



# Leveraging intellectual property for strategic advantage in product development

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**Key words:** Strategic product development, intellectual property, knowledge management mechanisms

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## 1 Introduction

### 1.1 Research focus

In the emerging knowledge-based economy where competencies in speed-to-market and

market intelligence are considered prerequisites for market leadership (Bean and Radford 2000; Coade 1997), innovation has become the primary factor influencing competitive differentiation and stakeholder value creation (Janszen 2000). In a context where creative thinking determines competitive advantage (Coade 1997) and where the nature of products and services is increasingly more complex (Downes and Mui 1998), knowledge creation and protection mechanisms also promote sustainable organizational leadership (Nonaka 1991) with intellectual property (IP) and knowledge management in product development serving as factors for differentiation by team, rather than by product (Coade 1997; Janszen 2000).

In seeking to identify management best practice in this ever-changing context of increasing competitiveness and complexity, the research to date indicates that management attention across the life cycle of a product must focus on exploiting IP as a strategic lever for creating competitive advantage. Such focus encompasses the following:

- *Resource management*: management must seek to ensure the synchronization of technical innovations with knowledge protection initiatives across the product development life-cycle; and
- *IP strategy*: management must define a tactic for the exploitation of its evolving IP at optimal commercial benefit.

## 1.2 Scope of intellectual property

'Intellectual property' refers to the protection of the products of human creativity that encompasses the 'originality of new products, the confidentiality of know-how and the distinctiveness of names, trade marks and get-up' (Spoor & Fisher 2001).

The legislation relating to copyright, patents, trademarks, designs and competition, all of which form part of IP, is a tool that must be exploited by product developers to create competitive advantages in the knowledge economy. Thus an understanding of this body of law is a prerequisite for exploiting potential benefits and includes an understanding of the (MRL201J 2003):

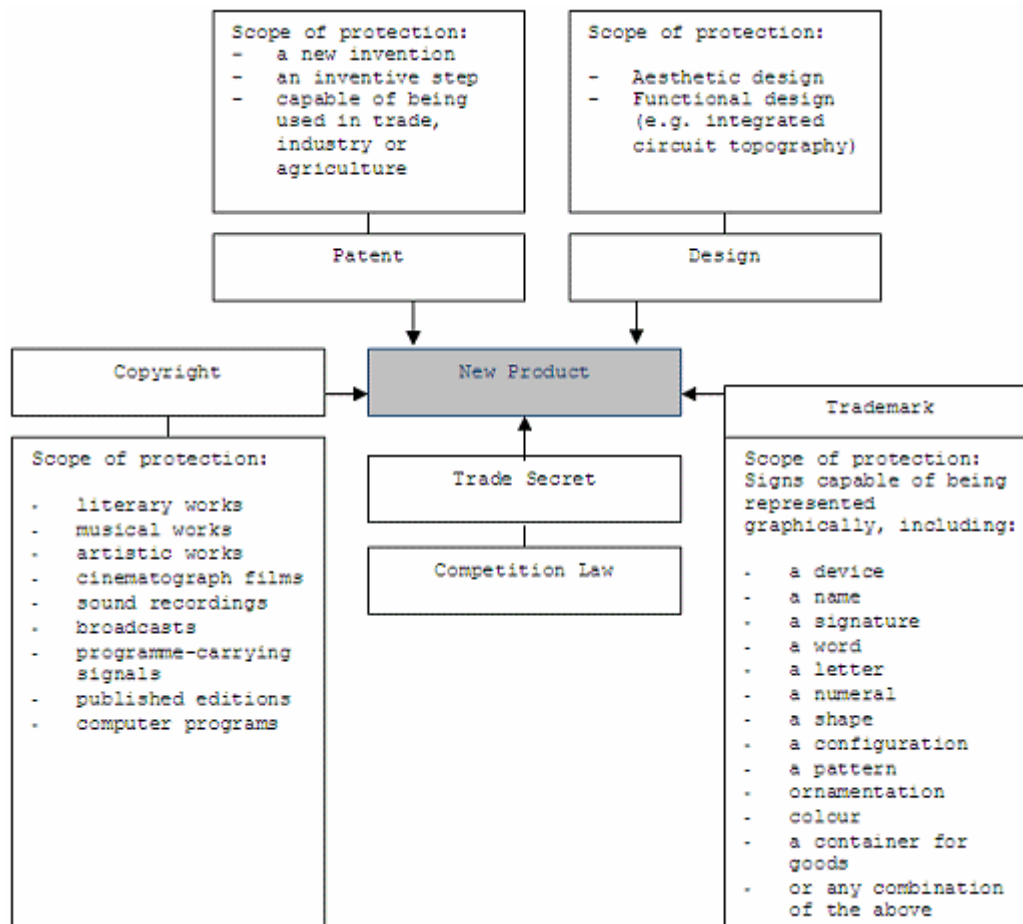
- legal framework that determines the nature and scope of a particular class of intangible assets;
- requirements that need to be fulfilled in order to create those assets;
- bodies who will acquire and enjoy the rights with respect to these assets;
- content and powers that are derived from such rights;
- manner and timing related to the enforcement of these rights; and
- duration and termination of these rights.

Han, Kim and Kim (2001) distinguish distribution access (controlled by trademarks) from proprietary assets (controlled by copyright and patent law) and identify these as types of entry barriers that are effective deterrents and enablers or inhibitors of innovativeness. Leading companies tend to innovate, originate and develop rather than administer, emulate and maintain (Bennis 1989), and for this reason the leaders are best able to exploit IP as a strategic lever to protect their organizational competitive positioning and create additional competitive advantages generated from the knowledge creation activities.

Employing IP as a strategic tool in product development warrants an 'IP Product Protection-Matrix' approach (Figure 1). This approach applies each aspect of IP law to particular products or services, providing protection on various levels and in this manner collectively creating significant barriers to entry.

**Figure 1** IP Product Protection-Matrix (adapted from Minnaar and Smit 1999; MRL201J

2003; Stern and Hooper 2004)



In the South African context, the advantages of such an approach include the following:

- Design protection provides the registered owner of the design with monopoly rights for a period of between 10 years (functional designs) and 15 years (aesthetic designs). This prevents competitors from importing, making, using or disposing of products covered by the registered design (Minnaar and Smit 1999; Stern and Hooper 2004);
- patent protection gives patent holders monopoly rights and enables the patent holder to exclude competitors from using, making, exercising or disposing of products covered by the patent, for the duration of the patent (normally 20 years from the date of filing) (Minnaar and Smit 1999);
- trademark protection (whether the trademark is registered or not) enables goods or services of the owner of the trademark to be distinguished from that of competitors, providing a mechanism for managing brand names, company names and product attributes such as quality, durability, etc. within the market, potentially into perpetuity (Minnaar and Smit 1999; Stern and Hooper 2004); and
- copyright protection enables the copyright owner *inter alia* to prevent others from copying, publishing, performing or renting out the work (Figure 1) to others for the lifetime of the author and includes protection for an additional 50 years after the author's death (Minnaar and Smit 1999; Stern and Hooper 2004).

### 1.3 Knowledge economy

Modern businesses are characterized by constant change, which is the result of greater creativity and the application of knowledge (Coade 1997; David 1998; Imparato and Harari 1996), typified by a shift in the world economy where technology has become the key driver

of increased efficiency (Downes and Mui 1998).

As witnessed in the last century, numerous market players have assumed dominant positions and leap-frogged competitors through successful innovation (Black and Lynch 2003; Han, Kim and Kim 2001) and, as the pace of technological developments continues to accelerate across various sectors, shifts in standards and needs have occurred, resulting in more windows of opportunity being opened for innovative challengers (Markides 1997).

The main levers for taking advantage of emerging opportunities are the acquisition, assimilation and management of knowledge, and the generation of new knowledge, all of which establish the organizational 'intelligence' that leads to and establishes leadership. Knowledge has thus become the key differentiator in this new context and, in order to exploit this knowledge, knowledge strategy formulation and choice need to be incorporated in the strategic framework and activities that receive management attention and resource allocation (Von Krogh, Nonaka and Aben 2001).

Formulating new strategies that constantly redefine the rules of the competitive landscape ensures advantage (Janszen 2000) and IP protection is a strategic tool that enables such leverage, being an essential component for the protection of innovation and sustainable development. It is therefore a core competency of those global leading companies that recognize it as an essential mechanism for creating barriers to entry (Lamprecht 2004a).

With the global trend being one where IP rights are deemed increasingly valuable assets by the market, IP rights are being strongly enforced (Drahos and Braithwaite 2002). Maier and Spivak (1994) refers to the American (US) cases of *Polaroid vs. Kodak*, 229 USPQ 561 and *Litton vs. Honeywell*, where significant amounts (US\$900 million and US\$1.2 billion respectively) were awarded in damages to the aggrieved parties respectively for IP infringement.

Since IP owners regard improvements in technology as increasingly important tools to police their IP rights (e.g. software development companies are now able to monitor client usage, automatically report instances of unauthorized copying or unlicensed usage via the Internet and take legal action where appropriate) (Drahos and Braithwaite 2002), employing an IP strategy that seeks to analyse and reduce infringement risks and build IP assets is justifiable, if not mandatory, in an information and knowledge-driven era (Maier and Spivak 1994).

In an arena where the encouragement of monopolies in improvements by means of IP rights makes information a valuable commodity, thus making the borrowing of ideas to innovate more expensive, there has been a significant number of concerns by market proponents that IP protection may inhibit research and development (Drahos and Braithwaite 2002). Such fears include, for example, the fear that genomic patents would disrupt biological research, that copyright extension into the digital networked environment will not be beneficial (especially in the field of education), and that patents covering business methods will retard the anticipated benefits for science and civil society from the development of e-commerce and the Internet. The main concern is that the IP system locks up new knowledge and information for lengthy periods, conflicting with the need of science to gain new information and disseminate that knowledge at minimal cost to benefit society (Dickinson 2000; Drahos and Braithwaite 2002). Dickinson (2000) identifies the following reasons for the perceived hindrance of research and development (R&D) as a result of IP:

- In considering (investment) trends in R&D in the US, the private sector has been funding an increasingly greater amount on R&D, while the government has been funding an increasingly smaller amount. The key motivator for companies to invest in R&D has been the anticipated financial returns, linked closely to the IP rights

emanating from the R&D. The consequence of this increasing role of private funding in R&D has thus led to an increasingly important role for IP. In the US case, the failure of government to benefit from the commercial exploitation inventions emanating from government-funded research has been attributed to a lack of motivation by universities, small companies and non-profit organizations to turn their research findings into marketable products. This was remedied through the passing of the *Bayh-Dole Act* and has resulted in the creation of 'more than US\$30 billion of economic activity, 250,000 jobs and 2,200 new companies a year' (Dickinson 2000) as a result of the commercialization of new technologies emanating from academic institutions.

- The economic value of information and knowledge has become increasingly important, driving competitive advantage among companies in today's knowledge-driven economy. Moreover, the value of the IP in such knowledge/information is increasingly receiving recognition, particularly in asset registers and company balance sheets (Minnaar and Smit 1999). Accountants and corporate executives are now recognizing IP as key business assets (e.g. the value of the Coca Cola brand potentially exceeds the value of the tangible assets of the company) (Minnaar and Smit 1999) to the extent that these assets may be suitable for securitization as assets that potentially become more valuable over time (Katz 2003). For example, an IP right in respect of a valuable resource is capable of placing the holder of the right in a controlling position in a particular market (Drahos and Braithwaite 2002). It has been suggested that the largest proportion of GDP in the US and the largest portion of exports in the US are attributable to goods and services with IP protection (Dickinson 2000).

These trends imply that knowledge is being 'locked up' within the IP system, where the dissemination of knowledge is exchanged for exclusive rights, which in turn become the primary motivators for companies to invest in when seeking and discovering new knowledge (Dickinson 2000). While the IP system arguably functions as an entry barrier into the market, with the height of the barrier varying with the nature of the IP and market structure (Drahos and Braithwaite 2002), the advantage that the IP system provides is that it encourages scientists to publish their findings in the form of patents, which permit and facilitate technological improvement, while ensuring protection of commercial spin-offs. This is a much better alternative than protecting research results as trade secrets, thereby preventing and inhibiting new knowledge creation (Dickinson 2000). In addition, an efficient IP system also reduces wasted time and money on research that has already been done (estimated by the European Patent Office to exceed US\$22 billion), and speeds up the access timeframe in terms of new knowledge discovery for the market (Dickinson 2000). Moreover the 210-year-old US patent system claims to be technology-neutral, seeking to apply the same norms to all inventions across sectors and technologies. This uniformity is deemed to be an advantage in allowing the system to respond to emerging sciences and industries without revision of the law (Dickinson 2000).

#### **1.4 South Africa and the knowledge-economy**

South Africa's body of law with respect to IP, like most other English-speaking systems, is still evolving. For example, although software is patentable in the US, the world's leading software developer, this is not the case in South Africa. This is proving to be inhibiting innovations in software, particularly with respect to applications in the mobile telecommunications industry (Maier and Spivak 1994). Currently the primary form of protection afforded to computer programs is in terms of the *Copyright Act*, which arguably does not protect source codes adequately (Maier and Spivak 1994). Increasingly, the view in this regard is that such protection should be appropriately catered for in terms of the *Patents Act*, rather than the *Copyright Act*. This view emanates from recent developments in the European Union (EU) regarding software patentability – South African patent law has been largely in line with British legislation, and any noteworthy amendments to patent law within

the EU may potentially influence its developments in South Africa (Dixon 2004).

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), an agreement which binds the South African government by virtue of its membership to the World Trade Organisation (WTO), has raised the importance of IP rights within the local context. The *Medicines and Related Substances Control Act 101 of 1965* enables the SA government to address access to potential life-saving HIV-treatment medicines. This culminated in 39 pharmaceutical companies challenging the South African government in the Pretoria High Court (March 2001). The principal issue raised by these companies was that TRIPS requires that patents be protected irrespective of the field of technology (Drahos and Braithwaite 2002; Lamprecht 2004a). Although these companies subsequently withdrew from the litigation and the case was settled out of court due to rising public pressure (Drahos and Braithwaite 2002), the case is cited globally as an example of the prominence of IP as a mechanism that enables the protection of corporate innovations to be secured even against governments.

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## **2 Managing IP as a strategic driver**

### **2.1 Effective IP management creates market leaders**

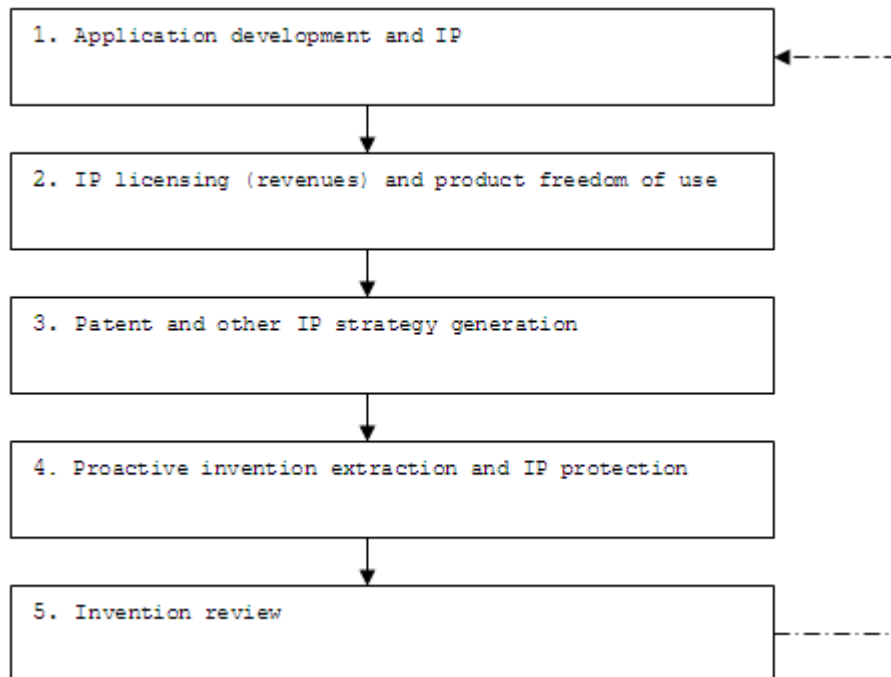
Effective management of IP rights must be recognized as an essential foundation for creating core competence and South African businesses need to develop competencies in this regard to promote business development through effective technology exploitation and knowledge transfer (Lamprecht 2004a).

IBM is an example of a company that has successfully exploited its technology and IP rights globally. In 2000, IBM was the number one company in terms of patents in the field of semiconductors in the US, with over 30000 patents worldwide contributing to the success of the company. Other IP assets included 8500 trademarks, and a vast portfolio of technology and software (Ehrlickman 2000). From a strategic product development perspective, IBM successfully established linkages (Figure 2) between its patent portfolio, its strategic technology, its business and its licensing requirements, coupled with the protection of leadership technology (Ehrlickman 2000) as the company sought to strengthen its competitive positioning through innovation and patent protection (Ehrlickman 2000). A comprehensive and aggressive IP licensing strategy was adopted to manage strategic joint development alliances, manufacturing joint ventures, return on technology, etc., with the aim of transferring specifications and information from inventors to partners through patent and other IP licensing (Ehrlickman 2000). IBM's business philosophy in regard to its IP portfolio was to properly value and leverage its IP assets to maximize return (Ehrlickman 2000). The benefits of patent and IP licensing to IBM included (Ehrlickman 2000):

- reinforcing its monopoly (in a manner similar to that of pharmaceutical companies, biotechnology companies, etc.);
- targeting its knowledge management at selected partners (e.g. Intel, Motorola, Shell Oil); and
- licensing its IP-rights to third parties, as a business (e.g. Lucent, Texas Instruments). IBM has a centralized approach to licensing activities, with multinational staff administering over 1100 active patent license agreements. From a business perspective, the company's policy has been to provide non-discriminatory patent licenses within an established royalty rates framework, seeking to maximize its perceived advantages which include deriving access to technologies from others, promoting IBM's platforms, minimizing patent litigation and growing revenue

(Ehrlickman 2000).

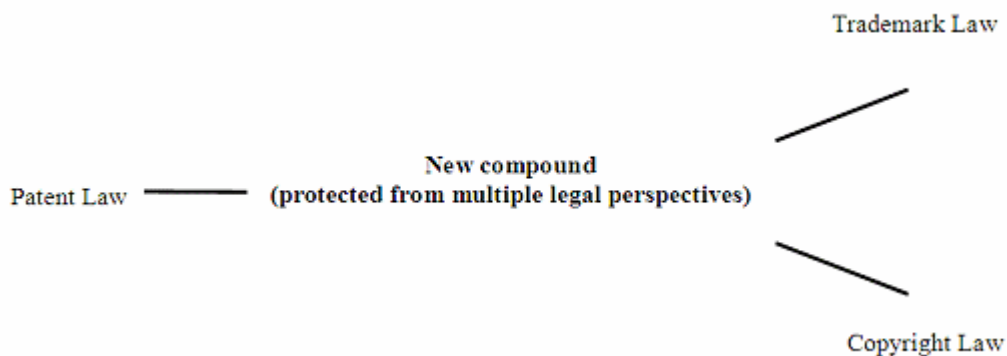
**Figure 2** IBM's IP life cycle (adapted from Ehrlickman 2000)



## 2.2 IP and product development

R&D is an expensive activity (Lamprecht 2004b). Moreover IP protection issues applicable during development have further extended the development complexity and costs, with the result that only corporates, universities and state-sponsored institutions have primarily engaged in R&D (Lamprecht 2004b). This has impacted directly on the innovation capability of South African companies with limited resources, in a scenario where the economy comprises many small-scale technology companies developing niche products (Lamprecht 2004b). Despite this, IP is a mechanism that also promotes creativity and product innovation in South Africa through the public disclosure of new knowledge while affording IP owners a period of exclusivity and protection to that knowledge (Lamprecht 2004a). Lamprecht (2004b) comments that although the South African IP law system places the onus on the owner of the IP rights of enforcing those rights, often at a cost, the benefits of exploiting IP through licensing (rather than solely through self-exploitation) become justification for public disclosure.

**Figure 3** Multi-dimensional IP product strategy (adapted from Drahos and Braithwaite 2002)



The pharmaceutical industry is a particularly good case study for developing an understanding of how IP can be used to strategic product advantage. In general, when a large pharmaceutical company develops a new medically beneficial compound, it encompasses that development within an IP strategy that surrounds the development, including a barrage of IP protection, with patent protection of all aspects of the compound (including the compound, dosage methods and manufacturing processes). Some knowledge is not disclosed and is protected under trade secret law, brand name identity is protected through trademark law and the mass of documentation is protected by copyright (Drahos and Braithwaite 2002). These companies rely on multi-dimensional IP strategy (Figure 4) to entrench and enforce rights that determine and guard market share in a highly competitive R&D arena.

**Figure 4** IP strategy should be aligned with competitive stance (adapted from Coade 1997)

<b>Defensive IP strategy:</b>	<b>Offensive IP strategy:</b>	<b>Invention IP strategy:</b>
<ul style="list-style-type: none"> <li>• Seek to identify and isolate risks associated with IP</li> </ul>	<ul style="list-style-type: none"> <li>• Seek to create a patent portfolio that matches planned/product development plans</li> <li>• Patents should create competitive advantages that support the long-term strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Align the overall busy strategy with product line development</li> </ul>

Within the quagmire of IP protection, in a scenario where companies both sell technology as well as manufacture for third parties, and where there is considerable demand for rapid innovations, great benefit may be derived by product developers who adopt an IP/technology surveying management policy that seeks to understand competitors' products and the market environment (Coade 1997), as through such insight IP may be used to block potential competitors from copying designs and trademarks as well as marketing tools and strategies (LIPP Project 2003). Market leaders will be the ones that are able to match an IP strategy (Figure 4) to the competitive threats. In those sectors where copying is an easy and a frequent competitor practice, the effectiveness of the strategy is questionable, however, particularly when prototypes are developed for clients without acquiring the requisite protection (LIPP Project 2003). For example, TMG SA, a designer and producer in the Spanish metallurgical industry, perceives IP to be ineffective as a strategic mechanism in that IP administration with the European Patent Office has been extremely timely and expensive, impinging on TMG SA's ability to take advantage of opportunities in the market. This has been coupled with the slow and expensive nature of legal action in respect of infringements of its IP (LIPP Project 2003).

One suggested route for companies facing this dilemma is a two-tier strategy regarding IP: 'When developing your own products it is beneficial to initiate the IP protection immediately so as to gain protection from rivals' (LIPP Project 2003), and 'when acting as a supplier to a big manufacturing firm, first test the product with this client and solicit real market feedback – as soon as the product indicates commercial interest, initiate the IP protection process' (LIPP Project 2003). The risk in this approach, however, is that third parties may copy any innovation which has no legal protection (LIPP Project 2003).

### 2.3 Using IP to inform strategy

The term 'knowledge strategy' refers to the employment of knowledge processes to an



existing or new knowledge domain in order to achieve strategic goals, where knowledge is considered dynamic and process focused, aimed at knowledge creation that enhances the pace and potential of creating innovations and encouraging selective knowledge transfer (Von Krogh, Nonaka and Aben 2001).

IP management typically encompasses teamwork between the legal team driving IP protection and the engineering team responsible for innovation because managing the stakeholder involvement and ownership of IP requires a specific technology/IP strategy that is integrated with the company's technology strategy and which seeks to encompass the technology management life-cycle (Lamprecht 2004b). The technology strategy should encompass the mechanisms by which IP generated during the R&D process may be used for long-term commercial benefit (Lamprecht 2004b).

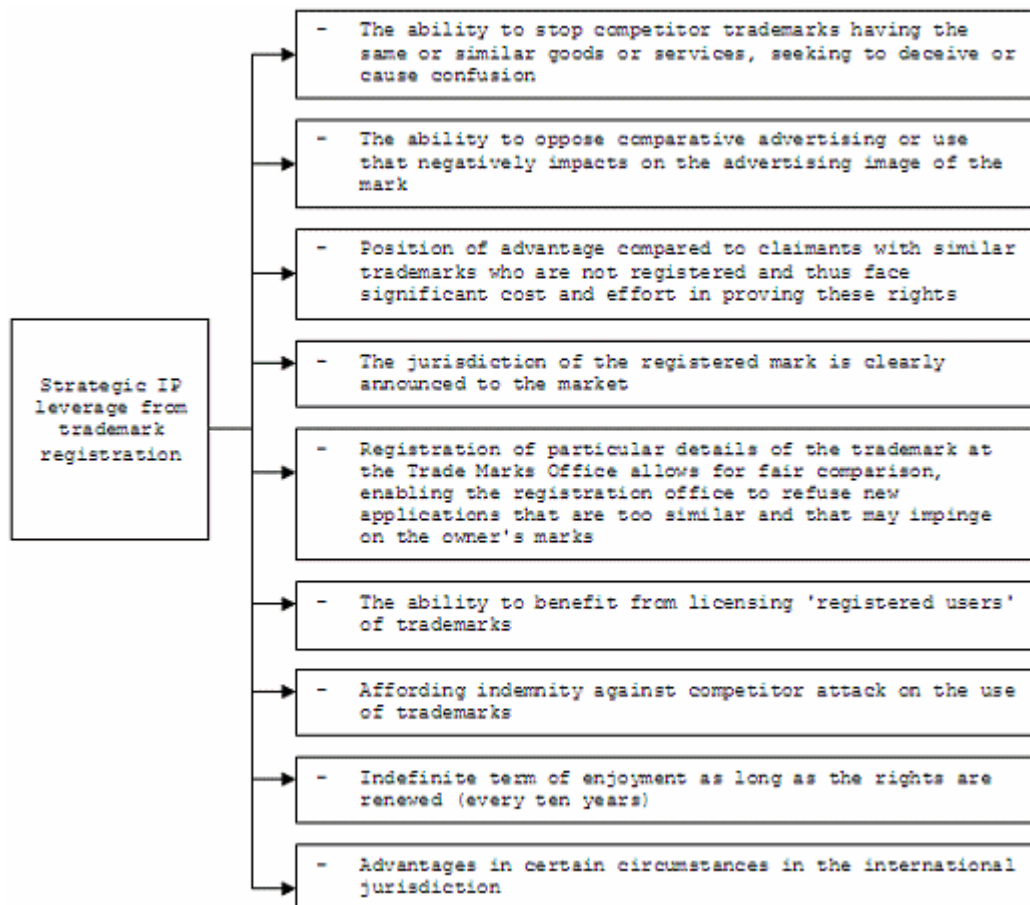
Within the R&D process, companies must consider the benefits of IP secrecy as against public disclosure and take steps to manage its knowledge appropriately (Lamprecht 2004a; Lamprecht 2004b). Therefore, a comprehensive IP strategy should encompass both a defensive and an offensive strategy (Figure 4). A defensive IP strategy should allow for the freedom to market goods/services while at the same time avoiding the risk of IP infringement litigation. An offensive strategy seeks to develop an IP portfolio that inhibits competition in a niche market (Maier and Spivak 1994).

### **2.3.1 Trademarks as a lever to define and guard product 'turf'**

The management of IP involves considerable resources and time to ensure its effectiveness. Using trademarks as a particular facet within the 'IP Product Protection-Matrix' trademark registration by companies has the advantage of distinguishing their goods or services from those of others and affording legal rights, which encompass the registration of services as diverse as engineering, construction and repair of buildings, computer programming, advertising, banking and insurance, leasing, entertainment, hotels (Spoor & Fisher 2001), etc. This has tremendous leverage potential for establishing competitive advantages through IP (Figure 5).

From an international product strategy perspective, Du Plessis (2004) indicates that businesses venturing abroad need to direct resources to ensure that timely trademark availability searches are conducted, since trademark registration does not necessarily ensure the availability or provide protection of trademarks abroad. Searches must aim to identify other trademarks that are identical or similar to the proposed mark in all territories where the business is likely to be conducted. If no conflicting marks are identified, an application for registration of the mark should be made expediently to mitigate the potentially costly risk of someone else registering the mark first (Du Plessis 2004) or of finding out later that the mark adopted is in fact infringing on another party's trademark that has already been registered. If the search reveals that similar marks already exist, this may necessitate an adaptation of the mark or adoption of a new trademark in order to make the mark uniquely distinguishable from the existing registration. Filing a trademark in EU countries has been simplified by the European Community Trademark Register, which affords trademark protection in all EU member countries. Even though composite filing is more expensive, it is more advantageous and cheaper in the long run than filing single applications in individual member countries.

**Figure 5** Pre-emptive benefits and leverage potential from trademarks (adapted from Spoor & Fisher 2001)



### 2.3.2 Leveraging IP to create and/or maintain product monopoly

Within IP rights, patents are recognized as one of the most effective knowledge protection mechanisms (Norman 2001). Barrier building (or entry deterrence) as a concept is based on the principle that the creation of an array of structural characteristics may impose conditions that are adverse to market entry for potential competitors, thus limiting the number and intensity of competition (Karakaya and Stahl 1989). Such barriers discourage market entry to varying degrees. They control and limit access to distribution and advertising and R&D and IP protection become the mechanisms for market control (Karakaya and Stahl 1989).

Companies seldom plan or activate IP strategies, so IP infringements are typically dealt with on an *ad hoc* reactive basis, with the risk of infringement often underestimated. An IP asset development strategy, which is proactively managed, should typically seek to mitigate these problems (Maier and Spivak 1994). Thus Raffi and Kampas (2002) state that IP protection is a mechanism that enables main market entry, particularly when insurgents face high barriers to entry, ultimately allowing access to suppliers and channels, capital investment and availability of venture capital. IP licensing therefore becomes an additional strategic lever that companies must exploit effectively to recuperate costs and create leadership positions (Krebsbach 2004; Lamprecht 2004b).

Within the realm of knowledge management and product innovation, Norman (2001) identifies the legal framework within which companies form knowledge protection and contractual mechanisms. This necessarily includes:

- striving to obtain IP that ultimately prevent or restrict imitation;
- specifying what information and capabilities can be shared;
- specifying what information and capabilities cannot be shared;
- providing consequences if alliance partners use proprietary knowledge in the wrong

- way;
- signing nondisclosure agreements;
- barring employment to partner employees; and
- ensuring that information or technology shared with partners is covered by IP.

In managing the product life-cycle, IP protection should accordingly be exercised between both the tactical and operational areas aligned to corporate product strategy, where protection mechanisms should typically be adopted between the market testing and commercialization phases of the new product development life-cycle (Bean and Radford 2000; Coade 1997).

In this way large successful leaders may use IP to limit the relative gains of competitors through a defensive strategy (Bean and Radford 2000; Maier and Spivak 1994) which would include control of distribution channels, copyright, trademark, design and patent protection. It would also include countering every challenge, developing and maintaining a close customer relationship, etc. On the other hand, new market entrants (including leaders, followers and 'nichers') could also use IP to adopt an aggressive or attacking strategic stance, empowered by copyright, designs, trademarks and patents, which enables market entry, product proliferation, product innovation, distribution innovation, intensive promotion and cost structure revolution (Bean and Radford 2000; Maier and Spivak 1994).

Those innovative challengers which are empowered with IP protection, are thus able to alter industry structure (Gort and Wall 1984) and thereby exploit new opportunities, overcoming the pre-emptive barriers of incumbents (Markides 1997). Rather than capital requirements, switching costs and distribution access which fail to offer significant resistance to innovative challengers, cost advantages and proprietary assets that are legally protected and not easily imitable serve as effective deterrents against new challengers (Han, Kim and Kim 2001). Thus, in managing cycles of innovation in consumer product development, incumbent companies should use selective barriers, such as IP, that are resistant to innovative threat, in order to maintain their positions of advantage.

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### 3 Conclusion

Within the realm of the product life-cycle, research indicates that corporate disposition and knowledge management are the new determinants of success and leadership in the knowledge-economy, which requires a management strategy and stance that seeks to promote competencies in IP creation to establish long-term competitive advantages. This article has sought to outline and recognize the facets of IP, encompassing trademarks, copyright, design and patent law, as essential strategic levers for management and product developers. Ultimately, success in the race for better, faster more innovative products or services demands that organizations identify and implement company-wide IP-based strategic activities that extend the organization's competitive advantages in product development by encouraging and defining measures for organizational IP evolution and exploitation.

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