



Review of the New Zealand Intellectual Property System

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LIMITATIONS TO THE RESEARCH AND DIRECTIONS FOR FUTURE RESEARCH AND ANALYSIS

Peer reviewer: Professor Reiko Aoki

This review of the Intellectual Property System in New Zealand is based on an internet survey of IP awareness among firms and IP advisors conducted in September and October of 2009. It also draws on data collected during semi-structured interviews of 22 businesses. The authors note, there is a self selection bias with internet surveys and that manufacturing firms are well represented in the survey with 25% of the respondents from the Manufacturing sector.

The Review notes that there are very stark differences among respondents regarding IP awareness, types of IP employed, and other factors by FTE size and one key recommendation is that the source of heterogeneity should be analyzed further. This will help determine whether it is size of firm which may limit specialization within a firm, or is whether firm size is a proxy for something else, such as industry or exposure to international markets. The authors suggest that firm size may also determine the person who responded to the survey. This is consistent with specialization within the firm. Further research needs to be undertaken to verify this. Work based on surveys in Japan suggests that smaller firms seem to be more innovative, as indicated in this New Zealand survey. Measures of innovativeness (proportion of R&D expenditure, proportion of R&D employees, number of new products, scope of products) can be used to verify this.

The Review makes several policy recommendations. Survey and interview results show that needs differ by industry and firm size. Although further research is necessary to understand the mechanism which gives rise to this difference in needs, the heterogeneity of policy needs should be expressed when making policy recommendations.

The Review summarizes the survey and interview results well and highlights the various issues that need to be explored in greater depth which will make policies more effective. These are outlined as follows:

Understanding firm heterogeneity

As noted above, firm heterogeneity (size, industry) regarding innovativeness, attitude towards IP and utilization of IP has been observed in other countries. Recent advances in econometrics of panel data analysis can be applied to firm panel data. There are obvious

differences among firms regarding innovation and IP. Panel data, together with patent data should be used to understand the source of heterogeneity. This will help target future policies better. For instance, independent new firms (such as venture firms) have very different needs from firms that are subsidiaries of foreign firms.

NZ firm patenting behaviour in major markets

Many firms patent overseas and often consider this more important than New Zealand patents. There is substantial research cooperation among European Patent Office (EPO), US Patent and Trademark Office (USPTO) and Japan Patent Office (JPO). The three organizations have also been cooperating with scholars to make data available, such as putting them on line (e.g., PATSTAT database of EPO, National Bureau of Economic Research (NBER) US patent citation database, Japan Patent Information Organization (JAPIO) database, OECD Triadic patent family database (USPTO, EPO and JOP)).

Questions that should be addressed in further research:

1. Which fields do NZ firms patent internationally?
2. What is the relationship between NZ patenting and overseas patenting?
3. Are domestic patents and international patents substitutes or complements?

Networks and collaboration of firms

Using patent data information (e.g., inventor, assignee, citation) it is possible to understand patterns of networks and collaboration: The following are some suggested questions that should be addressed by further research

1. Does domestic/international co-ownership expand the pool of inventors, relative to domestic co-ownership?
2. Controlling for the number of co-applicants, would domestic/international research collaborations enhance the scope of knowledge used for research, and does domestic/international research collaborations enhance research productivity?
3. Controlling for the number of inventors, is the use of knowledge embodied in public literature?

When collaborations include universities and government research institutes such as NZ's CRIs, understanding networks and collaboration has very wide funding implications.

Network and collaboration of researchers

Research on international collaboration requires international collaboration between researchers themselves. There are two different levels of networks and collaboration. First, there is the opportunity to cooperate with data accumulation. It is probably worthwhile organising NZ patent data to be consistent with one of the major triadic data bases, such as NBER. The US and Japan have conducted two rounds of innovation surveys. Great effort has been made to make the questions consistent in the second round (RIETI-Georgia Tech Inventor Survey). Doing the same survey in New Zealand will be useful for providing an opportunity for the comparison of large and small nations. Secondly, there should be collaboration in using the data. Giving free access to data internationally is very important, in addition to supporting short term visits and workshops.

Agriculture

Given the importance of agriculture in New Zealand for the economy, including international trade, more research should be done regarding innovation and IP in agriculture. Research should include the bio-tech industries as well. Aforementioned heterogeneity and networks apply to agriculture but it is probably worthwhile to specifically to look at agriculture and bio-tech.

Patenting and VC

In new industries, such as software and bio-tech, venture capital is particularly important. There is large literature linking IP and venture capital. These include work by economists Joshua Lerner at Harvard Business School and a recent paper on European firms by Haeussler, C., Harhoff, D., and Mueller, E., 2009: “To be Financed or Not: The Role of Patents for Venture Capital Financing”, (CEPR Discussion Paper No.7115) may be relevant for New Zealand firms especially given that there is no research in this area in the New Zealand context. Varieties of capital and its influence on IP strategy may be an area for future research.

EXECUTIVE SUMMARY

1. Building on the growth achieved since the 1980s requires *inter alia* greater understanding of, and attention to, capital formation, the drivers of innovation, and institutional quality. Technological change is fundamental to productivity growth and long-run economic prosperity. The rate of technological innovation within an economy depends on the incentives and impediments firms face to create new technology, and to assimilate technology which has been developed by other firms, into their products, production processes and services. In other words, facilitating technological change incorporates both the creation of new technology as well as the diffusion of existing technology. This observation is at the heart of the economic rationale of the IP system and should guide IP rights policy development.
2. IP rights have a range of functions and complex side effects. The main function of IP rights is to provide innovators with a means to prevent others from copying their technology, and thereby allow them to recoup their R&D investments through charging higher prices than would otherwise be the case. Research aimed at identifying whether patent reform has an observable impact on innovative activities has provided ambiguous results. However, a recent emerging literature, which focuses on the private returns to patent protection, suggests that where firms prefer patenting to other mechanisms of appropriation, the benefit is significant, in the order of 50% on average of invention value.
3. IP rights also play a positive role in diffusing knowledge and technology. The traditional argument that disclosure requirements are an important source of technology transfer has received little empirical support. However, the role of patents in facilitating partnerships and exchange between inventors and developers or other financial backers is an area of increasing interest to academics and policy makers alike. Improving the function of such markets may yet prove to yield substantial welfare gains. This is particularly important in the case of New Zealand, which is reliant both on foreign technology and foreign markets for domestic innovations. The IP system plays an important role in facilitating this exchange. Considerable evidence exists regarding the role of the IP system in facilitating technology transfer and foreign technology adoption via licensing and royalties, trade and foreign direct investment R&D-focused FDI.
4. The interviews with advisors, who were mainly patent attorneys and senior solicitors, revealed that there is a general awareness of IP which is not matched by a similar level of knowledge about IP. Technology-intensive clients, and those with an international focus, are more likely to understand IP. Awareness of PVRs is low and

most businesses appear to be focused on their own internal R&D. All advisor firms interviewed had education systems in place, including hard copy and soft-copy online. Advisors interviewed were of the view that not enough firms had an IP strategy in place. Advisors noted that there appears to be an increase in the numbers of IP managers in organizations such as CRIs.

5. A majority of advisors did not see government agencies as a primary source of information on IP and a relatively small number of advisors thought government should provide legal advice. As a source of information, the effectiveness of public and private organisations was similar.
6. Obtaining IP protection in New Zealand is not seen to be expensive but obtaining and enforcing IP protection overseas is. Advisors are of the view that clients don't consider the link between IP and productivity as important whereas the building of comparative advantage, protection, deterrence, and attracting investors is.
7. Suggestions from advisors for improving the system of protecting IPR's include
 - a. Lowering the cost of using the IP system, including enforcement.
 - b. Improve information to make best use of the IP system.
 - c. Patent reform, including the adoption of a system of innovation patents and the latest version of UPOV for PVRs.
 - d. Increasing the level of patent protection which is considered low by OECD standards.
 - e. Improving the IPONZ database interface for searches.
8. The on-line survey of businesses found that most respondent firms use three main IP instruments patents, trademarks and copyright and their frequency of use is higher than the UK. PVRs are not in common use. However, confidentiality agreements are rated the highest in terms of protecting innovations. This finding is supported by the large majority of firms that would choose "secrecy" as a means of protection.
9. The results of the business survey indicate a similar level of IP awareness amongst New Zealand businesses, no matter what their size in terms of FTE's. Because New Zealand has few enterprises with significant numbers of FTE's, it is not surprising that awareness is similar across the different business sizes. Relative to the UK there is a high level of awareness in respect of the need to apply for IP protection.
10. The average annual expenditure on obtaining and maintaining IPRs is \$177,631, much higher than the UK. Medium sized firms (20-49 employees) spend more than

firms employing 50-99. About one half of the respondent firms had “someone” responsible for managing IPRs. Most firms (52%) do not have an IP policy and majority of firms (63.2%) have not tried to estimate the value of their IP.

11. Larger businesses are also more likely to seek information from external patent attorneys, and this maybe a function of their being more aware of patent attorneys as a source of information and being able to afford their advice. External patent attorneys were, however, the primary source of information for all sizes of businesses. IPONZ was the third most likely source of information, behind external solicitors, and the percentage of respondents who sought advice from IPONZ was similar across all the different sized businesses.
12. Innovation is one of the drivers of productivity. In turn, the legal IP regime is essential to the protection of innovations, particularly technological innovations. However, while there is some evidence that the protection provided by the patent system, for example, acts as an incentive to innovation and therefore to an increase in productivity, the survey was unable to find convincing evidence that IP, on its own, is thought to be driver of productivity
13. Although New Zealand’s public expenditure on R&D is in line with other OECD countries the linkages between CRIs, universities, and the commercial sector need to be strengthened. Policy aimed at establishing performance measures for CRIs on commercialising IP as opposed to simply obtaining IP protection could better facilitate such commercialisation. Policy aimed at encouraging greater research collaboration between CRIs and universities would also foster commercialisation.
14. A general lack of awareness over the use, and potential value, of PVRs was a particularly striking finding of the review. Given the significance of plants in New Zealand’s economy there would seem to be enormous scope for greater commercial use of PVRs. Timely consideration of the Wai 262 claim coupled with policies aimed at achieving better utilisation of innovation opportunities that exist under the UPOV agreements should assist in unleashing the opportunities for improved use of PVRs .
15. There is an issue as to the ownership of IP that has been created in situations where there are two or more parties to an enterprise. Situations in which this is reported to arise include industry partners to FRST projects and government agencies that have commissioned pieces of IP.
16. There are anecdotal reports that overseas entrepreneurs have been searching New Zealand for IP that has value and has not been commercialised. Apparently, New Zealand organisations, including government agencies, that are ignorant of the value of some of the IP that they own, or lack the capital to invest in commercialisation, have sold off IP.

Recommendations

17. Government agencies have a role in raising awareness and understanding of IP amongst the business community and the wider community at large. In particular, the relationship between awareness, cost and the value of IP needs to be better articulated and promoted. An efficient programme would include education through the formal education providers at tertiary level and, possibly at secondary level. This would be supplemented by the existing programmes of advice and information provided by MED and IPONZ and other government bodies. A variation of the advice provided by government agencies would be to fund IP advisors to provide initial consultation and advice. A third level role for government agencies would be to provide/fund provision of advice and information by industry bodies, e.g. IPENZ. This third level of advice would be specifically tailored to the needs of specific industries and professions, such as engineers. As noted elsewhere, any initiatives to raise awareness and understanding of IP must include the wider IP profession including patent attorneys, IP lawyers, accountants and venture capital providers.
18. The tax position of firms that innovate needs to be considered. (i) Innovative firms have called for the reinstatement of tax incentives. This bears consideration. (ii) Amongst firms that did license their technology internationally there is a significant problem area with the tax treatment of royalties on IP. The MED has promoted the value of licensing IP and any tax policy that has a negative effect on licensing of intangibles needs to be reviewed.
19. A single, comprehensive IP policy would help ensure that enquiries from business and assistance to business were delivered efficiently. The policy would be flexible enough to take account of different needs in different industries and it would be include oversight of funding initiatives. It would be important that government agencies administering the policy communicate with one another. The policy would encompass an education programme.
20. The current review of IP has shown that there a number of issues where further research could be undertaken to the benefit of the overall objective of raising productivity.
 - a. *Awareness and Understanding*: What IP advisors do and how they can help raise awareness of firms and within firms? What is their role in providing strategic assistance to businesses? Understanding how managers become aware of IP will help to devise awareness programmes. An understanding of how IP contributes to innovation and productivity will benefit from an analysis of awareness and understanding and strategic use by specific sectors – the so-called Māori economy is a significant and growing part of the New Zealand economy. Growing the awareness of IP amongst Māori has already

been an issue for MED. Other social sectors that would add value to a general analysis of the awareness of IP are businesses owned and managed by immigrants of different nationalities and women. Another variation of this research would be the analysis of IPONZ data by geography to determine whether this showed actual or potential innovation ‘hot-spots’.

- b. *Meta-Analysis of IP Surveys*: A number of surveys have been conducted of businesses and IP related behaviour. These include the on-going StatsNZ business surveys and the bi-annual UABS Innovation Survey. Other one-off initiatives include surveys conducted by AJ Park and by FRST. It would be useful to conduct meta-analysis of the surveys and to ensure that on-going surveys are conducted in a collaborative manner.
- c. *Productivity*: From our previous projects, we know that it is possible to match firm-level data from IPONZ with ANZSIC industry categories to provide data that can be used to develop measures of IP intensity at industry level. If we identify those firms using IP and those that are not using IP then we should be able to see if differences in productivity are explained by the use of IP and/or possibly the contribution of IP to productivity growth. Identify industry clusters and work with universities, industry bodies (such as IPENZ) and IP advisors to produce IP advice tailored to the industry and delivered in association with the industry body in the form of print material and seminars.
- d. *Study of Social Networks*: Study of social networks using relational data to link members of a social network, such as members of professional or industry bodies. Two concepts deserve closer attention in a future research programme – ‘structural holes’ and ‘brokerage’. Structural holes constitute gaps in networks, whereas brokers can act to bridge holes by communicating interests and difficulties between groups, transferring best practice, drawing analogies and by synthesising. Brokers play a role in innovation by sharing knowledge across networks.
- e. *Clarify the Interface between IP and the Regulatory Environment*: An interesting and little understood factor is the interface between IP protection and the regulatory environment. The research would investigate the nature of regulatory requirements in order to determine whether they are an obstacle to the use of the IP system (that is, do firms regard IP protection as unnecessary) or whether the regulatory requirements can be used in tandem to provide extra levels of protection.

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BACKGROUND

The Purpose

The purpose of this report is to provide an analysis of the extent to which New Zealand businesses understand and use intellectual property. The analysis focuses on the links between intellectual property ('IP') and productivity, and IP and innovation, to identify where opportunities exist for New Zealand to improve its IP rights (IPR's) system in order to increase New Zealand's level of productivity.

Research Objectives

This report has been prepared in response to the Request for Proposals ('RFP') issued by the Ministry of Economic Development ('the MED') and entitled 'Review of Intellectual Property System in Driving Productivity'. The RFP stated that:

The aim of this review is to ensure government policies and practices, in respect of intellectual property, are well aligned to support [the goal of lifting New Zealand's level of productivity]. The focus of this work is on improving productivity and to identify areas which have the potential to support this goal. The report is to assess how well New Zealand businesses understand and use intellectual property and where opportunities exist to improve the intellectual property rights system.

In response to questions about the RFP, the MED stated:

The primary focus of this review is the perspective and focus held by New Zealand businesses, and their understanding and use of IP.

Methodology

The methodology included: (i) a review of the international literature on the role of IP in stimulating innovation and productivity; (ii) analysis of publicly available data; (iii) analysis of data held by the research team; (iv) qualitative research involving semi-structured interviews with selected businesses and an awareness survey directed at businesses generally. Qualitative research involving semi-structured interviews with selected IP advisors and a qualitative survey of directed at IP advisors generally was also undertaken.

The report proceeds as follows. The next section provides an overview of the economic literature that focuses on the underpinnings and linkages between economic growth, productivity, and IPRs. The third section presents results of two surveys of IP advisors.

Results of two surveys of businesses are presented in the fourth section. The report concludes with a summary of key findings and recommendations for future research.

ECONOMIC GROWTH, PRODUCTIVITY AND INTELLECTUAL PROPERTY RIGHTS

Economic Growth and productivity

Economic growth is most commonly defined in terms of the rate of change in some measure of national output, such as real gross domestic product (GDP), per capita. If real GDP per capita increases then this is taken to suggest that the standard of living has increased. The shortcomings associated with using GDP, as a measure of well being, are well known and not material to this report. Understanding the determinants of economic growth is one of the central questions in economics and, in the context of contemporary policy, one of the challenges facing New Zealand policy makers.

New Zealand's economic growth performance has improved since the 1990s (Treasury, 2004). Growth has been led by the services sector and increases in labour utilisation. Despite this improvement in performance New Zealand continued to slip in the rankings of GDP per capita relative to other OECD countries, leading to a renewed focus on policy initiatives aimed at restoring parity. The level of New Zealand's per capita GDP was approximately 85 per cent of the OECD mean level of per capita GDP in 2002, on a 1995 purchasing power parity basis (Treasury, 2004). Closing this gap within twenty years would require New Zealand's GDP per capita to grow on average at a rate of around 3 per cent, one per cent higher than the average OECD rate. As pointed out in the Treasury (2004) report, describing sectors (services) and factors of production (labour utilisation) that contribute to economic growth, while useful, does not uncover the primary forces of economic growth. Understanding the underlying factors is essential to the design of policy settings aimed at enhancing economic growth.

A simple model helps to structure the discussion. The relationship between output (Y), say real GDP, and factors of production, such as labour (L) and capital (K), is illustrated using the following simple model.

$$Y(t) = f(K(t), L(t)) \quad [1]$$

In this simple model technology (f) describes how capital and labour combine in the production of GDP over time (t). Setting aside the complexities of neoclassical economic growth theory, the above model captures the essence of economic growth and provides a vehicle for examining the link between growth, productivity, technology, and intellectual property rights. Long-run growth (GDP per capita) in the neoclassical model (Solow 1957)

depends on technical change which highlights the significance of knowledge and innovation to the formation of policy. At this stage of model development, technological change was exogenous; that is, it was outside the economic system.

Using equation [1] we can estimate average labour productivity (ALP) in industry i at time t simply as

$$ALP_{i,t} = \frac{Y_{i,t}}{L_{i,t}} \quad [2]$$

Equation [2] would have to be adjusted if cross country comparisons were involved. Estimating multifactor productivity (MFP) is a little more complex as it relies on assumptions underpinning the neoclassical growth model. Methodological details are not particularly germane to this report and are adequately covered elsewhere (see for example, Jorgenson et al. 1987). Mason and Osborne (2007) find that in aggregate, New Zealand market sectors compare unfavourably with the UK on ALP and attribute this weak performance to lower MFP and lower physical capital intensity. About a quarter of the gap in ALP is attributed to high shares of UK employment in high value added sectors relative to New Zealand. However, Mason and Osborne (2007) attribute three quarters of the ALP gap to within-sector productivity differences. Much of the gap remains to be explained.

Figure 1 - Trends in average labour productivity and IP

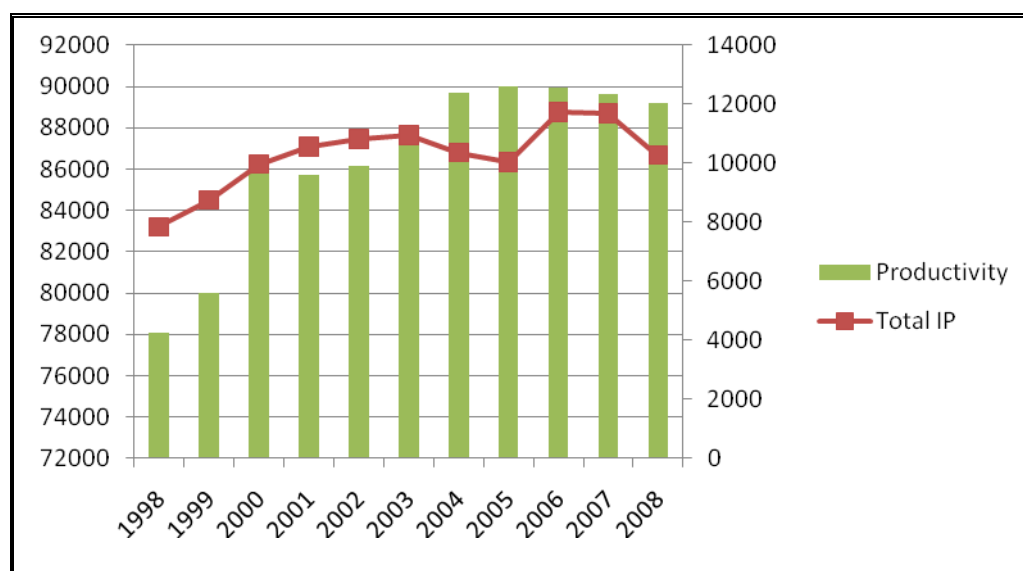


Figure 1 shows the trend in ALP and IP¹. The close association between average labour productivity and IP does not, of course, provide an explanation of causation. It does however indicate that further research into the role of IP in economic growth could contribute to policy initiatives aimed at lifting performance.

The policy significance of New Zealand's weak performance in measures of productivity, such as ALP and MFP, is found in the connection between technological change and wealth. Over time, average technology can only improve if the best technology is improving. However uncovering the underlying reasons behind the performance gap requires an approach that "opens up" the notion of technology in the neoclassical model. In other words we need to uncover the incentives and fundamental processes underpinning the process of technological change, this would include *inter alia* R&D, knowledge networking, knowledge spillovers, agglomeration, incentives for innovation, and so on. The literature on endogenous growth provides such a vehicle.

Endogenous growth refers to a wide body of theoretical empirical literature emerging in the 1980s (see for example, Lucas, 1988). Although both neoclassical and endogenous growth theory focus on the economy as a whole, endogenous growth theory emphasises that economic growth is the outcome of an economic system. Thus technological change – which would change (f) in the above model – is the result *inter alia* of intellectual property rights, education, links between universities and business, and so on. This development is of significance to the formation of policy.

Among the list of explanations offered by Treasury (2004) for New Zealand's economic performance, the following are relevant to this project:

- *Institutions*: sound institutions are essential for sustained economic growth and are particularly important for dynamic efficiency and adjusting the exogenous shocks (North, 1990). Poor economic performance prior to the 1980s reforms has been attributed to low quality institutional arrangements. The importance of property rights to innovations has been widely recognised by economists (Barzel, 1989). High quality IPRs are essential to providing the incentives necessary for inventions and their commercialisation.
- *Distance from markets and market size*: small domestic market size coupled with distance to larger markets means that there is less scope for agglomeration benefits.

¹ Average labour productivity is measured in terms of real 1996 dollars and excludes the following ANSIC sectors: government administration, education, health and community services and other services. Total IP includes trademarks, patents, design, and plant variety registrations.

Of particular relevance to this project is the observation that face-to-face contact is important to technology transfer which, in the absence of which, can act as an impediment to growth. Improvements in communication technology can dampen this effect.

- *Organisational design:* Although New Zealand's public expenditure on R&D is in line with other OECD countries, private expenditure on R&D is low. The role of Crown Research Institutes (CRIs) in innovation is not clear: "... whether they should be thought of primarily as public labs generating public-good science, or publicly owned vehicles for disseminating and commercialising public-good science." Exactly why CRIs are not playing a greater role in commercialising their intellectual property probably has a lot to do with property rights and incentives. In contrast to CRIs, the relationship between universities and industry is considered to be particularly weak. Again, creating incentives that facilitate greater university participation in research with commercial potential, and clarifying the rules around the ownership of intellectual property, could strengthen the relationship.

New Zealand's economic growth has improved and, in part, this can be attributed to the policy and institutional reforms launched in the 1980s. Building on this growth requires *inter alia* greater understanding of, and attention to, capital formation, the drivers of innovation, and institutional quality.

Innovation, Productivity and Economic Growth

While the analysis of technological change has existed since the 18th century, its role was marginalised from mainstream economic thought until after World War II. Marx, and subsequently Schumpeter, Nelson and Arrow, have each been credited with establishing some of the early theoretical foundations of contemporary theories of technological change. It was not until the late 1950s, however, that the work of Abramovitz (1956), Solow (1957) and Kendrick (1973) revealed that it is differences in technology which best explain long-run per capita economic growth. Technological disparities also account for most of the per capita differences in income between countries.

During this time, some key theoretical principles were established. Probably the most important was that knowledge is a non-rival good; that is, its use by one person does not affect the ability of others to use it at the same time. As such, knowledge (and technology) is quite different from other physical investments

A great deal of empirical research using firm-level as well as cross-country data has established a robust relationship between research and development (R&D) investment and economic performance. The social rate of return to R&D is the change in GDP that results from a change in R&D or technology stock. Estimates of the social return to R&D investment based on analysis of cross-country data typically range from 30 to 90 per cent (Lichtenberg 1992; Coe and Helpman 1995; Jones and Williams 1998; Frantzen 2000; Lederman and Maloney 2003). Using firm level data, researchers have also estimated the impact of R&D investment on firm productivity. These estimates range from 20 to 30 per cent (Lichtenberg and Siegel 1991; Nadiri 1993). The fact that estimates of the social rate of return are greater than the private rate of return is interpreted as strong evidence of the existence of spillovers. That is, much of the benefit of R&D is not captured by the innovator but rather ‘spills-over’ to other firms in the economy.

Researchers have also established a strong and robust relationship between measures of innovation – such as R&D investment and patent registrations – with firms’ market value (Griliches 1981; Hall et al. 2000; Bosworth and Rogers 2001; Feeny and Rogers 2003, Griffiths and Webster 2006). Beginning with Vernon’s (1966) seminal product cycle model, much has been written about the role of technological capacity in determining patterns of trade (Cantwell 1989; Montobbio and Rampa 2005). Technological differences have been found to be positively related to revealed comparative advantage and trade performance (Cantwell 1989).

Another stream of the literature looks at the role of indicators of innovation (such as R&D) on firm productivity. An influential paper by Crepon et al. (1998) develops a structural model of the interaction between R&D, innovation and productivity and applies this to data on French manufacturing firms. The study finds that firm productivity is positively correlated with innovative output (patents) and that innovative output is, as expected, related to R&D. The results suggest a positive relationship between productivity and technology protected by the patent rather than the legal instrument per se. Note, however, that this result should not be interpreted as evidence that increasing patent usage or applications (while holding the amount of new technology being produced constant) leads to higher productivity.

Intellectual property

Intellectual property (IP) rights include copyright, patents, trade secrets (contract law), trademarks and plant variety rights. The principal function of IP rights is to confer ownership over information. That is, they afford owners the right to exclude others from using the information and this enables them to charge a higher ‘monopoly’ price. As such, IP rights play an important role in shaping the incentives to produce and disseminate information, which in turn play a fundamental role in determining productivity in an

economy. The information and knowledge employed in production – which we refer to as ‘technology’ – determines a firm’s ability to create value by transforming inputs into products and services for consumption and export. The creation of new technology and the application of existing technology are both recognised as key drivers of productivity growth. Collectively these activities represent the two sides of the process known as technological change.

The production of cutting edge new-to-the-world technology requires investment in research and development (R&D). Firms will only make such investments if the R&D project has an expected return sufficient to cover the opportunity cost of their resources, and to compensate them for taking on the risk of failure. Technology will be undersupplied in an unfettered market where innovators are unable to charge a price high enough to enable them to recoup the fixed costs of R&D. In the absence of legally enforced IP rights, there may be muted incentives for firms to invest in R&D projects because, even if the project is successful, the firm may be unable to exclude others from using their technology and therefore unable to generate a commercial return. By providing legal protection from imitation, IP rights help inventors recoup their initial investments, thereby creating an *ex ante* incentive to innovate. Of course, there are a range of other mechanisms through which firms can appropriate returns from their innovative endeavours, which will be discussed further below.

However, not all productivity-enhancing technology is new-to-the-world. Firms can also can also licence, copy or reverse engineer existing technologies. The application of these technologies can be thought of as new-to-the-firm innovation. The diffusion of existing technologies is likely to play a more important role in driving aggregate productivity than the development of new-to-the-world technologies, particularly in the short run. This is due to the fact that a modest productivity improvement by every firm in an economy will have a much larger impact on aggregate productivity than a single firm taking a technological leap which doubles or even triples its productivity – simply because a single firm constitutes a tiny fraction of GDP.

In a static framework, inhibiting the diffusion of productivity-enhancing technology represents a welfare loss to society as a whole because the marginal cost of using existing technology is zero. This is because technology is non-rival, which implies that its use does not deprive anyone else from using the same technology. As a result, once a new technology has been created, it is welfare maximising to employ it everywhere in an economy that it can be useful. This is the classic IP policy trade-off: IP rights provide an incentive to innovators by granting them market power, but as a consequence, firms can charge a higher price which ultimately reduces the utilisation and diffusion of the innovation. In order to balance this tension, patents of limited breadth are only granted as a time-limited monopoly (20 years) on technology.

The IP system has a range of other impacts on the incentives and impediments firms face to create new technology, and also to assimilate technologies which have been developed by others. A principal aim of this literature review is to identify the main effects of the IP system that have been studied in the international literature. We begin by considering some of the evidence on the role of technological change on long-run productivity growth. The policy intent of the IP system is outlined as well as the factors that shape firm's decisions regarding the use of legally-enforceable IP protection. Subsequently, the theory and evidence regarding the effects of IP rights are discussed. Before drawing some conclusions, the literature relating to the role of IP in the context of the global economy is considered. In the Appendix, we provide a summary of the key research questions addressed in the literature and the methodology used to analyse these questions.

Purpose of the IP System

As discussed above, in the absence of legally enforceable IP, it can be difficult for innovators to prevent other firms from using, or copying, their technology in some technology areas. Thus, the main purpose of the IP system is to provide innovators with the right to prevent others from copying their technology, thereby allowing technology owners to recoup their initial R&D investment through insisting on their IP rights. The anticipation of this quasi-rent provides the ex ante incentive to innovate. Since patents have a special place in the IP-productivity nexus, this will be the focus of the remaining part of the literature review. However, the main economic function of most other forms of IP including copyright, trade secrecy and plant variety rights can be viewed analogously to patents.

Information protectable by a patent is, by requirement, a 'manner of manufacture', which essentially means they relate to industrial output and can therefore be classed as 'technology'. The primary intent of the patent system is twofold: (1) to create an incentive to innovate by giving the investor the right to exclude all others from using their technology. This may give the R&D investor the direct incentive to commercialise their invention or facilitate the sale of the invention to a partner who will undertake the commercialisation stage; and (2) to encourage diffusion of knowledge via disclosure of technical details on patent registrations. In practice both of these occur to varying degrees in the absence of legally enforceable IP, which will be discussed further in subsequent sections.

Non-patent IP rights legal instruments include copyright, trade secrecy and plant variety rights. Generally, they aim to facilitate excludability of non-rival intangible assets. However, these may also be used to protect other types of information that are not used in the production process (and, therefore, are not technology per se). For instance, copyright can be used to protect information that is not (generally) used in production, such as music, audio-visual material or literature. These types of information could perhaps more readily be classified as consumable goods.

Trade marks have a subtly different economic intent from patents and therefore deserve special mention. Trade marks are am insignia (e.g. a sign, word, phrase, or image) that firms use to uniquely identify their products or services. In part, trade marks afford their holders the right to exclude other firms from benefiting from their investments in intangible assets like advertising, brand awareness and reputation. This function is analogous to the role of other IP rights. However, trade marks have an additional role primarily in creating an incentive to produce information complementary to their goods and services.

Trade marks carry information about the quality of the wares of a particular company – in doing so, they help avoid adverse selection issues associated with the ‘market for lemons’ inefficiencies (Akerlof 1970). In the face of product quality uncertainty (for example when quality is not easily observable), consumers will pay a price reflecting the average quality of goods on the market, which in turn creates an incentive for producers to only offer goods of an average or lower quality (see Ramello 2006 for an introduction into the economics of trademarks). Unlike technology, assets protected by trademarks (such as company brand names) are rival goods. Infringing a trademark diminishes its value to its owner or even other infringers. A trademark that is widely infringed is not valuable to any firm using it. Further, there is also no risk that trademarks will stymie dynamic knowledge spillovers, cumulative innovation or lead to the coordination and hold-up problems associated with patents over complex technology.

Determinants of IP Usage

In practice, patents are just one of many different appropriation mechanisms that firms may exploit in order to appropriate returns from their innovative activities. Important alternative (i.e. non-patent) appropriation mechanisms include trade secrecy, exploiting the benefits of lead time or first mover advantage, leveraging from complementary sales and service, and branding. A recent study by Moser (2007) suggests that the key determinant of the decision to patent is whether the innovation can be protected using trade secrecy, which is a function of the technology area, the cost of patenting, and scientific breakthroughs which facilitate copying or reverse engineering of technology. Since patents require disclosure, applicants forego the opportunity to rely on trade secrecy. From this we can infer that, for those inventions where a patent application is made, patents are preferred to trade secrecy.

Unlike patents, trade secrets can last in perpetuity. This may play an important role when inventors are deciding whether to go down the patenting path or not. However, not all inventions are easily protected by trade secrecy. A firm’s ability to exclude others from their technology by trade secrecy depends on a range of factors, including how costly it is for other firms to copy or reverse engineer the given technology. For example, process innovations are easier to protect via trade secrecy than product innovations since new products require some measure of disclosure through distribution and marketing. In

general, technology that is codified – meaning that it can be easily written down in a formal blueprint or instructions – can be easily reproduced by another person skilled in the art. Tacit knowledge, on the other hand, is difficult and expensive to copy as it does not exist unless embodied in firm's employees.

Survey evidence from around the world suggests that patents are only really important in a minority of innovations in a few industrial sectors (Levin et al. 1987; Cohen 2000). This research tends to suggest that patents may only be necessary for effective commercialization in a few technology areas including pharmaceuticals and chemicals, where the technology is highly codified (Harabi 1995). As well as industry- and technology-specific factors, firm characteristics will also determine the choice and effectiveness of different appropriation mechanisms (Jensen and Webster 2006). Importantly, IP rights are costly to acquire and, unlike other forms of property rights, must be defended at the expense of the owner. For this reason, the value of patent protection will depend on the firm's willingness (or ability) to enforce the patent, which is thought to be a function of firm size, *inter alia*.

Effects of the IP System

Benefits of the IP system

Recent empirical research has sought to estimate the *private* value of patent protection, which relate to the benefits that accrue to the individual innovating firm. Total benefits to society as a whole include the private benefit net of any losses faced by other agents in the economy. While the private benefits are important, IP policy development is generally based on the net social benefits. However, since social costs and benefits incorporate the private benefits, knowing the magnitude of the average private benefit has value.

One way to understand the magnitude of the implicit benefit of patent protection is to consider that the patent system essentially provides a subsidy to inventors. Noting this, empirical researchers have attempted to identify the implicit subsidy embodied in the patent system. An emerging consensus, summarised below, for the technologies that firms choose to patent (i.e. technologies for which firms consider patent protection to be the best method of appropriation), patents provide an equivalent subsidy of between 10 and 50% of the invention value, on average. However, it should be noted that this effect varies greatly between firms and across technology areas. There are three general approaches to estimating the value or incentive effect of patents, which are detailed below.

The first is the renewal approach. This approach begins with the premise that firms will renew their patent if the net private value of patent protection over the renewal period, is larger than the costs of renewal (Schankerman 1998; Gronqvist 2009). The idea is to estimate the distribution of initial value of patented inventions to fit the observed pattern of renewals. This results in a dollar value of the patent rights. To estimate the effective rate of

subsidy, Schankerman (1998) divides the aggregate value of patents registered in a given year by the R&D expenditure in the previous year, which he argues is a reasonable proxy for the investment that went into making the inventions. The results suggest that the patent system provides an incentive equivalent to a 25% subsidy rate to R&D. Lanjouw (1998) performs analogous estimates for West German patents, estimating an equivalent subsidy rate of 10%.

Another approach to estimating patent value is based on the effect of registering a patent on firm market value (see Griliches 1981; Bosworth and Rogers 2001; Hall 2005, Jensen and Webster 2009). Bessen (2007) aims to estimate the value of patent rights in this way while controlling for 'quality adjusted' R&D stock. He estimates the effective subsidy rate for different industries, finding it to lie between 6 and 76%, which reinforces the notion that patents are much more important in some industries like pharmaceuticals and chemicals.

The third, more recent, approach uses survey data to understand the incentive power of patent protection. As an example of this approach, a recent study by Arora et al. (2008) develops a model of innovation and patenting which enables them to estimate the patent premium and its impact on R&D investment. They model the patent premium as a random variable that has a firm-specific mean. Their results suggest that for most industries, patents provide no additional incentive (relative to the second best means of appropriation). In instances that firms do apply for a patent, they estimate the average patent premium to be 50%. A recent study by Jensen et al. (2009) considers data from a survey of Australian inventors. By comparing the self reported value of inventions that are protected by patent with those not protected by patent, they estimate that patent protection represents an implicit subsidy of about 48%.

As an alternative to estimating the implicit equivalent subsidy rate of the patent system, a growing body of literature directly considers the effects of patents on commercialisation (Gambardella et al. 2008; Webster and Jensen 2009). These studies have typically been based on the results of inventor surveys. Results from Webster and Jensen (2009) suggest that having patent protection increases the propensity of firms to attempt commercialisation of their new technologies, but only by a modest 8 percentage points on average. This empirical finding is, however, quite consistent with earlier survey results. For example, Mansfield and collaborators (1986; 1991) found patent protection to be important in the commercialization of a minority of innovations (see also Taylor and Silberston 1973).

IP rights, and patents in particular, play an important role in facilitating the transfer, diffusion and utilisation of existing technology. The principal mechanisms through which this manifests are disclosure requirements, licensing and the establishment of markets for technology. The existing evidence relating to each of these effects is discussed below.

Patents require innovators to publicly disclose technical details of their inventions in exchange for a time-limited monopoly (Denicolo and Franzoni 2004). At least in principle, this ensures that new knowledge is made available to other inventors, who are able to build on the technology in the future, or ‘invent around’ the technology. However, in contrast to this theory, recent evidence indicates that patent disclosures are less important sources of learning for firms than other mechanisms such as interaction with customers and suppliers (Cohen 2000; Jensen and Webster 2009).

Patents also play an important role in facilitating gains from trade between inventors and downstream commercialisers – and in this way, may actually encourage technology diffusion. Arrow (1962) first identified that in the absence of patent protection inventors may not disclose details of their technology to potential investors and development partners. Therefore, without a patent, inventors may be unable to license their inventions to third parties or to raise capital. On this basis, it is sometimes argued that patents are particularly important to small firms, who, on account of their scale, require financial, development, or distribution partners to bring their innovations to market. Indeed, empirical evidence suggests small firms are far more likely to licence their innovations than large firms (Gambardella 2007).

The existence of unutilised technology – technology that firms are unable to find a development partner to licence to – may suggest a possible market failure, and potential benefits from policy intervention. Analysis of a recent survey of European patent owners found that there exists a significant pool of patents whose owners would like to licence but are unable to find a suitable partner (Gambardella 2007). The analysis suggests that potential licensors are able to identify which patents are more suitable to licensing – such as more valuable, more general technology, and technology that is more easily codified. These attributes of technology were not found to be important in explaining whether a successful licensing deal is struck, once owners wishing to licence out their technology is controlled for. The authors suggest key impediments may include a lack of experience with technology contracting, and the absence of intermediaries that can match technology buyers and sellers. The authors stop short of calling for intervention to create such intermediaries but suggest a possible role for standardisation of contracts and legal framework.

Costs of the IP System

Providing legally enforceable IP, like all market interventions, inherently involves tradeoffs. The most fundamental trade-off pertains to the welfare loss associated with granting monopoly rights over technology. Under-utilisation of technology that results from a monopoly market structure has particularly detrimental impacts on cumulative innovation. Recent research has highlighted additional concerns about other unintended effects of patent protection. These include coordination costs and hold-up problems associated with

patent thickets and other strategic uses of patents. These issues and the related empirical evidence will be discussed further below.

One important concern is whether patents can hinder innovation in complex, cumulative technologies (see for e.g., Scotchmer 1991; Bessen and Maskin 2000). The issue arises because the development of new technology commonly builds on (or extends) what has gone before. The phenomenon whereby a new technology opens up additional technological opportunities – raising the productivity of future research – is known as dynamic knowledge spillovers. Dynamic knowledge spillovers play a critical role in some endogenous growth models. The implication of this is that under utilisation of existing technology resulting from monopoly market structure can potentially slow the rate of cumulative innovation.

A famous historical example where patents have been accused of hindering the development of new technology outlined by Boldrin and Levine (2007) is the steam engine. The authors describe James Watt's use of patent protection to block parallel innovations such as the Hornblower engine as well as preventing the introduction of important improvements, including the high pressure steam engine. They describe an explosion of innovative activity after the patent's expiration in 1804. In recognition of the importance of allowing researchers access to existing technology to improve upon, many patent systems include special exemptions for research applications of technology.

Jones (1995; 2000) reminds us that spillovers can be either positive *or* negative. If, like the proverbial low hanging fruit, the most obvious technologies are invested in first, the productivity of future research is likely to decrease as the technological stock accumulates. However, Shackle (1949) has argued that in the context of fundamental uncertainty (such as R&D), there is no reason why the projects that turn out to be the most productive *ex post*, are invested in first since we often do not have the information to know how different innovation will succeed in the market.

Technologies that represent research tools present a particularly challenging case for IP policy. On one hand, the benefits to further research resulting in widespread adoption of the tools is anticipated to be particularly great and restricting their use under a monopolistic market structure may stymie the rate of production of new technology. On the other hand, if the principal market for a new technology is as a research tool, allowing researchers to use it without compensating the original inventor will destroy the incentive to invest in such innovations.

The problem is further complicated by the fact that, in many fields, there is not a clear dichotomy between fundamental and end-use inventions. Many end products are used as research tools and permitting patent rights on these end products can hamper research (by furnishing the monopolist with the right to hold up research and demand a price premium).

Dreyfuss (2004) argues that many inventions in the field of technology now: ‘...have immediate, commercial applications as diagnostics or treatments and thus they qualify for patent protection. At the same time, they are of crucial importance to researchers, and as such, they have enormous power ... They cannot be invented around: for instance, any scientist who wants to study the genetics of breast cancer needs to utilize the BRCA 1 test.’ Murray and Stern (2007) describe the phenomenon as ‘dual knowledge’. They identify a number of instances where new knowledge results in both a patent applications and an academic paper and find that a patent grant has a modest negative effect (10-20 per cent) on the citation rate of academic research which suggests that once an piece of research is patented, there is some reduction in the amount of follow-on research conducted.

Another issue arises in the case of complex technologies, where product development requires input of a range of technologies covered by different patents that may be owned by different, competing interests. Such a situation can result in very high coordination costs and problems of hold-up (see Heller and Eisenberg 1998; Shapiro 2000; Graevenitz et al. 2008). Shapiro (2000) describes such a circumstance as a patent thicket – where an innovator must obtain licences from multiple patentees in order to commercialise their new product. He argues that this can be a particularly significant problem in industries like telecommunications where technology covered by patents is part of industry design and interface standards.

There is considerable evidence of a large number of patents that are held purely for strategic reasons, such as blocking technological developments by competitors i.e., the technology protected by these patents is not actually produced or utilised by their owners (Hall and Ziedonis 2001). The emergence of the ‘patent troll’ business model has also raised cause for concern. A patent troll is a firm who registers patents and has no intention of using the technology covered. Trolls aim to generate revenue purely through litigation with successful technology users who are generally not aware of that the relevant patents existed. A recent \$US600m lawsuit between the makers of Blackberry (RIM) and NTP Inc. is sometimes cited as an example of the costs of such activity. Some researchers have also suggested that the publication of numerous “bad” patents in recent years (Sampat 2005; Merges 1999) has resulted in costly dispute resolution downstream.

Aggregate effect of IP rights

The preceding discussion has identified that IP rights play a range of complex and often opposing roles relating to the production of new technology, and also to the diffusion of existing technology. It is therefore an empirical question as to what the aggregate effect of the strength of the IP system is. Empirical economists have looked for evidence through a number of approaches including the relationship between IP strength and economic growth

as well as the impact of IP strength on more proximate measures of innovative activity such as R&D.

A number of studies have considered the relationship between IP strength and economic growth using aggregate macroeconomic data (Gould and Gruben 1996; Park and Ginarte 1997; Thompson 1999; Falvey 2004). To measure IP 'strength', researchers have included indices that rate the IP legislation in place in each country on a 5-point scale, according to criteria such as maximum patent duration, membership of international IP agreements, and potential enforcement mechanisms (see for example Park and Ginarte 1997). The results of most of these studies have found that the relationship of the strength of the IP system and economic growth depends on a country's level of income per capita. High income countries, with established R&D sectors, are thought to benefit from strengthening IP rights because of the incentive effect on R&D outweighs the negative effect on technology transfer via unauthorized copying. In the case of middle income countries that have greater technological competencies, the effect is thought to be negative because stronger IP rights may inhibit technology transfer through copying and reverse engineering (Falvey 2004).

Some authors have argued that weak IP rights have been beneficial in the industrial development of East Asian economies including Korea and Japan (Kim 2002; Kumar 2002). However, national IP choices are now primarily determined by international agreements such as the recent Trade Related Intellectual Property Rights (TRIPS) agreed to in the Uruguay round of GATT that set minimum IP standards for all WTO member countries.

Another body of empirical research, discussed in detail below, asks the somewhat simpler question: can we observe the effect of IP rights on R&D investment? Despite the strong theoretical prediction that strong IP rights should increase the incentive to innovate, and the encouraging results from the macroeconomic growth studies, empirically establishing the direct effect of IP rights on R&D has proved remarkably difficult. This may be because the value of patent protection is very heterogeneous across industries (as discussed earlier).

An important study by Sakakibara and Branstetter (2001) aims to identify how 300 Japanese firms' innovative efforts vary in response to significant reforms to Japanese patent law that occurred in 1988. To measure innovative effort the authors consider R&D investment and patent applications in the USA. The reason patent applications in the USA are considered (rather than applications with the JPO) is to control for the possibility that the reform affects the propensity to patent rather than innovative effort. Their study failed to find any evidence that strengthening the patent system contributed to increased innovative activities. Another study by Lerner (2002) looked at the patenting activity of 60 countries over 150 years. The data include 177 episodes of patent policy reform. The analysis failed to find conclusive evidence that strengthening IP rights regime led to more patent applications. Lederman and Maloney (2003) considered a large sample of both developing and developed countries. The authors estimate a reduced form model of R&D investment demand,

including the Park and Ginarte IP rights score, which is found to be a significant determinant of aggregate R&D intensity.

IP rights in a Global Economy

The globalisation of R&D has attracted increasing attention of policy makers across the OECD. The recent and dramatic ascension of China and India as major technology players has further sharpened the policy interest in this issue. Since R&D by domestic firms is only one of several sources of productivity-enhancing technology, the trend towards globalisation of R&D has important productivity implications. One of the most obvious contributions of foreign firms to domestic innovative capacity and technology stock is through direct investments in R&D in New Zealand, for example by outsourcing to domestic firms. IP rights will also impact upon international technology transfer and spillovers. Technology transfer can occur via a number of complementary channels, including imitation, reverse engineering, Foreign Direct Investment (FDI), licensing, trade and the movement of skilled employees between firms and countries. Theoretically a nation's IP regime can affect each of these channels in complex and often opposing ways.

Cross-border contract R&D, including transactions between multinational enterprise (MNE) affiliates as well as between unaffiliated firms account for over 7 per cent of business expenditure on R&D in New Zealand (OECD 2007) and this figure is growing. Data for total spend by MNE affiliates (including reinvested own funds) are not available, though US Bureau of Economic Analysis figures indicate that US MNE's alone contribute roughly 6% of business R&D in New Zealand, suggesting the total contribution of foreign firms is likely to be very large. This supports the contention that foreign firms are an important source of technology for firms in New Zealand (Smith 2006).

There is considerable evidence that the national IP regime can influence the technology transfer via international licensing agreements. For instance, several recent studies estimate the response of royalty payments from multinational enterprise (MNE) affiliates to changes in host country IP regime. Royalty payments reflect the magnitude and value of the technology used by the licensee. Branstetter et al. (2006) assess the technology transfer within US MNEs in response to IP reforms undertaken by 16 host countries over 15 years. The authors find that, among technology intensive firms, royalty payments increase in response to changes in host country IP. Similar analysis, has been undertaken considering Japanese MNEs (Wakasugi 2005) and French MNEs (Bascavusoglu and Zuniga 2002) with similar results. Regarding French MNEs, Bascavusoglu and Zuniga (2002) find the effect of IP rights only in the case of high-tech goods in high-income countries.

Formal transfer of technologies via licensing is a particularly visible form of technology transfer. Technological transfer also operates through other channels such as investment,

trade, and migration of labour. IP rights policy has the ability to directly influence these channels and this has been subject to some empirical scrutiny. Trade has long been proposed as a conduit for technology, particularly technology embodied in traded capital goods. Coe and Helpman (1995) find that both home country R&D stock, and the R&D stock of trading partners, contribute to total factor productivity. There is also some evidence that national IP regime affects trade patterns. For example, stronger IP rights strength in developing country importers has a positive impact on trade volumes in the manufacturing sector (Maskus and Penubarti 1995; Fink and Braga 1999). Considering one single, but important technology sector, Lanjouw (2005) systematically analyzed the determinants of drug launches across 68 countries over the period 1982 and 2002. The results suggest that stronger IP rights, in particular longer patent terms, will accelerate drug launches in high income countries.

Firms face strong incentives to conduct R&D in-house and, in the case of MNEs, in the home country. These arise out of a need to protect their commercial advantages and technology and to exploit economies of scale in R&D (see for discussion Dunning 1988a; 1988b; 1994; Caves 1996). Traditionally it has been held that MNEs will undertake R&D abroad to support local production facilities or to adapt products and production processes to specific locations. It has also been argued that MNEs are increasingly engaging in R&D abroad with the intention of tapping into technology spillovers (Athukorala and Kohpaiboon 2006). In this case, MNEs locate R&D facilities in globally recognised clusters of technological excellence, such as Silicon Valley in the USA. This type of R&D is focused on acquiring the best technology at the lowest cost. Costs may also play a role in determining the location of R&D facilities by global firms and as such, the supply of high quality low cost researchers. Tax policy may also play a role.

While the host country IP rights regime may influence MNEs' R&D location decision, it is also possible that stronger IP rights facilitates technology transfer (via licensing), which may be a substitute for R&D investments in the host country. Existing evidence on this issue is mixed, though more recent evidence appears to suggest IP rights is an important determinant of MNE R&D investment decisions, in that stronger host country IP rights is associated with more R&D investment by MNEs (see for example Kumar 1996, 2001; Athukorala and Kohpaiboon 2006; Branstetter et al. 2006; Thomson 2009). The most robust determinant of MNE R&D activity is typically found to be the sales and capital stock of affiliates. Host country higher education and performance in basic science has also been found to be significant. Evidence on the efficacy of tax incentives remains mixed. The most comprehensive existing study fails to establish robust evidence that tax incentives are effective in attracting foreign R&D investment (Thomson 2009).

Conclusion

Technological change is fundamental to productivity growth and long-run economic prosperity. The rate of technological innovation within an economy depends on the incentives and impediments firms face to create new technology, and to assimilate technology which has been developed by other firms, into their products, production processes and services. In other words, facilitating technological change incorporates both the creation of new technology as well as the diffusion of existing technology. This observation is at the heart of the economic rationale of the patent system and should guide IP rights policy development.

IP rights have a range of functions and complex side effects. One of the main objectives of this review was to identify the theory and evidence relating to the rationale and effects of IP rights. The main function of IP rights is to provide innovators with a means to prevent others from copying their technology, and thereby allow them to recoup their R&D investments through charging higher prices than would otherwise be the case. This reflects an income transfer from technology users to innovators. Considerable research has aimed to identify whether patent reform has an observable impact on innovative activities. This research has provided ambiguous results. For example, the effects of stronger IP regimes are hard to observe in aggregate. This may be explained by the fact that patents are much more important in some sectors than in others. However, a recent emerging literature, which focuses on the private returns to patent protection, suggests that where firms prefer patenting to other mechanisms of appropriation, the benefit is significant, in the order of 50% on average of invention value.

The trade-offs involved in IP rights policy are many and complex, implying that the consequences of any reform may be difficult to predict. At the most basic level, the monopoly market structure associated with patents results in static underuse of existing technology. The potentially deleterious effect on cumulative innovation is perhaps the most serious ramification of this. Recent research also highlights a range of other important 'side effects' of patent policy such as an increasing strategic use of patents, including the creation of patent thickets.

IP rights also play a positive role in diffusing knowledge and technology. The traditional argument that disclosure requirements are an important source of technology transfer has received little empirical support. However, the role of patents in facilitating partnerships and exchange between inventors and developers or other financial backers is an area of increasing interest to academics and policy makers alike. Improving the function of such markets may yet prove to yield substantial welfare gains. This is particularly important in the case of New Zealand, which is reliant both on foreign technology and foreign markets for domestic innovations. The IP system plays an important role in facilitating this exchange.

Considerable evidence exists regarding the role of the IP system in facilitating technology transfer and foreign technology adoption via licensing and royalties, trade and foreign direct investment R&D-focused FDI.

INTERVIEWS AND SURVEY OF IP ADVISORS

While it was always envisaged that we would seek input from patent attorneys and other advisors, the original research proposal did not contemplate the method that we eventually adopted, namely, interviews with selected IP advisors followed by a survey of those advisors has proved to be extremely valuable. This extended interaction with IP advisors was added after the project had begun. We decided that a review of the awareness, understanding and strategic use of IP by business required greater input from IP advisors than had originally been envisaged. These individuals and the firms they represent have direct contact with businesses in respect of IP issues and often have direct input into the formulation of IP strategies. They are therefore ideally placed to comment on the level of awareness, understanding and use – that is, to help understand what is going on. However, while advisors may be ideally placed to influence the awareness, understanding and use of IP, the views of such advisors do not replace the views of businesses themselves. Their views are probably most germane in respect of the awareness and understanding that their clients have of IP; although, it must be remembered that advisors are just that, they are not managers of the businesses that they advise and they are not privy to all the issues that managers must consider. There is also the possibility of unconscious bias when reporting their views, given that their professional relationships with their clients may be in question.

There is no formal classification or description of an IP advisor in New Zealand. For the purpose of this research, initial discussions were conducted with patent attorneys and with solicitors who specialise in IP on the assumption that these were the people who are most likely to be involved with businesses when issues regarding IP arise. This was confirmed by survey evidence. Patent attorney firms in New Zealand offer a wide range of advice in the categories of the rights that go to make up the IP regime – notably, patents, trade marks, registered designs and copyright. They also offer advice in the commercialisation of IP including advice on strategies such as licensing and franchising.

Methodology

The views of IP advisors were sought in a number of ways. These included semi-structured interviews, a survey, and on-going liaison and discussion with a variety of advisors as the project progressed and as issues were identified, such as the taxation position of firms receiving royalties from IP licensed off-shore.

Semi-structured Interviews

The first step in the research with IP advisors was qualitative and involved semi-structured interviews with patent attorneys from two different firms and with solicitors from a large law firm. These interviews were intended to identify the major attitudes that IP advisors attributed to their clients in respect of the issues of awareness, understanding and strategic use of IP.

In addition to those three interviews, a number of IP advisors were interviewed as part of the scheme of interviews of businesses – one advisor functioned very much like an IP manager for a firm and another advisor, who was a director of a consulting practice, was interviewed specifically to include the views of consultancies as businesses. Their comments are included in the report as appropriate.

Client Base

The client base for IP advisors is important because advisors provide advice to businesses in New Zealand that have enough awareness of IP, usually in the sense of the legal regime, to consult an advisor. Some businesses are sufficiently aware to consult advisors prior to an issue arising; others consult an advisor when issues arise. However, the gap in any discussion with IP advisors is that they are, of course, unable to identify the IP-unaware who do not constitute part of their client base and are therefore unable to provide much comment on them.

The interviewees from the three IP advisor firms confirmed that their client base varies according to the firm, one factor being how long the advisory firm has been in existence, but all three have a range of clients with a variety of needs.

- Clients ranged from large businesses through to small. Categories of clients that were mentioned by the interviewees included: individual inventors who may walk in off the street; CRI's; manufacturers protecting refinements to existing products
- The weighting of local vs. overseas clients differed amongst the firms interviewed and according to the services offered. (For example, most firms of solicitors do not file patent applications.)
- The level of advice offered differs with the client. Smaller clients are more likely to require an initial general discussion of IP including a discussion of the costs and benefits of various approaches.
- Local clients have different requirements from overseas clients; the latter can be classified as IP-aware, having sought advice about IP in an overseas jurisdiction.

Awareness and Understanding of IP

The IP advisors considered that the awareness of IP was good in the sense of knowing that components of the system existed, (particularly patents, trade marks and copyright); although the comment was made that intellectual property is not necessarily a term that is well known. The comment was also made that awareness had improved from 10 – 20 years ago. However, the advisors did not consider that the primary level of awareness was matched by a similar level of knowledge and/or understanding of IP. Of course, the advisors pointed out that there is a range of awareness and understanding of IP from clients who have a sophisticated approach to those that require education in the IP system.

So, in terms of the clients that, when they first come to us, no, pretty minimal awareness of what can constitute IP. They tend to think in very narrow terms, such as, 'I've got an invention. I've got a trademark.' And not thinking of the wider implications.

Advisors pointed out that awareness of IP, in the sense of understanding the costs and benefits associated with owned enforceable rights is often initiated by the experience of the threat of IP litigation or to experience actual litigation over a form of IP. Associated with this insight was the comment that patent attorneys often deal with the innovators within the organisation, such as the engineering department. It is only when a problem arises that the CEO is aware of an IP issue.

According to the IP advisors that we interviewed, businesses see value in innovations in terms of the competitive edge that they obtain.

All the firms that we interviewed have education systems in place including seminars, workshops and publications (both hard copy and soft copy on-line). With larger firms, IP advisors often provide a full service package and may even assume a quasi-IP management role within the business. IPONZ was seen as a source of general information for their clients, not as a source of advice on applications, for example. One interviewee promoted education at secondary and tertiary level as a means of improving awareness and understanding of IP.

Text Box 1 - A Litigation Model of Developing Awareness

1. A New Zealand firm exported its products to an overseas market. It had not had any IP problems in New Zealand. It had not checked for possible IP protection held by other firms in the overseas market.
2. The firm received a letter from a firm of solicitors threatening action for patent infringement. In order to continue exporting its products it was forced to agree to enter into a licence arrangement and to pay royalties.
3. The firm's management realised that it had to take IP more seriously and that it could have saved itself time and money if it had undertaken a search of the relevant IP.
4. However, an attitude remained – why should we bother with patents ourselves; we're never going to sue anybody. Their IP advisors pointed out to them that if the firm had patented aspects of its product, it could have offered a cross-licence instead of having to pay royalties.
5. The firm now has a strategic approach to IP and innovations:
 - Is the innovation commercially viable?
 - Is it legally protectable?
 - The IP manager has a budget.
 - They maintain a regular watch on competitors because the time lag between conceptualisation of an idea and its commercialisation can be 1 – 2 years.
 - They include the © symbol on their drawings.
 - They are more careful with the way they use their brands.

IP Strategy

The advisors did not believe that enough firms have an IP strategy. However, as noted above, IP advisors are not managers in the businesses that they advise and are not privy to all the issues that managers have to face when formulating business strategy. A number of general comments were made about IP strategy as adopted by their clients.

- Cost is seen as more of an issue when it comes to registering IP rights offshore.
- Licensing – there is not a lot of licensing, it depends on the particular firm. Factors include the cost of setting up licences and the cost and complexity of enforcing the licence off-shore. Firms are also fearful of losing control. Cross-licensing was suggested as a strategy that had been adopted by businesses to avoid litigation.
- IP is seen as a means of stopping people, i.e. a defensive strategy, rather than as an asset that can be licensed out, although this approach is adopted as well. IP advisors identify opportunities at an early stage.
- There is a lot of conflict over IP in New Zealand, but very little of that conflict goes all the way to court.

- There has been an increase in IP applications filed overseas.
- Whether a firm searches patent databases will depend on the individual firm and its level of sophistication. Searches are done more as a defensive matter i.e. to see what competitors are doing and to keep abreast or ahead of them. CRI's and some university related researchers are most likely to undertake overseas searches.
- Some clients have begun to adopt a selective approach to filing patents – they do not automatically file first in New Zealand. However, there is disagreement within the profession about the value of filing first off-shore.
- Confidentiality agreements were mentioned by some advisors as not being very important for their clients. But this observation is contradicted by the businesses survey.
- Another comment made was that firms are aware of copyright.
- IP is seen by IP advisors as a means of creating wealth, however, New Zealand firms have a 'strategy' of selling out and not maximising the worth of their IP.
- There are problems with commercialising creations – these include access to capital, small size of the market.
- There has been an increase in the numbers of IP managers in organisations. This would suggest that IP is regarded as more important and that a strategic approach to the use of IP will be adopted. IP managers are more likely to be found in organisations such as CRI's.

Survey

The next step was to conduct a survey of IP advisors. The survey sought to understand the views that IP advisors held of their clients' views about IP, their awareness of the IP system and their use of that system. Within the structure of the survey, there was opportunity for respondents to make comments about how the IP system could be improved. The responses to the survey confirmed comments made in the semi-structured interviews.

Emails inviting participation in the survey were sent to individuals who were listed on the websites of patent attorneys and larger firms of solicitors. However, participation was not limited to advisors with legal training and angel investors and accountants were also included. The latter are professionals who would be likely to refer businesses to patent attorneys and solicitors in the event of legal issues arising. Banks were not included on the basis that they do not lend against IP.

Within the survey of IP Advisors, respondents were asked 'What is the main business of your firm?' They were then asked to self-classify themselves as a patent attorney, solicitor, accountant, investor or other. Because of its structure, it would have been difficult to complete the survey if a respondent did not offer advice on IP. Of the 84 respondents who answered the question 'What is the main business of your firm?' the majority were patent

attorneys (59.5%), followed by solicitors (27.4%), accountants (8.3%) and investors (4.8%). While the responses were clearly biased towards external patent attorneys and solicitors, this probably represents the true structure of the IP advisor system in New Zealand – if a firm seeks advice about IP, it will usually be given by someone with legal training as opposed to business training. (In the awareness survey which we conducted of New Zealand businesses, respondents were asked from whom their business sought advice about IP rights. A large majority (71.4%) named external patent attorneys, followed by external solicitors (52.4%).)

Table 2 summarises the ANSIC sectors identified by respondents. It should be noted that an advisor could offer services across a number of sectors. Most advice would appear to be offered into: agriculture, forestry and fishing; and, manufacturing; followed by retail trade, construction, property and business services. We note that CRIs are included in business services.

Table 1 - Replies to question "Which of the following sectors best describe the majority of your New Zealand clients? (that is, ones for whom you personally act?)"

Sector	Response Percent
Agriculture (including horticulture), forestry and fishing	43.8%
Mining	7.1%
Manufacturing	53.6%
Electricity, gas and water supply	10.7%
Construction	22.3%
Wholesale trade	17.0%
Retail trade	33.9%
Accommodation, cafés and restaurants	15.2%
Transport and storage	17.9%
Communication services	25.0%
Finance and insurance	25.9%
Property and business services - including research institutes	24.1%
Government administration and defence	8.9%
Education	17.0%
Health and community services	21.4%
Cultural and recreational services	12.5%
Personal and other services	3.6%
Other	13.4%

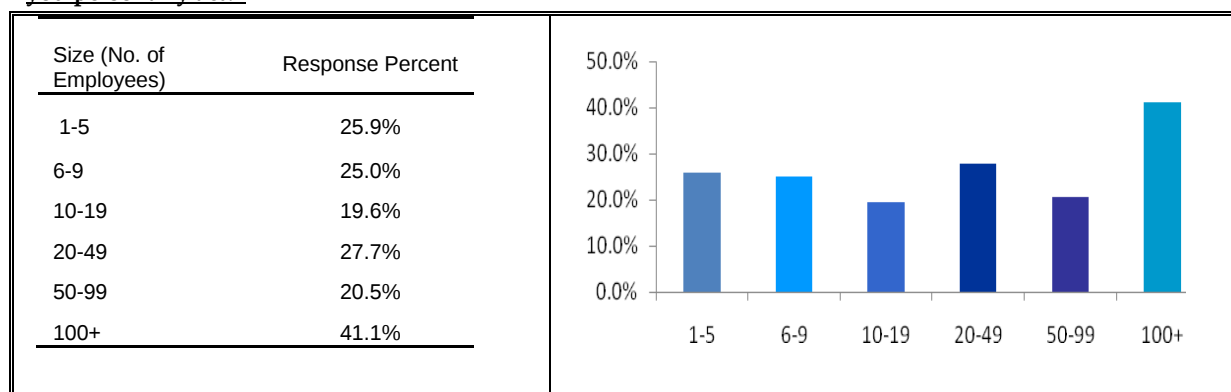
Table 2 - Replies to question "Which sectors best describe the majority of your New Zealand clients for whom you personally act?"

Table 3 shows that the distribution of advice across firm size (as measured by the number of employees) is fairly uniform to 99 employees.

Table 3 - The awareness of the majority of New Zealand Clients of the following types of IP (prior to their receiving advice from you)

	1. Very low	2	3. Some	4	5. Very High	6. Don't know
1. Copyright	9.6%	22.1%	48.1%	15.4%	4.8%	0.0%
2. Patent	12.4%	23.8%	34.3%	20.0%	8.6%	1.0%
3. Registered trade/service marks	5.9%	12.7%	42.2%	24.5%	11.8%	2.9%
4. Unregistered trade/service marks	16.0%	42.0%	29.0%	7.0%	2.0%	4.0%
5. Domain names	6.0%	8.0%	38.0%	28.0%	15.0%	5.0%
6. Registered design	35.0%	35.9%	20.4%	3.9%	1.0%	3.9%
7. Plant variety rights	61.4%	16.8%	6.9%	0.0%	1.0%	13.9%
8. Confidentiality agreements	4.8%	14.3%	39.0%	20.0%	20.0%	1.9%
9. Trade secrets	8.6%	33.3%	36.2%	9.5%	11.4%	1.0%

Table 3 is of potential interest because it shows that client awareness of PVRs is low. This raises a potential issue for policy makers because of the significant role plants play in the New Zealand economy. This issue is also highlighted in table 4 which shows the awareness of patents, designs, and PVRs as a source of information is quite low (73.3% answered 1 = very low and 2 = low).

Table 4 - The awareness of the majority of New Zealand Clients of the following aspects of IP (prior to their receiving advice from you)

	1. Very low	2	3. Some	4	5. Very High	6. Don't know
1. Source of information and advice about IP	15.4%	34.6%	33.7%	11.5%	1.9%	2.9%
2. Cost of applying for IP protection	20.8%	37.7%	25.5%	12.3%	1.9%	1.9%
3. Cost of enforcing IP protection	27.6%	37.1%	21.9%	7.6%	2.9%	2.9%
4. Benefits of IP protection	9.5%	25.7%	41.0%	16.2%	5.7%	1.9%
5. Patents, designs and PVR's as a source of information	37.1%	36.2%	13.3%	8.6%	1.9%	2.9%

There seems to be a general agreement among advisors that clients are unaware that international patents are a source of scientific and technical knowledge. Most businesses, it would appear, are focussed on their own internal R&D.

Table 5 - The use of international patents as a source of scientific and technical knowledge for R&D for the majority of New Zealand Clients

	1. Strongly disagree	2	3. Agree	4	5. Strongly agree	6. Don't know
They are generally unaware that international patents are a source of scientific and technical knowledge for R&D	4.0%	29.7%	16.8%	17.8%	20.8%	10.9%
The do not receive advice from their IP advisors about the value of international patents as a source of scientific and technical knowledge for R&D	18.8%	34.7%	14.9%	9.9%	5.9%	15.8%
The do not implement the advice from their IP advisors about the value of international patents as a source of scientific and technical knowledge for R&D	3.0%	27.0%	26.0%	15.0%	5.0%	24.0%
they are focused on their own internal sources for R&D	2.0%	13.1%	40.4%	16.2%	18.2%	10.1%

Table 6 - The role of government agencies in providing information and raising awareness of IP

	1. Strongly disagree	2	3. Agree	4	5. Strongly agree	6. Don't know
They are a primary source of information about IP	29.3%	35.4%	20.2%	5.1%	5.1%	5.1%
They should provide general (non-legal) advice about IP	8.9%	18.8%	41.6%	11.9%	17.8%	1.0%
They should provide legal advice about obtaining and using IP	57.0%	26.0%	7.0%	4.0%	4.0%	2.0%

Table 7 - The effectiveness in providing information about IP by organisations

	1. Very low	2	3. Some	4	5. Very High	6. Don't know
IPONZ	8.9%	25.7%	37.6%	11.9%	10.9%	5.0%
Industry associations	14.0%	29.0%	35.0%	12.0%	3.0%	7.0%
Seminars and conferences	4.0%	33.0%	31.0%	25.0%	2.0%	5.0%
Other	8.3%	13.9%	13.9%	19.4%	8.3%	36.1%

Sixty-four per cent of advisors did not consider government agencies as a primary source of information and only 15% thought government ought to provide legal advice. The relative effectiveness of public and private in providing information about IP is similar with around 30-40% of the response in the “very low to low” range.

Table 8 - The understanding of the majority of New Zealand Clients of the following types of IP (prior to their receiving advice from you)

	1. Very low	2	3. Some	4	5. Very High	6. Don't know
1. Copyright	12.9%	28.0%	50.5%	6.5%	1.1%	1.1%
2. Patent	14.9%	26.6%	42.6%	13.8%	0.0%	2.1%
3. Registered trade/service marks	6.5%	16.3%	48.9%	21.7%	2.2%	4.3%
4. Unregistered trade/service marks	15.4%	50.5%	27.5%	1.1%	1.1%	4.4%
5. Domain names	5.5%	16.5%	29.7%	34.1%	7.7%	6.6%
6. Registered design	36.6%	43.0%	14.0%	3.2%	0.0%	3.2%
7. Plant variety rights	54.3%	17.4%	15.2%	0.0%	1.1%	12.0%
8. Confidentiality agreements	5.4%	17.4%	43.5%	27.2%	4.3%	2.2%
9. Trade secrets	10.6%	35.1%	37.2%	11.7%	2.1%	3.2%

There is a reasonable correspondence between Table 4 and Table 9, again highlighting a lack of understanding about PVRs and registered designs.

Table 9 - Replies to question "Do the majority of your New Zealand Clients think that having IP protection increase the value of their firm?"

	1. Very low	2	3. Some	4	5. Very High	6. Don't know
1. Copyright	7.6%	21.7%	52.2%	13.0%	3.3%	2.2%
2. Patent	1.1%	1.1%	23.7%	44.1%	28.0%	2.2%
3. Registered trade/service marks	1.1%	3.3%	32.2%	37.8%	22.2%	3.3%
4. Unregistered trade/service marks	9.0%	28.1%	39.3%	13.5%	2.2%	7.9%
5. Domain names	1.1%	12.4%	34.8%	39.3%	6.7%	5.6%
6. Registered design	17.6%	19.8%	37.4%	16.5%	2.2%	6.6%
7. Plant variety rights	27.3%	18.2%	9.1%	11.4%	5.7%	28.4%
8. Confidentiality agreements	5.4%	21.7%	31.5%	30.4%	9.8%	1.1%
9. Trade secrets	4.3%	17.4%	40.2%	23.9%	10.9%	3.3%

Table 10 shows that clients see copyright, patent, registered trademarks, and trade secrets, as value enhancing IP instruments. Registered designs and PVRs are not seen in this light.

Table 10 - The attitude of the majority of New Zealand clients to IP

	1. Strongly disagree	2	3. Agree	4	5. Strongly agree	6. Don't know
IP protection is an important part of overall business strategy	3.2%	19.1%	40.4%	20.2%	17.0%	0.0%
IP protection is a common feature of business strategy in NZ	6.4%	33.0%	37.2%	16.0%	6.4%	1.1%
Clients with an international focus are more likely to have an understanding of IP	1.1%	6.4%	26.6%	39.4%	26.6%	0.0%
Technology-intensive clients are more likely to have an understanding of IP	2.1%	6.4%	27.7%	31.9%	30.9%	1.1%
Our clients are more likely to adopt IP protection after seeking advice	0.0%	5.4%	20.4%	41.9%	30.1%	2.2%
Our clients regard IP as being mysterious or complex	2.2%	26.9%	35.5%	25.8%	7.5%	2.2%
IP protection is expensive to obtain in NZ	7.4%	40.4%	20.2%	19.1%	10.6%	2.1%
IP protection is expensive to enforce in NZ	1.1%	9.7%	31.2%	33.3%	23.7%	1.1%
IP protection is expensive to obtain overseas	0.0%	2.1%	14.9%	38.3%	39.4%	5.3%
IP protection is expensive to enforce overseas	0.0%	2.1%	7.4%	24.5%	58.5%	7.4%

Table 11 - Replies to question "Please rate the following types of IP protection in terms of their use by the majority of your New Zealand clients"

	1. Not used	2	3. Sometimes used	4	5. Often used	6. Don't know
1. Copyright	1.1%	16.9%	38.2%	15.7%	27.0%	1.1%
2. Patent	1.1%	11.1%	41.1%	17.8%	25.6%	3.3%
3. Registered trade/service marks	0.0%	5.7%	18.4%	24.1%	48.3%	3.4%
4. Unregistered trade/service marks	4.7%	14.0%	32.6%	18.6%	25.6%	4.7%
5. Domain names	0.0%	4.6%	11.5%	33.3%	46.0%	4.6%
6. Registered design	19.3%	37.5%	23.9%	9.1%	4.5%	5.7%
7. Plant variety rights	43.7%	29.9%	5.7%	2.3%	3.4%	14.9%
8. Confidentiality agreements	0.0%	4.5%	23.6%	37.1%	33.7%	1.1%
9. Trade secrets	5.6%	24.4%	35.6%	14.4%	15.6%	4.4%

Turning to the existence of an IP strategy, responses were mixed and, if anything show that an IP strategy is not common. It Technology-intensive clients, and those with an international focus, are more likely to understand IP. Obtaining IP protection in New Zealand is not seen to be expensive but obtaining and enforcing IP protection overseas is.

Table 12 - Replies to question "Please rate the following reasons why the majority of your New Zealand clients use IP"

	1. Not important	2	3. Important	4	5. Highly important	6. Don't know
To send a signal to the market about the product	9.1%	14.8%	38.6%	19.3%	15.9%	2.3%
To provide a platform for licensing or franchising	0.0%	7.8%	28.9%	35.6%	25.6%	2.2%
To provide a deterrent	0.0%	3.4%	36.0%	29.2%	30.3%	1.1%
To establish a foothold in the market	8.1%	14.0%	37.2%	22.1%	17.4%	1.2%
To provide protection in overseas market	0.0%	11.1%	25.6%	33.3%	28.9%	1.1%
To provide protection against copying/imitation	0.0%	0.0%	27.0%	32.6%	39.3%	1.1%
To protect the value of the brand	0.0%	4.6%	19.5%	39.1%	34.5%	2.3%
To increase the value of an innovation	1.1%	7.9%	33.7%	24.7%	29.2%	3.4%
To increase market share	4.5%	23.9%	28.4%	27.3%	14.8%	1.1%
To increase productivity	23.5%	32.9%	27.1%	10.6%	1.2%	4.7%
To build competitive advantage	1.1%	5.6%	26.7%	34.4%	28.9%	3.3%
To attract investors	2.2%	4.4%	22.2%	32.2%	35.6%	3.3%
Other	0.0%	0.0%	0.0%	0.0%	14.3%	85.7%

Table 12 suggests that the link between IP and productivity is not considered important. The building of competitive advantage, protection, deterrence, and attracting investors is considered important.

Table 13 - Replies to question "Please rate the following statements regarding the use of IP by the majority of your New Zealand clients using IP"

	1. Strongly disagree	2	3. Agree	4	5. Strongly agree	6. Don't know
IP protection is an important part of overall business strategy	0.0%	17.2%	39.1%	23.0%	20.7%	0.0%
IP protection is a common feature of business strategy in NZ	2.3%	31.4%	38.4%	19.8%	7.0%	1.2%
Firms with an international focus are more likely to use IP protection	1.1%	3.4%	21.8%	42.5%	31.0%	0.0%
Technology-intensive clients are more likely to use IP protection	1.1%	8.0%	14.9%	35.6%	39.1%	1.1%
Firms are more likely to adopt IP protection after seeking advice	0.0%	4.7%	20.9%	43.0%	30.2%	1.2%
Firms regard IP as being mysterious or complex	2.3%	23.3%	33.7%	29.1%	9.3%	2.3%
IP protection is expensive to obtain in NZ	3.4%	40.2%	21.8%	24.1%	8.0%	2.3%
IP protection is expensive to enforce in NZ	1.1%	11.5%	28.7%	34.5%	20.7%	3.4%
IP protection is expensive to obtain overseas	1.1%	1.1%	19.5%	40.2%	35.6%	2.3%
IP protection is expensive to enforce overseas	1.1%	0.0%	6.9%	35.6%	52.9%	3.4%

Table 13 shows that IP business strategy is considered an important business strategy by those using IP but it is considered complex and expensive to enforce in New Zealand and overseas. This observation is corroborated by Tables 14 through 17.

Table 14 - Replies to question "Please rate the following factors in terms of their importance in inhibiting the use of IP by the majority if your New Zealand clients"

	1. Not important	2	3. Important	4	5. Highly important	6. Don't know
Cost of application in New Zealand	13.5%	11.2%	42.7%	19.1%	9.0%	4.5%
Cost of application overseas for all IP	0.0%	1.1%	19.3%	42.0%	36.4%	1.1%
Cost of enforcement in New Zealand	6.7%	27.0%	31.5%	22.5%	11.2%	1.1%
Cost of enforcement overseas	2.2%	12.4%	22.5%	30.3%	31.5%	1.1%
Uncertainty regarding the benefits of protection	3.4%	18.0%	46.1%	21.3%	10.1%	1.1%
Lack of awareness and understanding of the system	4.5%	23.9%	37.5%	20.5%	12.5%	1.1%
Speed of product innovation	3.4%	25.0%	39.8%	17.0%	5.7%	9.1%
Concerns regarding disclosure	10.2%	23.9%	38.6%	17.0%	4.5%	5.7%
Limited managerial resources	6.8%	29.5%	39.8%	13.6%	6.8%	3.4%
Lack of access to capital	0.0%	11.2%	27.0%	24.7%	31.5%	5.6%
Issues with the legal system	15.1%	41.9%	22.1%	4.7%	4.7%	11.6%

Table 15 - The cost of using IP system within New Zealand for the majority of New Zealand clients

	1. Strongly disagree	2	3. Agree	4	5. Strongly agree	6. Don't know
The cost of applying for IP protection is too high	10.1%	48.3%	24.7%	11.2%	2.2%	3.4%
The cost of enforcing IP protection is too high	5.6%	18.0%	32.6%	21.3%	20.2%	2.2%
IP protection is too costly for clients intending to export	9.1%	33.0%	26.1%	15.9%	12.5%	3.4%
The lower cost of on-line applications for IP has helped clients	25.8%	27.0%	16.9%	10.1%	7.9%	12.4%

Table 16 - Replies to question "Does the majority of your New Zealand clients think that the IP system in New Zealand meets their needs in terms of:"

	1. Strongly disagree	2	3. Agree	4	5. Strongly agree	6. Don't know
Cost of application and maintenance	2.2%	15.7%	59.6%	9.0%	5.6%	7.9%
Enforcement	6.7%	38.2%	27.0%	13.5%	0.0%	14.6%
Provision of information about IP	3.4%	27.0%	32.6%	14.6%	1.1%	21.3%
Administration of the registered IP system	3.4%	19.1%	43.8%	13.5%	3.4%	16.9%

Table 17 - The importance of the IP system in New Zealand for the majority of New Zealand clients by industry sectors

Sector	1. Not important	2	3. Important	4	5. Highly important	6. Don't know
Agriculture (including horticulture), forestry and fishing	1.3%	8.9%	39.2%	16.5%	21.5%	12.7%
Mining	3.3%	8.3%	13.3%	3.3%	6.7%	65.0%
Manufacturing	0.0%	2.5%	32.9%	27.8%	22.8%	13.9%
Electricity, gas and water supply	8.1%	21.0%	16.1%	8.1%	4.8%	41.9%
Construction	10.1%	20.3%	27.5%	5.8%	5.8%	30.4%
Wholesale trade	7.4%	11.8%	23.5%	5.9%	10.3%	41.2%
Retail trade, Accommodation, cafés and restaurants	11.6%	11.6%	23.2%	17.4%	10.1%	26.1%
Transport and storage	9.0%	22.4%	25.4%	4.5%	6.0%	32.8%
Communication services	1.4%	1.4%	15.9%	33.3%	30.4%	17.4%
Finance and insurance	4.2%	18.3%	26.8%	25.4%	5.6%	19.7%
Property and business services - including research institutes	0.0%	5.5%	15.1%	28.8%	32.9%	17.8%
Government administration and defence	8.2%	19.7%	16.4%	9.8%	4.9%	41.0%
Education	6.7%	30.0%	18.3%	11.7%	6.7%	26.7%
Health and community services	8.6%	18.6%	22.9%	12.9%	11.4%	25.7%
Cultural and recreational services	4.8%	27.0%	12.7%	14.3%	4.8%	36.5%
Personal and other services	9.1%	10.9%	5.5%	1.8%	3.6%	69.1%
Other	0.0%	0.0%	0.0%	5.0%	10.0%	85.0%

Advisors consider client assessments of the importance of IP system to be relatively high in agriculture, forestry, fishing, manufacturing, communications, and property and business services (which includes CRIs).

Table 18 – Respondents Company Role

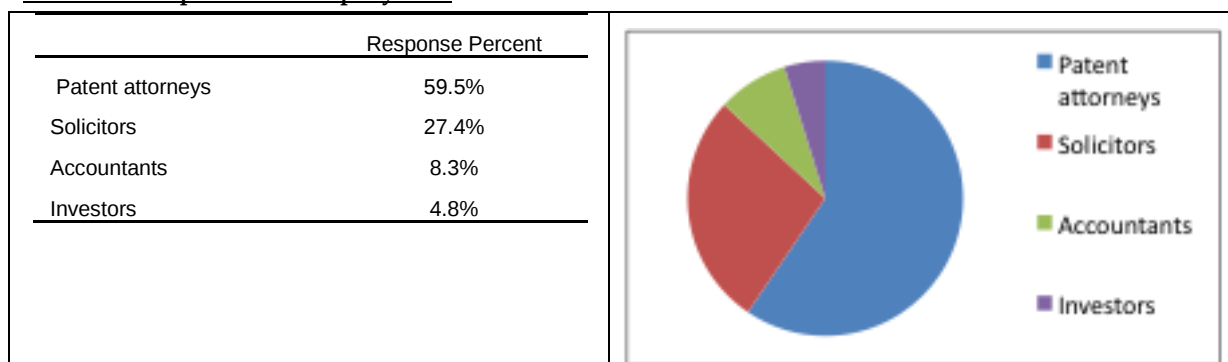


Table 19 – Company Ownership

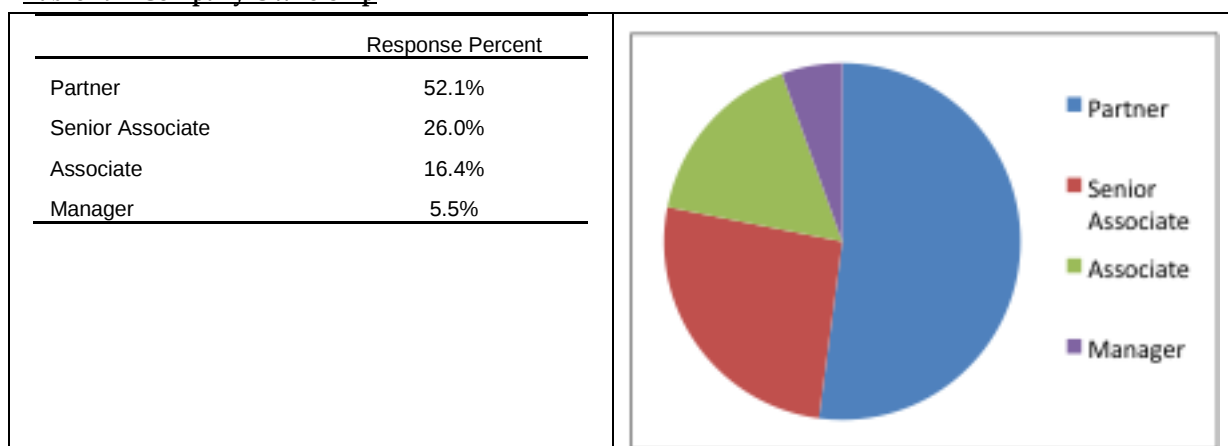
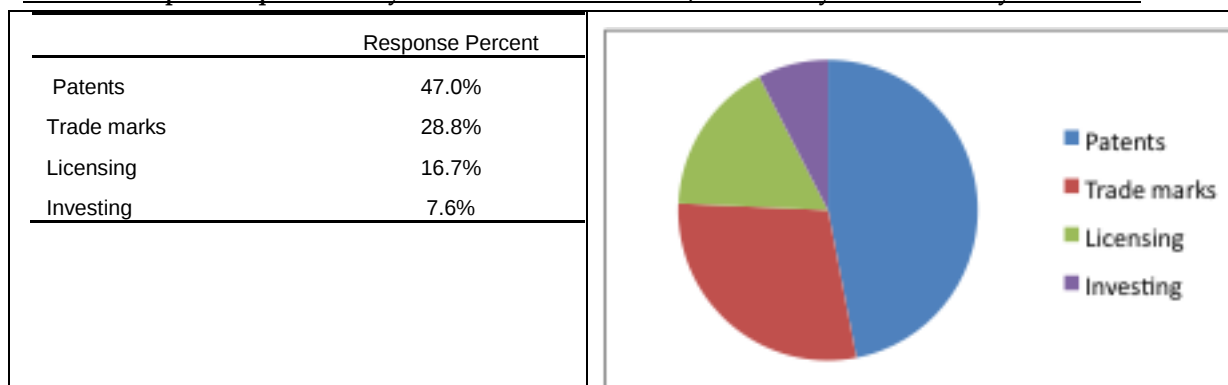


Table 20 - Replies to question "If you are a member of a team, what does your team mainly deal with?"



Tables 18 through 21 provide a summary of advisor attributes: most are patent attorneys and solicitors at the level of senior associate or partner, and deal mainly with patents and trademarks.

Conclusions

- The interviews with advisors revealed that there is a general awareness of IP which is not matched by a similar level of knowledge about IP. Enhanced level of understanding can arise from threat of litigation or actual experience with litigation. All firms interviewed had education systems in place, including hard copy and soft-copy online.
- Advisors interviewed were of the view that not enough firms had an IP strategy in place. In contrast to the business survey, some IP advisors considered confidentiality agreements as not being important. IP is seen as a defensive strategy and conflict rarely goes to court. Advisors noted that there appears to be an increase in the numbers of IP managers in organizations such as CRIs.
- Survey respondents were mostly patent attorneys and solicitors at the level of senior associate or partner, and deal mainly with patents and trademarks.
- Manufacturing, agriculture, forestry, and fishing (AFF) sectors clearly dominate in terms of clients. The distribution of advice across firm size is fairly uniform, at least up to 100 employees. Awareness of PVRs is low and most businesses appear to be focused on their own internal R&D.
- A majority of responses did not see government agencies as a primary source of information on IP and a relatively small number of respondents thought government should provide legal advice. As a source of information, the effectiveness of public and private organisations was similar.
- Clients are considered to be unaware that international patents are a source of scientific and technical knowledge. Most focus on their own internal R&D.
- Clients see copyright, patent, registered trademarks, and trade secrets, as value enhancing IP instruments.
- Advisors note that the existence of an IP strategy is not common among clients. Technology-intensive clients, and those with an international focus, are more likely to understand IP.
- IP business strategy is an important business strategy by those clients using IP but it is considered complex and expensive to enforce in New Zealand and overseas. It Technology-intensive clients, and those with an international focus, are more likely to understand IP. Obtaining IP protection in New Zealand is not seen to be expensive but obtaining and enforcing IP protection overseas is.
- Advisors are of the view that clients don't consider the link between IP and productivity as important whereas the building of competitive advantage, protection, deterrence, and attracting investors is.

- Advisors consider client assessments of the importance of IP system to be relatively high in agriculture, forestry, fishing, manufacturing, communications, and property and business services (which includes CRIs).
- A number of respondents answered the question in the survey - 'Do you have any suggestions that would improve the existing IP protection system within New Zealand?'

Two of the answers were:

Our relatively low performance in terms of capturing, protecting and commercialising our innovations is more of a matter of lack of awareness of IP as an asset, lack of large businesses that are IP intensive and that have succeeded overseas and a perception that it is all too hard or too expensive. The fact remains that the large global companies are heavy users of the IP system globally and if we want companies to compete with them we will need to be users of those systems as well.

Introduction and/or better promotion of simple methods for letting people know whether material that is published online is freely available to use, restricted for use in some way etc (e.g. creative commons notation is one such system but is little used). Object here is to promote better understanding and therefore respect for copyright in particular.

SURVEY OF BUSINESSES

The RFP issued by the MED specified that ‘The review should examine those New Zealand businesses or industries or sectors where the potential for productivity growth is most promising.’ Our approach to meeting the latter requirement was to adopt the classification proposed in the MED paper ‘New Zealand’s Future Competitive Advantage Report’. That Report identified three key sectors in which the authors considered New Zealand has future competitive advantage, based on product markets and/or technologies. These sectors are: (i) natural resource-based; (ii) services; (iii) niche manufacturing and high tech. We added a fourth sector, namely, research institutes, to cover organisations such as CRI’s and universities which do not conveniently fit into the other three sectors. However, organisations that are in the sector of research institutes are significant for their intensive development of IP. The dissemination of information from those organisations and its commercialisation by commercial entities has ramifications for the issues addressed in this review.

We identified businesses that fitted one of the four sectors from a number of sources. These included businesses referred to in ‘New Zealand’s Future Competitive Advantage Report’; businesses suggested by the MED; businesses that received publicity for being innovative; and businesses identified in reports from NZTE and other government departments. The businesses we identified were then mapped against the four categories to produce a representative spread.

Methodology

The views held by the management of businesses were sought in two ways. The primary means was a series of semi-structured interviews with the organisations listed in Table 21. The sample to which email invitations were sent to complete the questionnaire was drawn from a number of sources and included all the sectors in the ANZSIC Codes. The write-ups of the interviews and further information on the methodology are contained in a separate report.

We also conducted an on-line survey that aimed to provide an overview of IP awareness in the wider business community. ‘The main risk with a survey designed to assess awareness of anything is that those unaware may also be unconcerned and therefore less likely to reply.’ (Pitkethly, 2007, p 51) Even if the unaware are concerned enough to attempt to answer the survey, because they are unaware, they will not be able to provide meaningful answers.

Interviews

A challenge of conducting research on IP awareness is that it is the IP-unaware and the reasons for their lack of awareness that are of as much interest as the IP-aware. The IP-unaware are also likely to be uninterested in research of this nature, therefore trying to identify the IP-unaware and then discovering what they do not know is a problematic exercise. An example may illustrate the difficulties – we contacted a firm which claimed not to use IP at all and declined to be interviewed. However, a search of the IPONZ database showed that the firm is the owner of a registered trade mark. There are two main conclusions that can be drawn from this example: (i) the respondent had a poor understanding of IP; and/or (ii) the respondent was resistant to being involved in the research.

Data Limitations

More innovative companies and a selection of research institutes were deliberately selected to be interviewed. This approach was taken to meet the specification in the RFP that ‘the review should examine those New Zealand businesses or industries or sectors where the potential for productivity growth is most promising’. We attempted to moderate this potential for bias by asking interviewees about their perceptions of levels of awareness in their industries.

Levels of awareness and understanding of those interviewed varied. Use of New Zealand’s IP regime varied considerably across different industry categories.

It’s not a lot of expertise. There’s a lot of awareness and there’s, ‘We’ve heard of IP, we don’t want those research providers ripping us off, so we want to own that.’ That’s about as deep as the understanding goes. So it’s not like they’re unaware of it.

Our proposal in response to the RFP specified twenty interviews, which, at this stage of the MED review programme, was deemed to be sufficient to give an indication of the factors under review for businesses and the areas of need for further research. (In the event, we interviewed 22 businesses.) While a variety of views emerged in the first fifteen or so interviews, the amount of new information decreased as the number approached and exceeded twenty, which suggests that the sample was reasonably representative of the categories of firms interviewed. The approach also suggested that a wider sample could be canvassed in later research, for example such social categories as Māori, women and immigrant owned businesses.

We note that within the sample of businesses which we interviewed, we found a cross-section of organisations and a cross-section of views within sectors. Hence the views of our sample are indicative of the views of IP-aware businesses in New Zealand at this time. The

caveat is that the views of the organisations which we interviewed cannot be taken to represent the views of businesses which are IP-unaware.

Table 21 - List and spread of businesses interviewed by sector

Description	Natural resources	Services	Niche manufacturing	Researchers
Niche manufacturer			√	
Contract manufacturer			√	√
Financial consulting service		√		
Consulting and services provider		√		
Researcher and manufacturer			√	√
Manufacturer			√	√
Primary resource processor and marketer	√	√		
Niche designer and manufacturer		√	√	
Niche manufacturer		√	√	
Primary resource processor and marketer	√			
Retailer		√		
Niche manufacturer			√	
Manufacturer		√	√	
Software developer		√	√	
Marketing and supply chain company	√			√
Research commercialiser		√		√
Biopharmaceutical company			√	√
Research institute	√			√
Research institute	√	√		√
Representative body for SMEs		√		
IT products and services provider		√		
Multinational Corporation		√		

Although the businesses we interviewed represent a number of different industry sectors and range from small to large, we have adopted a consistent approach to writing up the interviews. Each interview was conducted to a similar set of questions (the interview outline is set out in Appendix 3) but the detail differed. The interview outline acted as a framework

for the interviews and was adapted to suit the various interviewees. Some interviewees were prepared to spend more time and had more experience of IP than others and we were able to draw out more information from the former. For comparability, the interviews were written up according to a basic set of headings. These headings were supplemented with other headings when the style of the interview demanded it.

The basic headings are: Organisation Background; Use of the IP System; IP Strategy; Benefits of Using the IP System; Barriers to using the IP System; Success of the IP System.

The supplementary headings included: IP and productivity; Recommendations for Improvements to the IP System.

Organisation Background

This section of the interview write up provides the reader with some background information on the various businesses we interviewed. Because we promised the interviewees that we would preserve their anonymity, information in this section is limited to material that does not identify the individual business. As noted above, the businesses we interviewed represented a range of businesses across the four sectors that we selected. They included businesses with a range of FTE's – from 2,500 in one business to twelve in another (nine in New Zealand and three overseas). The age of the businesses also varied from three that were formed in the past four years to three that were over fifty years old. A number of the businesses were also exporters; Australia and the United States were the countries most frequently mentioned. The size and sophistication of the organisation obviously impacted on the ability of the business to make use of IP.

No, we haven't registered the design. Well, we've dabbled with copyright and patents. It's very difficult when you're a small organisation and you start dealing with patent and copyright attorneys to not get the feeling that you're just their next meal.

Use of the IP System

Interviewees were asked about the IP that was used in their businesses including a preliminary question, 'What do you understand IP to be?' or 'What is IP to you?' All the businesses had at some time either registered or applied to register under the formal IP system, the most common formal rights sought were patents and trademarks. Other IPR's that were commonly mentioned were copyright (identified by eight interviewees as relevant to their businesses) and trade secrets (identified by five interviewees). Five of the businesses could also be described as having a portfolio of registered IPR's.

It can be concluded that all the managers that we interviewed were aware of IP and they had some understanding of how it could be applied to the benefit of their businesses even though some of the businesses could not be described as having a formal IP policy. The

other important conclusion is that the term IP had a much wider meaning than one that is restricted to the formal legal regime. The managers that we spoke saw IP in three ways: (i) the formal IP system; (ii) knowledge held in the minds of employees or in the organisation generally – ‘intellectual capital’, ‘internal knowledge’ or ‘organisational knowledge’.

We have ... primary formal forms of IP. I guess the other thing we have is, we have a huge amount of industry knowledge and know how things like that

(iii) The third aspect of IP comprises the strategies associated with the other forms of IP. Some of these strategies would be easily recognised by managers and advisors familiar with the legal regime – trade secrets and maintenance of confidentiality form the obvious example and they are associated with strategies such as restraint of trade provisions in contracts of employment to prevent employees using or disclosing a firm’s secrets and know how. Compliance with the regulatory environment proved to be a critical issue for a number of businesses. Other strategies are more closely related to marketing and include first-mover advantage and maintenance of good relationships with customers and clients. The latter was important for the professional services firms that we interviewed.

With a professional service firm you find a lot of that relationship sits with personal goodwill.

It may be that there is a correlation between businesses that have a wider sense of IP and businesses that are successful in a general sense.

IP Strategy

The firms which we interviewed used IP in different ways which reflected their knowledge and understanding of IP. IP was mainly viewed as a form of protection, even by businesses that exhibited a degree of sophistication.

IP is the combination of the idea with legal protection.

And we have put in a lot of the systems and processes within the company to look at IP development and protection.

If you’re looking at a very formal thing like a patent, how many countries are you going to patent in, how much protection are you going to get, is it really worth it and could they work it out by themselves anyway?

Organisation E – has become more assertive of its IPR’s. This is taking protection to another level – other firms are reactive or even have a policy of not litigating.

As noted above, the businesses which we interviewed were all IP-aware. They can be divided, however, into firms which employed a structured approach to the use of IP including regular meetings of relevant managers and the reference of innovations to committees which applied criteria to decisions about whether to seek protection under the formal registered IP regime and firms which had a more ad hoc approach to the use of IP. The characteristic that marked businesses with a formal approach to the appraisal of their stocks of IP was that they had the resources in the form of managers who were trained to understand IP. Those businesses were either large, well-established firms or they were research institutes.

However, other firms that did not have a formal IP policy still approached the use of IP in a strategic fashion.

So it gave [our distributors] comfort even though, deep in my heart, I know it was a waste of time and money. But it gives them the comfort that, and the same with America, we patent in America, we haven't even got a distributor in America ... But I know if I got to America and say, 'Yes, it's got UL approval and it's got a patent in America on it,' that will give it the credibility for them to be able to support it and say, 'Look we'll stock it, we'll distribute it, we will promote it, otherwise we won't.'

The other important feature of the use of IP that was clear from the discussions was that all the businesses used IP in forms that are peripheral to the formal IP system. Even a firm that claimed to have no interest in IP recognised the value of the regulatory environment for protecting its innovations and for slowing its competitors down. A number of firms, both large and small, referred to the first-mover advantage.

I guess one of the key things we have is the first mover advantage where, because we have the critical mass and we're constantly innovating

There's always a first mover advantage in any market and so somebody coming along behind, they are then having to sell off price.

Benefits of Using the IP System

All the businesses that we interviewed recognised that the IP system delivered benefits or value to a greater or lesser extent. However, the depth of discussion of the benefits and barriers or problems associated with the use of IP will always be determined by the understanding embedded in the business. If an interviewee's understanding of IP is limited to mere awareness, then it will be difficult to articulate the firm's position.

Yeah. So, that's sort of an issue in terms of New Zealand in general. I think there's a lower level of understanding by, it's rising to the level now that people are aware of 'it', they're not

quite sure what 'it' is, and it must be important, but it's still, I think, needs a lot more understanding.

While the majority of the businesses that we interviewed recognised that IP provided benefit in one form or another, an on-going challenge is to increase firms' awareness of the value and benefits of the IP system, over and above the value that they are currently extracting from the system.

1. IP Provides Protection

As noted above, the businesses we spoke to took the primary use of IP to be protection for innovation. However, at least one business had a cynical view towards its value as a form of protection. It referred to the 'myth' of protection which acts as more of a deterrent to copiers than the actuality of legal processes.

Yeah, but then again it's the threat of it that counts. ... no one's got the money or the inclination to go along and try and copy it that closely because they know that they'd be ostracised by any distributor in those two countries anyway. Because [our distributor] would publicise the fact that someone has copied a product that is distributed by them. So it's the threat all along, it's built on myth really, you know?

2. IP Provides Stability in the Marketplace

More sophisticated businesses recognise that the protection provided by the IP system provides stability and enables them to have confidence in marketing their products even if they make a strategic decision not to invest in IP.

The fact that we may not have protection on that is sort of incidental. I mean, some elements, trademarks and plant variety rights absolutely you need that protection because otherwise it's a free for all.

3. IP Creates Strategic Options

Using the IP system creates strategic options for a firm that give them flexibility in their planning and reduce risk.

You effectively start off by creating a portfolio of options for a business. For example, when you take up a patent you're really creating a strategy called a real option for that business to exploit at a future point in time and then as you go along and you exercise that option you can work that option into an asset.

4. IP Provides Confidence to Distributors, Licensees and Investors

IP, particularly registered IP, is an important asset for firms in dealing with distributors, licensees and investors. Sometimes, patents are applied for even though the firm may not be confident about their values.

We did take out a patent on the very first, on that first invention that the company was based on and I'm really dubious as to whether that patent was ever really necessary, whether it would ever really pay off. At the time it made sense because all we had was, at the very beginning, was some intellectual property, so an idea effectively ... And nobody walks into a store and buys an idea, they buy products and there's, you can have the most brilliant idea in the world but it's no use without turning it into a practical product.

5. IP Protection is Essential for Licensing

A number of firms that we interviewed were involved in licensing their IP.

The companies that make the real big money in this industry are the companies that understand how to build an annuity stream out of their IP and that could be licensing, but I could be... service platforms ... IP gives you an ability to leverage off that.

6. Patents and Trade Marks

Patents were mentioned most frequently in terms of adding value to the company.

So I'm always working with the development teams and capturing what is patentable.

And my first slide had four words it had 'no IP, no money.' So without any intellectual property you in this business you will have, you will not be able to raise any funds to do anything therefore there will be no productivity.

A number of companies recognised that the real value lay in their reputation and their brand.

We're pretty sharp on defending and fighting that, mainly trade marks. We spend a greater proportion of our time and energy saying, 'No. This is our space. This is our name, or our brand, or our statement. You can't have that. You can't trade off that.'

Barriers to the Use of the IP System

Firms we interviewed were asked directly, or indirectly, whether they encountered barriers to the use of the IP system. Depending on how the term 'barrier' is interpreted, the responses generally identified problems they had encountered rather than actual barriers to using the system. It is important to remember that barriers to the IP-aware will also be barriers to the IP-unaware. However, the unaware may perceive that there are greater barriers or disincentives to using the IP system because they are unaware of the value of IP

that arises without formality (and they could be using the system without being aware of it; or they could be unaware of the benefits of IP, or unable to do a true cost-benefit calculation).

While problems or barriers differed amongst the different industry sectors, there were a number of problems or barriers that were consistent across industries.

1. Ignorance is probably the greatest barrier to the use of IP or to the most effective use of IP.

While ignorance of the IP system was not spoken of by the interviewees as a particular problem, the problems identified below all relate in one way or another to a lack of understanding and the advice which businesses received. For example, greater management resources in numbers and/or education would obviously improve ability to deal with and make use of IP. One interviewee did refer to '*a woeful depth of ignorance about what IP protection means*'.

2. Management resources

Management resources in terms of time, available personnel and the level of understanding or misunderstanding of the IP system together comprise a significant barrier to an effective use of the system. A number of the firms we interviewed had small management teams and were focused on the primary aim of profit maximisation. IP management was sometimes seen as a distraction.

We don't do it well. No, we don't. IP's pretty boring and we're all running around, it's worth money but we're all running around with no free time and nobody looks after it well.

3. Costs

The costs of using the IP system, particularly, the costs of obtaining professional advice are an issue for all firms, both large and small. Even significant sized enterprises are monitoring their IP-related costs. Firms did note that IP-related costs overseas are significantly higher than in New Zealand.

My belief is our goal for supporting New Zealand business has to be to help to promote and educate the use of intellectual property protection and this is keying in to some of your questions further down but what I find with a lot of small businesses is they just don't want to invest in it. It's a cost, it's an overhead they just see it as being something that they're going to pour money into.

The cost of the enforcement of IPR's was recognised as an issue by a number of the businesses that we interviewed. However, while enforcement costs in New Zealand were an

issue, they were not the issue they are overseas. A number of businesses take a strategic approach to the enforcement of their IP that reflects their attitude towards IP generally.

4. Complexity

A number of firms commented on the level of complexity associated with IP. Sometimes, this is a consequence of the kind of advice being given.

There is a lot of mystery and mystique around IP. And to be perfectly honest the IP firms create that mystery and mystique because that's their revenue stream, they complicate this stuff and so a big part of my role is I'm a watchdog with our patent attorneys I'm making sure that they're not pulling the wool over the eyes of the guys that are on the floor doing the work, because they do play those games unfortunately.

Success of the IP System (or Factors Undermining the System)

Businesses in New Zealand look to the IP system for protection. From this it follows that the success of the system should be gauged against its success in providing businesses with protection. According to a number of IP advisors, there is a significant level of disputes over IP in New Zealand; however, these disputes are not often taken through the courts. In fact, a number of businesses of all sizes do not pursue IP litigation. According to the interviewees there are a number of reasons, the obvious one being the cost of litigation.

You have to be big enough that is a problem, there's no question about that for, well, for anybody really. And yeah, you have to be big enough and you have to have the will to put some money into litigating to protect your patent. Like if you put a hundred thousand into getting a patent in many countries in the world, but you then let people just infringe on it, and don't enforce it, then you may as well not have put the money into it.

However, that cost is far greater in overseas jurisdictions.

You just hope that by having the patents in place and having, doing that up front work is that we can avoid potential litigation costs even if we are successful because you're talking about some big players in the United States.

Experience with litigation has led some businesses to become cynical about the IP system and it has strengthened the view of some managers that formal IPR's offer very little real, practical protection. They do recognise that formal IP protection does provide them with the ability to threaten – that is, the appearance of having protection, which is often sufficient.

The threat of intellectual property litigation is the biggest defence we have ... we won quite a large case against someone just by threatening them.

Even if a business is successful in a court action, another problem arises. A number of the businesses that we interviewed were involved in licensing their IP. The ability of the IP system to facilitate licensing can be counted as a success of the system. However, it is important that the IP system deliver certainty as to the level of protection available and it is possible that litigation about IP could raise doubts in the minds of potential distributors and reduce the perceived value of the market protection.

We've got competitors in New Zealand and Australia who compete with us on a domestic level but none of them do what we do in terms of licensing our designs globally and successfully.

Because if one of our licence partners pays this licence fee and then wants to start manufacturing and selling this product, they need to be clear in their minds and secure that they are not going to attract any potential infringement litigation and so that IP needs to be rock solid. So not only are we, we have freedom to operate, we're clear with all our, with our design but also it's protectable, it's unique in a way that no one else can copy our work going forward.

Another indicator of the impact of IP litigation is that it raises awareness of the IP system and the protection that the system provides. One company that we interviewed has set an example for the rest of the industry by taking an infringer to court.

Our competitors do know that it's a no-no to take somebody's product and copy it exactly because ... we set the example by taking one of our competitors to the High Court and winning that case. And we've circulated it to everybody so that they know that we're quite serious. When we say we'll do something we do it. And so the tendency has been, if we do have an issue and we ring somebody and we have legitimate reasons, they know that we're not pushing hot air that we're serious in what we say.

Apart from litigation to enforce the protection that a business has obtained, the success of the IP system can be gauged by the difficulties which businesses face in obtaining that protection. These difficulties are often related to the core issue of awareness and understanding and the nature of the advice that is provided to businesses. Businesses that are better resourced and have a strategic approach to the use of IP are more likely to be

successful in using the system. Those businesses take care to maximise the chances of success.

The point at which you make that decision to invest is critical. If you do it too late you'll impact the development process if you do it too early you'll spend too much money on intellectual property searching or protection.

IP and Productivity

The connection between innovation and productivity is clear, the connection between IP and productivity is less clear. Businesses that we interviewed were asked about the link between IP and productivity. (In discussions with businesses and IP advisors, the term 'productivity' was used in a shorthand way as being 'value added per person employed'. This is compatible with the way in which the term is used in papers prepared by the Treasury.) As noted above, productivity is a factor that businesses consider when they innovate. (See results of the UABS Innovation Survey.) However, the businesses that we interviewed did not have a great deal to say about productivity.

The ability to apply its IP to produce new products will often enable a business to improve or to consolidate its position in the marketplace. IP protection is responsible for indirectly maintaining the level of a firm's productivity. If a patent or other IP protection is in place, it may preserve a firm's market. Without protection for its IP and the embodiment of the IP, a firm may lose market share to another business that is not excluded from that marketplace by a patent. The loss of market share would impact on the firm's home country productivity.

The Chinese ones will go into that country. We may not sell any more. Our productivity goes to zero in New Zealand in terms of value and producing.

IP owned by A and embodied in a new or improved product, for example, may also contribute to the improvement of the productivity of its customer B. That new or improved product may be an innovation in the hands of customer B if it contributes to new or significantly improved methods for production or delivery (operational processes).

Protection for IP or intellectual capital in the wider sense is especially important if a firm wishes to license its stocks of knowledge. Productivity from licensing only contributes to productivity if the royalty flows are reinvested in New Zealand.

Recommendations for Improvement

Interviewees were given the opportunity to make recommendations for improvement they would like to see made to the IP system. Only four took advantage of this opportunity.

While this was disappointing, it is also consistent with the level of awareness and understanding amongst the interviewees – if they were not confident of their knowledge of the system, then they would not be confident in suggesting improvements to it.

The recommendations that were made were all in respect of improvement to the patent regime. Organisation F has made submissions to the Patents Bill presently before Parliament with the objective of bringing it more in line with international standards.

Presently it is easier for competitors to get patents granted in New Zealand than in most other countries in the world. This puts New Zealand at a distinct disadvantage as a manufacturing base for businesses that are predominantly export focused.

Organisation I suggested ways of streamlining its IP protection process and making it more economically viable in marginal cases which would increase the effective productivity of its New Zealand operation.

If the Australian and New Zealand Intellectual property offices amalgamated and allowed a single AS/NZS patent to be examined as a single application that resulted in an ANZ patent. Considerable savings could be made to both the operation of the intellectual property offices and the costs to applicants.

Any positive change in the procedure [to obtain a patent through the European patent system] would be a significant benefit for NZ companies who want to market to Europe with IP protection on their R&D technology.

Organisations N and T argued against removal of the pre-grant opposition system in New Zealand.

We actually do like the pre-grant opposition process, because it's a cheap way of challenging a patent on a range of grounds. After a patent has been granted, you can only challenge it on very specified grounds and it starts to become an expensive legal process.

Organisation T also argued in favour of grace periods and patent term extensions.

One of the key things, from my understanding, is that the New Zealand patent system is based on [the belief] that we are a net importer of patents, so we'll make it difficult for people from outside filing patents. I think we need to recognise that there are some good things coming out internally, and to encourage people to make it easy to get things through. I don't mean that we have weak patents, but things like grace periods, there aren't any in New Zealand.

Patent term extensions. They're there for things like pharmaceuticals, but some of the biological things that come out, it can take you just as long to get through the regulatory process, so, can you have a longer period there?

Organisation F made recommendations to improve awareness of the IP system. In terms of supporting the role of the intellectual property system in driving productivity in New Zealand, they suggested educating and providing 'know-how' support for SMEs through industry bodies, i.e. for those organisations that could not afford in-house staff dedicated to IP management. This support would include an IP manual; consultancy support; financial incentives to invest in IP; tax incentives for SME's.

This type of support has been proposed because developing businesses may not realise the need to invest in IP until it is too late. If the New Zealand Government can educate, support and incentivise investment in IP then local businesses may take the time to protect the IP that underpins them and therefore provide the greatest possible chance of becoming businesses that are sustainable long term.

Conclusions

We interviewed businesses that ranged in size from small to large. The level of understanding of management in those businesses could be characterised as varying from the IP 'savvy' to the IP ignorant and included the IP cynical. Nevertheless, a number of conclusions can be drawn from our discussions with the businesses that we interviewed.

In respect of awareness of the IP system, it can be said that businesses in New Zealand (or, at least, businesses of the types that we interviewed) are aware of IP. However, awareness alone is not sufficient; it must be developed into understanding. It can be concluded that the understanding that leads to strategic use of IP is dependent on management resources.

I'm a little bit, shall I say, intellectual property, for the type of work we tend to do, isn't really at the forefront of my mind.

In terms of supporting the role of the intellectual property system in driving productivity in New Zealand, where Organisation F saw the need was in educating and providing 'know-how' support for SMEs, i.e. for those organisations that could not afford in-house staff dedicated to IP management.

For businesses in New Zealand, IP is seen in three ways: (i) the formal IP system; (ii) organisational knowledge; (iii) strategies associated with the other forms of IP. A truly IP-

aware business will have a good understanding of all three and will factor all three into its strategies.

The two major benefits of the formal IP system are the protection that it offers to the stocks of knowledge that a business possesses and, linked to that, the ability to license that knowledge to other businesses. Strategies associated with IP, such as brand building, being first to market or compliance with the regulatory environment, supplement or even supplant the protection provided by the formal IP system.

Yeah, there's always a first mover advantage in any market and so somebody coming along behind they are then having to sell off price.

For businesses, therefore, the success of the IP system needs to be gauged against the level of protection it provides to enable commercialisation of organisational knowledge, either by the firm or by its customers.

Enforcement of formal IPR's through litigation has a number of dimensions. The cost of enforcing IPR's through the courts is a negative factor; however, this is turned to a positive by some businesses who find that the threat of litigation is sufficient, particularly, if IP litigation is well known in that industry.

The greatest barrier to the effective use of the IP system is ignorance; and this is associated with the perceived complexity of the formal IP system and the level of advice which some businesses receive.

There's nothing to stop anybody else sort of copying what we've done. There are a number of barriers and that's what I was saying before about us looking at sort of some sort of IP protection and backing away from it because we could see it costing us a lot of money and in the final analysis probably not giving us any great protection anyway because people would be able to design around a registered design.

Our industry is relatively low tech. When somebody comes up with a bright idea, they tend to put it to work. They don't think, 'Can I get a patent for it?'

In order to derive an improvement in productivity from organisational knowledge as an innovation, it is critical to commercialise before a business seeks formal protection. That is, it should undertake market development and customer development. A formal IPR is only as valuable as the asset it protects – it just represents a stream of potential economic benefits. If that market development and customer development has been successfully carried out then the business may reap economic benefits and improve productivity. Customers of the

business may also improve productivity by employing the innovation in their own businesses.

Recommendations for improvements to the IP system made by businesses which we interviewed focused on improvements to the patent system and to the implementation of an educational programme to raise awareness of IP.

Survey

A survey of IP awareness was conducted between 8 September 2009 and 12 October 2009. The survey was identical, *mutatis mutandis*, with the UK Intellectual Property Awareness Survey 2006. The survey was distributed widely across businesses in New Zealand as classified by ANZSIC 96 Level 1. The survey was divided into five main categories of questions: Business Background; IP Knowledge and Understanding; Ownership of Intellectual Property Rights (IPRS); Management of IPRS by Your Business; Sources of Information about IPRS.

Business Background

The largest category of businesses that responded to the survey and was able to place itself in one of the ANZSIC classifications was the Manufacturing sector - 25%; followed by Agriculture, Forestry and Fishing – 15%. Most responses came from larger businesses (100+ full time employees). Over half the businesses classified themselves as privately owned companies. The next largest category of businesses (10.8%) comprised subsidiaries of a company based outside Australia or New Zealand.

Respondents were also asked about the level of innovation in their businesses – i.e. ‘Has your business invented or developed products or services which are significantly improved or completely new to the market in the last 5 years?’ The level of innovation was similar across all industry sizes (around 66%). This supports the conclusion that New Zealanders are innovative in business.

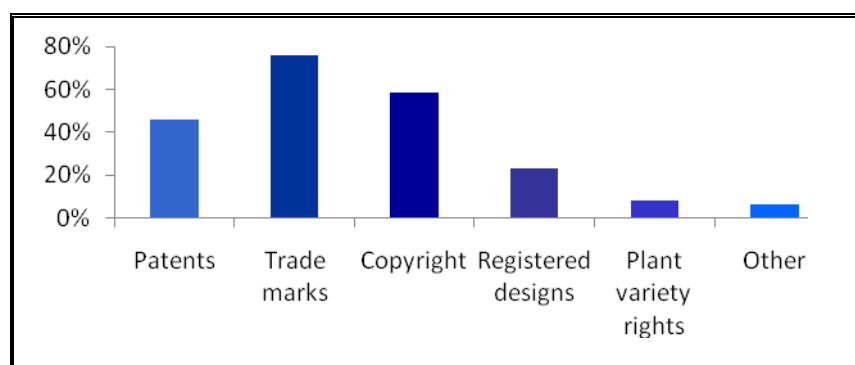
Trademarks, confidentiality agreements and lead-time over competitors were regarded as the most important means of protection for innovations. By comparison, patents and registered designs were not considered to be particularly important means. However, the size of the business was not a major factor – patents were considered to be ‘essential’ by 24.3% of large businesses and by 21.4% of micro businesses.

Ownership of IPRs

Table 22 shows respondent use of three main IP instruments patents (45.7%), trademarks (75.7%) and copyright (58.6%). For these categories, the frequency of use is higher than the UK. The UK figures are shown in red in each of the tables. Interestingly, firm size does appear to materially affect the frequency of use. PVRs are not commonly created.

Table 22 – Creation or ownership of IPRs

No. of Employees ²	1-5	10-19	20-49	50-99	100+	Total
% of Respondent Firms Creating or Owning IPRs						
1. Patents	50.0%	42.9%	48.0%	36.8%	46.9%	45.7% (9.2%) ³
2. Trade marks	61.1%	71.4%	68.0%	73.7%	84.4%	75.7% (36.2%)
3. Copyright	50.0%	78.6%	40.0%	63.2%	62.5%	58.6% (60.5%)
4. Registered designs	11.1%	14.3%	16.0%	15.8%	32.8%	22.9%
5. Plant variety rights	5.6%	21.4%	4.0%	0.0%	9.4%	7.9%
6. Other	16.7%	0.0%	16.0%	0.0%	3.1%	6.4% (12.1%)

Figure 2 - Creation or ownership of IPRs

Innovation

More than 50% of the respondents, across size categories, reported inventing or developing a product or service in the past five years. Over all, sixty-five per cent of respondents reported that they had, which stands in contrast to the UK average of 19%.

Table 23 - % of Companies Inventing or Developing products or services in the past five years

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
% of all firms	67.7%	68.2%	65.8%	59.3%	65.9%	65.5% (19.0%)

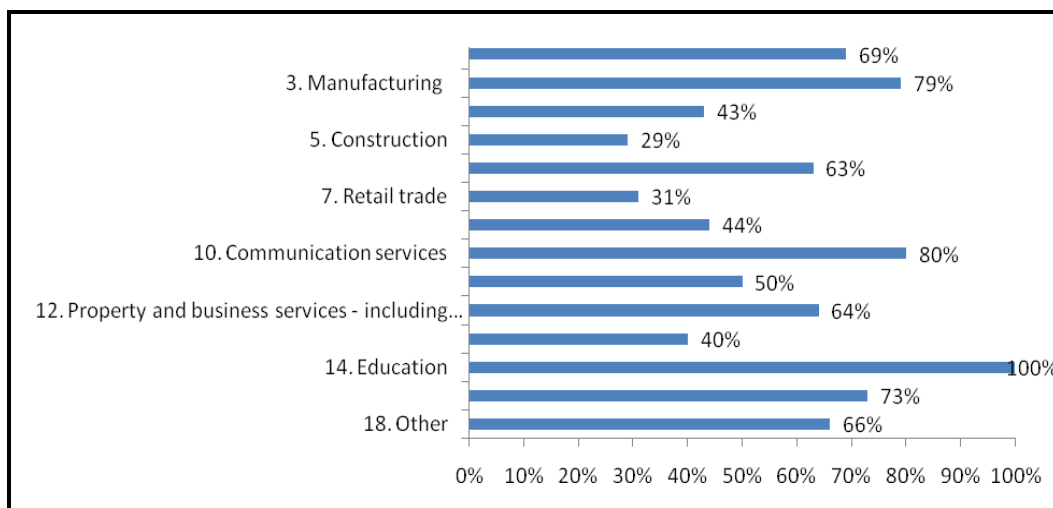
² No. of Employees 6-9 omitted due to no reply.

³ All the percentages in brackets represent the data from UK Intellectual Property Survey 2006 for comparison purpose.

Figure 23 shows the percentage of companies inventing/developing products/services in the past five years by ANZIC classification. The percentage of companies reporting invention/development in the following sectors: agriculture, forestry, fishing, manufacturing, wholesale trade, communication services, property and business services (which includes CRIs) and education all exceed 60%.

Basil can we get all of these bars named?

Figure 3 - % of Companies Inventing or Developing products or services in the past five years



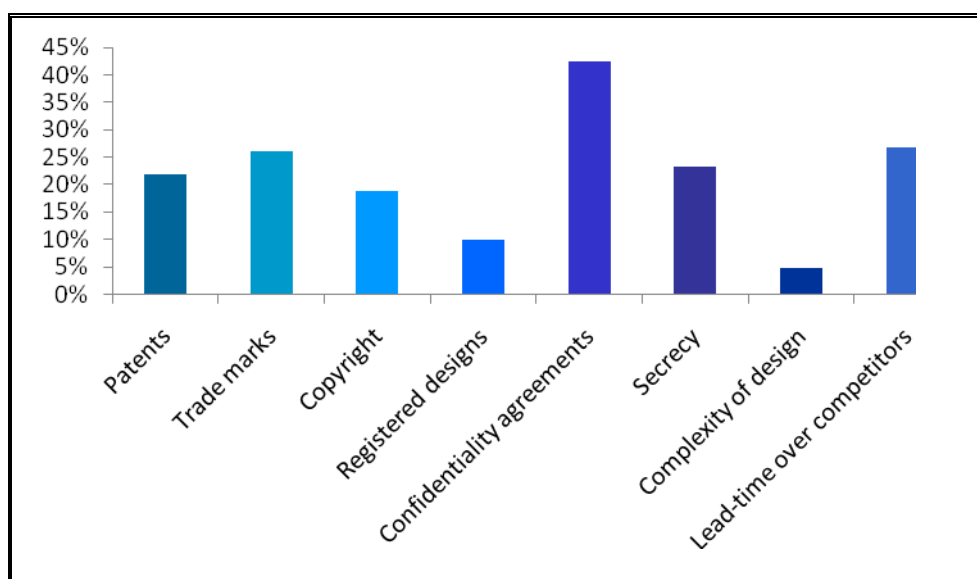
(2. Mining 8. Accommodation, cafe & restaurants 16. Cultural & recreational services & 17. Personal & other services omitted due to small number of replies/No replies)

IP Effectiveness

Firms were asked to indicate the importance to their business of various methods of protecting innovations, both formal and strategic, using a 5 point Scale ranging from 1. *Unimportant* to 5. *Essential*.

Figure 4 - % of respondents rating method of protecting innovations as "Essential"

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
1. Patents	21.4%	19.0%	23.3%	16.0%	24.3%	21.9% (13.2%)
2. Trade marks	23.3%	19.0%	26.7%	24.0%	29.7%	26.1% (13.2%)
3. Copyright	23.3%	14.3%	10.3%	20.8%	20.8%	18.8% (21.9%)
4. Registered designs	11.5%	5.0%	10.7%	12.5%	9.7%	10.0% (10.1%)
5. Confidentiality agreements	39.3%	47.6%	46.7%	20.8%	47.3%	42.4% (26.9%)
6. Secrecy	24.1%	9.5%	38.7%	24.0%	20.3%	23.3% (19.2%)
7. Complexity of design	3.8%	14.3%	3.4%	8.3%	1.4%	4.7% (7.2%)
8. Lead-time over competitors	31.0%	42.9%	13.3%	28.0%	25.7%	26.8% (14.8%)

Figure 5 - % of respondents rating method of protecting innovations as “Essential”

The percentage of respondents rating patents, trademarks, and copyright as “essential” is fairly uniform across firm size. Perhaps of greater interest is the perceived role of confidentiality agreements vis-a-vis the “parliament” made instruments. The dominance of confidentiality agreements is highlighted in Figure 5. This finding is similar to the UK.

IP Knowledge and Understanding

The first question in this section asked whether the publication of an invention before filing a patent application prevented a valid patent from being obtained. This is an important question because it asks about a key requirement for obtaining a valid patent. While it is not essential that everybody in a business should understand all the elements of IP protection, this is a basic requirement. A majority of respondents (42.4%) responded, ‘Yes’, while 41.8% stated, ‘Don’t know’. Firm size was a factor, with a higher proportion of ‘Yes’ amongst the smaller businesses. Smaller businesses were also less likely to respond, ‘Don’t know’.

Figure 6 - Does publication of an invention before filing a patent application for it prevent a valid NZ patent being obtained? (% of firms).

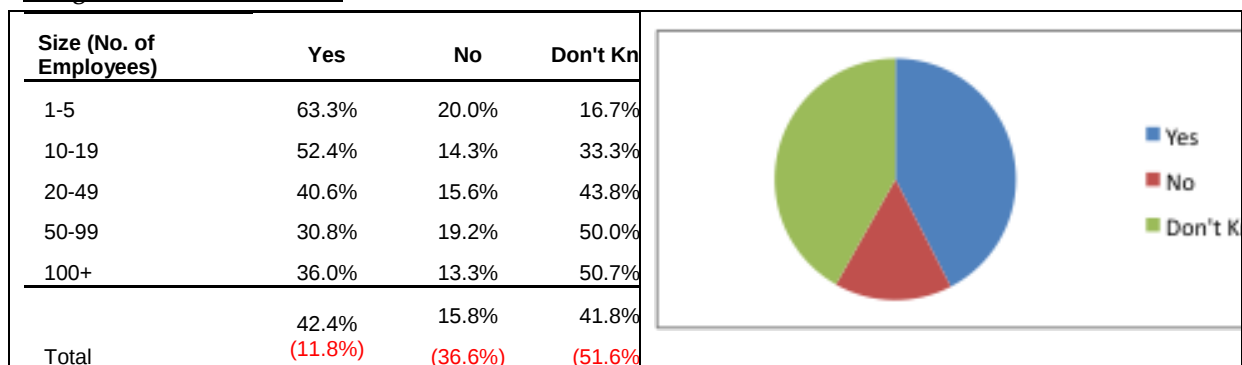


Table 24 - Does publication of an invention before filing a patent application for it prevent a valid NZ patent being obtained? (% of sectors)

Sector	Yes	No	Don't know
Agriculture (including horticulture), forestry and fishing	46.4%	21.4%	32.2%
Manufacturing	51.0%	5.9%	43.1%
Electricity, gas and water supply	80.0%	0.0%	20.0%
Construction	21.4%	35.7%	42.9%
Wholesale trade	62.5%	0.0%	37.5%
Retail trade	0.0%	46.2%	53.8%
Transport and storage	0.0%	20.0%	80.0%
Communication services	22.2%	22.2%	55.6%
Finance and insurance	75.0%	25.0%	0.0%
Property and business services - including research institutes	0.0%	0.0%	100.0%
Government administration and defence	40.0%	0.0%	60.0%
Education	33.3%	0.0%	66.7%
Health and community services	22.2%	44.5%	33.3%
Other	52.8%	5.5%	41.7%
Total	40.1% (11.8%)	14.9% (36.6%)	45.0% (51.6%)

(2. Mining 8. Accommodation, cafe & restaurants 16. Cultural & recreational services & 17. Personal & other services omitted due to small number of replies/No replies)

Choice of new business or product name

When asked which source they would choose to check in respect of a new business or product name, 83.7% of respondents chose company names. This choice was slightly more than the 79.9% who chose trademarks. Less than 2% admitted that they would not search any of the sources mentioned. Smaller businesses were again more likely to undertake some

form of check. Respondents were also able to nominate other sources that they would check. Interestingly, nearly 5% of the sample stated that they would search international sources.

Table 25 - % of firms choosing method of clearing new business or product name

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
% of firms						
1. NZ (UK) trade marks	83.3%	85.7%	71.9%	69.2%	84.0%	79.9% (52.9%)
2. NZ (UK) company names	90.0%	90.5%	84.4%	84.6%	78.7%	83.7% (69.9%)
3. Domain names	83.3%	66.7%	71.9%	61.5%	65.3%	69.0% (46.9%)
4. Web search (e.g. Google)	86.7%	85.7%	56.3%	53.8%	76.0%	72.3% (57.8%)
5. None of these	0.0%	0.0%	3.1%	0.0%	2.7%	1.6% (8.2%)
6. Other	13.3%	4.8%	3.1%	11.5%	10.7%	9.2% (3.9%)

Choice of protection for technical innovation

Table 26 – firms choosing IPR as means of protecting a completely new and non-obvious technical invention
(%Best = % of all firms choosing IPR as best method)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total	% Best
% of firms							
1. Copyright	100.0%	71.4%	66.7%	85.7%	82.1%	81.7% (36.1%)	8.2% (6.0%)
2. Patent	30.8%	47.1%	44.0%	36.8%	31.0%	35.9% (69.6%)	51.1% (43.3%)
3. Registered design	75.0%	75.0%	100.0%	75.0%	90.0%	86.7% (22.3%)	4.4% (2.5%)
4. Secrecy	78.6%	85.7%	100.0%	100.0%	83.3%	86.3% (9.8%)	3.8% (2.6%)
5. Trade mark	100.0%	100.0%	100.0%	92.3%	93.3%	95.0% (16.1%)	1.6% (0.5%)
6. Don't know	100.0%	100.0%	100.0%	66.7%	66.7%	86.7% (19.3%)	1.1% (-)
7. Other	66.7%	0.0%	50.0%	0.0%	100.0%	81.8% (0.2%)	1.1% (0.7%)

Ninety-five percent of the respondents would choose trademark as a means for protecting a new and non-obvious invention. However, 86.3% would choose secrecy.

Ownership of commissioned copyright work

Table 27 – Replies to the question “If you pay a subcontractor to design your website or promotional literature would copyright exist in that material?”

Size (No. of Employees)	Yes	No	Don't Know
1-5	70.0%	16.7%	13.3%
10-19	52.4%	28.6%	19.0%
20-49	71.9%	9.4%	18.8%
50-99	69.2%	11.5%	19.2%
100+	72.0%	13.3%	14.7%
	69.0%	14.7%	16.3%
Total	(42.4%)	(12.5%)	(45.1%)

Table 28 – Replies to the question “In the absence of any assignment who would own any copyright created?”

Size (No. of Employees)	Your business	The subcontractor	Don't Know
1-5	56.7%	30.0%	13.3%
10-19	47.6%	38.1%	14.3%
20-49	66.7%	21.2%	12.1%
50-99	52.0%	16.0%	32.0%
100+	54.1%	32.4%	13.5%
	55.7%	28.4%	15.8%
Total	(31.3%)	(25.1%)	(43.6%)

Need for an application

Relative to the UK, Tables 29 and 30 indicate a higher level of awareness in respect of the need to apply for IP protection.

Table 29 – Replies to the question “Is an application necessary to obtain any of the following Intellectual Property Rights (IPRs)?”

Size (No. of Employees)	Yes	No	Don't Know
Patents	87.4% (68.0%)	1.7% (3.0%)	10.9% (27.5%)
Trade marks	81.3% (58.2%)	6.1% (5.6%)	12.6% (32.5%)
Copyright	37.6% (37.1%)	44.4% (29.6%)	18.0% (30.0%)
Registered designs	65.7% (50.5%)	2.2% (4.3%)	32.1% (41.8%)

Table 30 – Replies to the question “Is an application necessary to obtain a Patent”

Size (No. of Employees)	Yes	No	Don't Know
1-5	93.3%	0.0%	6.7%
10-19	90.5%	0.0%	9.5%
20-49	78.1%	0.0%	21.9%
50-99	84.0%	4.0%	12.0%
100+	89.3%	2.7%	8.0%
Total	87.0% (69.0%)	1.6% (3.0%)	10.9% (28.0%)

Spending on IPRs

Average annual expenditure on obtaining and maintaining IPRs is \$177,631 which is higher than that estimated in the UK. Expenditure generally increases by firm size. Firms with 20-49 employees spend considerably more than larger firms with 50-99 employees.

Table 31 – Approximate amount spent on obtaining and maintaining IPRs each year

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Average \$NZ (£)	30,486	96,154	147,442	28,847	306,044	177,631 (13,248)

Litigation

Table 32 – Replies to the question “Have you or your business ever been involved in a legal dispute involving IPRs?” (% of firms).

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	20.7%	28.6%	34.4%	50.0%	51.4%	40.2% (27.4%)
No	75.9%	57.1%	59.4%	50.0%	32.9%	50.0% (92.1%)
Don't know	3.4%	14.3%	6.3%	0.0%	15.7%	9.8% (1.9%)
<i>% of those answering "yes" above with litigation in the following countries:</i>						
New Zealand	100.0%	50.0%	50.0%	83.3%	78.4%	74.0%
Australia	16.7%	33.3%	16.7%	25.0%	32.4%	27.4%
United Kingdom	16.7%	33.3%	16.7%	16.7%	8.1%	13.7%
United States	16.7%	83.3%	41.7%	16.7%	24.3%	30.1%
Other	16.7%	16.7%	25.0%	25.0%	21.6%	21.9%

Being involved in a legal dispute is arguably the best way to develop awareness and understanding of IP, although, it is not a recommended course of action. Table 32 shows that 40.2% of respondents answered ‘Yes’ to the question: ‘Have you or your business ever been involved in a legal dispute involving IPR’s?’ (the response to a similar question in the UK survey was 92.1%); nearly 50% answered ‘No’. Large businesses were twice as likely to have been involved in a legal dispute as smaller enterprises. New Zealand, followed by the

United States and Australia, were the countries in which disputes were most likely to have occurred.

Management of IPRs

Greater intellectual property awareness arguably results in increased attention to the management of IPRs. Firms were therefore asked a series of questions which were intended to measure the extent of IP management practices. These are presented in the tables 33 – 36 below.

Licensing activity whether licensing in or out is primarily the preserve of larger companies. Interestingly licensing in appears to be slightly more common than licensing out of technology whatever the size of the company.

Table 33 – Replies to the question “Has your business ever licensed in intellectual property from other parties (to allow your company to use intellectual property owned or controlled by others)?” (% of firms)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	34.5%	38.1%	36.4%	50.0%	60.0%	47.5% (13.2%)
No	65.5%	57.1%	54.5%	45.8%	22.9%	42.9% (81.7%)
Don't know	0.0%	4.8%	9.1%	4.2%	17.1%	9.6% (5.2%)

Table 34 – Replies to the question “Has your company ever licensed out intellectual property to other parties (to allow others to use intellectual property owned or controlled by your company)?” (% of firms)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	37.9%	38.1%	25.0%	45.8%	48.6%	40.9% (8.9%)
No	58.6%	57.1%	65.6%	45.8%	35.7%	48.9% (87.3%)
Don't know	3.4%	4.8%	9.4%	8.3%	15.7%	10.2% (3.9%)

Table 35 – Replies to the question “Is anyone in your business specifically assigned responsibility for managing IPRs?” (% of firms)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	34.5%	33.3%	51.5%	54.2%	60.9%	50.6% (8.3%)
No	65.5%	61.9%	42.4%	45.8%	33.3%	45.5% (91.1%)
Don't know	0.0%	4.8%	6.1%	0.0%	5.8%	4.0% (0.6%)

A pie chart illustrating the distribution of responses to the question 'Is anyone in your business specifically assigned responsibility for managing IPRs?'. The chart is divided into three segments: a large red segment representing 'No' at 91.1%, a smaller blue segment representing 'Yes' at 8.3%, and a very thin green segment representing 'Don't know' at 0.6%. A legend to the right of the chart identifies the colors: blue for 'Yes', red for 'No', and green for 'Don't know'.

If firms have a person assigned specifically for managing IPRs only 20% have a separate department responsible for this task. Interestingly, the percentage of smaller firms with 10-19 employees with a separate department exceeds larger firms.

Table 36 – Replies to the question “If Yes - does your business (or parent) have a separate Patents/IP Dept(s)?” (% of firms answering Yes in Table 15)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	0.0%	40.0%	19.0%	6.3%	26.4%	20.0% (8.6%)
No	86.7%	60.0%	66.7%	93.8%	67.9%	73.0% (91.3%)
Don't know	13.3%	0.0%	14.3%	0.0%	5.7%	7.0% (0.1%)

Very few (22.8%) of firms have had their IP valued. Again, the percentage of firms with 10-19 employees having valued their IP exceeded the larger firms.

Table 37 – Replies to the question “Has your business ever tried to assess how much your IP is worth?” (% of firms)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	35.7%	30.0%	21.2%	8.7%	20.9%	22.8% (1.1%)
No	57.1%	60.0%	75.8%	78.3%	55.2%	63.2% (96.6%)
Don't know	7.1%	10.0%	3.0%	13.0%	23.9%	14.0% (2.3%)

Table 38 – Replies to the question “If Yes - Has your business ever had IP professionally valued? ” (% of firms)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	23.8%	18.2%	13.6%	0.0%	20.9%	17.3% (11.5%)
No	66.7%	63.6%	68.2%	92.3%	53.5%	64.5% (86.7%)
Don't know	9.5%	18.2%	18.2%	7.7%	25.6%	18.2% (1.8%)

Only 38.7% of respondent firms have an overall IP policy, higher than the UK estimates of 4.1%. Most firms with an IP policy explain/distribute the policy to staff. However, 73.4% of the respondents don't offer any training on IP to staff, and 88.6% don't incentivize obtaining IPRs.

Table 39 – Replies to the question “Does your business have an overall IP Policy?” (% of firms)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	34.5%	38.1%	22.6%	47.8%	44.9%	38.7% (4.1%)
No	62.1%	52.4%	67.7%	52.2%	40.6%	52.0% (91.0%)
Don't know	3.4%	9.5%	9.7%	0.0%	14.5%	9.2% (4.8%)

Table 40 – Replies to the question “If Yes - is it explained or distributed to staff?” (% of firms answering Yes)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	47.1%	77.8%	50.0%	50.0%	57.5%	55.3% (46.8%)
No	47.1%	11.1%	25.0%	43.8%	35.0%	35.1% (52.7%)
Don't know	5.9%	11.1%	25.0%	6.3%	7.5%	9.6% (0.5%)

Table 41 – Replies to the question “Is any training in IP issues provided by your business to its staff?” (% of firms)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	21.4%	15.0%	10.0%	30.4%	30.9%	23.7% (2.3%)
No	78.6%	85.0%	83.3%	69.6%	64.7%	73.4% (97.0%)
Don't know	0.0%	0.0%	6.7%	0.0%	4.4%	3.0% (0.7%)

Table 42 – Replies to the question “Are your staff offered any specific incentives to obtain IPRs?” (% of firms)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	3.4%	20.0%	3.0%	0.0%	8.6%	6.9% (0.9%)
No	96.6%	80.0%	84.8%	95.7%	87.1%	88.6% (98.4%)
Don't know	0.0%	0.0%	12.1%	4.3%	4.3%	4.6% (0.7%)

Table 43 – Replies to the question “If your business owns IPRs does it actively check for potential infringements?” (% of firms)

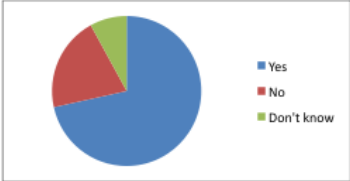
No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	32.0%	50.0%	35.7%	42.9%	42.4%	40.4% (8.6%)
No	60.0%	43.8%	53.6%	57.1%	43.9%	50.0% (87.7%)
Don't know	8.0%	6.3%	10.7%	0.0%	13.6%	9.6% (3.7%)

Sources of Information about IPRs

Table 44 shows that most respondent firms have sought advice on IPRs; overall 71.6% in contrast to the UK estimate of 21%. When this figure is broken down by firm size, it shows that larger businesses are slightly more likely to seek advice than small businesses. External patent attorneys appear to be the predominant source of advice (68.3%).

Table 44 – Replies to the question “Has your business ever sought advice on IPRs?” (% of firms)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	69.0%	66.7%	65.6%	75.0%	75.7%	71.6% (21.0%)
No	27.6%	28.6%	25.0%	25.0%	11.4%	20.5% (76.2%)
Don't know	3.4%	4.8%	9.4%	0.0%	12.9%	8.0% (2.7%)



Larger businesses are also more likely to seek information from external patent attorneys, and this may be a function of their being more aware of patent attorneys as a source of information and being able to afford their advice. External patent attorneys were, however, the primary source of information for all sizes of businesses. IPONZ was the third most likely source of information, behind external solicitors, and the percentage of respondents who sought advice from IPONZ was similar across all the different sized businesses.

Table 45 – % of firms having used source of advice on IPRs

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
% of firms ever taking advice						
1. Intellectual Property Office of New Zealand (IPONZ) & Ministry of Economic Development (MED)/ (UK IP Office)	40.0 %	50.0 %	19.0 %	44.4 %	35.8 %	36.5% (27.1%)
2. External Patent Attorney	60.0 %	71.4 %	66.7 %	50.0 %	77.4 %	68.3% (33.1%)
3. In-House Patent Attorney	0.0%	14.3 %	19.0 %	5.6%	9.4%	9.5% (4.2%)
4. External Solicitor	60.0 %	35.7 %	47.6 %	50.0 %	47.2 %	48.4% (49.3%)
5. In-House Solicitor	5.0%	14.3 %	14.3 %	5.6%	32.1 %	19.0% (2.8%)
6. Licensing Consultant	25.0 %	7.1%	14.3 %	5.6%	11.3 %	12.7% (14.4%)
7. Other	15.0 %	14.3 %	4.8%	5.6%	1.9%	6.3% (20.7%)

Table 46 – Perceived extent of need for advice on issues involving Intellectual Property (1. Always 2. Usually 3. Sometimes 4. Rarely 5. Never)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
1. Always	51.7%	35.0%	31.3%	33.3%	22.9%	32.0% (22.5%)
2. Usually	17.2%	30.0%	25.0%	25.0%	42.9%	31.4% (13.1%)
3. Sometimes	20.7%	15.0%	25.0%	16.7%	20.0%	20.0% (15.5%)
4. Rarely	6.9%	20.0%	12.5%	25.0%	10.0%	13.1% (23.0%)
5. Never	3.4%	0.0%	6.3%	0.0%	4.3%	3.4% (25.9%)
Average Score	1.93	2.20	2.38	2.33	2.30	2.25 (3.17)

Table 47 – Perceived extent of need for advice on issues involving Intellectual Property (1. Always 2. Usually 3. Sometimes 4. Rarely 5. Never)

Sector	1. Always	2. Usually	3. Sometimes	4. Rarely	5. Never
Agriculture (including horticulture), forestry and fishing	40.7%	33.3%	18.5%	7.4%	0.0%
Manufacturing	41.7%	33.3%	18.8%	4.2%	2.1%
Electricity, gas and water supply	20.0%	40.0%	20.0%	20.0%	0.0%
Construction	33.3%	8.3%	8.3%	41.7%	8.3%
Wholesale trade	62.5%	0.0%	12.5%	25.0%	0.0%
Retail trade	46.2%	23.1%	7.7%	23.1%	0.0%
Transport and storage	20.0%	40.0%	20.0%	0.0%	20.0%
Communication services	0.0%	50.0%	12.5%	25.0%	12.5%
Finance and insurance	33.3%	33.3%	0.0%	0.0%	33.3%
Property and business services - including research institutes	11.1%	33.3%	33.3%	22.2%	0.0%
Government administration and defence	0.0%	60.0%	0.0%	40.0%	0.0%
Education	0.0%	33.3%	33.3%	0.0%	33.3%
Health and community services	33.3%	22.2%	33.3%	11.1%	0.0%
Other	29.4%	41.2%	20.6%	8.8%	0.0%
	33.5%	31.9%	18.3%	13.1%	3.1%
Total	(22.3%)	(13.4%)	(15.7%)	(23.1%)	(25.6%)

(2. Mining 8. Accommodation, cafe & restaurants 16. Cultural & recreational services & 17. Personal & other services omitted due to small number of replies/No replies)

Table 48 – Replies to the question “Has your business ever used or searched Patent, Trade Mark or other IPR databases?” (% of firms)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
Yes	65.5%	66.7%	56.3%	58.3%	75.7%	67.0% (22.5%)
No	31.0%	19.0%	34.4%	33.3%	12.9%	23.3% (71.4%)
Don't know	3.4%	14.3%	9.4%	8.3%	11.4%	9.7% (6.1%)

Comments

The survey invited comments from respondents – ‘Do you have any suggestions to improve the system of protecting IPR’s in New Zealand?’ Over forty respondents took advantage of this opportunity and their comments can be considered to be representative of issues that businesses in New Zealand can relate to. Those comments can be grouped into a number of categories:

1. Costs

The cost of using the IP system was a major concern for a number of respondents. It was often associated with patent attorneys.

Only that patent costs are insidious and one wonders about the real value they provide in most cases. Attorneys need to be more up front about annual costs of patent maintenance.

Make them [IPR’s] easier/cheaper to apply for.

2. Provision of information

A number of respondents recognised that they did not receive sufficient information to make best use of the system. One comment was especially plaintive:

Simple clear info on what is available and how you go about it. I have no idea what we can do or how we could do it.

Others were more specific:

More training and case studies of why it is worth the cost and effort.

Advertise what has to be done to achieve protection of IPR’s.

Protection is very difficult, complicated and expensive and what works in New Zealand doesn’t in Australia, and the issue if passing off” in a B2B issue is effectively unprotectable ... how do you make IP better protected while having it commercially relevant.

3. Patent reform

There were a number of suggestions for improvement to the patent system. Patent extensions were mentioned by a number of respondents. One respondent suggested that New Zealand adopt a system of innovation patents; while there was conflict over software patents – one respondent was in favour, another was opposed.

Examining applications for IPRs in a timely manner, ensuring our legislation is not out of step with major trading partners (e.g. US and AU where patent term extensions are

available, methods of treating humans are allowable as a couple of examples) and adopting latest version of UPOV for PVR's.

I believe an innovation patent similar to that used in Australia would have significant advantages. While it does not provide the extended protection of a patent it gives a higher level of protection than achieved through trademark protection and in reality is seen as, and offers, the full protection of a patent. The draw back at present is IP lawyers do not differentiate between the two in NZ and the costs are similar. If the opportunity was available here the cost would come down and make it more attractive for all parties concerned.

4. The cost of enforcement

A number of respondents raised the issue of cost of enforcement, both enforcement by a New Zealand business and when a New Zealand business is threatened.

Essentially there is no protection for small companies when challenged by larger organisations, no matter the supposed level of protection. There needs to be some level of support for small companies.

Initiating legal action against overseas parties that infringe your copyright can be extremely difficult for NZ companies and the laws covering infringements require further work.

5. Other strategies

One respondent made a sophisticated comment about the value of other strategies in protecting IP.

I think that in some cases there is an over-valuation of IP, especially patents. Statistics showing NZ's high patent filing rate does not mean that these patents have any value. Some companies, especially CRIs are obsessed with IP to the point that their main focus is on patenting technology rather than extracting commercial value from it. Speed to market, marketing, distribution etc. are just as (and sometimes more) important than protecting the technology. In certain situations trade secrets can work very well if used correctly and in combination with the above factors.

6. The level of protection

The level of protection provided by the system, in general, and by patents, in particular, was a matter of concern.

Give more certainty that protection exists without having to test in a Court of Law.

Patent protection in New Zealand is relatively poor when compared to comparable OECD countries. In particular the lack of any provision for patent term restoration is a major concern for many international companies, and impacts on the products and services that are made available to New Zealanders.

7. Administrative matters

A number of respondents made suggestions that have been classified as administrative matters. They relate to the administration of the formal system through IPONZ and the PVR office including registration and searching.

Examining applications for IPRs in a timely manner.

Improve the IPONZ database interface for searches / publications.

PVR office needs to improve its systems and response times and understand the science behind the invention better.

Conclusions

- Manufacturing was the largest category that responded to the on-line survey, followed by agriculture, forestry and fishing. More than 50% of the respondents reported inventing or developing a product or service in the past five years. The frequency of development does not appear to vary across firm size.
- When it comes to creating IPRs, most respondent firms use three main IP instruments patents, trademarks and copyright and the frequency of use is highly than the UK. PVRs are not in common use. However, confidentiality agreements are rated the highest in terms of protecting innovations. This finding is supported by the large majority of firms that would choose “secrecy” as a means of protecting a new and non-obvious invention.
- The results of the survey paint a picture of a similar level of IP awareness amongst New Zealand businesses, no matter what their size in terms of FTE’s. Because New Zealand has few enterprises with significant numbers of FTE’s, it is not surprising that awareness is similar across the different business sizes. Relative to the UK there is a high level of awareness in respect of the need to apply for IP protection.
- When selecting a new business or product name, most would check company names. Of more interest is the level of that awareness in all businesses and whether respondents reported accurately.

- The average annual expenditure on obtaining and maintaining IPRs is \$177,631, higher than the UK. Medium sized firms (20-49 employees) spend more than firms employing 50-99.
- About one half of the respondent firms had “someone” responsible for managing IPRs. However, few firms offer specific incentives to obtain IPRs.
- Most firms (52%) do not have an IP policy and majority of firms (63.2%) have not tried to estimate the value of their IP.
- Larger businesses are also more likely to seek information from external patent attorneys, and this maybe a function of their being more aware of patent attorneys as a source of information and being able to afford their advice. External patent attorneys were, however, the primary source of information for all sizes of businesses. IPONZ was the third most likely source of information, behind external solicitors, and the percentage of respondents who sought advice from IPONZ was similar across all the different sized businesses.

Matching Intellectual Property Data with ANZSIC Level 1 Industry Sectors

Improvements to products (goods and services) and the associated marketing and promotional activities that take place during the commercialisation of the products can be protected under the umbrella of IPR's. Applications for the registration of patents, trade marks, designs and PVR's are made to IPONZ. Individual applications can be searched using a public search engine; large scale searches may be made with the help of IPONZ staff to compile the data. Data on applications for IPR's provide a useful guide innovative activities. (For confidentiality reasons, data on designs related to registrations.) By comparing IPONZ data with productivity data provided by StatsNZ, it is possible to draw some valuable insights into the connection between formal, registered IP rights; R&D and productivity.

Table 49 shows the number of applications for registered IPR's made in New Zealand by NZ Applicants and the total numbers of applications – the difference between NZ Applicants and Total Applicants represents overseas applicants. It is possible for overseas based entities for obtain registered IP rights in New Zealand; likewise, it is possible for New Zealand entities to obtain registered IP rights in overseas countries. This Table shows, for example, that in 2008, 78% of the patent applications were made by overseas Applicants; 55% of PVR's; 52% of trade mark applications; and, 74% of design applications. These figures support the contention that New Zealand is a net importer of IP.

Table 49 - Applications for Intellectual Property Rights in New Zealand

Patents	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
NZ Applicants	1256	1342	1569	1881	1790	1757	1630	1517	1715	1610	1719
Total	3176	3249	6848	7247	6861	7007	7093	6932	7904	7971	7792
PVR	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
NZ Applicants	74	59	56	53	76	49	54	47	52	60	70
Total	144	169	189	143	188	177	149	121	114	157	156
Trade Marks	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
NZ Applicants	6064	6950	8035	8394	8657	8863	8371	8223	9654	9656	8393
Total	16559	18637	24422	20886	20082	19077	16301	16853	18815	19612	17645
Designs	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
NZ Applicants	431	402	431	324	380	384	375	378	473	481	352
Total	831	911	1037	919	870	1154	1333	1283	1526	1508	1335

Source: IPONZ 2009

Table 50 - IPONZ Units Match Summary with StatsNZ Business Frame

	1996			
	Division			
	Design	Patent	PVR's	Trade Marks
ANZSIC 96	N	N	N	N
A Agriculture, Forestry and Fishing	16	77	16	155
B Mining	.		.	7
C Manufacturing	53	159	.	669
D Electricity, Gas and Water Supply	.	.	.	43
E Construction	23	64	.C	92
F Wholesale Trade	18	76	.	589
G Retail Trade	11	30	4	308
H Accommodation, Cafes and Restaurants	C.	5	.	79
I Transport and Storage	6.	9		55
J Communication Services		5.	.C	110
K Finance and Insurance	6	67	C	685
L Property and Business Services	56	292	25	946
M Government Administration and Defence	.	.	.	93
N Education	.	7	.	81
O Health and Community Services	C	6	.	100
P Cultural and Recreational Services	.C	11	.	308
Q Personal and Other Services	C	11	.	163
Units with multi matches in BF with different ANZSICs	37	93	16	445
Non matched units	100	471	6	1135
Total	333	1383	69	6063

Note: C represents a figure so small that it is suppressed for reasons of confidentiality.

Table 50, which shows the number of applications made by New Zealand applicants in 1996 matched against ANZSIC 1996 Level 1 Sectors, is used to illustrate the possibility of using the IPONZ data base to construct a time series of data that could be used to further investigate the relationship between IP and productivity. This is recommended as an avenue for future research *viz.* combining IPONZ data with IBUILD for econometric analysis

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CONTENTIONS/SPECIFIC AREAS OF INTEREST

In the following section, responses to contentions raised by the MED are discussed with the help of illustrative quotations where these are considered relevant.

A. NZ businesses approach IP as a legal mechanism. NZ businesses would do better if IP was integrated into wider business development and commercialisation strategy. How can NZ firms be encouraged to integrate IP into their wider business strategies and management?

Responses from businesses did not support the contention that IP was viewed solely as a legal mechanism. Although interviewees often cited legal forms of IP, they also thought of IP broadly in terms of intellectual capital. Furthermore, it was clear that organisations use a range of mechanisms to protect their intellectual capital instead of, or as well as, the formal or legal forms of IP. One recurring theme was the concept of innovating ahead of the competition which is related to the importance of the first mover advantage. Another theme was the impact of the regulatory environment in which the business operated. That environment, by requiring competitors to meet the same standards as business A, supplements protection, such as patents and registered designs, for IP owned by A.

Contention A assumes that New Zealand businesses would indeed do better if IP was integrated into wider business development and commercialisation strategy. The research shows that New Zealand businesses are generally aware of IP; however, their understanding of IP needs to be improved. This goes to the heart of the research and issues such as the resources, in time and money, of firms that are not truly IP-aware and also reaching out to firms that are IP-unaware. The contention also assumes that firms with limited resources have the time or the inclination to devise a business strategy and then to adhere to it.

The best example that we heard of encouraging New Zealand businesses to adopt this strategic approach to the use of IP was the approach adopted by Organisation E. Organisation E engages IP advisors with whom they meet regularly to review their IP strategy. An advisor also attends the company's monthly R&D meetings. The advisor is involved at the start of a project and has a proactive role – asking the questions about what the company is trying to achieve with its protection and how to balance this against other demands on its resources. Patent attorneys can also assist by suggesting ways in which an invention can be used that might not have occurred to the inventor.

That's right and that's something that they, that sort of person will see an overview that the original inventor usually won't or often won't. You know, usually the inventor's focused on a product or a specific problem or something. The patent attorney sees different things everyday in a huge area of things normally, so their mind is open to all sorts of things.

There may be a more important role for advisor firms outside the normal range of IP advisors. There is a growing category, which comprises firms that focus on funding the commercialisation of IP and firms that provide patent insurance. There is also an international patent exchange market.

B. International patents are a vast repository of scientific and technical knowledge. How can NZ firms be encouraged/empowered to access and utilise this knowledge and stimulus more effectively?

This contention assumes that searching international patent databases is a valuable resource. Organisations such as the European Patent Office suggest that this contention is correct. When interviewed, firms gave a number of good reasons for not undertaking such searches. The obvious reason is cost and time resources. However, firms that are design based, and therefore dependent on copyright and design registrations, are loath to review competitors' products or publications for fear of later being accused of copying. Another interviewee questioned the value of patent searching on the basis that information available in patent databases could not immediately be turned to commercial use.

Researcher 1

There's all this IP out there, why don't firms just go out there and search and find it and utilise it?

Participant

Because it's not ready for use. ... it needs to be got to that stage where they can use it.

When searching was undertaken, the primary reason was to establish freedom to operate, i.e. to ensure that what they were planning to develop would not infringe on other people's patents.

And so, for example, 'freedom to operate', we can look for patents or other things that would impact on, so we're looking around patentability. So, is it new, is it novel? And as part of that we would identify patents on some areas that may impact on our ability to use it going forward, so that we know that that's a license required.

C. More NZ firms are internationalising. What are the implications of this for business IP strategy and practice and the potential policy implications for the Ministry?

For those firms that were exporting extensively, the domestic IP regime was less relevant than those of other countries. For this reason, policy initiatives in respect of awareness and understanding of IP need to include aspects of IP strategy in overseas regimes to cover issues of administration, monitoring and enforcement, e.g. patent litigation insurance is an area that government departments such as NZTE could consider. NZTE apparently assists some New Zealand businesses to monitor IP infringements in markets such as China.

I would like New Zealand to establish patent or IP protection insurance. Currently this is hard to get and it is an important part of the whole IP mix.

Firms were generally aware that registration of IP and litigation of IP offshore was more expensive and the US was regarded as especially problematic. Anecdotal comments from IP advisors suggested that many firms are naive about IP requirements overseas and have suffered as a consequence. Another issue of cost and efficiency for businesses with extensive off-shore interests is the need to engage large international law firms in multiple jurisdictions rather than going through a New Zealand law firm and its overseas partners.

An important policy issue when businesses expand internationally is the tax regime. This is discussed below.

D. Should more NZ firms license their technology internationally rather than manufacture and export the product? How could NZ firms make a 'technology licensing business model' a practical and profitable business strategy, and what would be the role of the Ministry or other government agencies?

Although there might appear to be a compelling logic in New Zealand firms licensing their IP offshore, particularly to drive productivity growth through the so-called 'weightless economy', organisations that had taken this approach stressed that licensing IP was complex and fraught with difficulties. The strongest message was not IP specific; it was to 'know your market including the regulatory environment'. Another issue for New Zealand firms was that they found it difficult to establish licensing partners because they were not known in the overseas markets. Having registered IP protection may be a minimum requirement to give confidence to your licensees that they have freedom to operate. An IP advisor suggested that having registered protection may also enable a business to cross-license, effectively combining technologies with a competitor. Another issue is that the decision to seek registered protection may therefore be taken earlier if a business is intent on licensing its innovations.

Yes, definitely. Going back to the very origins of the company, it was based around the formation of some intellectual property. So I did some work, some research and I developed an algorithm which had some applications ... and went looking for licensees. And I wouldn't say

wasted a lot of time, but it was not a fruitful exercise. I visited a lot of companies that weren't interested in licensing technologies from a company in New Zealand that they'd never heard of and, in the end, we found customers rather than licensees.

An interviewee believed that there was little return in licensing for the company or the country:

But if you license somebody, you'd be surprised how little, normally, a margin you can take for licensing something. If you take too much, a person in the other country can't sell any, so you don't get anything and they don't get anything so they don't stay with you. If you take too little, well you're not actually getting that much.

Amongst firms that did license their technology internationally we found one significant problem area with the tax treatment of royalties on IP. Non-resident Withholding Tax on licence fees earned/received in overseas countries is not eligible for dividend imputation. The tax treatment is summarised in Table 51 on page 96, together with an alternative structure for an organisation that would improve the tax position.

It was suggested to us that firm size and development may be a factor in whether a firm engages in licensing its IP. It may be that innovative firms are sometimes bought out before they reach the stage of licensing out. That is a consequence of New Zealand's geographic location and the value of the currency which make it easy for overseas firms to buy out innovative businesses.

IP advisors are in a good position to suggest that licensing IP should be part of overall business strategy. (See the discussion in the text box that follows)

The role of government agencies in developing a licensing strategy is obviously part of raising strategic awareness of IP and its layers of value. Beyond that, if an IP-aware business decides to offer licenses off-shore, agencies, such as NZTE and MFAT, have a role in developing contacts and ensuring that New Zealand businesses have the credibility they need to develop meaningful business relationships.

Text Box 2 – Licensing (1)**Researcher 1**

How amenable are New Zealand businesses to that idea of licensing out, or licensing in?

Participant

Not as much as I'd like. Because I think Kiwis tend to want to hold onto it, and want to do it themselves. And, also, they'd much rather have a 100% of something small, than 5% of something a thousand times bigger.

And, also, there is this fear of the big guys coming in. But you see, the whole thing with IP is that that's how you safeguard yourself, in terms of the big guys coming in. Another misconception is that, 'Well, the big guys are going to trample over me.' Well, they can, but if they're smart they won't. And this is the way IP works, is that if you're a big guy in business, and you've got equally large companies you're competing with, what you could do is you could trample over the little guy, and so can everybody else. That's one way of doing it. If you're smart, you license the rights from the little guy, because suddenly you've got something which is a monopoly, because you're a big guy and you've got this monopoly. Your competitors are wanting to get into your space, you've actually got an advantage over your competitors, rather than just levelling the playing field by trampling over the little guy.

And so, when you're looking at licensing out, you're not just looking at who you're going to license to, you look at their competitors, because part of your selling proposition is working out, 'Well what advantages they're going to have in relation to their competitors if they can license my IP?' And if it's going to give them an edge over their competitors, because they've got the monopoly, then it's worth it to them talking to you. And the other thing is that if they are going to try and reduce the terms or whatever, you've got the option to go to their competitors because you've checked that out. And so, who wants it the most? So it's still scary, but not as scary as you would think, because if you've got the IP they've got a reason to talk to you.

Researcher 1

At what stage in the business, though, do you think that the owner, or the owners, are ready for that kind of a concept, is it a business of \$10 million, \$25 million, or what?

Participant

No, right down to very, very small. I think SME's should be looking at that.

Researcher 1

I know they should be, but, if I had three men out the back working with me, and you're suggesting to me that strategy, it would seem very scary.

Participant

It depends on what they want to do. Again, you've got to go back to what they're trying to with their business. When you looking, say \$10, \$25 million, you're looking at a very small percentage of New Zealand businesses, anyway, in terms of the size of the country. I was actually looking at our clients, our client list yesterday, and when you go through our client list and you have a look at them, a lot of clients aren't in that big category. We've got big clients, but a lot, a majority of them are in the SME size. And they, part of their strategy is, 'We want to do our own local business, but for us to expand we've got to bring in extra resource. How do I bring in extra resource, I've got have something to talk to somebody about?' And that's part of the, part of their strategy.

Researcher 2

So the advantage in the licensing arrangement is that it actually gives the protection, so rather than them being scared of the

big guys they can get the big guys on their side and...

Participant

Yeah. It's leverage for them to talk to them. Because if you don't have it, they won't talk to you. But you need to know what they're hoping to do at the start, because, another thing you said before is trade secrets worth versus patents. But, you go through and you analyse what are the advantages and disadvantages of both. And sometimes, with a particular innovation, there are some bits you have to patent because it's very easy for others to reverse engineer. And as soon as it's out there people can tell what you're doing. And, so therefore, that's the stuff that you need to protect, it gives you an edge, that's the stuff you need to protect. And there's other stuff where you can put really tight controls around access to it.

So, for example, with a lot of software based clients, say their innovation is, I don't know, some sort of analysis or something like that, sometimes what you advise them do is to have an in-house server, people just send in the data, they do the analysis in-house, send out the results, nobody gets to actually contact or see, that sort of thing, because it can't be reverse engineered from the results. But that's, again, you need that talk at the start so you can actually structure your business model, because a lot of software people, for example, will send out discs, or have let you download the software and run it yourself. So as you do that you lose control. But that's why you need to have that advice at the start, so you can, sometime your business model's driven by the IP.

Text Box 3 - Licensing (2)

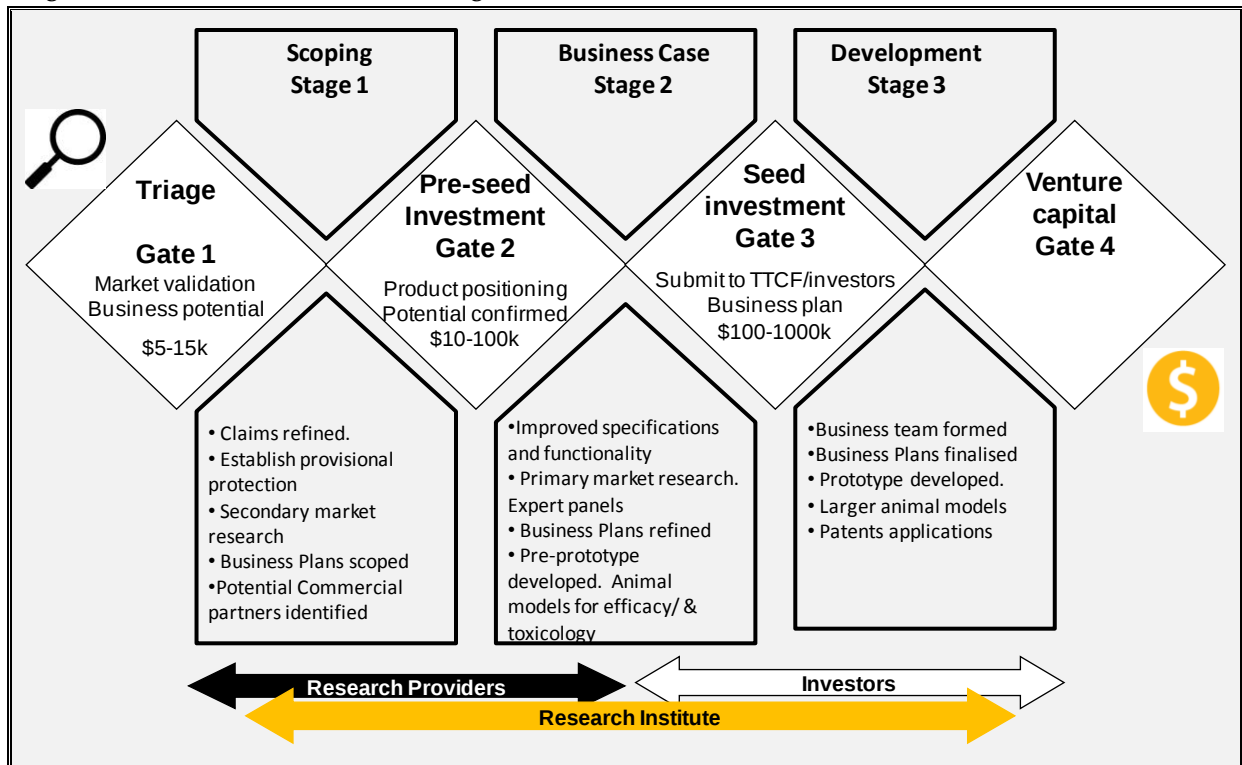
Researcher

One question/issue that has arisen already that you may have a view on is the big corporation's attitude to a small firm's IP. Most firms in New Zealand now recognise that IP is a valuable asset, unfortunately, some are unable to maximise its commercial potential because they are fearful of disclosing it – they think that a big corporation will just take the idea away.

Participant

Regarding the question you raised, my experience is that there is a very broad range of views on IP disclosure. We typically don't encounter problems with clients, as [our company] is the entity disclosing the IP. I have worked on one very interesting project where a very small (3 person) company brought significant IP to [our company], with the aim of forming a partnership to commercialise it. Disclosure issues were resolved by signing simple Non Disclosure Agreements so it didn't present a problem. I suspect most smaller firms are more worried about their direct competition within NZ and their own industry segment than larger multinationals.

Figure 7 - Framework for commercialising research



Source: Key Respondent Auckland Uniservices

Table 51 - Different tax treatments for selling products and licensing IP offshore

	Sell Product Company	License IP			
		Company	Trading Trust		
			Trust Income	Beneficiary income @ 12.5% @ 38%	
Taxable profit	1000	1000	1000	1000	1000
NRWT	0	-100	-100	-100	-100
Corporate tax @ 30%	-300	-300			
Trust tax @ 33%			-330	0	0
less NRWT		100	100	100	100
NZ Profit net of tax	700	700	670	1000	1000
NZ tax available for imputation credit	300	200			
Taxable dividend/trust distribution	1000	900	670		
Individual tax @ 38% (12.5% - 38%)	380	342		125	380
less NRWT (individual)				-100	-100
Trust distribution @33%					
imputation credit	-300	-200			
net tax paid (individual)	80	142		25	280
Total tax					
Corporate tax	300	200			
NRWT		100	100	100	100
Trust tax			230	25	280
Individual	80	142	0		
	380	442	330	125	380
Effective tax rate	38.00%	44.20%	33.00%	12.50%	38.00%

Note: New Zealand and the United States are currently negotiating changes to the double tax agreement between the two countries. One of the changes is to reduce the rate of non-resident withholding tax on royalties to 5%.

E. NZ businesses avoid addressing IP issues because of perceptions of it being mysterious, complex and expensive. How could NZ firms be better supported with IP advice and information?

Businesses confirm this contention. They made a number of references to mystery, complexity and cost. It is indeed possible that some businesses might have avoided or ignored IP issues. However, it is more correct to suggest that these issues are barriers to use. A related issue is that several interviewees thought that patent attorneys created a kind of mystique around their work to justify their expenses.

There is a lot of mystery and mystique around IP. And to be perfectly honest, the IP firms create that mystery and mystique because that's their revenue stream, they complicate this stuff.

Cost is an issue for all firms and a consideration in deciding whether to proceed with registration of IP rights. However, those businesses that were aware of the costs of registering and defending rights in other jurisdictions considered cost in New Zealand to be modest.

Support for New Zealand businesses could be provided in the form of education undertaken on three levels: the formal education system, particularly at tertiary level; advice and information provided by the IP profession (including the MED, IPONZ and other government bodies); advice and information provided by industry bodies, e.g. IPENZ.

The problem is currently at least two-fold: (i) there is a wealth of information available on a variety of sites. Unfortunately, this information is not easily found and even intuitive searching on Google is not enough. Serendipitous location of IP information is not what businesses want or require. Businesses want information that is 'accessible'. (ii) Information which is provided is often complex. Businesses want information that is 'simple and clear'.

As noted above, IP advisors are the primary source of IP information. The answer to raising IP awareness may be to work with IP advisors or at least to consult IP advisors on their views of how awareness can be improved.

F. The information available on IP use in NZ is insufficient to support robust innovation policy. How can the way data is collected and stored be redesigned to give a clearer indication of how IPR's affect innovation in NZ and associated barriers and opportunities?

There are several elements to this contention: (i) Information available to policy makers: MED and other policy makers need to determine the level of information that they require and the sources of that information. (ii) Information available to users including industry

groups, which overlaps with *Contention E* above. For users, it is one thing to have information available; it needs to be promoted to users and it needs to be in usable form. There is information publicly available from some government sources, such as IPONZ and NZTE. However, the information is scattered and often too general to be of use in specific instances. It would be highly beneficial to have the information co-ordinated by links to a central repository, a 'one stop shop'. What would also be more useful is industry-specific information made available through industry body websites. Having information available does not mean it will be used. Many potential users would need to be educated. This involves education programmes and/or being able to consult advisors. It is also an issue of education within organisations as much as education to organisations. (iii) Collection of data involves the interface between MED and IPONZ on one hand and departments and organisations such as StatsNZ on the other hand to ensure consistency and comparability of collection devices and assembling that information in usable and accessible forms.

KEY FINDINGS

In the course of this review, we interviewed selected businesses across a number of industry sectors. We also surveyed a much larger number of businesses across virtually all the ANZSIC Level 1 classifications. The problem with this sort of research is that interviews and surveys designed to assess awareness of anything is likely to be undertaken mainly, if not entirely, with businesses that are aware of the subject matter of the research. A number of businesses that we approached to be interviewed declined our request. We could not calculate the response rate to the awareness survey because of the way it was promoted. It can be assumed that the unaware are unconcerned and unlikely to respond either to a request for an interview or to complete a survey. In respect of the evidence of businesses that we interviewed, the following findings are therefore provided by IP aware businesses. IP advisors were asked, in the main, to respond in terms of their opinions of the views held by their clients. Their evidence is hearsay, although, valuable nonetheless.

Application of Scarce Resources

The issue of the application of scarce resources is one that New Zealand businesses face in respect of all their business activities and not just those that apply to the awareness and use of IP. However, the cost in money and in management time, both scarce resources for many New Zealand businesses, requires decisions about the application of those resources when IP issues arise. Both businesses and the advisors who assist businesses recognise that this is a key issue. As such, it is not a key finding of this review – it is well known – however, we have confirmed its importance. A specific application of this issue, one which is also well known, is the issue of enforcement of IPR's – primarily the cost defending against the threat of litigation, although, sometimes the cost of threatening and carrying through on litigation.

The Findings

The findings of our research are comprised of the standout features that we identified, including gaps in the system. They are informed, where appropriate, by information and data drawn from other sources.

1. IP has a Broad Meaning

A broad perspective is desirable when discussing and reviewing IP outside or overarching the boundaries of a formal discipline such as law or economics. As a general rule, the understanding of IP amongst business management in New Zealand is not limited by those boundaries. It is probably true to say that the most consistent approach to IP for managers is that it is the product of, or it is contained within, intellectual activity and it is related, in

various ways, to the workplace. Even the term ‘intellectual capital’ is problematic, because some managers prefer to see IP as being outside the property regime.

The interviewees reported IP as having three parts: (i) the formal IP system; (ii) knowledge held in the minds of employees or in the organisation generally – ‘intellectual capital’, ‘internal knowledge’ or ‘organisational knowledge’; (iii) The strategies and practices that do not form part of the formal IP regime that encompasses both registered and unregistered rights.

2. Awareness and Understanding

Awareness of IP in general terms, as in being aware of the existence of the IP regime or conscious of the importance of IP in the overall economy can be classified in a qualitative sense as least as being ‘good’ across all industries. Levels of awareness and understanding of those interviewed varied. All the firms that we interviewed recognised that the IP system delivered benefits or value to a greater or lesser extent.

However, awareness in the deeper sense of having an understanding of IP – the value that IP can deliver and the strategic options it makes available, is more variable. Understanding of the various elements within IP varies – even the difference between IPR’s that arise upon registration and those that arise without formality varies; and awareness and understanding of IP is greater in some industries than in others. The awareness survey found that trade marks, confidentiality agreements and lead-time over competitors were regarded as the most important means of protection for innovations. By comparison, patents and registered designs were not considered to be particularly important means.

A particular challenge will be to increase the awareness that businesses have of the value and benefits that can be extracted from the IP system, over and above the value that they are currently extracting from the system. It is also important to promote awareness within a business.

There was a strong call for ‘clear, simple, accessible information’. One interpretation of this call was that the information be provided outside the existing network of IP advisors.

3. Understanding is Critical to the Ways Businesses use IP

The place of IP strategy within an overall business strategy will be a function of the level of IP sophistication within an organisation and its advisors and the influence of those advisors. The strategic use of IP, as opposed to ad hoc non-strategic use, flows from an awareness and understanding of IP. The more sophisticated of the managers that we interviewed made it clear that there are at least three initial decisions to be made concerning the protection of an

innovation within the overall concept of IP and they all relate to the effective commercialisation of that innovation. (i) Will protection under the wider IP regime add value to the innovation? (ii) What is the appropriate form of IP protection – the formal registration system or other less formal forms of IP but still part of the IP regime? (iii) Should the primary means of protecting the innovation be outside the recognised forms of IP, that is, marketing and management strategies, such as ‘first to market’ or ‘the regulatory environment’? Having determined that protection is necessary, there is a decision to be made as to when and where protection should be sought.

Respondents to the awareness survey confirmed that a surprisingly high proportion of businesses had IP policies (overall, 38.1% of respondents had an overall IP policy); this should not be taken as a guide to the overall strategic awareness of New Zealand businesses.

4. IP and Productivity

Innovation is one of the drivers of productivity. In turn, the legal IP regime is essential to the protection of innovations, particularly technological innovations. However, while there is some evidence that the protection provided by the patent system, for example, acts as an incentive to innovation and therefore to an increase in productivity, there is no evidence that IP, on its own, is a driver of productivity.

A connection can be established between IP and productivity – that is, IP in the broad sense of the term, can contribute to productivity. Businesses acquire a proprietary stock of knowledge which may be protected in a variety of ways, including elements of the formal IP regime, such as patents, before it is released to the market; alternatively, less formal IP may be sufficient, such as secrecy or being first to the market. Innovative products produced by one firm may contribute to productivity gains made by another. A new or improved product may be an innovation in the hands of the second firm.

5. Reform of the Legal Regime

Reform of the formal legal system was advocated by a number of the businesses that we sampled. In particular, there were suggestions for improvement to the patent system. Patent extensions were mentioned by a number of respondents. One respondent suggested that New Zealand adopt a system of innovation patents; while there was conflict over software patents – one respondent was in favour, another was opposed. Other changes that New Zealand businesses supported included provision of a grace period; the retention of pre-grant opposition to patent applications; clarification that software was patentable in New Zealand; and, adoption of effective patent life. These issues will, no doubt, be addressed before the Select Committee that is currently considering the Patents Bill.

Several of the organisations that we spoke to were concerned about issues that had arisen over the ownership of IP. This arose in various situations, including demands from businesses involved in FRST research programmes. The simplest solution would be to mandate that the entity that commissions IP should own the IP, subject to agreement to the contrary. At the macro-policy level, the issue of ownership of IP by Māori is an issue for Māori businesses and the economy at large.

6. Size of Businesses

The results of the survey show that there is a similar level of IP awareness amongst New Zealand businesses, no matter what their size in terms of FTE's. One reason for the relatively high level of awareness amongst smaller enterprises is that the direct involvement of the owner. The owner is also more likely to receive advice or information directly from what are in New Zealand traditional sources of information, namely, suppliers and customers. Smaller enterprises therefore seem to be equally IP aware but it is important to preserve this awareness as they grow. It is important to promote awareness to companies and within companies.

A more likely determinant of IP awareness including readiness and ability to implement IP strategies is the availability of management resources. These are more likely to be present in larger firms, but are also significant factors in research based organisations.

7. The Role of IP Advisors

IP advisors are in a difficult position. Because of the nature of the advice they are called upon to offer, many of them need to have specialist skills in at least two disciplines – the law of IP and the discipline of engineering/science. This may be a factor in the perception that IP advisors create a level of mystique around their work to justify their expenses. Professional advisors are required by their codes of practice to err on the risk-averse side in giving advice and may thereby appear to maximise the threat potential. Business managers, on the other hand, often seek commercially balanced advice, which they perceive would be less expensive than covering all bases. Associated with the complexity of the advice offered, there is an issue with the cost of the advice.

Whatever real or perceived problems there are with IP advisors, they are very much part of the solution to the problem of developing and maintaining IP awareness amongst New Zealand businesses. Over 70% of the businesses that we surveyed had sought advice about IPR's. Larger businesses are slightly more likely to seek advice than small businesses. External patent attorneys were, however, the primary source of information for all sizes of businesses. One IP advisor we interviewed put forward an important point in discussing the

role of IPONZ: ‘patent attorneys have the interests of their clients at heart – could a government department say that?’

8. The Role of Government Agencies

Government agencies have a role in raising awareness and understanding of IP amongst the business community and the wider community at large. An efficient programme would include education through the formal education providers at tertiary level and, possibly at secondary level. This would be supplemented by the existing programmes of advice and information provided by MED and IPONZ and other government bodies. A variation of the advice provided by government agencies would be to fund IP advisors to provide initial consultation and advice. A third level role for government agencies would be to provide/fund provision of advice and information by industry bodies, e.g. IPENZ. This third level of advice would be specifically tailored to the needs of specific industries and professions, such as engineers. As noted elsewhere, any initiatives to raise awareness and understanding of IP must include the wider IP profession including patent attorneys, IP lawyers, accountants and venture capital providers.

A number of agencies and departments are involved in providing information about aspects of IP, promoting its use by businesses and monitoring that use. Those agencies also undertake research into aspects of IP knowledge and management. These activities are not limited to national agencies – there are projects being undertaken at regional level, funded by national agencies. It is not immediately apparent whether there is collaboration between government agencies. If there is, it is not apparent in the form of a national IP database.

9. Specific Issues Requiring Attention

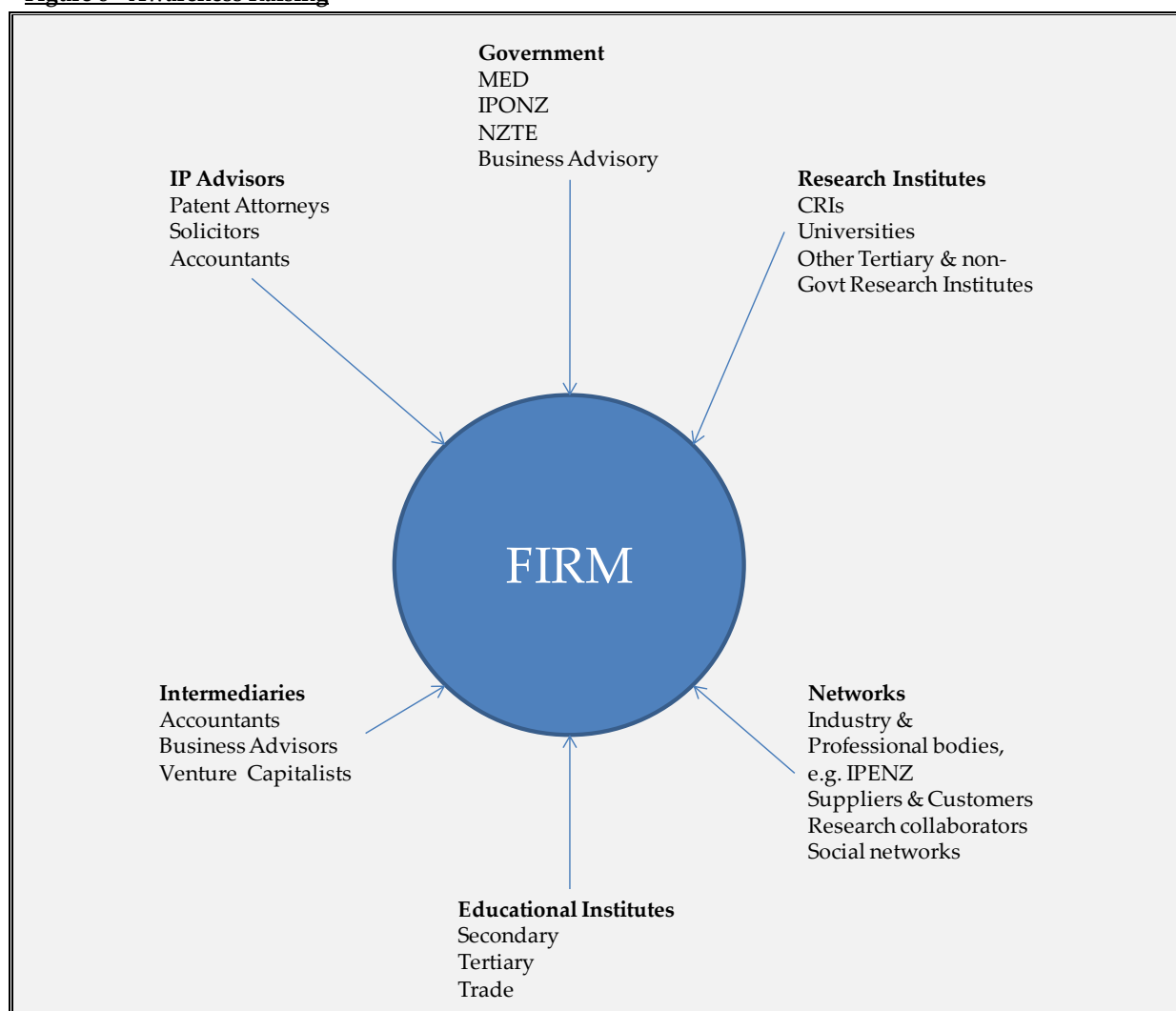
1. The tax position of firms that innovate needs to be considered. (i) Innovative firms have called for the reinstatement of tax incentives. This bears consideration. (ii) Amongst firms that did license their technology internationally there is a significant problem area with the tax treatment of royalties on IP. The MED has promoted the value of licensing IP and any tax policy that has a negative effect on licensing of intangibles needs to be reviewed.
2. There is an issue as to the ownership of IP that has been created in situations where there are two or more parties to an enterprise. Situations in which this is reported to arise include industry partners to FRST projects and government agencies that have commissioned pieces of IP.
3. There are anecdotal reports that overseas entrepreneurs have been searching New Zealand for IP that has value and has not been commercialised. Apparently, New

Zealand organisations, including government agencies, that are ignorant of the value of some of the IP that they own, or lack the capital to invest in commercialisation, have sold off IP.

10. The Context and Characteristics of New Zealand are Important

New Zealand is distant from its main markets, but it has significant natural resources. There is an emphasis on agriculture, a small manufacturing sector and a large service sector incorporating a large social and community services. These and other factors such as access to capital and an emphasis on self-reliance are all factors that have to be borne in mind when considering policy formation. In the context of formal IP, New Zealand is a net importer of IP.

Figure 8 - Awareness Raising



Text Box 4 - Key Components of an Effective Innovation System (IPENZ)

1. An organisational culture that values innovation, where there is implicit encouragement for staff to think differently, take calculated risks and challenge the status quo.
2. Responsibility for innovation is placed on all staff. While some roles will be more directly involved in innovation (e.g. research and development, product development) all staff should have a mandate to act innovatively within their roles (i.e. suggest and implement improvements to process or products).
3. Human resource systems that develop and encourage staff to be innovative. This requires a dedication to training, education, mentoring and the rewarding of staff for innovative behaviours. Staff also need time and resource allocations to stop and think about new ideas, which will not happen while they are giving 100% of their time to the daily routine.
4. A performance measurement system that measures the innovative pulse of a company. Simple measures that are often used include spending on innovation (often labelled R&D expenditure), new product percentage (number of new/changed products introduced this period as a proportion of total product numbers) and number of patents held.
5. Linkages with the marketing function. Understanding the customers, their needs, and the competition is critical for targeting resources to the innovation systems. The most successful innovators understand the customers' needs better than the customers themselves. They are often able to identify and solve problems before the customer has realised that perhaps there is a problem, let alone thought about buying a solution.
6. Knowledge acquisition and management processes that constantly bring into the organisation new ideas, information, concepts and knowledge. This can range from simple things such as receiving trade, scientific, engineering and professional magazines, attendance at conferences and participation in industry networking forums right through to having a comprehensive research capability. Where knowledge is not readily available, polytechnics, universities and research institutes have the capabilities for developing it for you.
7. Intellectual property management systems that identify, protect, value, manage and audit the organisation's intellectual property (IP). This intellectual property is the new knowledge that arises out of the innovation process e.g. it may be a unique understanding of a production process that facilitates superior efficiency or design in a new product. Some organisations have difficulty in identifying their IP. One way of doing so is answer the question: what do we know that our competitors don't and that we don't want them to know? Once identified, it needs to be protected or the competitors will find out! Protecting your IP can range from simply keeping it confidential through to the more formal means such as trademark protection, patents and plant variety protection.
8. Collaboration with other organisations who can contribute to innovation processes. Most organisations cannot achieve best-practice innovation working in isolation. They need to work with research providers, tertiary education institutes, associated and support industries and even their own competitors. Clustering of similar organisations and their support industries is a proven tool for ensuring collective growth by sharing those parts of the innovation process where their interests overlap. This may require collective ownership of the IP that arises from that sharing.

RECOMMENDATIONS

Policy

1. Industry-Government Co-investment in R & D and Innovation

Support for Innovative Firms - Tax and R&D Incentives

The overall policy should be one of investing without attempting to ‘pick winners’. The introduction of tax relief and support for R&D, including assistance in obtaining IP protection, would be welcomed by business. The latter could include funding consultation with IP advisors and IP business strategists.

Support for Innovative Firms – Exporters and Licensors

The barriers to the use of the IP system in overseas jurisdictions – particularly issues of cost and enforcement – are higher (in some cases, much higher) than comparable costs in New Zealand. An additional issue is the need for resources within the New Zealand firm and resources in the form of advisors in the overseas jurisdiction. Consideration needs to be given to supporting innovative firms with monetary grants and extended assistance with issues such as – international registration of IP, monitoring and enforcement of IP rights. This point was strongly made by an IT reseller and developer that was recently formed. The interviewee pointed out that the cost of IP protection is ‘front-loaded’ unlike other costs that start up companies have to face. A number of firms referred to patent litigation insurance and one IP advisor suggested that NZTE could consider underwriting some form of patent litigation insurance.

2. Develop and Promote a Comprehensive IP Communication Strategy

A single, comprehensive IP policy would help ensure that enquiries from business and assistance to business were delivered efficiently. The policy would be flexible enough to take account of different needs in different industries and it would include oversight of funding initiatives. It would be important that government agencies administering the policy communicate with one another. The policy would encompass an education programme.

3. Reform of the Legal Regime

From time to time there are initiatives to reform the IP legal regime. Too often these are driven by non-business interests – most notably, the artists' resale royalty right – and driven by departments outside the core IP expertise in the MED. Reform of the IP regime should not be ad hoc, it should be coherent and driven by recommendations from business for ways in which the IP system can be reformed to better assist business to improve productivity. There should be a willingness to implement changes that New Zealand based business supports, e.g. grace period when making a patent application, innovation patents, retaining pre-grant opposition in patent prosecution, clarifying ownership rules.

Further Research

The current review of IP has shown that there a number of issues where further research could be undertaken to the benefit of the overall objective of raising productivity. We suggest that the following list be refined in consultation with interested parties including IP advisors and other government agencies.

Awareness and Understanding

1. Identify IP advisors and their roles

Identify who can be classified as IP advisors, what they do and how they can help raise awareness of firms and within firms. What is their role in providing strategic assistance to businesses?

2. How do managers become aware of IP?

Knowing how managers become aware of IP will help to devise awareness programmes.

This applies both to (i) IP unaware businesses; (ii) and to individuals within organisations that may be classified as IP aware merely because they file patents etc.

3. Awareness Analysis by Sector

An understanding of how IP contributes to innovation and productivity will benefit from an analysis of awareness and understanding and strategic use by specific sectors – the so-called Māori economy is a significant and growing part of the New Zealand economy. Growing the awareness of IP amongst Māori has already been an issue for MED. Other social sectors that would add value to a general analysis of the awareness of IP are businesses owned and managed by immigrants of different nationalities and women.

Another variation of this research would be the analysis of IPONZ data by geography to determine whether this showed actual or potential innovation ‘hot-spots’.

4. Meta-Analysis of IP Surveys

A number of surveys have been conducted of businesses and IP related behaviour. These include the on-going StatsNZ business surveys and the bi-annual UABS Innovation Survey. Other one-off initiatives include surveys conducted by AJ Park and by FRST. It would be useful to conduct meta-analysis of the surveys and to ensure that on-going surveys are conducted in a collaborative manner.

5. Follow-up Interviews with IP Advisors and Firms

The current review has identified a number of issues and problems. It would be useful to follow up the review with further interviews of IP advisors and businesses concentrating on specific issues.

Productivity

1. Linking Firm Level IP Data with Firm Level Productivity Data

From our previous projects, we know that it is possible to match firm-level data from IPONZ with ANZSIC industry categories to provide data that can be analysed to develop measures of IP intensity at industry level. If we identify those firms using IP and those that are not using IP then we should be able to see if differences in productivity are explained by the use of IP and/or possibly the contribution of IP to productivity growth.

2. Identify Industry Clusters and Prepare IP Material

As part of an awareness raising programme, identify industry clusters and work with universities, industry bodies (such as IPENZ) and IP advisors to produce IP advice tailored to the industry and delivered in association with the industry body in the form of print material and seminars.

3. Study of social networks

Study of social networks uses relational data to link members of a social network, such as members of professional or industry bodies. Two concepts deserve closer attention in a future research programme – ‘structural holes’ and ‘brokerage’. Structural holes constitute

gaps in networks, whereas brokers can act to bridge holes by communicating interests and difficulties between groups, transferring best practice, drawing analogies and by synthesising. Brokers play a role in innovation by sharing knowledge across networks.

4. Firm characteristics and the use of IP

Research could be undertaken to determine whether characteristics such as a firm's financial success or its size parallels its use of the formal IP system and whether this feeds into productivity gains.

Protection in the wider IP context

1. Clarify the Interface between IP and the Regulatory Environment

An interesting and little understood factor is the interface between IP protection and the regulatory environment. The research would investigate the nature of regulatory requirements in order to determine whether they are an obstacle to the use of the IP system (that is, do firms regard IP protection as unnecessary) or whether the regulatory requirements can be used in tandem to provide extra levels of protection.

Communication

1. Identify and Collate IP Research and Advice

There is a significant amount of IP related material on websites, such as MED and IPONZ, where one would expect to find advice and background material. There are, however, large amounts of useful information on other websites, such as FRST and NZTE, which do not, intuitively, spring to mind as sources of IP information. Information that is not communicated or is not communicated to the appropriate recipients is useless information. All available IP material should be identified and reviewed for its value to business. Ways of communicating information to busy and resource-poor business should then be identified.

GLOSSARY

CRI	Crown Research Institute
IPONZ	Intellectual Property Office of New Zealand
IP	Intellectual Property

APPENDICES

Appendix 1 – The New Zealand Context for Innovation

This review assesses how well New Zealand businesses understand and use IP and the links between IP and productivity and IP and innovation. Although there are aspects of the review which are international in nature, the focus of the review is on how businesses behave within the New Zealand context and within the New Zealand IP system.

Considerable work in the field of innovation has been undertaken overseas by organisations such as the OECD and within New Zealand by organisations such as the Treasury and the MED.

Characteristics of the New Zealand context impact on business behaviour both inside and outside New Zealand. Smith has identified a number of the characteristics of the New Zealand economy which may affect innovation and are therefore important for a review of IP. (Smith, 2006, p 35)

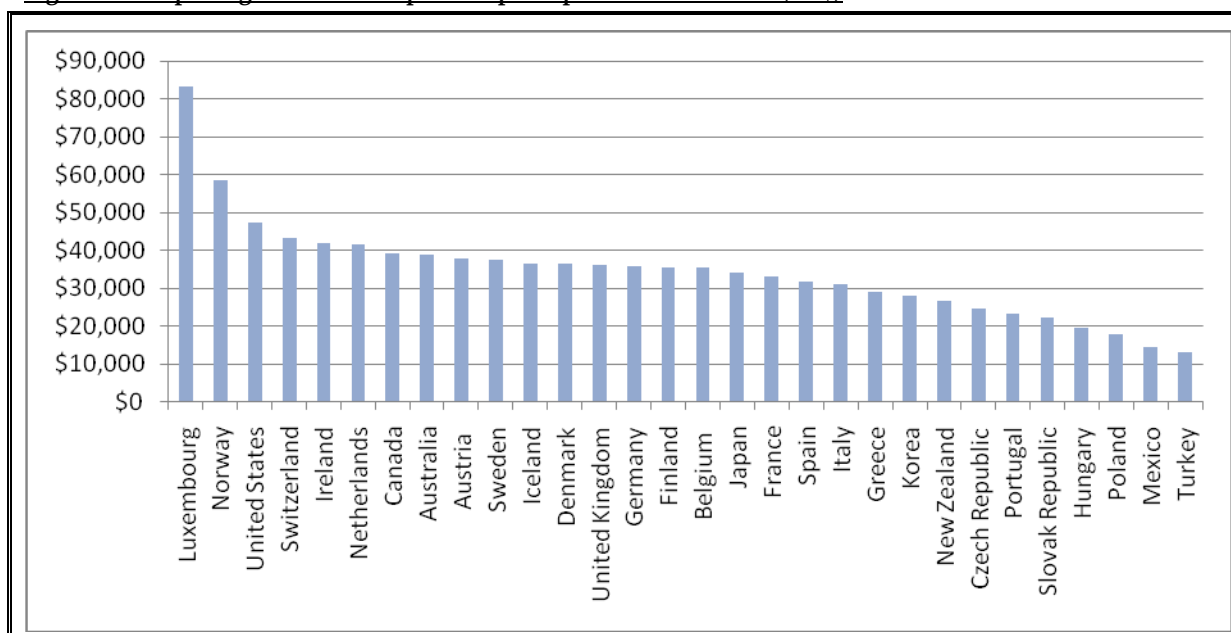
- An industrial structure with a strong emphasis on agriculture
- A small manufacturing sector with a large proportion of output concentrated on low and medium-technology sectors
- A large service sector incorporating a large social and community services element (meaning especially health and education)
- Both the gross and business (GERD and BERD) R&D intensities are low
- There is significant technology import including a strong level of embodied technology import
- Rates of gross fixed capital formation are comparatively low
- From a geophysical perspective, New Zealand is distant from its main markets, but has significant natural resources
- Its physical make-up is such that it faces communications problems and hence has major physical infrastructure challenges

However, Smith's analysis doesn't cover the entire situation. Smale argues that how Kiwis think and behave (their culture) determine business success rather than the resources available to them. (Smale, 'Why Kiwi Culture and not access to resources is the limiting

factor for New Zealand's innovation performance', 2009) Aspects of Smith's analysis, together with the role of networks and the role of culture are discussed below.

The New Zealand Government, like others, aims to achieve economic growth. In 2008, New Zealand's GDP per capita was ranked 23th in the OECD at US\$ 26,650 Purchasing Power Parity basis (PPP) per capita.

Figure 9 - Graph of gross domestic product per capita for OECD 2008 (US\$)



Source: OECD.stat.extract (<http://stats.oecd.org>)

For New Zealand to raise its ranking into the top half of OECD, it would need to increase GDP to above US\$35,000 per capita (if all other countries remained the same). Such an increase would require New Zealand's annual growth rate to exceed the OECD average.

New Zealand's productivity is lower than other comparable countries and it has been falling relative to theirs. One way the government has identified to strengthen economic growth is to improve productivity in industry. Improvement in productivity is achieved by increasing the amount of output while keeping the unit of input constant, or by increasing input at a lower rate than the increase in output. As a national measure, productivity generally refers to labour productivity, which is the amount of GDP per hour worked or value created per hour worked. In a business model, value is only created when something is made and sold to someone else at a profit.

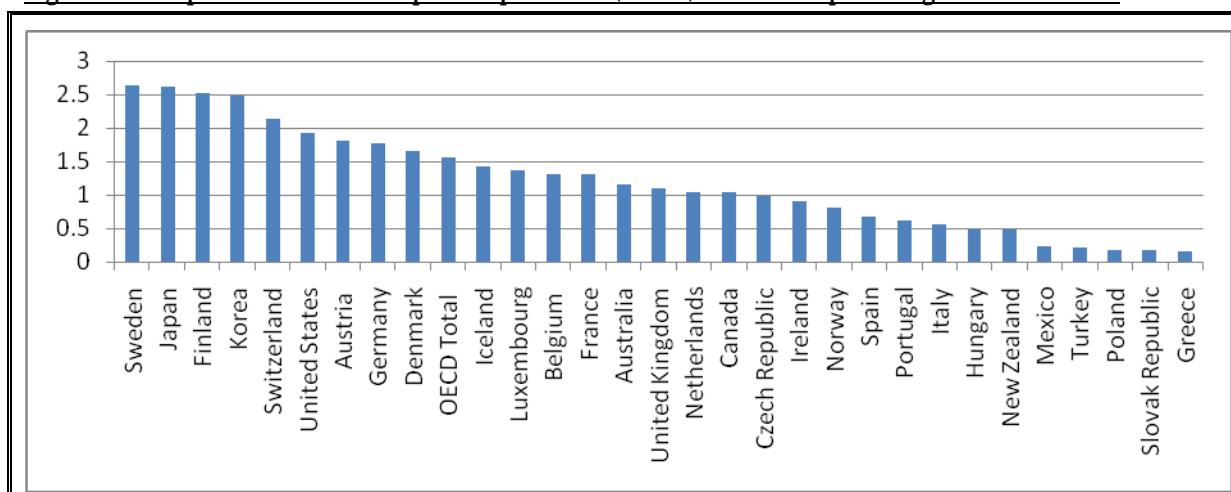
Labour productivity is strongly affected by capital investment and knowledge, and also by labour utilisation rates. NZ's capital:labour ratio is low by international standards, educational levels are generally good, and labour utilisation rates are high. This combination

of factors suggests that the key to lifting labour productivity is not by working harder (New Zealanders participate in the workforce at higher rates than comparable countries and work longer hours) but by working smarter, using knowledge, capital and advanced technology. (IPENZ, Prosperity through Productivity: A Plan of Action, 2006.)

Enhanced productivity and innovation

Productivity can be increased by investment in research and development (R&D) that is commercially focused on generating improved products or processes. Investment can be by government or by business. New Zealand is relatively strong in basic science with a larger than average share of national R&D investment being undertaken in the government and higher education sectors. R&D expenditure by the higher education sector (HERD), accounts for about 0.38 per cent of New Zealand's GDP, placing it well ahead of Ireland, and behind Australia and the UK. As characterised by Smith, however, compared with other OECD countries, New Zealand is a small, technology-importing country with low business expenditure on R&D (BERD). The ratio of royalty payments to receipts is among the highest in the OECD, possibly because New Zealand firms are skilled at sourcing existing world technology for local application, to the benefit of the New Zealand economy. Alternatively, royalty payments may represent the large number of foreign MNEs making intra-firm payment from their New Zealand subsidiary to their parent. While New Zealand's overall investment in R&D investment is slightly higher than that of Ireland, but lower than Australia and the UK, expenditure by businesses (BERD) is lower than for other OECD countries. NZ businesses only invested a total 0.49% of GDP in R&D compared with the 1.56% OECD average in 2007.

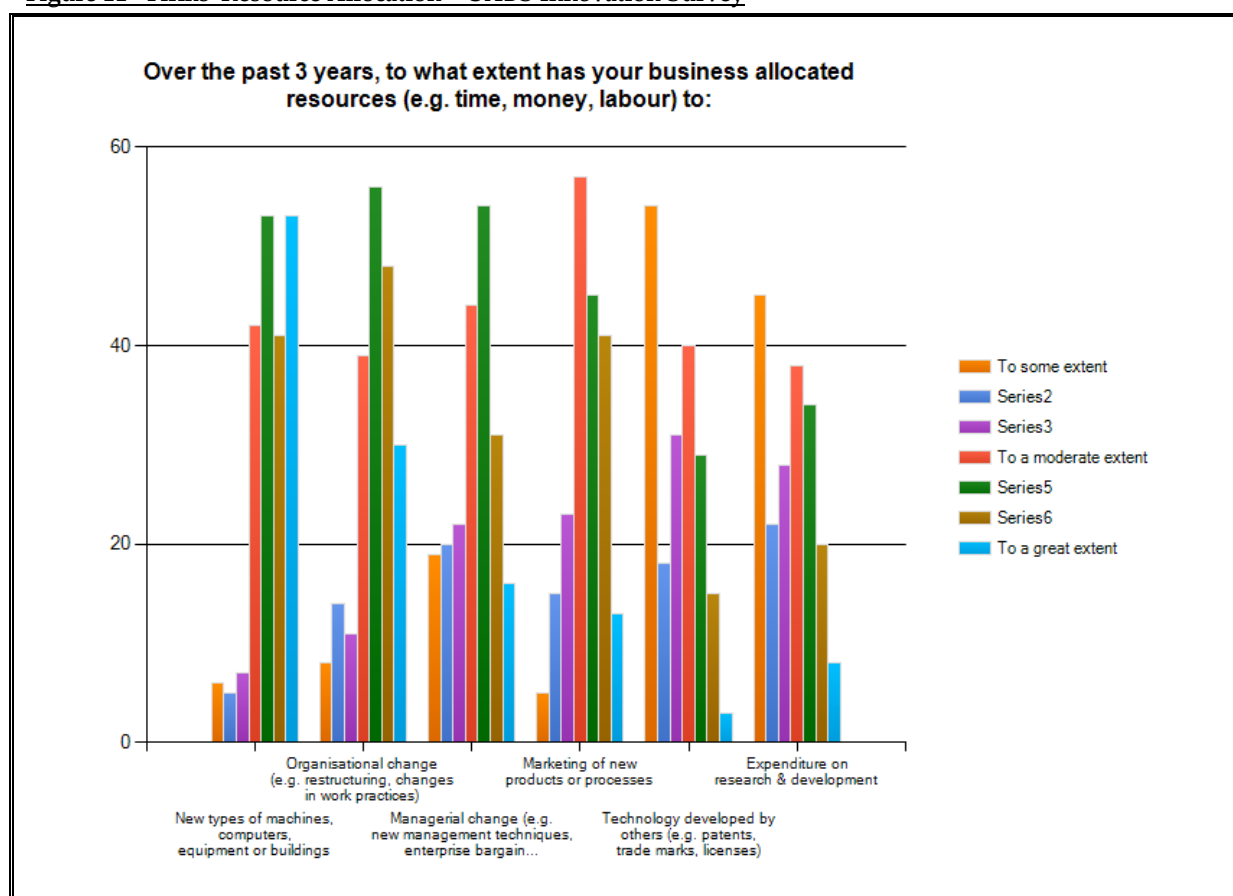
Figure 10 - Graph of Business Enterprise Expenditure (BERD) on R&D as percentage of GDP in 2007



Source: OECD (2008), *Main Science and Technology Indicators*, OECD, Paris, p. 29.

New Zealand businesses have shown a remarkable ability to innovate. While business expenditures on R&D in New Zealand are relatively low, the share of small and medium sized businesses that actively research and develop is larger than in any other OECD countries. (OECD, 2007) The results from The University of Auckland Business School Innovation Survey 2009 (UABS Innovation Survey) show that investment in new types of machines, computers, equipment or buildings were heavily invested in; by comparison, investment in technology devised by others was low. The survey also shows that innovations were most commonly developed and used in-house by the respondents. Licensing, both licensing out and licensing in, was not a significant feature of respondents' activity. However, businesses saw that there was a link between innovation and productivity.

Figure 11 - Firms' Resource Allocation – UABS Innovation Survey



Source: The University of Auckland Business School Innovation Survey 2009 (UABS Innovation Survey)

Table 52 - Innovation Index NZ 2009 – UABS Innovation Survey

To what extent are your organisation's innovations...?									
Answer Options	To some extent		To a moderate extent			To a great extent		Rating Average	Response Count
Developed and used in-house	10	10	7	40	45	42	45	5.04	199
Developed in-house and licensed to other businesses	103	22	11	18	14	6	4	2.17	178
Licensed from other businesses	82	28	22	28	8	12	2	2.43	182
Licensed from universities or other researchers	132	15	10	8	5	3	0	1.54	173
Focused on improving productivity	5	7	14	51	46	48	23	4.87	194
answered question									206
skipped question									65

Source: UABS Innovation Survey

Despite the emphasis on innovation in small businesses in New Zealand, labour productivity remains low. During the past two to three decades, the perception of where innovation comes from has changed. Innovation was seen as a result of firms investing in internal R&D (Nelson & Winter, 1982; Schumpeter, 1942); and this appears to be the New Zealand model – see the results of the UABS Innovation Survey. But more recent research argues that innovation is more likely to happen when existing knowledge stocks are combined across organisations (Kline & Rosenberg, 1986; Lundvall, 1992). This is the essence of the model of ‘open innovation’ that has attracted attention from academics and policy makers (Chesbrough, 2003). With open innovation, knowledge becomes a tradable item where firms buy in external knowledge or sell out unutilized knowledge, e.g. patents or know-how. Some of the outcomes are faster innovation and more new products and services being introduced to the market.

Barriers for New Zealand businesses to innovate and enhance productivity

Size, distance from major markets, average firm size and industrial mix play are factors in determining New Zealand’s innovative performance. And a number of barriers in the New Zealand infrastructure hinder businesses full capitalisation of their high rate of innovation. Some of these have been identified as:

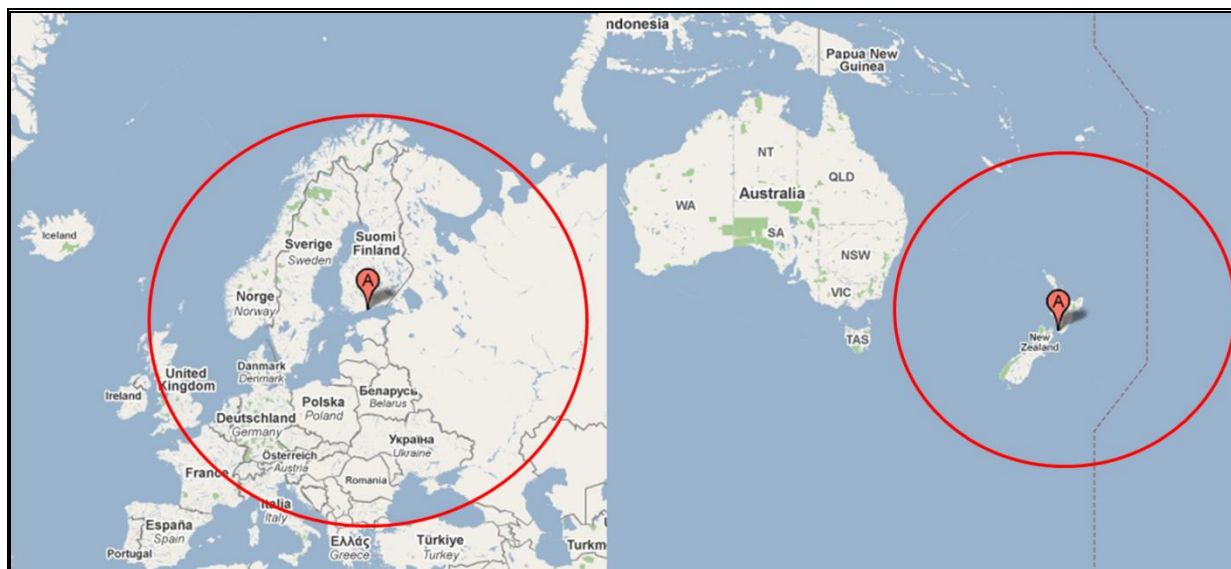
- Distance to markets is a significant barrier for New Zealand businesses competing overseas. (Hummels, 2001)
- Public sector R&D has not been sufficiently directed towards commercial value for New Zealand industry. (OECD, 2007)
- New Zealand firms lack the managerial skills to undertake or use innovation strategically. (Ministry of Economic Development, 2008). This could be expressed otherwise as the absorptive capacity of firms. (Ministry of Research, Science and Technology, June 2004)
- Insufficient capital is available to invest in new ventures and intellectual property (Lerner & Shepherd, 2009).

Distance to market

New Zealand is a small country in the South Pacific with long distances to overseas markets. While there are some complications with small near-market size, the distance to sizeable export markets is a more significant barrier. For comparison: Finland is only marginally larger in population than New Zealand and the country is relatively isolated in the northern part of Europe. But if a 2,000 km radius circle is drawn centred on Helsinki, Finland, it

encompasses more than 250 million people. The same radius circle centred on Wellington, New Zealand, contains only the population of New Zealand.

Figure 12 - Radius 2,000 km from Helsinki, Finland and Wellington, New Zealand



Maps are only approximately scaled and should not be used to measure real distance.

Geography affects trade through transport cost as a function of distance to markets and depreciation of goods as a function of time to market. One study estimated that every additional day of ocean transit reduced the probability of trade between two countries by 1.5% for manufacturing goods (Hummels, 2001). It can be argued that the transaction cost is less for knowledge-intensive products that can be transferred by internet or mail. However, even for these types of product tacit and non-codified knowledge is more efficiently transferred person to person. For New Zealand businesses, costs of travel are still a disadvantage; establishing and maintaining personal relationships with people residing halfway around the globe is more expensive than with those next door. New Zealand businesses can counteract the disadvantage of physical distance to some extent by increasing the codification of their inventions into more transferable knowledge, e.g. patents or licenses.

Public sector R&D

A country's innovation infrastructure comprises institutions that produce and distribute knowledge in society. In New Zealand, the universities and Crown Research Institutions (CRI) are the major institutions, but also other tertiary institutions, private research institutes and some Government departments undertake government-funded research and development. Universities; institutions such as Cawthron; and CRIs undertake R&D that has

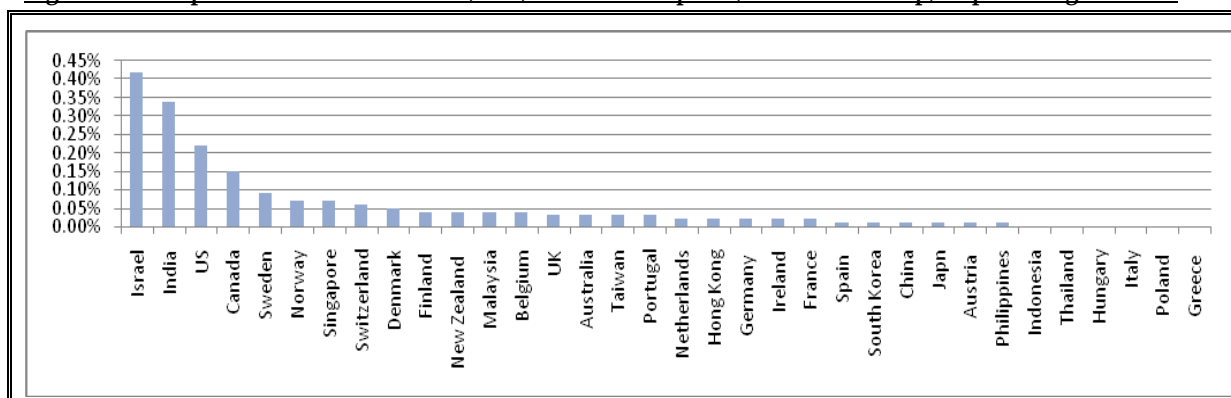
a public good component and a fundamental long-term effect on innovation in society. Industry use of publicly funded R&D to develop innovations can make a worthwhile contribution to future economic growth. Therefore, it is important to build strong links between public and private sector R&D to stimulate innovation and leverage the government's initial investments in R&D.

Absorptive capacity and a lack of managerial skills to undertake and use innovation

A firm's absorptive capacity is its ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends. This capacity is critical to its innovative capabilities and is largely a function of the firm's level of prior related knowledge. Development of absorptive capacity and innovative performance are history or path-dependent. Lack of investment in an area of expertise early on may foreclose the future development of a technical capability in that area. (Cohen and Levinthal, 1990) New Zealanders have the knowledge, skills and technical competence and are quick to pick up and use new technologies, but the capital market for investment in technology is immature and the level of venture capital remains low. However, an organisation's absorptive capacity differs from that of its individual members.

Underdeveloped venture capital market

Another significant obstacle for innovation and formation of more knowledge-intensive businesses is the small venture capital market in New Zealand. Venture capital can enable new ventures to grow more rapidly than conventional funding sources. New ventures are typically characterised by significant intangible assets and years of negative earnings in their early stages. It is difficult to secure bank loans or other debt financing; banks don't put a value on IP and will only lend against tangible assets. The role of venture capital in an innovation infrastructure operates to bridge the gap in the supply of finance (Lerner & Shepherd, 2009). During the past 10 years, the New Zealand venture capital market has increased in size but still remains small compared with some countries.

Figure 13 – Graph of annual investment (2007) in venture capital (seed and start-up) as percentage of GCP

Source: (Lerner & Shepherd, 2009, p. 52)

New Zealand has increased its venture capital market from 0.01% in 2004 to 0.04% in 2007 to its current level of \$54 million. The increase comes partly from the Government's Seed Co-investment Fund, which is targeted at small and medium sized businesses and start-ups in high technology sectors and with assets that are difficult to value including IP. The fund co-invests on a 50/50 basis with accredited investment partners. New Zealand's international ranking for venture capital is in the top half, similar to Finland, higher than the UK and Australia, but behind Norway, Sweden and Israel. New Zealand has a high rate of small and medium-sized businesses (SMEs), especially amongst innovative companies. Many of these businesses have difficulty finding funding and accessing expertise and know-how to realise the full potential of their innovation strategy. Besides investing in growing businesses, venture capitalists contribute to the management or operation by leveraging their experiences, know-how and personal networks. Businesses funded through the Government's Seed Co-investment fund might miss out on this opportunity as government plays a more passive role.

The role of networks

There are a number of concepts in social network analysis that could be useful to an analysis of firm productivity, IP awareness and understanding. Study of social networks uses relational data to link members of a social network, such as members of professional or industry bodies. The method of analysis for this study has not extended to networks; however there are two concepts that deserve closer attention in a future research programme – 'structural holes' and 'brokerage'. Structural holes constitute gaps in networks, whereas brokers can act to bridge holes by communicating interests and difficulties between groups, transferring best practice, drawing analogies and by synthesising. Brokers play a role in

innovation by sharing knowledge across networks. (Burt 1992, 2004; Hargadon and Sutton 1997)

In a recent study, Hendy and Sissons (Hendy and Sissons, 2009) analysed inventor network activity in Finland showing the increasing intensity of networking over the period 1993 to 2006. Nodes in the networks are linked if inventors share a patent. The researchers demonstrated a correlation between productivity and collaboration. They noted that New Zealand has no significant networks while Australia has networks of several hundred inventors in Sydney and Melbourne and Helsinki has 1376 inventors. The ability to form networks might be affected by New Zealand's geographic isolation and industry characteristics, there would appear to be potential for exploring possibilities for networks based on the CER arrangements with Australia.

The role of culture

Smale argues that, rather than the resources available to them, how Kiwis think and behave determines business success. Although resources remain important, how they are used, whether constrained or unlimited, and how much profit is created and captured, depends on the national culture as well as an individual's mindset and capability. He claims that there is a statistically significant correlation between national culture and the initiation and implementation stages of innovation. He observes that, 'The Kiwi culture makes us good at invention and not so good at creating value and profit ... that Kiwi culture is unusual because all of the important dimensions strongly favour initiation at the expense of implementation.'

- Being strongly control centric and not liking to rely on others for our success
- Preference for transactional rather than long-term trust-based relationships
- The Tall Poppy Syndrome causing under-performance and reluctance to be seen to excel
- Low assertiveness leading to weak negotiation skills
- Reluctance to give and receive feedback
- Work goals being in strong competition with personal and recreational goals, with the result that we satisfice (reach a threshold where we consider we have enough wealth at a low level relative to other nations)
- We do not pursue personal satisfaction and respect through work and wealth accumulation, and therefore leave a lot of value on the table.

Smale argues that with 'right thinking' we could build innovation, business and market engagement models for New Zealand.

APPENDIX 2 – INNOVATION AND IP

Innovation

The term ‘innovation’ is used in Statistics New Zealand (StatsNZ) publications in accordance with the OECD guidelines contained in the third edition of the Oslo Manual. An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations. (Oslo Manual, 2005, page 46).

The *Oslo Manual* identifies four types of innovations:

- product innovations – new or significantly improved goods or services
- process innovations – new or significantly improved methods for production or delivery (operational processes)
- organisational innovations – new or significantly improved methods in a firm’s business practices, workplace organisation or external relations (organisational or managerial processes)
- marketing innovations – new or significantly improved marketing methods. (Statistics New Zealand, 2008)

In turn, innovation is identified in the Treasury papers as one of five broad drivers of productivity. ‘These drivers provide a useful way to assess and develop policies to improve the productivity performance of New Zealand.’ In summary, they are: Enterprise; Innovation; Skills; Investment; and Natural Resources. Productivity is described in the Treasury papers: ‘A country’s ability to raise its standard of living depends on its ability to raise output per hour of work, the amount and value of goods and services each hour worked produces. This is not solely so that firms become increasingly internationally competitive; productivity is a fundamental driver of quality of life. Incomes are linked to workers’ productivity and a more productive labour force leads to higher wages. (‘Putting Productivity First’ New Zealand Treasury Productivity Paper 8/01 April 2008 page 1)

The IP system has a central part to play in the process of innovating and taking innovations through to commercialisation with the expectation that there will be productivity gains for the nation. ‘The IP system drives individual creativity and adoption by society.’ (Gollin, 2008, page 15) In many cases, it is a significant factor in determining when an innovation becomes available for others to use or whether it is not made available to the public.

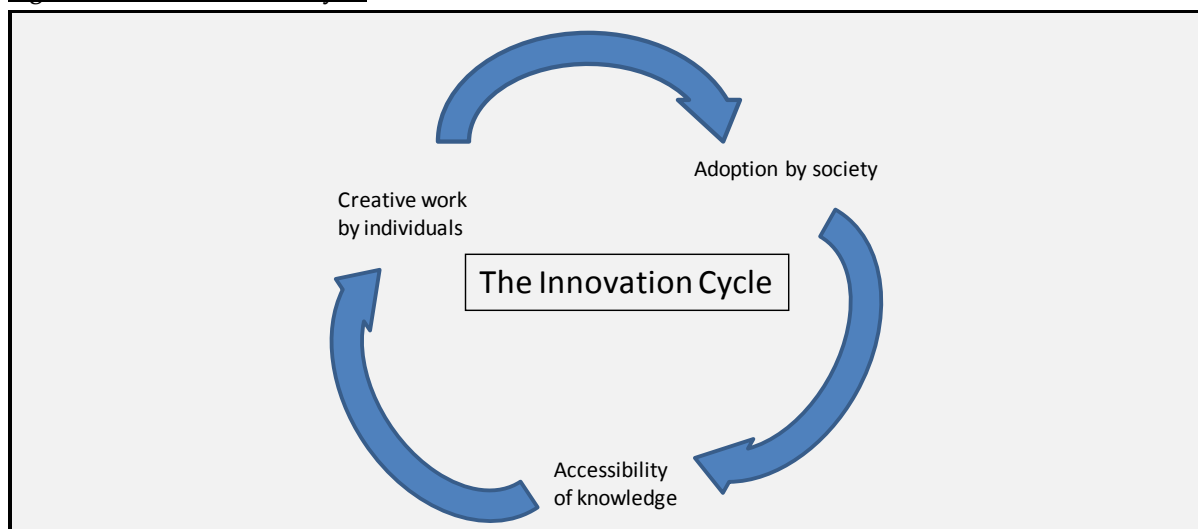
You might create a process, but it’s not yet a proven asset unless you’ve really derived commercial benefits from it. So therefore, it’s no point jumping the gun and protecting something which has not yet got a proven commercial value and therefore I would say try and defer this unless, of course, there’s an absolutely necessity.

The formal IP regime determines when innovations are available by defining boundaries around organisational knowledge and providing exclusive property rights to the owners of that knowledge. In the broader view that is taken of IP in this review, it is seen as a means of protecting innovations whether by formal legal means or by strategic means, such as utilising first mover advantage. We also take the view that IPR's provide businesses with options.

Let's look at a business at a point in time. What it has is it's got some established cash flows, it's got various IP rights which give it options and as you go along what will happen is that those options get converted into a series of assets and cash flows.

We also suggest that innovations developed by a firm become subsumed in that firm's IP in the wider understanding of the term, because innovations before they are incorporated into new or improved products or processes are intellectual creations and therefore part of the store of organisational knowledge. If the knowledge embedded in those improved processes or products is commercialised, then other aspects of IP become important, including protection under the formal IP regime.

Figure 14 - The Innovation Cycle



Adapted from: Gollin, Michael A., *Driving Innovation: Intellectual Property Strategies for a Dynamic World*, 2008, p.17.

'Creative people use available knowledge in their work, their new products are adopted in their community and broader society, and the innovations eventually add to the reservoir of accessible knowledge.'

Open Innovation

Basic research seeks new knowledge without constraint. Society's needs must be translated into stimulating messages in order to steer basic research. Sophisticated business and society know how to inform basic research with their important needs in order to provide this steerage. With this information, basic research is more likely to produce inventions that are potentially valuable.

Inventions require a well managed process of innovation to realise this value. The key roles are (i) to translate society's needs into information for researchers; (ii) to recognise valuable inventions and translate these into innovations useful for society. These translations require:

- an intimate relationship with the researchers;
- a trusted relationship with society;
- effective processes, people and resources to link the two.

The major opportunity for New Zealand is for society and business, with its unusual mix of SMEs and its remoteness from major markets, to establish an effective relationship with research institutes that reflects the previous principles. Government can enable but not intermediate this relationship. Universities and their commercial arms need to be active at this interface within the unique New Zealand context.

Figure 15 - Open Innovation

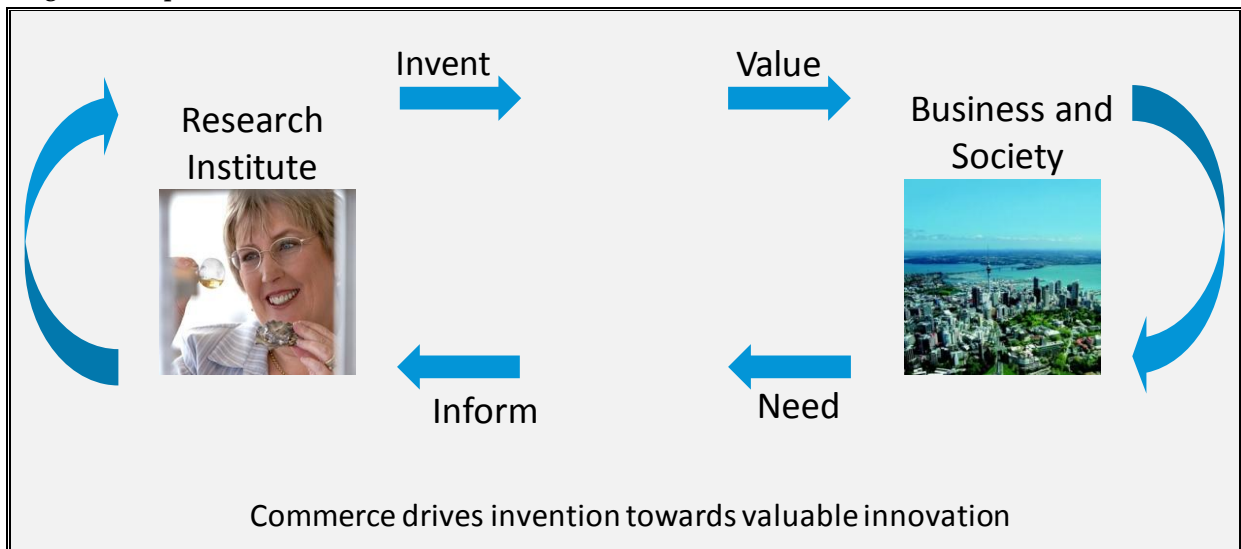
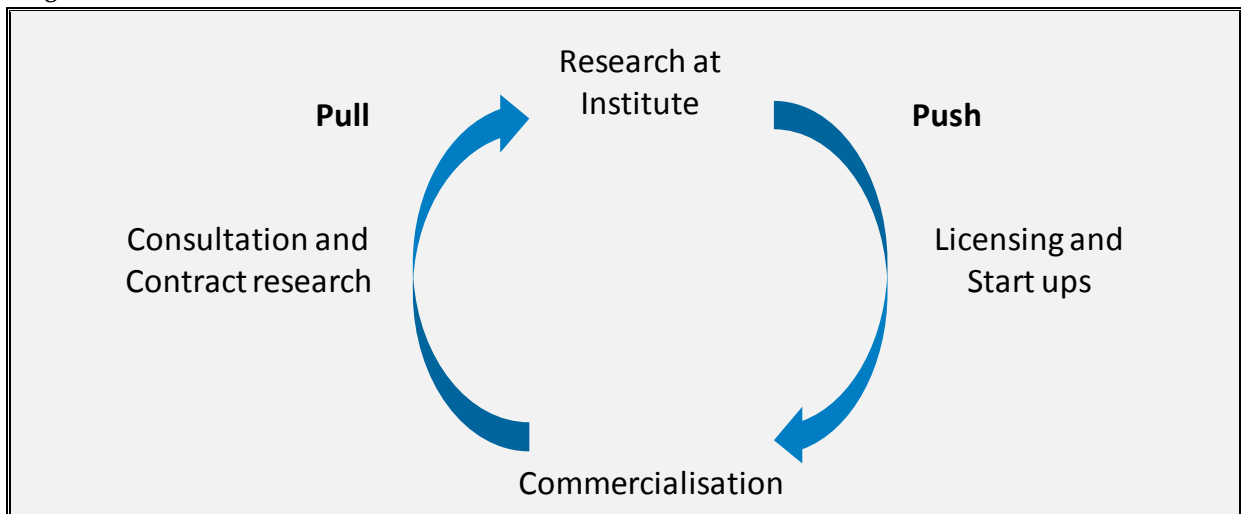


Figure 16 - Push and Pull Business Model



The Intellectual Property System

As the purpose of this review is to analyse the extent to which New Zealand businesses understand and use intellectual property, it is important that some meaning is assigned to the crucial term ‘intellectual property’. It is possible to use the term in a number of different ways (Gollin, 2008, 22 - 23).

- Dictionaries: define IP as something intangible to which legal rights attach.
- Law: lawyers have adopted the term as shorthand way of referring to a number of legal doctrines.
- Accounting: accountants view IP as a form of intangible asset.
- Management: ‘Business people consider intellectual property to be a management tool for converting human capital into value by defining and capturing new knowledge.’
- Scholars: IP ‘refers to an ethical system that values all that is known.’

In the RFP, the MED takes a broad view of what constitutes IP. It refers to ‘all forms of IPR’s – formal and informal, proprietary and open-source – and how these work in combination’; and later to: ‘informal protection strategies, such as trade secrets or a “first-to-market” approach’. This view of IP, which encompasses a number of Gollin’s categories, accords with the broad brush approach that characterises New Zealand businesses. For them, there are three categories of IP: (i) The formal IP system; (ii) Organisational knowledge; (iii) Strategies associated with categories (i) and (ii) that protect their innovations. When discussing IP in this report, the context will determine whether the report is discussing one of those three categories or a combination of all three.

The Formal IP System

The easiest way to conceive of the formal IP system is to view it as a legal system that confers negative rights – that is, rights to stop others from doing certain things. In the present context, those rights protect ideas and information of commercial value. Some of the statutory rights are characterised as being property rights. In the formal legal sense, the term ‘intellectual property’ is self-explanatory – it refers to products of intellectual endeavour which are protected by property rights. A number of those property rights are obtained by way of a registration system. For convenience sake, the administrative function performed by the Intellectual Property Office of New Zealand (‘IPONZ’) and other offices around the world is considered as part of the overall formal IP system.

The RFP specifically stated that, ‘This is not a review of specific legislation or legislative requirements. It is set in the context of major legislative changes already underway, and should not include issues

that already have proposed statutory amendments.’ Therefore, this report does not canvass any of the issues relating to changes in the formal IP system, other than those raised by businesses or their IP advisors. In this regard, a number of respondents suggested organic changes to the patent system and to the administration of IPONZ.

The formal IP system comprises both statutory and common law rights. Some of those statutes are concerned with the conferral and enforcement of IP rights (IPR’s) – the four great IP statutes are the Copyright Act 1994, the Designs Act 1953, the Patents Act 1953 and the Trade Marks Act 2002. For the agricultural and horticultural sectors, the Plant Variety Rights Act 1987 is also important. There are a number of other statutes that are important to the IP system, of these, the Fair Trading Act 1986 is the most important.

Protection is also available for aspects of IP that may not be protectable under the statutory regime. Businesses in New Zealand are very familiar with the concept of trade secrets and an important strategic decision that often needs to be made by a firm is whether to pursue protection under the patents system or whether to rely on maintaining the secrecy of an innovation. The tort of passing off is also important for protecting those elements of a brand that are not protectable under the trade mark registration system.

Statutory Protection

Copyright Act 1994

Designs Act 1953

Geographical Indications (Wine and Spirits) Registration Act 2002

Layout Designs Act 1994

Patents Act 1953/Patents Bill

Plant Variety Rights Act 1987

Trade Marks Act 2002

Crimes Act 1961

Fair Trading Act 1986

Flags, Emblems and Names Protection Act 1981

Major Events Management Act 2007

Privacy Act 1993

Common Law Protection

Confidential information – trade secrets

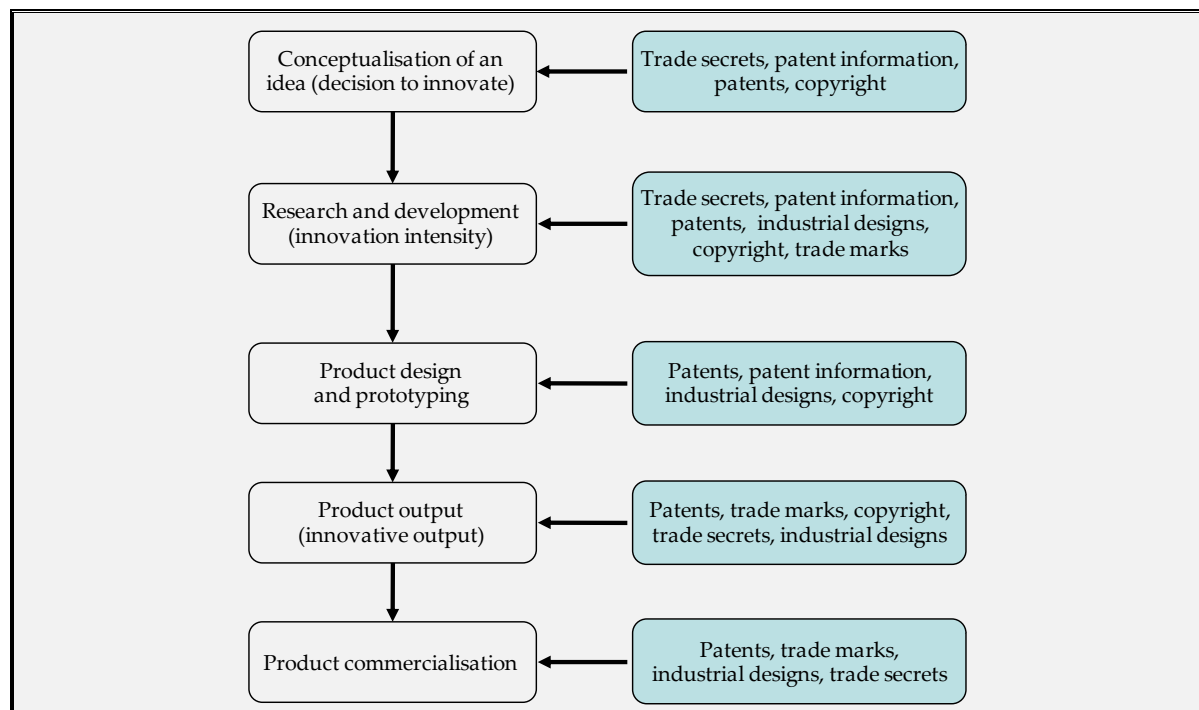
Tort of passing off

Tort of privacy

The role of IPR's in the Innovation Process

Below is a graphic representation of the role of IP in the innovation process, identifying the types of IP tools that can be used at each stage of the process. The choice of the type of IP tool at each stage should be considered as part of the overall business strategy.

Figure 17 - IP in the Innovation Process



Source: Adapted from Intellectual Property, Innovation and New Product Development (WIPO Magazine, Issue No 5, July/August 2005, page 6)

Strategies outside the Formal IP System

Businesses employ a number of legal strategies that protect their innovations. Contractual provisions are frequently employed in software agreements to enhance copyright protection. Licensing arrangements and employment agreements will normally cover issues relating to the ownership and use of IP. While strategies of this nature could be classified as part of the formal IP system, their essential contractual nature means that they are treated as being outside that system for the purposes of this review. The requirement to comply with the regulatory environment is seen by a number of the businesses which we interviewed as being an important supplement to the IP system. The compliance requirements of the United States Food and Drug Administration ('FDA') are a prime example and one business which we interviewed had made a positive out of its compliance.

Non-legal strategies which are adopted by businesses can give those businesses a form of protection for their IP. First to market, or first mover, is a strategy mentioned by a number of New Zealand businesses. It refers to the advantage sometimes gained by the first business to occupy a market segment by gain control of resources that firms which follow may not be able to match. Firms may also attempt to add a level of complexity to their goods in an attempt to prevent reverse engineering of those goods. Strategies like these are usually adopted in conjunction with other legal strategies.

Legal strategies

Compliance with the regulatory environment

Contractual provisions

Licensing

Ownership provisions in employment agreements

Registration of a domain name

Restraint of trade provisions

Non-legal strategies

Branding strategies

Complexity of goods or services

First to market

The Importance of IP to Business in a Recession

In a recent study of worldwide patent activity amidst the current recession, Rosie found that shocks to the financial system create opportunities for strong companies (Rosie, 2009, page 7). Rosie argues that for companies with cash and ideas, history shows that downturns can provide strategic opportunities,

and his recent research confirms that logic – United States-based patent filings have increased during the 2008-09 recession.

This conclusion was mirrored in the activity of some of the businesses we interviewed. One told us that it is using the opportunity assertively, knowing that its potential competitors are struggling to their operational costs and would therefore be unlikely to have residual funds to put into R&D. That company is investing more in IP during the recession to further strengthen its market leadership position for the future. Is this a case of the strong getting stronger at the expense of the weak?

Perhaps the lessons to take from this analysis are that: At a macro, or country level, investment in IP during a recession will spur economic growth and productivity. At a micro, or firm level, companies with cash and ideas should continue, or increase investment in IP, but those at the margin that have to choose between expenditure on meeting regulations, other commercialisation costs and IP protection, will need assistance to invest in IP. A concern for businesses is that R&D incentives have been abolished and not replaced.

The shrinking print market is forcing us to be innovative and look at new opportunities in print packaging and digital are growth areas. Paper usage in NZ is down 30% and that is a published figure and that has a direct flow-on to our industry. This in turn will see staff reductions of around the 20% in the past financial year. This figure of 20% also matches other printing business in NZ. Fairfax, APN, Bluestar, GEON, PNP.

Is an IPR an asset? Value and Valuation of IP

IPR's (or intellectual capital) comprise one of a range of intangible assets. These include people's ideas, organisational processes, concessions and skill-sets that create economic value. Whether or not an IPR is an asset depends on its stage of development, in a similar way to inventions and innovation.

Invention is the generation of a new idea, whereas innovation usually concerns the commercialisation of new ideas. Invention does not necessarily proceed to commercialisation. An application for an IPR, such as a patent, at the time it is filed creates an option for future development of the invention. That option gives flexibility to the right-holder over the timing of production and the market placement of a product, in other words the opportunity to convert the IPR into an asset.

The moment you actually exercise that option, in other words it becomes a product, then you have converted that option into an asset

If the patented idea is never converted into a product, it does not become an asset. For IP to be deemed an asset, several criteria must be met. The IP must be legally protected, and have significant, identifiable, enduring benefits that derive from commercial interest, and be transferable.

When strategies shift from manufacturing to services, physical capital accounts for a decreasing portion of a firm's value, and greater emphasis needs to be given to managing intangible assets and IP. Several business situations arise where valuation of IP is required. These situations include buying or selling a business that owns IPR's, such as patents, designs, trade marks, PVR's or copyright; buying/selling an IPR; licensing out or in; seeking funding to commercialise IP; or dividing relationship property where marriage, defacto or civilly united partners share business interests in IP. Valuation is a process of determining the worth of an asset, whether physical or intangible.

One of the issues we encountered in the interview process was the wide disparity of perception about where the value of IP lay. Was it with the inventor without whom there would not be the genesis of a marketable product, or the commercialiser without whom the idea could not be converted to a marketable product and sold for profit, or in the legal regime that secured a 'monopoly' position in the marketplace for the invention, however constrained? A related question is who owns, or should own the IP? The relationship between the two questions lies in an assumption that whoever created the most value should own the IP.

When I was doing the deal with [the inventor] I said, "Do you know what your [invention] is worth right now?" And he goes, "What?" And I said, "Nothing, zero, absolutely nothing. It'll be worth whatever I make it worth and the team that I've put together." And so, and it's true, I mean there's just so much that needs to get done to wring out risk in this industry, there're so many risks.

Nevertheless, in this situation the patented invention had sufficient intrinsic value to attract investment funds, because the patent de-risked the first stage of the project. Firms or individuals that require valuations are often in early stages of developing an invention, without proven economic potential.

Businesses which we surveyed were asked, 'Has your business ever tried to assess how much your IP is worth?' Respondents answered 'Yes' - 22.4%; 'No' - 63.8%; 'Don't now' - 13.8%. Of those that had tried to assess the value, 17% had had their IP professionally valued. Funding providers generally require a basis for assessing the risk or reward of advancing money. Since valuation becomes a process of establishing today a value for benefits to be derived in the future, it is speculative.

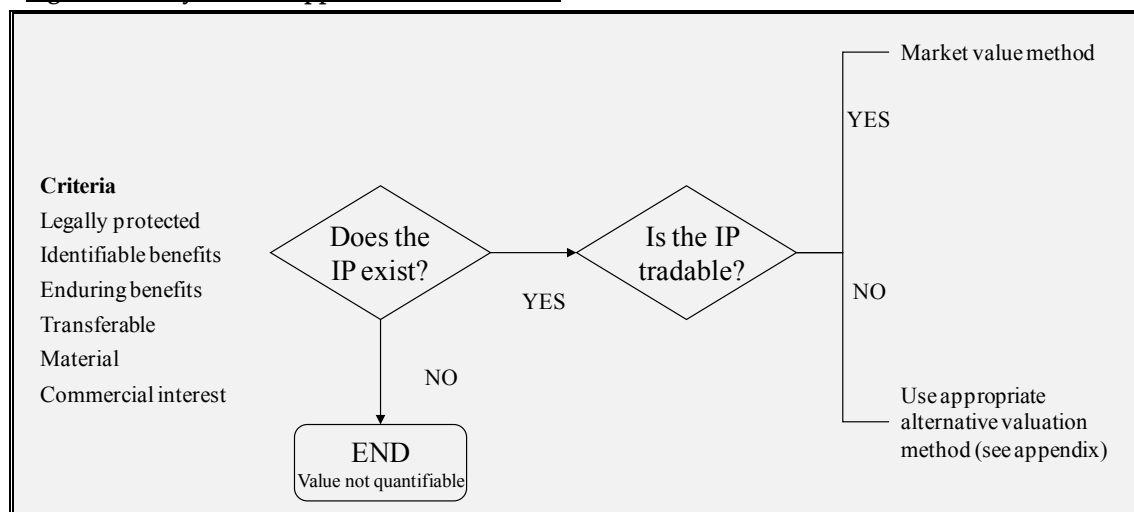
For valuation purposes, IP can be regarded as the legally protected subset of intangible assets. Like tangible assets such as land, buildings and machinery, without the protection of property rights, IP (in its widest sense) is open to appropriation and without an established ability to generate profits, it has

no operating value. Where IP assets differ from tangible assets is that the intellectual capital is almost inextricably linked to a person generating an idea.

Several difficulties arise, such as confusion between legal protection and value (described above); the IP may not be separable from a combination of other assets, in which case the value lies in the portfolio of IP; the value to an owner and a buyer will differ depending on how they intend, or are able to use the IP. For these reasons, using more than one valuation method can indicate a range of possible values, rather than one estimate. Choosing the appropriate technique is important, but its use must be accompanied by rigour, pragmatism and commercial judgement. Where valuations are used for purposes of sale and purchase of a business or and IP right or for licensing, they are only ever a guide for the negotiation process.

Given these challenges, a systematic approach to valuation is called for. The following framework is a suitable guide. The choice of method will depend on the stage of development of the IP, its maturity, tradability and the industry type. Appendix 1 describes various bases of valuation.

Figure 18 - A systematic approach to IP valuation



Source: Adapted from Basrur and Jain, 'Valuation of Intangible Assets and Intellectual Property', in Make You Move: Getting Ahead with Intellectual Property, publisher Intellectual Property Office of Singapore, 2002.

APPENDIX 3 – IP VALUATION METHODS

Several business situations arise where valuation of IP is required. These situations include buying or selling a business that owns IPRs, such as patents, designs, trade marks, PVRs, or copyright; buying/selling a patent; licensing out or in; seeking funding to commercialise the IP; or dividing relationship property where marriage, defacto or civilly united partners share business interests in IP.

Intellectual property (or capital, or assets) is one of a range of intangible assets. These include people's ideas, organisational processes, concessions and skill-sets that create economic value. For valuation purposes, IP can be regarded as the legally protected subset of intangible assets.⁴ Like tangible assets such as land, buildings and machinery, without legal protection of ownership rights IP is open to appropriation, and without an established ability to generate profits, it has no operating value. Where IP assets differ from tangible assets is that the intellectual capital is almost inextricably linked to a person generating an idea.

Firms or individuals that require valuations are often in early stages of development, without proven economic potential. Funding providers generally require a basis for assessing the risk or reward of advancing money. Accounting rules do not provide a basis of valuation as they generally do not allow recognition of internally generated IP. Since valuation becomes a process of establishing today a value for benefits to be derived in the future, it is somewhat speculative and open to erroneous estimates or even manipulation.

There can be confusion between legal protection and value. While legal protection might, in some cases, be necessary, alone it is not sufficient to create and sustain value. Legal protection might prevent imitators encroaching on a market space, but that place in the market has to be established and maintained for any value to arise.

Another difficulty arises because the IP may not be separable from a combination of other assets, especially where the IP is generated at an intermediate stage in a product development life cycle, or it protects inter-related technologies. In these cases, the value lies in the portfolio rather than in one single component of IP.

IP is context dependent and this has significant ramifications. For example, the value to an owner and to a buyer will differ according to their business strategies – how they intend, or are able to use the IP, the synergies with each portfolio of assets, the distribution networks, etc. One contextual valuation

⁴ Jai Basrur and Vishrut Jain, 'Valuation of Intangible Assets and Intellectual Property', in *Make You Move: Getting Ahead with Intellectual Property*, publisher Intellectual Property Office of Singapore, 2002.

challenge lies in differences between industries, their norms and commercial practices with respect to IP and its tradability. It is difficult to apply one consistent valuation method or to compare IP assets across industries. Another contextual issue is the tax regime within which the owner or purchaser operates.

For these reasons, using more than one valuation method can provide a cross-check between values or, more helpfully, establish a reasonably reliable range within which a value might fall, rather than one estimate. The choice of method will depend on the stage of development of the IP, its maturity, tradability and the industry type. The bases of valuation methods can be cost, market value, economic value or stochastic. An overview of the different methods is given in the following table, but a detailed discussion is beyond the scope of this report.

Table 53 - Summary of valuation methods

Method	Cost based	Market Value based	Economic Value based	Stochastic method
Elements	Development cost	Gross Profit differential	Net present value (NPV) of incremental cash flows	Real options
	Replacement cost	Premium sales price	Relief from Royalty	Gated probability cash flows
	Opportunity cost	Market based	Excess profits or notional royalty payable	
		Brand strength	Capitalisation of identifiable earnings	
Source: Basrur and Jain, 'Valuation of Intangible Assets and Intellectual Property'.				

Brief description of methods

A **cost-based** method assumes the value of the asset is the same as the cost of developing or replacing it, or the cost of the next best use forgone. However, value usually bears little relation to cost, except (i) with monopoly IP where regulation constrains pricing to cost recovery; (ii) when IP benefits are definitely present but difficult to quantify.

A **market value-based** method assumes the value of IP is same as the price paid for comparables in the market. The method can be used when IP is tradable and markets are efficient; or if not tradable, there are enough transactions in the market to establish comparable benchmarks.

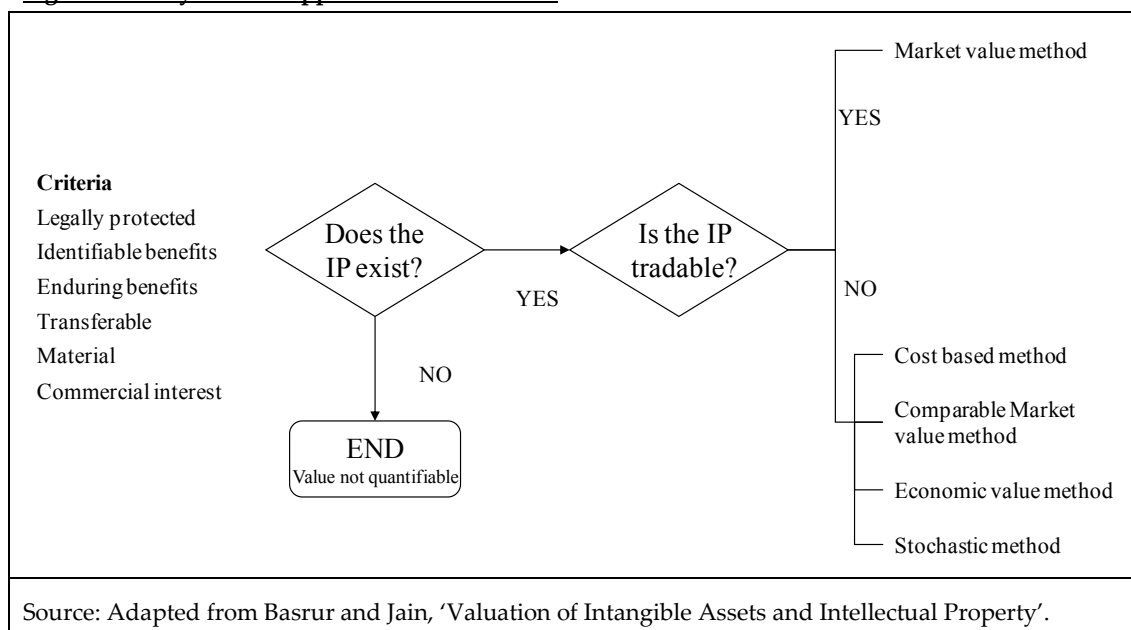
Economic value-based methods use established discounted cash flow (DCF) techniques and are useful for mature assets and established markets. Valuation involves forecasting cash flows from IP and discounting back to the present. The valuer must forecast tangible benefits, make assumptions about life-span of benefits and rate of erosion, incorporate risks, make assumptions about costs of developing and operating/producing assets, and determine an appropriate discount rate. The methods have the

advantage of forcing analysts to make explicit assumptions about value drivers; the advantage being that others can assess how changing those assumptions might affect value from a different perspective.

Stochastic methods are mainly option based. This is a method of modelling the inherent uncertainty of IP. The method can incorporate assessments of probabilities of contingent paths that technology could take, flexibility of decisions about scale, scope or timing, and a range of alternative futures. The method is useful for assessing IP at various stages of development.

Given the range of challenges described above, a systematic approach to valuation is called for. Basrur and Jain suggest the following framework.

Figure 19 - A systematic approach to IP valuation



Choosing the appropriate technique is important, but its use must be accompanied by rigour, pragmatism and commercial judgement. Where valuations are used for purposes of sale and purchase of a business or an IP right or for licensing, they are only ever a guide for the negotiation process.

APPENDIX 4 – KEY SURVEY RESEARCH QUESTIONS AND METHODOLOGY

Question	Example Papers and Methodology
What are the economic effects of patents?	Arrow (1962) is among the seminal contributions on the economics of IP and patents. Scotchmer (2006) a more recent text book on the economics of patents. Includes empirical and theoretical issues.
What determines if technology is licensed?	Gambardella et al. (2007) analyses PatVal-EU data which is a survey of European patent owners. The quantitative technique includes a probit model of probability to licence. They also employ a Heckman-selection model.
Does R&D (or innovation) drive productivity?	One of the seminal papers using firm level data is by Griliches and Mairesse (1983). Based on analysis of US Compustat data. The estimation is based on a Cobb-Douglas production function. Lichtenberg (1992) was one of the first studies to use cross country data to estimate the elasticity of GDP with respect to aggregate national R&D. Data is from OECD countries and the model is a linear macro production function. An important paper by Crepon et al. (1998) develops a structural model to estimate the relationships between innovation, R&D activity and productivity. The model is estimated using asymptotic least squares.

What is the relationship between IP regimes and economic growth?	Falvey et al. (2004) use regression analysis on cross-country data incorporating an indicator of national IP regime strength as an explanatory variable. The methodology allows for structural breaks between subsamples using a threshold technique.
Do patents hinder academic productivity?	Murray and Stern (2007) identify a sample of technical breakthroughs that lead to both scientific journal publication as well as patent applications. They test whether a patent grant slows the rate of subsequent citation of the journal publication using a difference-in-difference estimator.
What is the effectiveness of different appropriation mechanisms?	Cohen et al. (2000) present analysis of a survey of nearly 1500 R&D labs in the US manufacturing, which covers issues relating to their choice of appropriation mechanism.
What is the value of patent protection?	Jensen et al (2009) estimate a random effects linear regression model using data from the Australian Inventor Survey 2007.
Do IP rights induce R&D investment?	Sakakibara and Branstetter (2001) use Japanese firm level data to estimate the impact of Japanese IP law reform. The regression equation takes a simple log linear form. Lederman and Maloney (2003) use cross country data in a simple linear regression model to consider the same question.
What determines IP usage?	Moser (2007) provides quantitative analysis of the attributes and IP choice regarding 7000 inventions presented at world fairs between 1851 and 1915.
Do patents aid commercialization?	Webster and Jensen (2009) analyse survey data of Australian patent applicants. The statistical model is a two stage probit model with a Heckman selection.

A) QUESTIONNAIRE SURVEY

Table A1 – Respondents Company Role

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
% of Respondents						
1. CEO	32%	27%	31%	19%	26%	27%
2. COO	0%	5%	0%	0%	0%	1%
3. CFO	0%	0%	3%	0%	5%	2%
4. CIO	0%	0%	0%	4%	5%	2%
5. MD	0%	14%	10%	15%	2%	6%
6. GM	0%	14%	13%	26%	15%	14%
7. Director	42%	5%	18%	26%	3%	15%
8. Manager	13%	18%	10%	7%	31%	20%
9. Other	13%	18%	15%	4%	13%	13%
	100%	100%	100%	100%	100%	100%

Table A2 – Company Ownership & Governance Q.3)

No. of Employees	1-5	10-19	20-49	50-99	100+	Total
% of all firms						
1. Sole proprietor	13%	0%	8%	4%	2%	5%
2. Privately owned company	74%	68%	73%	59%	32%	54%
3. Publicly listed company	0%	0%	0%	7%	17%	8%
4. Government/public sector organisation	0%	5%	3%	7%	16%	9%
5. NZ Subsidiary	0%	9%	3%	4%	7%	5%
6. Australian Subsidiary	3%	0%	0%	7%	9%	5%
7. O/S Subsidiary	0%	14%	18%	11%	12%	11%
8. Other	10%	9%	5%	7%	10%	9%

B) MEASURING IP AWARENESS

The possible replies to most of the questionnaire questions were, of necessity in most cases, Yes or No dichotomous replies but with an added “Don’t Know” option to guard against random answers. In analysing these replies a correct answer was scored 1 and “No” or “Don’t know” Scored as 0. So for example question 8: “Does publication of an invention before filing a patent application for it prevent a valid NZ patent being obtained? Yes / No / Don’t Know” was scored 1 for Yes as the correct answer and 0 for No or Don’t know.

Scale Formation

As mentioned in the main text of this report, two scales A and B were formed: the former including questions relating to IP management and the latter excluding them. The questions included in the two scales are shown in the list of questions below by the mark (A) or (B). It should be stressed that the inclusion or exclusion of a question has been based on the question as it now stands and that is not to say that a better version of any of the questions currently used in the survey could not be used in future.

Classical Measurement Theory

Classical Measurement Theory (CMT) creates scales to measure underlying concepts from simple addition of the responses to a number of relevant questions. The extent to which the questions selected all relate to a common underlying concept can be assessed by measuring the reliability of the items (Cronbach's Alpha or KR20 score in the present case of dichotomous data). Given a range of possible questions the scale's reliability can be improved by adding or removing questions from the scale – provided the relevance and necessity of including the questions are of course considered as well as the statistical measure of reliability. The KR20 (Cronbach's Alpha) score for scale A was 0.979 and for scale B was 0.999. High reliability means that there is a high probability that items estimated with high measures do have higher measures than items with low measures.

C) SUMMARY OF IP AWARENESS RELATED SURVEY QUESTIONS

(A) indicates inclusion in Scale A including IP management issues

(B) indicates inclusion in Scale B excluding IP management issues.

IP Knowledge and Understanding

8. (A)(B) Does the publication of an invention before filing a patent application for it prevent a valid NZ patent being obtained?

Yes / No / Don't Know

9. If you were choosing a new business or product name which of the following would you check?
(Please select all relevant)

1. (A) (B) NZ trademarks 2. NZ Company Name 3. Domain names 4. Web Search (e.g. Google) 5. None of these 6. Other

10. How would you protect a completely new and non-obvious technical invention? (If more than one, please indicate the best.)

1. Copyright 2. Patent 3. Registered Design 4. Secrecy 5. Trademark 6. Don't Know 7. Other

11. (A) (B) If you pay a subcontractor to design your website or promotional literature would copyright exist in that material?

Yes / No / Don't Know

12. (A) (B) In the absence of any assignment who would own any copyright created? :

Your business / The subcontractor / Don't Know

13. Is an application necessary to obtain any of the following IPRs? 1. (A)(B) Patents 2. Trade marks 3. (A)(B) Copyright 4. Registered Designs :Yes/No/Don't Know

14. Please indicate the importance to your business of each of the following formal methods to protect innovations:

(1. Unimportant 2. Not very Important 3. Important 4. Very Important 5. Essential):

1. Patents 2. Trademarks 3. Copyright 4. Registered Designs 5. Confidentiality agreements

15. Please indicate the importance to your business of each of the following strategic methods to protect innovations:

(1. Unimportant 2. Not very Important 3. Important 4. Very Important 5. Essential):

6. Secrecy 7. Complexity of Design 8. Lead-time over competitors 9. Other (please specify)

Ownership of Intellectual Property Rights (IPRs)

16. Does your business create or own any of the following IPRs:

1. Patents 2. Trade marks 3. Copyright 4. Registered Designs 5. Plant variety rights 6. Other

18. Approximately how much does your business spend on obtaining and maintaining IPRs it owns each year? (Approximate figures acceptable)

\$NZ dollars

19. Have you or your business ever been involved in a legal dispute involving IPRs? :

Yes / No / Don't Know.

20. If yes - In which countries have you or your business been involved in a legal dispute involving IPRs? : 1. New Zealand 2. Australia 3. United Kingdom 4. United States 5. Other

Management of IPRs by your Company

21. (A) Has your business ever licensed in intellectual property from other parties (to allow your company to use intellectual property owned or controlled by others)?

Yes / No / Don't Know

22. (A) Has your business ever licensed out intellectual property to other parties (to allow others to use intellectual property owned or controlled by your company)?

Yes / No / Don't Know

23. (A) Is anyone in your business specifically assigned responsibility for managing IPRs?

Yes / No / Don't Know

24. (A) If Yes - does your business (or parent) have a separate Patents/IP Dept(s)?

Yes / No / Don't Know

25. (A) Has your business ever tried to assess how much your IP is worth?

Yes / No / Don't Know

26. If Yes - Has your business ever had IP professionally valued?

Yes / No / Don't Know

27. (A) Does your business have an overall IP Policy?

Yes / No / Don't Know

28. (A) If Yes - Is it explained or distributed to staff?

Yes / No / Don't Know

29. (A) Is any training in IP issues provided by your business to its staff?

Yes / No / Don't Know

30. (A) Are your staff offered any specific incentives to obtain IPRs?

Yes /No /Don't Know

31. (A) If your business owns IPRs does it actively check for potential infringements?

Yes / No / Don't Know

Sources of Information about IPRs

32. (A)(B) Has your business ever sought advice on IPRs?

Yes / No / Don't Know

33. If yes - From whom (please select all that apply) :

1. (A)(B) Intellectual Property Office of New Zealand (IPONZ) 2. (A)(B)Ministry of Economic Development (MED) 3. (A)(B)External Patent Attorney 4. (A) In-House Patent Attorney 5. (A) (B) External Solicitor 6. (A) In-House Solicitor 7. Licensing Consultant 8. Other (Please specify)

34. Please indicate on the following scale, to what extent you think your business would need external advice when considering issues involving Intellectual Property:

1.Always 2.Usually 3.Sometimes 4.Rarely 5. Never

35. (A)(B) Has your business ever used or searched Patent, Trade Mark or other IPR databases?

Yes / No / Don't Know

APPENDIX 5 – INTERVIEW QUESTION GUIDE

The following set of questions was used as a guide only. The questions listed acted as a framework for the interviews and would be adapted to suit the interviewee. For instance, the first question only applied to interviewees who either started a business themselves, or where a business was a fairly recent start-up for which the interviewees experience was relevant. Where interviewees were particularly engaged in the discussion and had more experience with IP, the questions were supplemented to check themes that had emerged from earlier interviews, or to raise issues with which the researchers were not familiar.

Organisation background

How did this business start/ How did you start this business?

What size has the firm grown to?

How would you say you/the firm used ideas, intellect to improve its operations, or branch into new areas?

IP awareness, knowledge and understanding

What do you understand by the term Intellectual Property?

When did you become aware of IP issues?

In what circumstances?

How (and from what sources) did you/ the firm find out more about IP rights?

Do you search IP registers in New Zealand or Overseas? If so, why?

To check if someone else has already registered the idea you have developed, or are thinking of developing?

To find new ideas you could develop in New Zealand if they haven't been registered here?

Any other reason?

Strategy and IP decisions

Do you have an IP strategy?

Is someone in the company specifically assigned responsibility for managing IPRs?

If so, are they directly involved in developing the business strategy?

When in the product development cycle is IP protection considered and decided on?

How do you decide whether or not to use rights/protection, and what kind?

Is the decision different for local and overseas markets for your products/services?

IP use, benefits, barriers and value

Which IP rights have you used?

Have they been useful or beneficial?

Have they helped increase productivity?

Have they added value in some other way?

What kind of value? – e.g. to protect your invention or brand, to obtain funding, marketing tool, ...

Why, or in what circumstances, would you not use IP rights?

General

Amongst similar industries to your own, how well do you think other participants understand, are aware of and use IP protection?

What other issues are you aware of that we have not discussed so far?

What improvements would you like to see in New Zealand's IP regime?

How else might government or industry groups help you make more productive use of the IP regime?

Appendix 6 – Interview case studies

A record of the Interview case studies can be obtained from Uniservices Ltd.

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