

## Firm-based Strategies for Protecting Innovations

**Protection offered by Intellectual Property Rights is not always appropriate or effective. Sara McGaughey (University of Strathclyde) and Stuart Macdonald (University of Sheffield) describe 4 firm-based strategies for protecting the value of innovations, and explain why such strategies are likely to become even more relevant to many firms.**

Intellectual property is not the same as intellectual property rights (IPR). IPR seeks to extend to intellectual property (knowledge and information) the protection that most governments give to other forms of property. As the value of information increases - not least for innovation - so, too, does interest in protecting this value through such IPR as patents, design rights, copyrights, trademarks, and a few other very specialized rights.

Inadequate IPR protection in many less-developed but high potential markets remains, however, a key challenge for executives of large and small firms alike. Even in more highly industrialized nations, challenges exist in the use IPR. In the UK, US and Australia, for example, software piracy rates (i.e. the total number of units of pirated software deployed in 2007 divided by the total units of software installed) range from 20 to 28 percent.<sup>1</sup> Despite this, there appears to be a trend of multinational enterprises taking the seemingly risky step of locating their research and development activities (and not just sales or manufacturing) in a wide range of emerging economies where laws protecting IPR are weak or ineffective.<sup>2</sup> Innovative SMEs are also increasingly active on the world stage, sometimes with seemingly little regard for the use of formal IPR protection at home or abroad. Of course, practical disadvantages often deter small firms and firms in developing countries from using IPR, such as patents. SMEs often find the patent system complicated, slow and expensive. More important, they find that the temporary monopoly patents promise cannot be defended with the resources at their disposal. So how do such firms appropriate the value of their intellectual property, without formal protection? Consider the following two examples of innovative Australian SMEs from the marine industry.

**Case 1. Computer Design Marine (CDM):** This small Western Australian firm offers a variety of aluminium powerboats for domestic sale and export to Indonesia, Japan, Malaysia, Portugal, Thailand and the United Kingdom. One of the ways in which the vessels can be acquired involves the sale of software only. This software contains the cutting and marking codes for aluminium plate that is then welded together by the customer to form the selected vessel. Yet many of CDM's target markets have flourishing piracy industries. For example, piracy rates for business software have been estimated as 78% in Thailand, 59% in Malaysia and 43% in Portugal. *How does CDM protect itself against piracy of its software and the unauthorized duplication and sale of its boats?*

---

<sup>1</sup> Software piracy rates are drawn from the *Fifth Annual BSA and IDC Global Software Piracy Study 2007*, available at <http://global.bsa.org/idcglobalstudy2007/>

<sup>2</sup> See Zhao, M. (2006) Conducting R&D in countries with weak intellectual property rights protection. *Management Science*, 52(8), 1185-1199.

**Case 2. INCAT:** INCAT is an innovative Australian designer and constructor of high speed car- and passenger-carrying catamarans. It created the first high-speed car ferry, and developed the innovative wave-piercing catamaran in operation in Europe, North and South America, and Asia. In the 1990s, INCAT entered into a joint production arrangement with a former Hong Kong licensee, AFAI High Performance Ships Ltd, for the construction of its smaller catamarans in Panyu, southern China. While China was accepted as a member of the World Intellectual Property Organisation in 1980 and introduced its own patent law in 1985, the law's application continues to be viewed as favoring domestic firms. Even so, INCAT was and remains reluctant to rely on IPR to protect its intellectual assets – despite the heavy reliance on patenting by its major Australian competitor. *How can INCAT's continuing lack of interest in IPR be explained?*

### **Firm-based Strategies for Protecting Intellectual Property**

Special legislation is required to protect IP because information is not like other forms of property; it has its own peculiar characteristics.<sup>3</sup> Of relevance here is that information can be seized by others as soon as it is made public. In the absence of constraints, it can be passed on to others, and there is no incentive to pay for the same information a second time. Executives of innovative firms can protect their intellectual assets (knowledge and information) in four basic ways: impede identification, transmission, understanding, and application. Sometimes they use formal IPR protection to achieve this, sometimes not.<sup>4</sup>

- **Impede Identification:** Secrecy is the game here – keep information within the firm. Some sorts of information are more easily kept secret than others. Codified knowledge, for example, is explicit and can be expressed in words, numbers and symbols that are more easily shared. Uncodified knowledge is often tacit – knowledge that is personal and context-specific. Information identification and transmission are costly and difficult even within the firm, let alone outside the firm.
- **Impede Transmission:** Even if identified, firms may engage in efforts to impede the unwanted transmission or dissemination of key information through, for example, digital copying or word of mouth diffusion. While larger firms may use the threat of retaliation against imitators, this option is rarely available for SMEs, which are more likely to rely on in-built protection rather than market power.
- **Impede Understanding:** Inventions and new ideas are not as readily imitated as is often supposed. Even patents disclose only part of the story. Innovations often comprise a bundle of

---

<sup>3</sup> See Macdonald, S. (1998) *Information for Innovation. Managing Change from an Information Perspective*, Oxford University Press, Oxford.

<sup>4</sup> See McGaughey, S.L. (2002) Strategic interventions in intellectual asset flows. *Academy of Management Review*, 27(2): 248-274.

information fitted together in a pattern. Firms may deliberately impede the understanding of potential users by modularizing their innovations. They limit the identification of some parts of the innovation by unauthorized users, while allowing the identification of other parts that are too costly to keep secret. The interdependence of the modules means that potential competitors find that some parts of the jigsaw are missing. Understanding the whole may simply not be possible for competitors, particularly if they do not have the appropriate knowledge or experience themselves to fill in the gaps.

- **Impede Application:** While copying of highly codified intellectual assets (e.g. digitized plans or registered designs) may be inexpensive, unauthorized application of that information in creative processes of potential competitors is not so simple. This is especially the case where its use requires a large tacit component, where rapid cycles of innovation draw on a path dependent accumulation of knowledge, or where the innovation needs to be married with complementary assets to exploit the information in the market place.

#### **Illustration: IP Strategies of CDM and INCAT**

The above four strategies for impeding flows of key information are not necessarily used in isolation from each other. Consider again our two Australian companies.

**Case 1. CDM:** CDM uses two of the above strategies, applying three mechanisms to impede the identification and transmission of information, and hence protect its software in export markets. First, it impedes identification of the source-code by using encryption – it keeps this knowledge within the firm. Second, it impedes unauthorized duplication through copy protection. Third, to prevent the unauthorized production of the vessels through multiple uses of the one software disk, the computer software destroys itself immediately as soon as it has guided the cutter and checked a panel for welding in boat assembly.

**Case 2. INCAT:** INCAT uses all four strategies to protect its intellectual property, but does not try to protect everything. There is a significant amount of technical information available to its joint venture partner, and all vessels sold by INCAT in the international market also contain a complete set of plans that explain how the vessel was built. This information is thus easily identified and transmitted. The plans of INCAT's design for any one vessel, however, convey only part of the story. Missing is a vast stock of tacit and codified knowledge used in the vessels' creation, production, maintenance and customization for new situations and customer requirements.<sup>5</sup> Codified information, such as the principles underlying the design features of INCAT's vessels, is kept secret, and key modules of the vessels are manufactured at home to avoid unwanted transmission and understanding of core technological information. INCAT's vast amount of tacit knowledge is accumulated over time through

---

<sup>5</sup> McGaughey, S.L., Liesch, P.W. and Poulson, D. (2000) An unconventional approach to intellectual property protection: The case of an Australian firm transferring shipbuilding technologies to China. *Journal of World Business*, 35(1):1-20.

a complex combination of activities. These activities include the tracking of each vessel over its entire life, despite changes in ownership; participation in marine advisory boards; and the generation of computer simulations to understand vessel performance in adverse conditions. Without this understanding accumulated over time, potential competitors find it impossible to make alterations to a design to accommodate requests for customization. Effective application of the information in a competitor's own product development is thus impeded, and competitors lack the understanding that can inform complementary services, such as quick-response maintenance. Competitors do not gain the advantages of learning-by-doing and experimentation, and INCAT keeps one step ahead of competitors through continual investments in incremental innovation.

So, CDM and INCAT have managed to protect their intellectual property without resort to formal IPR. While CDM has automatic copyright protection for its software, it chooses not to rely on this. INCAT, unlike its major Australian competitor, holds no patents. Yet, with changes in the world of IPR in recent years, such firms may be tempted to re-assess their reticent approach towards IPR. There has been massive increase in patent scope (almost anything can now be patented), patent scale (patent applications and patents granted have increased everywhere), and patent reach (as the Trade-Related Aspects of Intellectual Property arrangements seek to harmonize national IPR systems). Together, these changes make IPR, and the patent in particular, more valuable and thus more attractive to those who are able to reap the value of IPR. These are not usually the small and weak, though: they tend to be the big and strong, able to search databases, maintain large patent portfolios, and engage in sophisticated IPR strategies.<sup>6</sup> Such strategies can be costly. In this new world firms will have to be as creative in their strategic use of IPR as in their innovation.

**Sara McGaughey** is Professor of International Management at Strathclyde Business School, University of Strathclyde. Sara has worked in small businesses in Japan and Mexico, and has held academic posts in Australia, Denmark and the UK. Her research is interdisciplinary, typically arising from engagement with organizations and managers and the challenges they are facing. Current research projects explore strategies for protecting and exploiting knowledge and information in multinational enterprises and SMEs, international entrepreneurship and the role of multiple business ownership in international new venturing, and 'institutional entrepreneurship' whereby entrepreneurs build their own goals into (and hence change or shape) European and international standards. Email: [sara.mcgaughey@gsb.strath.ac.uk](mailto:sara.mcgaughey@gsb.strath.ac.uk). <http://www.strath.ac.uk/management/staff/saramcgaughey/>; Telephone +44 (0)141 553 6122

**Stuart Macdonald** is Professor of Information and Organisation at the University of Sheffield. Research has long been concerned with the role that information plays in innovation and in change

---

<sup>6</sup> Macdonald, S. (2004) When means become ends. Considering the impact of patent strategy on innovation, *Information Economics and Policy*, 16, 1, pp.135-58. Macdonald, S. (2003) Bearing the burden: Small firms and the patent system, *Journal of Information, Law and Technology*, 1.

more generally. Most is strongly empirical, generally involving long-term investigation within organisations. An approach that makes information central to enquiry does not fit comfortably within the boundaries of a single discipline and has necessarily been pursued in several. This is reflected in publication in journals of many disciplines - economics, physics, geography, history, engineering, electronics, agriculture, management. Inevitably, the research has become inter-disciplinary and multi-disciplinary. Much of it has been carried out overseas, a great deal in Australia, and there are currently research collaborators in several parts of the world. Always the aim of the research is to contribute to understanding and thereby, perhaps, to corporate strategy and government policy. Email: [s.macdonald@sheffield.ac.uk](mailto:s.macdonald@sheffield.ac.uk). Telephone: 44 (0)114-222-3446.