MUNK SCHOOL OF GLOBAL AFFAIRS

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EXPANDING THE FREEDOM TO OPERATE: DEVELOPING A CANADIAN INTELLECTUAL PROPERTY STRATEGY

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Expanding the Freedom to Operate: Developing a Canadian Intellectual Property Strategy

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Executive Summary

To be competitive in the innovation economy, countries must develop strategies to invest in and protect their intellectual property (IP). So far no such approach has been adopted in Canada, and as a result, Canadian firms have faced challenges in scaling to global markets and competing in knowledge-intensive sectors. This brief describes three key barriers to innovation that could be overcome if the Government of Canada were to develop a national IP strategy as a key component of the Innovation Agenda.

First, Canadian innovators are not commercializing technology fast enough to compete in high-tech sectors on a global scale. Canadian innovators are not filing their IP in countries with large markets for technology, limiting their ability to grow beyond Canada. A focus on the creation of globally valued patents, filed in the United States (US), would allow innovative sectors of the Canadian economy to grow beyond the country's small domestic market. Israel's use of the US Patent and Trademark Office (USPTO) is provided as an example of a country registering patents outside its domestic market to support the growth of high-tech industry.

Second, in the cases where Canadian firms have been successful in developing globally competitive patents and scaling beyond Canada, they have access to limited resources within Canada to help protect their IP. An IP strategy must include the protection of Canadian IP abroad. Without this support, Canadian firms face strong incentives to sell their IP to foreign entities for short-term gain. Here we emphasize the importance of domestically held IP in allowing firms to compete in the innovation economy, and we provide key findings from France, Japan, and South Korea to highlight how Canada can hold on to and exploit these key assets. In evaluating international IP strategies, we explore the use of sovereign patent funds (SPFs) as a mechanism for defending valuable IP and helping firms expand beyond Canada.

Third, patent protection is not always being used strategically to support innovation. Consequently, increased barriers to academic-industry partnerships have arisen. The Government of Canada should provide support to enhance pre-competitive research spaces to support these vital partnerships. Policies that encourage the development of patents, only when such IP is backed by a valid business model, should be explored. In addition, funding for the establishment of patent pools in certain sectors with a critical mass of IP should be provided to expand Canadian innovators' freedom to operate.

Introduction: Canada's Challenge Competing in the Global Knowledge Economy

IP is an increasingly valuable currency in the innovation economy. Today most of the wealth generated from R&D-intensive firms is held in intangible assets such as patent-protected IP.[1] Patents function as dual purpose assets: they give companies the right to exclude other players from using their invention and the sole freedom to operate for a period of time. Patents can also function as assets themselves that can be bought, traded through licensing or cross-licensing agreements, or even donated to a pool.[2] The value of IP and its role in fostering innovation is sector-dependent. In the field of information technology, a single patent holds little value by itself but functions as a ticket to sit at the table with key innovative firms that are defining emerging technology standards.[3] Conversely, in the field of life science, a single patent can be an extremely valuable commodity when licensed exclusively to generate income. In sectors with a high concentration of patents (referred to as "patent thickets"), numerous patents can cover similar technology, which makes the value of these individual assets less clear. In such situations, patent thickets restrict knowledge-flow because they make it difficult for innovators to determine who holds exclusive ownership over the technology.[4] In addition, patents are increasingly being used to threaten litigation and drive competition from the market.[5] Given this trend, it is becoming clear that exclusive IP rights can serve to both support and hinder innovation.

Countries excelling in the knowledge-economy succeed at commercializing new ideas and patenting new technologies in regions with the largest market for such products.[6] Their success can be attributed to the development of national IP strategies that aim to maximize the return on R&D investment in knowledge-based sectors.[7] To drive economic growth, Canada has traditionally relied on high commodity prices and manufactured exports sent to the US, and has not invested in a comprehensive IP strategy that would support the growth of knowledge-intensive industries. Consequently, despite being a country that makes large investments in both public and private R&D,

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[1] Tangible IP LLP, "Why Every Company Needs an IP Strategy," 2015. Accessed at: http://ecotechquebec.com/documents/files/Autres/why-every-company-needs-an-ip-strategy.pdf.

[2] World Intellectual Property Organization (WIPO), "IP and Business: Launching a New Product: freedom to operate," *WIPOMagazine* 5 (2005). Accessed at: http://www.wipo.int/wipo_magazine/en/2005/05/article_0006.html.

[3] Dan Breznitz and Michael Murphree, "What the U.S. Should be Doing to Protect Intellectual Property," *Harvard Business* Review, January 27, 2016. Accessed at: https://hbr.org/2016/01/what-the-u-s-should-be-doing-to-protect-intellectual-property.

[4] Carl Shapiro, "Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting," *University of California at Berkeley* 1 (2000):119-150.

[5] Colleen V. Chien, "From Arms Race to Marketplace: The New Complex Patent Ecosystem and Its Implications for the Patent System," *Hastings Law Journal* 62 (2010): 297-357.

[6] The Global Intellectual Property Centre, "2017 International IP Index: The Roots of Innovation," *The US Chamber of Commerce*, February 8 2017. Accessed at: http://www.theglobalipcenter.com/wp-content/uploads/2017/02/GIPC_IP_Index_2017_Report.pdf.

[7] Dan Breznitz and Michael Murphree, "What the U.S. Should be Doing to Protect Intellectual Property," *Harvard Business Review*, January 27, 2016. Accessed at: https://hbr.org/2016/01/what-the-u-s-should-be-doing-to-protect-intellectual-property.

Canadian businesses are failing to translate new ideas into valuable technology.[8,9,10,11] Business investments in R&D are mainly encouraged through generous tax credits, but these credits have not incentivized investment in R&D as intended. Furthermore, there are few programs in Canada that directly fund the development or protection of IP.[12] Without investment in business R&D and patent creation, small and medium enterprises (SMEs) will continue to lack the capacity to create valuable IP and absorb IP from Canadian academic institutions. Of course, firms that have created valuable patents can attract private investment.[13] However, private investors may prefer to see a company acquired early in its life cycle to ensure a return on investment. This preference creates incentives for startups to sell out rather than continue product development. Attracting private funding from angel investors or venture capital (VC) firms can be challenging in Canada because there are significantly fewer private investors compared to the US, and those that do exist in Canada are generally more risk-averse than their foreign counterparts.[14] When Canadian firms overcome these obstacles and are able to scale to global markets, they still face barriers due to limited financial resources and a lack of expertise in patent management. Consequently, their IP is far less protected in comparison to US firms and vulnerable to challenges in courts.[15] Given the difficulty that SMEs face in generating enough funding to commercialize new technology and scale, there is an incentive for new firms to exit the Canadian market by either relocating to the US or selling their IP to foreign

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[8] Dan Breznitz, "Canada's innovation agenda: There's such a thing as too much consultation," *The Globe and Mail*, April 23, 2016. Accessed at: http://www.theglobeandmail.com/report-on-business/rob-commentary/canadas-innovation-agenda-theres-such-a-thing-as-too-much-consultation/article29722903/.

[9] Intellectual Property Institute of Canada, "Fostering a Culture of Innovation in Canada," *Intellectual Property Institute of Canada, Pre-Budget Submission to the Department of Finance*, January 29, 2016. Accessed at: https://www.ipic.ca/download_submission.php?file=176.

[10] Jameson Berkow, "Canada's Patent Problem," *Financial Post,* October 7, 2011. Accessed at: http://business.financialpost.com/news/economy/canadas-patent-problem.

[11] Kirill Savine, "Canada's Innovation Performance: A Scorecard," *Centre for Digital Entrepreneurship and Economic Performance*, March 2015. Accessed at: http://deepcentre.com/wordpress/wp-content/uploads/2015/03/DEEP-Centre-Canadas-Innovation-Performance-March-2015.pdf.

[12] Nick Pantaleo, Finn Poschmann, and Scott Wilkie, "Improving the Tax Treatment of Intellectual Property Income in Canada," *The C.D. Howe Institute Commentary* 379 (2013).

[13] Catherine Beaudry and Andrea Schiffauerova, "Is Canadian intellectual property leaving Canada? A study of nanotechnology patenting," *Journal of Technology Transfer* 36, 6 (2011): 665-679.

[14] Deloitte, "The future of productivity: An eight-step game plan for Canada." *Future of Canada Series*, 2014. Accessed at:https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/insights-and-issues/ca-en-insights-issues-future-of-productivity-2014.pdf

[15] James W. Hinton and Kent C. Howe, "The New Innovator's Commercialization Dilemma: A Report on the CIGI International Intellectual Property Law Clinic," *Centre for International Governance Innovation*, April 29, 2015. Accessed at: https://www.cigionline.org/sites/default/files/intellectual_property_law_clinic_special_report.pdf.

entities.[16, 17] Though this is a challenge for all small economies that trade with the US, the shared border makes it easier for US firms to shop for valuable IP in Canada.[18]

Without an IP strategy to support the long-term growth of domestic R&D-intensive SMEs, IP flight will continue to diminish Canada's capacity to compete in the innovation economy. Technology that in many cases was originally developed with taxpayer dollars is too often transferred to foreign entities for modest returns. Combining this acquired IP with their existing portfolios, foreign companies produce valuable products, which are then sold back to Canadian consumers for significantly more than the initial value of the IP.[19] Consequently, taxpayer dollars are under-utilized, benefiting foreign economies rather than the Canadian economy. Public funding flowing to foreign economies has been notable in high-value sectors such as nanotechnology and artificial intelligence.[20, 21] Because Canadian firms lack the ability to develop and absorb IP from Canadian institutions, the country faces a trade deficit in IP, which can make innovation prohibitively expensive for Canadian firms.[22]

These trends in IP ownership should be a concern for Canadian Government, given that patents play essential roles in allowing firms to scale-up to, and stay competitive in the innovation economy. First, the protection offered and the income generated from patents held internationally gives firms the freedom to operate in global markets. Second, patents can be bundled to increase their individual value, allowing innovators to participate in the development of new technology. Considering the role that patents play in the innovation economy, the Government of Canada needs to develop better strategies for encouraging domestic firms to invest in R&D projects, so that IP stays in the country. However, these strategies must go beyond encouraging businesses and institutions to amass large quantities of low-value patents. While regional programs, such as the First Patent System in Quebec,

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[16] David Sweet, "Intellectual Property Regime in Canada Report of the Standing Committee on Industry, Science and Technology," *House of Commons Canada,* March 2013. Accessed at: http://www.parl.gc.ca/content/hoc/Committee/411/INDU/Reports/RP6038442/indurp03/indurp03-e.pdf

[17] Dax Dasilva, "Too many Canadian startups are bought out. Here's how to change that," *The Globe and Mail,* January 6, 2016. Accessed at: http://www.theglobeandmail.com/report-on-business/rob-commentary/too-many-canadian-startups-are-bought-out-heres-how-to-change-that/article28024596/

[18] Jim Balsillie, "Canadians can innovate, but we're not equipped to win," *The Globe and Mail,* May 8, 2015. Accessed at: http://www.theglobeandmail.com/report-on-business/rob-commentary/balsillie-learns-canadian-innovators-not-equipped-for-global-competition/article24346408/17

[19] Chris Sorensen, "Why does Trudeau keep sucking up to foreign tech companies?" *Macleans,* February 26, 2016. Accessed at: http://www.macleans.ca/society/technology/trudeaus-troubled-vision-why-tech-wont-save-canadas-economy/

[20] Catherine Beaudry and Andrea Schiffauerova, "Is Canadian intellectual property leaving Canada? A study of nanotechnology patenting," *Journal of Technology Transfer* 36, 6 (2011): 665-679.

[21] Sean Silcoff, "Canada counters Silicon Valley talent raid with fresh funding for AI," *The Globe and Mail,* March 28, 2017. Accessed at: http://www.theglobeandmail.com/technology/vector-institute-to-receive-funding-as-part-of-canadian-artificial-intelligence-push/article34467422/

[22] Kirill Savine, "Canada's Innovation Performance: A Scorecard," *Centre for Digital Entrepreneurship and Economic Performance,* March 2015. Accessed at: http://deepcentre.com/wordpress/wp-content/uploads/2015/03/DEEP-Centre-Canadas-Innovation-Performance-March-2015.pdf.

provide direct funding to help Canadian firms file patents,[23] there is a risk that such programs will result in an increase in low-value patents. Strategies that provide incentives for patent creation can waste government resources and can hinder innovation. Therefore, in developing an IP strategy, focus must be placed on protecting and managing valuable IP in a way that enhances innovation systems.[24]

To this purpose we argue, that the Government of Canada must provide resources to help SMEs register patents through the USPTO. Furthermore, policies aimed at increasing the number of Canadian-held US patents should be partnered with strategies to protect this IP. As an example of one such strategy, we examine the establishment of a sovereign patent fund (SPF) in other countries, and highlight some positive effects that have resulted from this strategy. SPFs are able to protect domestic IP abroad, and provide a way for the government to acquire strategic patents from SMEs looking to exit the market. However, we argue that improvements in the rate of USPTO patent registrations and enhanced protection of IP should only be part of the country's IP strategy. Therefore, lastly, in recognition that an accumulation of large quantities of low-value patents can hinder innovation, we argue that there should also be an increased focus on improving academic-industry partnerships to ensure that only patents backed by strong business models are filed. We further discuss the benefits of increased funding for patent pools in key sectors of the economy where Canada has a critical mass of IP. Patent pools can be used to increase the value of IP to generate a higher return on R&D investments.

Section 1: The Importance of Globally Valued Patents

Canada's Relative Ability to Develop Globally Valued Patents

Canadian firms seeking protection for their IP must file patents globally. Increasingly, countries investing in innovation are relying on the number of patents registered in the US as a metric for measuring innovative success.[25] US patents are particularly valuable to foreign countries that rely on access to larger markets to drive economic growth.[26] Therefore, for countries with smaller economies, these patents provide the space for their firms to operate in global supply chains by protecting product and process innovations.[27] Because 75% of Canadian exports are sold in the US,

[23] Intellectual Property Institute of Canada, "Government of Quebec Launches 'First Patent' Program," *Intellectual Property Institute of Canada News,* October 9, 2013. Accessed at: https://www.ipic.ca/english/news/government-of-quebec-launches-first-patent-program.htm

[24] Richard Gold, "Avoiding the Mistakes of Biotech: How Intellectual Property Can Be Better Managed to Advance Nanotechnology Research," *Studies in Ethics, Law, and Technology* 3, 3 (2009).

[25] Johnathan M. Barnett, "Patent Tigers: The New Geography of Global Innovation," *Center for Law and Social Science Research Papers Series* 16-29 (2016).

[26] Ibid.

[27] Ibid.

access to the US market should be an essential component of Canada's IP strategy.[28, 29] The proximity of this large market gives Canadian firms a competitive advantage if they file their IP, and ensure the freedom to operate, in the US. A failure to do so results in missed opportunities for Canadian firms to access global markets and causes Canadian inventions to be left behind or patented by competitors.

Canada is falling behind its foreign counterparts in acquiring globally valued patents and continues to have an IP trade deficit.[30] In 2015, Canada's ability to develop global patents in high-tech sectors such as pharmaceutical technology, biotechnology, and environmental technology has continued to decline, which greatly impacts the country's ability to compete globally in these high-growth sectors.[31] In contrast, Israel, Taiwan, and Japan, the global leaders in innovation, have exceeded even the US in the number of domestically held US patents. These global leaders hold more than 400 USPTO patents per one million residents, while Canada is lagging far behind in the bottom category of performers with less than 200 patents per one million residents.[32] Although there has been an increasing trend in Canadian registrations of utility patents in the US, moving from 2,894 being granted in 2005 to 6,802 granted in 2015,[33] Canada's share of foreign owned patents remain small at 4.3%. In contrast, Japan, South Korea, and Germany respectively held 33.2%, 11.3%, 10.5% of the shares of utility patents with foreign origin in 2015.[34] An IP strategy that includes a focus on acquiring globally valued patents will be needed to allow Canada to compete in knowledge-intensive sectors.

Israel and Globally Valued Patents

Despite the small size of Israel, the country is one of the most active and successful users of the USPTO system. Israel outperforms most of its OECD counterparts in growth and innovation through the use of USPTO patents,[35] ranking as the third-largest national recipient of USPTO patents per capita.[36] In addition to the aforementioned benefits of globally valued patents, filing IP

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[28] Ibid.

[29] Export Development Canada (EDC), "United States: Country at a Glance," n.d. Accessed at: http://www.edc.ca/EN/Country-Info/Pages/United-States.aspx

[30] Kirill Savine, "Canada's Innovation Performance: A Scorecard," *Centre for Digital Entrepreneurship and Economic Performance*, March 2015. Accessed at: http://deepcentre.com/wordpress/wp-content/uploads/2015/03/DEEP-Centre-Canadas-Innovation-Performance-March-2015.pdf

[31] Ibid.

[32] Johnathan M. Barnett, "Patent Tigers: The New Geography of Global Innovation," *Center for Law and Social Science Research Papers Series* 16-29 (2016).

[33] US Patent and Trademark Office Patent Technology Monitoring Team (PTMT), "Extended Year Set – Patent Counts By Country, State, and Year Utility Patents December 2015," *USPTO,* December 2015. Accessed at: https://www.uspto.gov/web/offices/ac/ido/oeip/taf/cst_utlh.htm

[34] Ibid.

[35] Johnathan M. Barnett, "Patent Tigers: The New Geography of Global Innovation," *Center for Law and Social Science Research Papers Series* 16-29 (2016).

[36] Ibid.

in the US allows Israel to address three challenges of market access, commercialization, and global distribution in their innovation economy by: (1) integrating Israeli R&D inputs into foreign markets (2) providing permanent access to the US infrastructure to commercialize products, and (3) mitigating the risk of distributing products in the US market.[37]

It should be noted that the successful filing of a patent through the USPTO is not itself a guarantee of increased commercialization of high-tech research in its country of origin. Rather, the significant number of successful filings of patents in the US by Israeli firms reflects a strong performance in innovative R&D-intensive sectors and the ability of the country to leverage this success into commercialization in the US. The patents themselves are of value for Israeli firms, research institutes, and subsidiaries of multinational companies, given they can facilitate collaboration with US partners and expand freedom to operate.[38] For instance, the Weisman Institute, one of the world's most successful technology transfer entities, employs a US patent portfolio of over 477 USPTO patents to ensure its IP is protected when the institute engages in commercialization processes with industry.[39] This protection allows for returns on investment in IP by means of corporate partnerships both locally and internationally. In one agreement with Teva Pharmaceuticals, the Weisman Institute generated over USD$4 billion in licensing over 25 years.[40] This ability to protect IP through globally recognized networks and develop key partnerships outside of the country, has directly benefited both Israeli firms and research institutions.

Israel's use of the USPTO system is focused on securing and promoting Israeli inputs in the innovation economy. Similarly, firms in Canada should focus on acquiring globally valued patents to secure space in global supply chains. These steps would ensure that Canadian innovators can take advantage of the freedom to operate in larger markets, and also benefit from the knowledge transfer occurring within enhanced distribution networks. Both of these outcomes are essential to growth.

Section 2: Protecting Freedom to Operate in Competitive Markets

Challenges facing Canadian Firms in the US Market

Owing to its large market for high-tech products, the US has become the most desirable country in which to register patents. However, filing patents in the US creates challenges for foreign firms. Canadian SMEs looking to expand to the US are at a disadvantage and face challenges defending their IP in US courts. Many Canadian entrepreneurs lack the IP legal knowledge and financial

[37] Ibid.

[38] Ibid.

[39] Ibid.

[40] Ibid.

resources necessary to protect their IP during the early stages of commercialization.[41] It is very expensive to file and maintain IP in multiple countries, and enforcing patents outside Canada can be extremely costly.[42] Because of these high costs, Canadian firms cannot protect their IP to the same extent as US firms. This situation creates an incentive for Canadian firms to sell these assets to US firms for short-term profit.[43] Given the high government investment in supporting R&D in high-tech sectors, the loss of IP to US companies means that the Canadian Government is, in effect, funding US companies, who then use patents paid for by the Canadian taxpayers to extract rents from Canadian firms.[44] Without an IP strategy that includes the protection of IP outside of Canada, Canadian firms sell valuable IP early and are vulnerable to patent-infringement claims by US firms and patent enforcement entities (PAEs or more commonly, patent trolls). This risk is becoming more pronounced as the standards applied to patent evaluation evolve.

The effectiveness of the patent system to support innovation hinges on the definition of what is patentable and the mechanisms that enable trade in IP. In 1982, the US created the Court of Appeals for the Federal Circuit (CAFC) to ensure that patent litigation was carried out in a consistent manner across the country. Then, in the 1990s, the USPTO shifted from being an agency primarily funded by tax revenue to one funded by the fees collected from applicants.[45] The USPTO is now a profitable entity for the US Government, and there are strong incentives for the USPTO to process applications as quickly as possible at low cost. Even though USPTO earnings have increased since the 1990s, the office lacks the resources to provide rigorous analysis of patent applications. Relevant prior art, which allows the examiner to assess whether an invention is in fact patentable, is typically only identified by examining the diversity of patents already filed.[46] However, for emerging fields, much of the prior art may exist in papers or conference proceedings, and therefore has been disclosed to the public. Failing to identify previously disclosed material can lead to the inappropriate approval of patent applications.

Both the creation of the CAFC and subsequent changes to the USPTO have led to a decrease in the standards of novelty and non-obviousness and a dramatic increase in the number of US patents. With an expansion in the scope of what is deemed patentable, and an overall decrease in the quality

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[41] Julius Melnitzer, "Firms team up to launch Waterloo law clinic for startups," *Financial Post,* June 4, 2014. Accessed at: http://business.financialpost.com/legal-post/firms-team-up-to-launch-waterloo-ip-law-clinic-for-startups.

[42] James W. Hinton and Kent C. Howe, "The New Innovator's Commercialization Dilemma: A Report on the CIGI International Intellectual Property Law Clinic," *Centre for International Governance Innovation*, April 29, 2015. Accessed at: https://www.cigionline.org/sites/default/files/intellectual_property_law_clinic_special_report.pdf.https://www.cigionline.org/sites/default/files/intellectual_property_law_clinic_special_report.pdf

[43] Dax Dasilva, "Too many Canadian startups are bought out. Here's how to change that," *The Globe and Mail*, January 6, 2016. Accessed at: http://www.theglobeandmail.com/report-on-business/rob-commentary/too-many-canadian-startups-are-bought-out-heres-how-to-change-that/article28024596/

[44] Ibid.

[45] Adam B. Jaffe and Josh Lerner, *Innovation and Its Discontents* (New Jersey: Princeton University Press, 2004).

[46] Ibid.

of patents, it is easier to use IP as an offensive weapon to deter entry of new firms to the market by reducing their freedom to operate.[47] Given this situation, there is an increasing risk that Canadian firms looking to expand to the US market will face aggressive patent infringement litigation. Because access to and ability to operate within the US market is still essential for Canadian firms to compete globally, the Government of Canada should invest in protecting domestically created IP.

Patent Funds and Protection of IP

One recently proposed strategy for protecting Canadian patents registered internationally is the creation of SPFs.[48] SPFs, recently launched in France, Japan, and South Korea, are state-funded investment mechanisms that operate as intermediaries in the IP market, strategically acquiring and protecting valuable IP assets to help domestic firms expand to other markets. These funds have typically been established to operate in a defensive capacity, focusing on protecting domestically-created IP registered in the US. Though there has been an increasing tendency for SPFs to function in an offensive capacity, acquiring patents that can be used to generate a return on investment through litigation,[49] here we highlight the use of SPFs to help domestic firms expand their freedom to operate outside of Canada.

SPFs give entrepreneurs the opportunity to give up the exclusivity of their patented technology in exchange for protection and management by the state. Because these funds have the resources to support firms that are threatened by patent litigation, they could in theory reduce the risks associated with growth of Canadian firms into the US market. While protecting Canadian-owned IP abroad, a SPF could also strengthen the R&D capacities of domestic SMEs, by providing commercialization support services to under-resourced SMEs on a national scale. In France, such support services have been found to be a key benefit of the SPF, France Brevets.[50] SPFs can acquire assets and develop revenue-sharing models, either permanently or temporarily, to prevent patent flight and manage assets on behalf of SMEs while they grow. Acquiring patents that would otherwise be absorbed by foreign firms provides an important tool for rescuing patents underwritten by large public investments and preserving freedom of operation for new local companies. In the Canadian context, sectors that have received proportionally very high public funding are: aerospace, artificial intelligence, health, and quantum computing. Protecting the IP generated primarily from publicly-funded research programs would ensure a larger return on this investment and a greater public benefit.

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[47] Dieter Ernst, "Global Strategic Patenting and the Distribution of Innovation Gains," *East West Center Working Papers: Innovation and Economic Growth Series* 2 (2015).

[48] Warren Clarke and James W. Hinton, "Mobilizing National Innovation Assets: Understanding the Role of Sovereign Patent Funds," *Centre for Digital Entrepreneurship and Economic Performance*, May 2016. Accessed at: http://deepcentre.com/wordpress/wp-content/uploads/2016/06/DEEPCENTRE_MOBILIZING_NATIONAL_INNOVATON_ASSETS_MAY2016.pdf

[49] Ibid.

[50] Warren Clarke, "Sovereign Patent Funds: Sovereign Wealth Funds 2.0?" *Global Policy* 7, 4 (2016).

Beyond protecting IP, SPFs could also provide funding to cover the costs of valuable legal expertise for entrepreneurs during the commercialization and scaling-up phase. Such state-funded legal expertise would reduce the cost of filing IP in multiple countries and minimize the vulnerability of early-stage entrepreneurs to infringement claims. Supplying Canadian firms with expertise in methods to protect their IP outside of the country affords more firms the opportunity to compete globally and leverage the value of their IP to generate the greatest return on investment.[51] While certainly not a clear-cut case, within the specific Canadian context, SPFs should be seriously and systematically evaluated as one tool that could be part of a new national IP strategy.

Section 3: Supporting Collaboration Among Canadian Innovators

Overcoming Challenges to Generating High-Value Patents

Patent protection is intended to reward innovation by generating earnings that are proportional to the impact of the technology being patented. For instance, a patent on an invention that has little demand in the market should not be worth very much. Yet, the rise of PAEs that monetize IP through litigation, using patents as offensive exclusionary tools, reveals that patents can also deter innovation. Since IP protection can both support and hinder innovation, Canada needs to develop an IP strategy that would encourage commercialization of research, but not incentivize the accumulation of large patent portfolios that could then be used to generate rents without ever been translated into innovation. In developing an IP strategy, the Canadian Government needs to consider at what point in the R&D process it makes the most sense to patent technology.

In Canada, academic institutions provide a wealth of knowledge that can support industry R&D efforts. But researchers operating within these institutions are not situated in the market and are often not best positioned to recognize the commercial value of their IP. Industry partners are better at assessing the market value of academic knowledge and are better developers of patents. There appears to be a general misconception in Canada that the value of IP resides in the original idea; however, the actual monetary value of IP is created by developing a business plan to translate that IP into a commercial product. Discoveries that are patented too early generate little revenue because their utility in the market has not been realized. In many cases, the IP generated in academic institutions is rarely translated into commercial products, and the patents filed lie dormant within institutions.[52] The relentless pressure on universities to show an increase in patenting and licensing can significantly impede the transmission of knowledge from academia to industry while increasing the costs for both sides.[53] Academic researchers should be encouraged to collaborate widely with

[51] Dan Breznitz and Michael Murphree, "What the U.S. Should be Doing to Protect Intellectual Property," *Harvard Business* Review, January 27, 2016. Accessed at: https://hbr.org/2016/01/what-the-u-s-should-be-doing-to-protect-intellectual-property

[52] Karima Bawa, "Leveraging University-Generated Intellectual Property To Benefit Canadian Industry," *Centre for International Governance Innovation*, September 12, 2016. Accessed at: https://www.cigionline.org/sites/default/files/pbno84.pdf.

[53] Mario Cervantes, "Academic Patenting: How universities and public research organizations are using their intellectual property to boost research and spur innovative start-ups," World Intellectual Property, n.d. Accessed at:

industry, since R&D projects with long time horizons progress more efficiently through collaboration. But because Canadian firms are not absorbing IP from academic institutions, patents on technology that have unrealized market value are often being purchased by foreign firms and commercialized outside of the country.[54]

While universities should reach out to SMEs and support opportunities for collaboration, government policy should also help SMEs engage with research institutions and absorb knowledge.[55] Canadian SMEs need to be better incentivized to form R&D partnerships with academia, in order to compete with foreign counterparts engaging in similar research consortia. Access to a single, permanent government funding mechanism is one way to successfully develop this capacity. For example, the US Small Business Innovation Research (SBIR) Program, in existence since 1982, allocates a percentage of the federal research budget for small businesses to engage in technical innovation.[56] Federal departments grant funds to these firms during different phases of the R&D process to: (1) establish technical and commercial feasibility, (2) continue R&D efforts, and (3) commercialize products.[57] This policy has provided a program that is predictable in its requirements, competitive across sectors, and reliable in access to funding year after year. Using simple, predictable funding mechanisms to support business R&D would better incentivize Canadian SMEs to engage with academic researchers. Strong partnerships between academics and industry would provide a way to efficiently capitalize on the technical expertise within universities to develop new high-quality patents that are tied to sound business models. Supporting such partnerships, and streamlining the application process for funding, would bring down the transaction costs of collaboration and improve knowledge transfer between Canadian institutions and industry.

Patent Pools and the Freedom to Collaborate

To further support the innovation economy in Canada, the Government should also explore the use of patents to incentivize innovation through collaboration in later stages of product development. There has been a shift in the landscape of innovation in that the development of new technology increasingly relies on multidisciplinary collaboration. Developing strategies to improve access to

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http://www.wipo.int/sme/en/documents/academic_patenting.html.

[54] Ibid.

[55] Dan Herman and Anthony D. Williams, "Driving Canadian Growth and Innovation: Five Challenges Holding Back Small and Medium-Sized Enterprises in Canada," *Centre for Digital Entrepreneurship and Economic Performance*, May 2013. Accessed at: http://deepcentre.com/wordpress/wp-content/uploads/2013/03/DEEP-Centre-May-2013-Driving-Canadian-Growth-and-Innovation.pdf

[56] Small Business Innovation Research (SBIR), "About SBIR," n.d. Accessed at: https://www.sbir.gov/about/about-sbir

[57] Ibid.

patents among industry collaborators has the potential to generate a higher return on R&D investment.[58, 59, 60]

The Government of Canada can support the production of high-value patents by allocating funding to support patent pools in key sectors of the knowledge economy where Canada has a concentration of IP. Patent pools could foster stronger R&D partnerships and increase the rate of innovation by reducing the costs of accessing valuable IP. State-sponsored patent pools offer an advantage to innovators who are limited in their capacity to commercialize their technology without the use of related IP. Pooling provides a way for patent-holders to share their IP with other firms to incentivize knowledge exchange and bundle complementary patents to increase their value. Ultimately these agreements expand the freedom to operate by reducing R&D costs and providing an opportunity to improve existing technology. Improvements can then be fed back into the pool to further drive up the value of the IP. Patent pools can operate through an open model, where the IP is accessible to all members of the public, or they can operate under more exclusive terms, where only members of the pool have royalty-free access to the assets held.[61]

Patent pools can work within existing IP laws, and have been used successfully to promote the development of technology to minimize the environmental impact of oil sands production. Canada's Oil Sands Innovation Alliance (COSIA) functioned through a semi-open mechanism, where members made their IP accessible at no-cost to other members of the pool, while allowing third parties to purchase a license to use the patents created.[62] The success of COSIA in supporting the development of crucial technology, that allowed for improvements in oil sand production, could be leveraged for future opportunities across the country to develop high-value IP. Government involvement in initiatives similar to COSIA, only on a broader scale, would ensure Canadian innovators have the freedom to collaborate, generating more valuable IP, and allowing firms to better compete globally. By focusing on the accumulation of high-value patents, with an eye on their potential to facilitate collaboration, a patent pool established in sectors that have accumulated a critical mass of IP can be used to expand the freedom of individual firms to operate.

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[58] Organization for Economic Cooperation and Development, "Collaborative Mechanisms for Intellectual Property Management in the Life Sciences," OECD (2011). Accessed at: https://www.oecd.org/sti/biotech/48665248.pdf

[59] Richard Gold, "Avoiding the Mistakes of Biotech: How Intellectual Property Can Be Better Managed to Advance Nanotechnology Research," *Studies in Ethics, Law, and Technology* 3, 3 (2009).

[60] Bassem Awad, "Patent Pledges in Climate Change Technology," *Centre for International Governance Innovation,* June 22, 2015. Accessed at: https://www.cigionline.org/articles/patent-pledges-climate-change-technology

[61] Ibid.

[62] Ibid.

Conclusion

In the absence of a coherent IP strategy, Canada has faced significant barriers to innovation. As the Government of Canada considers policies to promote innovation, we argue that there should be a focus on developing an IP strategy that is centered on expanding Canadian firms' freedom to operate domestically and abroad. Examining successful IP strategies emerging in Israel, South Korea, France, and Japan indicates that these countries are better positioning themselves to compete in the innovation economy. The Government of Canada needs to develop a comprehensive IP strategy to address the country's relatively poor performance in developing and protecting globally competitive IP. An increase in the number of Canadian-owned US patents alone will not drive innovation in the country. The Government must also develop strategies that support patent registration at the right stage of the R&D process so that innovation is not hindered. Better support for effective partnerships to improve the collaborative translation of R&D into high-value patents will position more Canadian innovators and industries for success.

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