how his different levels of analysis could be integrated.

The CEO of Royal Dutch/Shell wrote that in his first two books, Porter pulled together a widely scattered literature on the nature of competition, added his own research findings, and presented a coherent and comprehensive approach to analyzing the market place 'which businessmen can actually use' (p. 20). His three generic strategies—cost leadership, differentiation and premium value to customer, and market niche—'provoked managers into thinking seriously' about strategic choices, and his five-choices model enabled managers 'to analyse and question more acutely their own environments and to raise the level of strategic debate at the business level' (p. 23).

In the chapter on corporate strategy, a former co-chairman of Unilever (and now a Professor of Strategic Management in the Department) wrote of the tensions throughout Unilever's history, between growth by diversification and growth through synergies in related businesses. In his account of Unilever's changing business strategies, he demonstrated the relevance of Porter's five-forces model, value chain, and 'most importantly' his concepts of corporate strategy, and concluded that he handed Unilever tools that will help the corporation to further improve business performance. However, he warned that although the value-chain concept can be a great help in strategic thinking, intuition is often needed to complement or qualify quantification.

In the chapter on national competitive advantage, the Secretary General of the