CARDOZO LAW REVIEW
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COLLABORATIVE INNOVATION AND ECONOMIC GROWTH: A COMMENT ON CHINA'S INNOVATION POLICIES

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INTRODUCTION

Today, national economic growth depends heavily on innovation. Innovation, in the form of applied knowledge that creates new value, is

[*] The authors would like to thank John F. Gray, Neil S. Feltham and Philip Yu of DuPont, and A.B. Culvahouse and Lining Shan of O'Melveny & Myers, LLP for their advice and assistance. The views expressed herein are those of the authors only and do not necessarily reflect the views of either DuPont or O'Melveny & Myers.

not the only critical input to economic growth, of course. Capital, labor, and natural resources all play important roles, as they have traditionally. But innovation is the plus factor—the ingredient that spawns breakthrough efficiencies, boosts productivity, and rewards producers and customers alike. Represented by intellectual property, which includes patents, copyrights, trademarks, and trade secrets, innovation fosters new products that achieve what their predecessors could not, delivers improved processes for the creation of goods and services, and guides businesses in what to do—and equally important what not to do—to be successful.

Not all innovation is of comparable import. Some new ideas represent game–changing breakthroughs that, in turn, stimulate new ecosystems of value creation. The Internet is a prime example. So are fundamentally new product concepts, such as the advent of the personal computer in the 1980s, or the creation of mobile computing devices in the past few years. Breakthrough innovations threaten the existence of previous forms of products and services, as in the way that the Internet has disrupted the old telephone networks of the twentieth century. Such discontinuity is likely to come from outside an established industry, introducing "[e]ntirely new competitors or new suppliers."[1]

Incremental innovation is valuable, but in a different way, improving prior products and services, but not necessarily displacing them. A new version of Microsoft's Windows operating system, for example, can extend and expand innovation without fundamentally breaking with the past.[2]

Given the recognized importance of innovation as an input to national economic growth, it is not surprising that nations are focused on how to boost innovation, including, for example, through support of basic R&D, improvements in the availability of capital for start-up businesses, and greater educational opportunities in science, technology, engineering, and mathematics (so–called "STEM" programs).

Because innovation results from the creative use of both pre-existing and new knowledge, nations have focused on the identification and protection of intellectual property, which is the body of law that creates protectable property rights in inventions and learning. For example, the passage of the America Invents Act in 2011[3] represented a decision by Congress and the President to emphasize both the

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[1] MICHAEL E. PORTER, COMPETITIVE ADVANTAGE: CREATING AND SUSTAINING SUPERIOR PERFORMANCE 197 (1985).

[2] The example is courtesy of Pradeep Tumati, *Types of Innovations*, GO4FUNDING, *http://www.go4funding.com/Articles/Types-Of-Innovations.aspx* (last visited Feb. 15, 2013).

[3] Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (to be codified in scattered sections of 35 U.S.C.).

importance, and the quality, of U.S. patents.[4]

China has also taken steps to encourage the creation of intellectual property by Chinese companies. This Article will first examine the nature of those policies, then consider their impact on the goal of better innovation in China, as well as the impact on multi-national companies that wish to do business in China. The Article will conclude with suggestions about the best ways to build innovation policy to encourage sustainable relationships between China and multi-national companies.

I. CHINA'S PATENT AND INDIGENOUS INNOVATION POLICIES

Having achieved rapid economic growth in the prior three decades, Chinese policymakers have turned their attention to improving the nation's capacity for innovation. The core goal: "to encourage manufacturers to move up the value chain and advance rapidly to the global technology frontier (and in some areas, push that technology frontier forward)," while also "nurturing a culture of open innovation [so that] the services sector could also be an important beneficiary" of increased innovation.[5]

Patents are an important tool for nurturing innovation and Chinese policy incentivizes its businesses to file for patent protection. China issues invention patents, utility model patents (which do not exist in the United States), and design patents, which vary in the extent to which novelty and inventiveness are required.[6] Just as important for purposes of this analysis, China has adopted a series of goals and incentives to increase the number of patent filings. As described by a recent study

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[4] *See* Quentin Palfrey, *The America Invents Act: Turning Ideas into Jobs*, WHITE HOUSE BLOG (Sept. 16, 2011), http://www.whitehouse.gov/blog/2011/09/16/america-invents-act-turning-ideas-jobs.

[5] THE WORLD BANK & THE DEV. RESEARCH CTR. OF THE STATE COUNCIL, CHINA, CHINA 2030: BUILDING A MODERN, HARMONIOUS, AND CREATIVE HIGH-INCOME SOCIETY 19 (2013), *available at* http://www.worldbank.org/content/dam/Worldbank/document/China-2030-complete.pdf [hereinafter CHINA 2030].

[6] DAN PRUD'HOMME, EUROPEAN CHAMBER, DULLING THE CUTTING EDGE: HOW PATENT-RELATED POLICIES AND PRACTICES HAMPER INNOVATION IN CHINA 3 n.1 (2012), *available at* http://www.europeanchamber.com.cn/upload/media/media/27/patentstudy2012%5B766%5D.pdf ("Invention patents can be granted to both products and processes, and must meet a standard for novelty (not part of the 'prior art,' i.e. not openly known to the public abroad or in China before their filing date), 'inventiveness,' and practical use as determined by a review called a Substantive Examination. Utility models can be granted on the shape and/or structure of a product, and do not undergo a Substantive Examination but are required to be novel, meet a far lower level of 'inventiveness' than invention patents, and must meet criteria for practical use/functionality. Invention patents and utility models enjoy basically the same level of legal protection during their lifetimes. Design patents are granted on the appearance of a product that makes it particularly recognisable, do not undergo a Substantive Examination nor have to meet any technical or functional thresholds but must be distinct from prior designs, and should not conflict with prior rights like copyrights or trademarks.").

commissioned by the European Union Chamber of Commerce, those incentives begin with national and provincial quantitative patent targets.[7] For example, the 12th Five Year Plan, which runs from 2011–2015, calls for invention patents to increase from 1.7 to 3.3 for every ten thousand people by 2015.[8] China has also established the goal of being among the top five countries in the world by 2020 for the purposes of the issuance of invention patents.[9] Other policies to encourage the filing of patents include subsidies, tax rules, governmental procurement, and standards–making processes.[10]

The number of patents alone does not, however, correlate directly to the quality (or even the quantity) of innovation. In this respect, close attention must be paid to "utility model" patents. Utility model patents were originally created to provide a quick, inexpensive option for individuals and small businesses to procure shorter-term intellectual property protection for inventions that fell short of the requirements of an invention patent. To achieve that purpose, utility model patents do not require the same level of inventiveness as that required of invention patents under Chinese law,[11] and are issued without any substantive examination of the claimed innovation.[12]

According to a recent report published by the U.S. Chamber of Commerce, the impact of utility model patents has been contrary to the original governmental expectations: "[i]nstead of simply encouraging inventors, the less costly patent prosecution process is yielding utility model patents that are inexpensive, unexamined, rapidly granted, and difficult to invalidate when necessary, resulting in patent weapons that are disruptive to normal business growth."[13]

Non–Chinese companies may become more concerned about the cumulative effect of China's policies to encourage the filing of patents, alongside its broader "Indigenous Innovation Policy," which has itself been controversial. That policy began in 2006 with the issuance of the State Mid-to-Long Term Science and Technology Development Plan

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[7] *Id.* at 62.

[8] *Id.*

[9] *Id.*

[10] *See id.*

[11] *Compare* China's Patent Law (promulgated by Standing Comm. Nat'l People's Cong., Mar. 12, 1984, effective Apr. 1, 1985) Ch. II art. 22, *available at* http://english.sipo.gov.cn/laws/lawsregulations/201101/t20110119_566244.html [hereinafter *China's Patent Law*] (establishing the standard for an invention patent as "prominent substantive features and represents notable progress"), *with id.* (establishing the standard for a utility model patent as "substantive features and represents progress").

[12] *China's Patent Law*, *supra* note 11, at Ch. IV art. 40. By comparison, issuance of an invention patent requires a substantive examination. *China's Patent Law*, *supra* note 11, at Ch. IV art. 39.

[13] THOMAS T. MOGA, U.S. CHAMBER OF COMMERCE, CHINA'S UTILITY MODEL PATENT SYSTEM: INNOVATION DRIVER OR DETERRENT 8 (2012).

2006–2020 (MLP)[14] by the State Council. The MLP calls for reducing China's dependence on foreign technology and directs that the number of invention patents granted to Chinese nationals annually rank in the top five nations in the world by 2020.[15]

In addition, several implementing measures of the MLP link indigenous innovation development to government procurement policies. For example, the disclosure that indigenous innovation development was to be implemented through procurement decisions under the central government procurement product catalogue in 2009 attracted wide protests from non–Chinese companies. In reaction to those protests, the Chinese government modified its written policies favoring fostering indigenous innovation through government procurement, but the extent to which the policy has been actually changed, especially at the provincial level, is uncertain.[16] As a whole, the policy has been described as "a massive and complicated plan to turn the Chinese economy into a technology powerhouse by 2020 and a global leader by 2050."[17]

II. CHINA'S INNOVATION: METRICS AND COLLABORATION

The former Director of the United States Patent and Trademark Office has recognized that, "[p]atent filings do not equal innovation, by any stretch."[18] There are a number of reasons why the existence of a patent does not necessarily demonstrate true innovation. First, not all patents, in U.S. or China, are high quality—a risk that is especially likely in connection with China's utility model patents, discussed above, which are subject to lower standards of inventiveness and review and undergo no substantive examination upon grant (or registration). Second, not all patents are commercialized (indeed, the

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[14] THE STATE COUNCIL OF THE PEOPLE'S REPUBLIC OF CHINA, GUOJIA ZHONGCHANGQI KEJI FAZHAN GUIHUA GANGYAO [THE NATIONAL MEDIUM- AND LONG-TERM PROGRAM FOR SCIENCE AND TECHNOLOGY DEVELOPMENT] (2006-2020) (2006) [hereinafter *MLP*], *available at* http://www.gov.cn/jrzg/2006-02/09/content_183787.htm, *available in English at* http://www.cstec.org/uploads/files/National%20Outline%20for%20Medium%20and%20Long%20Term%20S&T%20Development.doc.

[15] *See id.*

[16] Stanley Lubman, *Changes to China's 'Indiginous Innovation Policy': Don't Get Too Excited*, WALL ST. J., July 22, 2011, 12:53 PM, http://blogs.wsj.com/chinarealtime/2011/07/22/changes-to-chinas-indigenous-innovation-policy-dont-get-too-excited/.

[17] JAMES MCGREGOR, U.S. CHAMBER OF COMMERCE, CHINA'S DRIVE FOR 'INDIGENOUS INNOVATION': A WEB OF INDUSTRIAL POLICIES 4 (2011).

[18] Gregory Ferenstein, *Patent Director: 'Patent Filings Do Not Equal Innovation,' U.S. Needs New Measure*, FAST COMPANY (Mar. 12, 2011), http://www.fastcompany.com/1738089/patent-director-patent-filings-do-not-equal-innovation-us-needs-new-measure (quoting David Kappos, Dir. of the U.S. Patent and Trademark Office).

commercialization of patents is probably a better measure of market value than their existence *per se*). Third, some patents are created and used for defensive purposes associated with litigation risk. Fourth, patents may serve to complicate if not actually impede innovation through the existence of patent "thickets,"[19] a risk especially in the Information Technology sector where, for example, a single smartphone can contain as many as 250,000 patents.[20]

As noted above, the 12th Five Year Plan for National Economic and Social Development of China[21] sets quantitative targets for obtaining patents. China's National Patent Development Strategy (2011–2020)[22] requires that by 2015: (i) annual patent filings (the total number of filings for invention patents, utility model patents and design patents) reach two million/year; (ii) China ranks among the top two nations in terms of annual number of invention patents granted to its citizens; and (iii) more than 8% of industrial enterprises above a designated size (defined as businesses with annual revenue from principal business activities of RMB 20 million) will have patent filings. To that end, the State Council's Notice on Strengthening IPR Works in Strategic Emerging Industries (issued in April 2012)[23] set the target of tripling, by 2015, the number of invention patents and international patent filings in strategic emerging industries (as compared to 2010).

In response to the numerical targets set by the central government, local governments formulated their own numerical targets. For example, Beijing's 12th Five Year Plan on Intellectual Property (Patent) Development jointly issued by the Beijing Intellectual Property Bureau and the Beijing Development and Reform Commission, has one subsection titled "Key Numerical Targets," which includes the goal of "[e]ndeavor[ing] to achieve annual growth rate of 5% in terms of patent

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[19] A patent thicket has been defined as "a dense web of overlapping intellectual property rights that a company must hack its way through in order to actually commercialize new technology." Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, *in* 1 INNOVATION POLICY AND THE ECONOMY 120 (Adam B. Jaffe et al. eds., 2001), *available at* http://faculty.haas.berkeley.edu/shapiro/thicket.pdf.

[20] Steve Lohr, *Apple-Samsung Case Shows Smartphone as Legal Magnet*, N.Y. TIMES, Aug. 26, 2012, at A4.

[21] THE STATE COUNCIL OF THE PEOPLE'S REPUBLIC OF CHINA, GUOMIN JINGJI HE SHEHUI FAZHAN DISHI'ERGE WUNIAN GUIHUA GANGYAO [THE 12TH FIVE YEAR PLAN FOR NATIONAL ECONOMIC AND SOCIAL DEVELOPMENT OF CHINA] (2011), *available at* http://www.gov.cn/2011lh/content_1825838.htm.

[22] STATE INTELL. PROP. OFFICE, NATIONAL PATENT DEVELOPMENT STRATEGY (2011–2020) (2010), *available at* http://www.sipo.gov.cn/ztzl/ndcs/zscqxcz/2011ipweek/tpstr2011/201104/t20110419_598974.html., *available in English at* http://graphics8.nytimes.com/packages/pdf/business/SIPONatPatentDevStrategy.pdf.

[23] *Notice on Strengthening IPR Works in Strategic Emerging Industries*, OFFICE OF THE STATE COUNCIL OF THE PEOPLE'S REPUBLIC OF CHINA (April 28, 2012), http://www.gov.cn/zwgk/2012-05/02/content_2127881.htm.

filings and patents granted during the 12th five year plan."[24]

Recently, the Deputy Director of China's State Intellectual Property Office (SIPO) explained that within the first ten months of 2012, the domestic invention patent filings accepted by SIPO totaled 386,000, up by 26.5% over the same period of 2011; domestic invention patents granted in force totaled 120,000, up by 32.9% over the same period of 2011.[25] By end of October 2012, the number of invention patents per 10,000 people reached 3.09, up by 30.4% over the end of 2011.[26]

The granting of utility model patents is increasing in a similar way. By the end of December 2010, for example, China had granted 849,454 utility model patents that were still in force, but only 257,893 invention patents.[27] In 2011, when total patent applications in China grew by 33.6% from the previous year, there were more applications for utility model patents than for either invention or design patents.[28]

The intention of the Chinese Government to set quantitative patent targets is to stimulate innovation.[29] In reality, heavy focus on quantitative patent targets may incentivize the pursuit of immediate and incremental results over breakthrough innovation. That's because high–quality breakthrough technology developments usually require longer term research and development, frequently measured in years. In addition, under the pressure of the "state–planned" system of metrics,[30] enterprises may try to achieve numerical patent targets at the cost of quality, by circumventing rules and regulations regarding monitoring and evaluation.[31] This is facilitated by the fact that China's overall regulatory and enforcement systems remain less developed than those of Western countries,[32] for example in ensuring the operation of an independent judiciary.

It is understandable that firms would prefer quantitative targets than qualitative targets, because success is easier to gauge with the use of numerical measures.

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[24] BEIJING INTELL. PROP. OFFICE, BEIJING'S 12TH FIVE YEAR PLAN ON INTELLECTUAL PROPERTY (PATENT) DEVELOPMENT (2007), *available at* http://www.bjipo.gov.cn/zcfg/zlgh/201202/t20120207_25714.html.

[25] *Woguo Mei Wanrenkou Faming Zhuanli Yongyouliang Yida 3.09 Jian [the Number of Patents owned by China has Reached 3.09 per 10,000 people]*, STATE INTELLECTUAL PROPERTY OFFICE (Nov. 30, 2012), http://www.sipo.gov.cn/yw/2012/201211/t20121130_776050.html.

[26] *Id.* As noted above, the goal for 2015 is 3.3 invention patents for every ten thousand people. PRUD'HOMME, *supra* note 8 and accompanying text.

[27] In addition, China had granted 718,056 design patents. MOGA, *supra* note 13, at 19.

[28] *Id.*

[29] *See, e.g.*, *supra* notes 7–10, 14–17 and accompanying text (establishing China's motivations behind its innovation policies).

[30] *See supra* notes 7–10 and accompanying text.

[31] *See* MCGREGOR, *supra* note 17, at 65.

[32] *See generally* PRUD'HOMME, *supra* note 6, at 125–40 (discussing regulatory and enforcement issues in China).

Furthermore, it is believed that some entities file patent applications principally for the purpose of obtaining additional subsidies from the local governments.[33] Thus, one expert in Chinese intellectual property has concluded that the existence of a large number of "junk patents" has been prompted by governmental subsidies that promote quick payment over quality patents.[34]

Taking all these above factors into consideration, there are valid concerns about the extent to which the focus on numerical targets actually furthers the Chinese's governmental goal of creating important new kinds of innovation. This dilemma is being recognized within China. For example, Ms. Liu Yan, the Secretary General of Organization Committee of China Patent Annual Conference (2011), was reported to have said during that conference that although patent filings in 2010 reached a new high of 1.222 million, the large number of patent filings cannot conceal the relatively low overall quality of Chinese patents.[35]

An important contribution to the discussion about China's economic future came earlier this year from a joint set of recommendations issued by The World Bank and the Development Research Center of China's State Council, which is headed by the Premier of China and is China's senior administrative body.[36] That report concluded that "China has seen a sharp rise in scientific patents

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[33] *China Economic Weekly: 3,000,000 patent, the number of "junk"?*, PEOPLE'S DAILY ONLINE (July 31, 2006), http://news.people.com.cn/GB/37454/4650184.html. Tian Lipu, Director of SIPO stated

> during recent years, local governments have issued some subsidy policies in order to encourage patent applications. These policies have been playing positive roles in encouraging creation and invention and improving the enthusiasm of the Chinese to innovate. But these policies have shortcomings. For example, the number of patent applications is taken as the evaluation criteria, thus a small number of patent applicants file patent applications for existing technology without making any improvement, in order to obtain subsidy. This is the subjective cause of 'junk patents'. Therefore, guidance shall be given to local governments to improve patent fee subsidy and incentive policies, suggesting them focusing on invention patents with high-tech contents so as to eradicate the phenomenon of filing malicious application in order for getting subsidy.

Id. The Vice Director of Guangzhou Intellectual Property Office was similarly quoted as explaining that "the reason for existence of 'junk patents' is that utility model patents and design patents, *before* being filed for patents, are publicly known or used by the public, and applicants file patent application for things which have been known to the public for many years." *Id.* (emphasis added).

[34] *More harm than good "junk patents" enterprise innovation*, CNIPR (Nov. 23, 2011), http://www.cnipr.com/focus/sdbd/201111/t20111123_138667.html. Utility model patents and design patents are sometimes classified as "junk" patents because the standards for their issues is not as rigorous as with invention patents. *See* MOGA, *supra* note 13, at 16.

[35] *China's patent applications last year, the first break million overall quality is still not high*, CHINA NEWS NETWORK (Nov. 10, 2011), http://www.chinanews.com/cj/2011/11-10/3450986.shtml.

[36] *The State Council*, THE CENTRAL PEOPLE'S GOVERNMENT OF THE PEOPLE'S REPUBLIC OF CHINA, http://english.gov.cn/links/statecouncil.htm (last visited Feb. 14, 2013).

and published papers, but few have commercial relevance and even fewer have translated into new products or exports."[37] Why? Perhaps because of the "weak incentives for indigenous, government–backed research institutes to work with commercial users of new technologies" and, or, because "research institutes may not be capturing opportunities to leverage their capabilities by networking within their country and connecting with global R&D networks."[38]

In sum, China has set specific goals for patent innovation and appears to be on the way to achieving them. But those goals—set out as numerical targets and supported by subsidies and other governmental actions—are themselves only weakly correlated to break-through innovation and, in fact, may not even reflect significant incremental innovation. Moreover, by focusing attention on misguided measures of short-term success, they may actually detract Chinese innovators from forming valuable collaborative relationships with global R&D creators and customers. The next section of this Article examines the impact of current Chinese innovation policies on the formation of those kinds of relationships.

III. COLLABORATION AND INNOVATION: IMPACT ON MULTI-NATIONAL CORPORATIONS

The previous section suggested that, on its own terms, the emphasis on numerical metrics for patent filings is not well–matched with China's goal of increasing innovation. This section looks to additional impacts on innovation development, particularly on the ability of non–Chinese multi-national corporations to collaborate with Chinese entities.

The starting point is the nature of innovation in the world today. Increasingly the concept of "innovation" is being coupled with "collaboration." In other words:

> [I]nnovations are increasingly brought to the market by networks of firms, selected according to their comparative advantages, and operating in a coordinated manner. In this new model, organizations de-construct the innovation value chain and source pieces from partners that possess lower costs, better skills and/or access to knowledge that can provide a source of differentiation. The aim is to establish mutually beneficial

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[37] CHINA 2030, *supra* note 5, at 35. The report made an exception to this statement for telecommunications and consumer electronics. *Id.*

[38] *Id.*

> relationships through which new products and services are developed. In short, firms increasingly seek superior performance in innovation through collaboration.[39]

Multiple reasons exist for this shift away from a focus on internally–created innovation within a single corporation's R&D department. Dynamic fast-moving markets force change on companies rapidly and from multiple directions, which puts greater premium on the ability to work with different sets of external collaborators, often simultaneously. The massive improvements in information technology make collaboration over long distances more practical. On a local level, increased understanding of the competitive advantages of geographic "clusters" demonstrate the importance of shared resources that create the spillover effects that economists label "positive externalities."[40]

It is not surprising, therefore, that large innovation–focused multinational companies have embraced collaboration. Proctor & Gamble famously announced in 2001 that "50% of its innovation would contain a significant component of external collaboration."[41] Cisco has concluded that "[i]mproved collaboration is a largely untapped source of competitive advantage."[42] DuPont emphasizes the importance of "inclusive innovation" to meet the world's biggest challenges, including agriculture, energy, and environment.[43]

Belief in collaboration is not, however, confined to Western multinational corporations. The "China 2030" Report discussed above specifically notes that "[c]loser collaboration and partnerships with multinationals on the basis of mutual trust and recognition will contribute to the creation of a dynamic and open innovation system" in China.[44]

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[39] Alan MacCormack, Theodore Forbath, Peter Brooks & Patrick Kalaher, *Innovation through Global Collaboration: A New Source of Competitive Advantage* 1 (Harvard Bus. Sch., Working Paper No. 07-079, Aug. 14, 2007), *available at* http://www.hbs.edu/faculty/Publication%20Files/07-079.pdf (emphasis omitted).

[40] Jonathan Sallet, *Innovation Policy in Tough Times on Tight Budgets: The Case for Regional Innovation Clusters*, SCIENCE PROGRESS (Oct. 8, 2010), http://scienceprogress.org/2010/10/innovation-policy-tight-budgets-and-tough-times/.

"Externalities refers to situations when the effect of production or consumption of goods and services imposes costs or benefits on others which are not reflected in the prices charged for the goods and services being provided." *Glossary of Statistical Terms: Externalities*, OECD, http://stats.oecd.org/glossary/detail.asp?ID=3215 (last visited Apr. 23, 2013).

[41] *Partnering with the World to Create Greater Value*, P&G, http://www.pg.com/en_US/downloads/innovation/C_D_factsheet.pdf.

[42] *Collaboration: The Next Revolution in Productivity and Innovation* 4, *in* THE CISCO BUSINESS TRANSFORMATION SERIES: COLLABORATION, CISCO (2008), http://www.cisco.com/web/offer/cioday2009/Cisco_Collaboration_Revolution.pdf.

[43] *Solving Global Challenges Together*, DUPONT, http://www2.dupont.com/inclusive-innovations/en-us/gss/global-challenges.html (last visited Feb. 14, 2013).

[44] CHINA 2030, *supra* note 5, at 35.

Similarly, the Director of the Research Center of Multi-National Corporations, Chinese Academy of International Trade and Economic Cooperation, Ministry of Commerce of China, Wang Zhile, emphasized in 2006 that foreign–created, China–based R&D centers are part of China's innovation system, pointing out ways that China can cooperate with multi-national corporations.[45] In 2010, the Deputy Minister of Science and Technology of China, Cao Jianlin, called on foreign universities, research institutes, and foreign companies to continue cooperation and joint R&D efforts with Chinese partners to innovate continuously and achieve "win-win" outcomes.[46]

The advantages of cross-border collaboration have been recognized by Chinese businesses as well. For example, the CEO of Neusoft, which has grown in the last twenty years into China's largest Chinese medical system and equipment provider, attributes Neusoft's success to its open and collaborative innovation ecosystem, including its joint venture with Phillips.[47] Similarly, the Chairman of Nantian Electronics Information Corp., Ltd. (Nantian), the leading Chinese IT company in banking automation, cites Nantian's open innovation success in working with IBM to develop software for mainframe computers and with HP to construct a large–scale core banking service system based on cloud computing.[48]

The difficulty is that the emphasis on the number of patents as a sign of true innovation achievement in fact appears to frustrate achieving true innovation—decreasing the ability of multi-national corporations to collaborate effectively with Chinese counterparts.

First, the focus on filing for patents risks distraction. Any organization executes to its defined goals, and if the goal is to file patents, then resources and attention will necessarily follow. Moreover, the fact of patent filing itself may be viewed as indication of innovation *per se*. In these circumstances, Chinese entities may be less interested in collaboration simply because collaboration is not as directly additive to their ability to file for a patent (and might even compromise their ability to claim sole ownership and seek subsidies).

Second, the emphasis on utility model patents leads almost entirely to incremental, not breakthrough, innovation. Putting aside the question

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[45] *Experts said foreign-funded R & D institutions is an integral part of China's innovation system*, SINA (Aug. 27, 2006), http://finance.sina.com.cn/roll/20060827/1755885731.shtml.

[46] *Ministry of Science and Technology Cao Jianlin: hope multinationals to set up R & D center in China*, SOHU IT NEWS (Sept. 19, 2010), http://it.sohu.com/20100919/n275096931.shtml.

[47] *A road of innovation of Chinese enterprises: Neusoft Group Chairman and CEO Liu Jiren interviews*, GANSU ECONOMIC INFORMATION NETWORK (Feb. 14, 2012), http://www.gsei.com.cn/html/GSIT/dtxx/762_145227.html.

[48] *Open innovation to lead the continuing development of the southern sky*, NANTIAN (July 11, 2011), http://www.nantian.com.cn/ShowArticle.Aspx?ArticleID=12686.

of whether utility model patents should be classified, as some do, as "junk" patents,[49] the legal standard for utility model patents under Chinese law is expressly lower than an invention patent (and the term of protection is shorter).[50] This lessens the likelihood that major innovations will be the goal or the result of work that leads to the filing of a utility model patent.[51] Collaboration for the purpose of breakthrough innovations becomes less important to an organization that does not have the goal of achieving that level of step-change achievement.

Third, the focus on numbers may send the wrong message about collaboration. China is obviously interested in improving its national innovation capacity and demonstrating its strength as an innovator on the world stage. But the danger of the numerical goals is that they strongly imply that Chinese companies are better off if they go it alone, without multi-national partners, even if the impact of collaboration would be to improve innovation outcomes in China and other countries. In fact, devoting time and attention to low–quality patents for the sake of meeting numerical targets actually takes resources away from research and lessens the alignment between productive research and successful business strategy.

That is why the question of patent metrics should be examined in a larger context. As discussed above, China's Indigenous Innovation Policy has been criticized for linking national goals to the development of intellectual property by Chinese companies (or the transfer of intellectual property ownership to them).[52]

Furthermore, multi-national corporations have encountered a series of difficulties in establishing sustainable working relationships and protecting their intellectual property. Two prominent examples have arisen in the high-speed train and wind-turbine industries. In 2004, China's Ministry of Railway sought bids to supply cars and locomotives for high-speed trains, but limited eligibility to locally–incorporated companies (excluding wholly-owned subsidiaries of foreign companies)

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[49] *See supra* notes 34–35 and accompanying text.

[50] *China's Patent Law*, *supra* note 11, art. 42. The term of protection for an invention patent is 20 years, while the term for protection for a utility model patent is 10 years.

[51] This conclusion is not always so, because inventors in China may file simultaneously for both invention and utility model patents but the general practice is to choose the invention patent when the process ultimate forces a choice. *China's Patent Law*, *supra* note 11, at Ch. 1 art. 9; Wei-Ning Yang & Andrew Y. Yen, *The Dragon Gets New IP Claws: The Latest Amendments to the Chinese Patent Law*, 21 INTELL. PROP. & TECH. L.J. 18, 20 (2009), *available at* http://www.ipo.org/AM/Template.cfm?Section=Patents&Template=/CM/ContentDisplay.cfm&ContentID=25439.

[52] *Domestic Innovation and Procurement*, CHINA BUS. REV. (2010), https://www.chinabusinessreview.com/public/1003/uscbc.html; Spike Nowak, *On the Fast-Track: Technology Transfer in China*, GATEWAY HOUSE (Aug. 31, 2012).
available at http://gatewayhouse.in/publication/gateway-house/features/fast-track-technology-transfer-china.

and required winning companies to transfer their key technologies to their Chinese partners.[53] Over the next few years, contracts were won by joint ventures partially owned by non–Chinese companies including Bombardier, Kawasaki, and Siemens.[54] Soon Kawasaki's partner became a competitor, building its own train sets and filing for over one hundred patents on high-speed train sets despite Kawasaki's claims that it had originally developed some of the technologies.[55]

Also in 2004, China launched the "Wind Power Concession Project," requiring bidders to include 70% local content in wind-power equipment, reducing reliance on imported wind turbines by favoring domestic production of wind power equipment.[56] In order to qualify for bidding, foreign companies had to set up production in China or source components or parts from China.[57]

Given such policies, multi-national corporations may have become more hesitant to engage in collaboration, R&D, and manufacturing in China with Chinese partners. Some may include only older technology in their China–based operations. Others may look for collaborators outside of China, including in other parts of Asia.

Because successful collaboration is a two-way street, lost opportunities from diminished collaboration detracts from China's innovation objectives, as well as on prospects for multi-national partners. A particularly good example comes from the use of trade secrets in manufacturing processes. Trade secrets are not patented, but they are protected intellectual property under the laws of both the United States[58] and China.[59] Trade secrets are valuable information in

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[53] Toh Han Shih, *China's Rail Titans Bid for U.S. High-Speed Project*, MASS TRANSIT MAGAZINE (June 22, 2011), http://www.masstransitmag.com/news/10284479/chinas-rail-titans-bid-for-us-high-speed-project; Norihiko Shirouzu, *Train Makers Rail Against China's High Speed Designs*, WALL ST. J., Nov. 18, 2010, at A1, *available at* http://online.wsj.com/article/SB10001424052748704814204575507353221141616.html; Brian Spegele, *Train Spat With Japan Heats Up*, CHINA REAL TIME REPORT, WALL ST. J., July 8, 2011, 7:32 PM, http://blogs.wsj.com/chinarealtime/2011/07/08/train-spat-with-japan-heats-up/.

[54] Shirouzu, *supra* note 53; Spegele, *supra* note 53.

[55] Shirouzu, *supra* note 53; Spegele, *supra* note 53.

[56] *See Snapshot: Renewable Energy—China's Imbalanced Trade*, POWER-TECH. (May 18, 2011), http://www.power-technology.com/features/feature119046.

[57] DEWEY & LEBOEUF LLP FOR NAT'L FOREIGN TRADE COUNCIL, CHINA'S PROMOTION OF THE RENEWABLE ELECTRIC POWER EQUIPMENT INDUSTRY: HYDRO, WIND, SOLAR, BIOMASS II (2010), *available at* http://www.nftc.org/default/Press%20Release/2010/China%20Renewable%20Energy.pdf; Jim Hight, *Building Bridges for Climate Change Mitigation: A Roadmap of Global Trade Patterns in Wind Power Goods and Services*, GLOBAL FORUM ON TRADE: TRADE AND CLIMATE CHANGE, OECD (2009), at 17, *available at* http://www.oecd.org/tad/envtrade/42886096.pdf.

[58] In the United States, The Uniform Trade Secrets Act's definition states:

> 'Trade secret' means information, including a formula, pattern, compilation, program, device, method, technique, or process, that:
>
> (i) derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use, and

which a company may invest tremendous financial resources and labor resources. Thus, trade secrets have become an important corporate asset. One analysis in 2005 calculated that intangible assets reportedly constituted 79.7% of the total value of the Standard & Poor's 500 and that the vast bulk of intangible assets were trade secrets.[60] Many industries rely heavily on trade secrets to establish and retain their competitive advantages, including the chemical industry, pharmaceutical industry, biotechnology industry, and food-and-beverage industry. Some often cited examples of trade secrets include the Coca Cola formula and the Kentucky Fried Chicken (KFC) chicken recipe.

The trade secrets of multi-national corporations are not well-protected in China. One analysis showed that "trade secret cases are the least likely to succeed of any civil IP litigation in China."[61] A report in 2012 from the Shanghai/Pudong Basic Court found that plaintiffs prevailed in only two of sixty-two trade secret cases between 2002 and 2011.[62]

Hence, "[w]estern companies rarely sue Chinese companies over trade secret theft in China—in part because of perceptions they will not be viewed fairly, but also out of fear of retaliation in the marketplace."[63]

(ii) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

UNIF. TRADE SECRETS ACT § I (4) (1986), *available at* http://www.uniformlaws.org/shared/docs/trade%20secrets/utsa_final_85.pdf.

[59] In China, the Law Against Unfair Competition states that trade secrets "refers to any technology information or business operation information which is unknown to the public, can bring about economic benefits to the obligee, has practical utility and about which the obligee has adopted secret-keeping measures." Law of the People's Republic of China Against Unfair Competition, art. 10 § 3, *available at* http://law.npc.gov.cn:87/page/browseotherlaw.cbs?rid=en&bs=97709&anchor=0#go0.

[60] JOHN R. THOMAS, CONGRESSIONAL RESEARCH SERVICE, THE ROLE OF TRADE SECRETS IN INNOVATION POLICY 2 (2010), a*vailable at* http://www.fas.org/sgp/crs/secrecy/R41391.pdf; James E. Malackowski, *The Intellectual Property Marketplace: Past, Present and Future*, 5 J. MARSHALL REV. OF INTELL. PROP. L 605, 611 (2006), *available at* http://www.jmripl.com.php5-10.dfw1-2.websitetestlink.com/issues/article/122; R. Mark Halligan, *Protection of U.S. Trade Secret Assets: Critical Amendments to the Economic Espionage Act of 1996*, 7 J. MARSHALL REV. OF INTELL. PROP. L. 656, 657–58 (2008), *available at* http://www.jmripl.com.php5-10.dfw1-2.websitetestlink.com/issues/article/172.

[61] *What the Data Says About Trade Secret Litigation in China*, CHINA IPR (Oct. 31, 2012), http://chinaipr.com/2012/10/31/what-the-data-says-about-trade-secret-litigation-in-china/..

[62] *Shanghai Pudong New Area Court Research Report on the Situation of Trade Secret Litigation in Accordance with the Law*, PEOPLE'S COURT NEWS, June 28, 2012, *available at* http://pdiprlaw.org.cn/pdcqw/web2011/xxnr_view.jsp?pa=aaWQ9NTE4ODQmeGg9MQPdcssPdcssz. According to the report, among the 62 cases, 28 cases were tried by the Pudong Basic Court. 26 were withdrawn, 2 were deemed as withdrawn or 4 were settled and 2 were referred to other courts. *Id.* Among the 28 trials, in only 2 cases the court upheld all the claims of the plaintiff and in 10 cases, the court upheld part of the claims of the plaintiff. *Id.*

[63] Nicola Groom, *Wind energy dispute may test U.S.-China IP resolve*, REUTERS, Jan. 9, 2012, 1:43 PM, http://www.reuters.com/article/2012/01/09/us-amsc-sinovel-

Some companies have sought recourse, instead, in non–Chinese venues, such as the U.S. International Trade Commission in cases involving solar panels,[64] railway wheels,[65] and rubber resins.[66] Separately, Sinovel Wind Group Company, a Chinese wind-turbine manufacturer, has been accused of theft of trade secrets of AMSC, a U.S. manufacturer.[67]

In sum, the impact of current Chinese patent strategy, especially when considered in the context of technology-transfer and failure to protect intellectual property, is to decrease the incentives of both Chinese companies and multi-national corporations in establishing cutting-edge innovation collaborations. China is too big a market and too large an economy for all such relationships to be deterred. But collaboration at sub-optimal levels decreases innovation opportunities for both China and multi-national corporations.

Consider a little–known, but important example of the kind of knowledge that is very difficult to acquire without collaboration and that, therefore, may be missing from China's innovation policies. The understanding of how to accomplish a task is called "know-how" and it's a very valuable form of trade secret.[68] An important part of know-how is the knowledge of what has been tried that didn't work. That goes by the name "negative know-how," and it's a trade secret that directly boosts efficiency.[69] Suppose a scientist looking to create a new form of synthetic fiber tries twenty different combinations, only one of which is successful. In the short term, that one formula is obviously valuable. But in the long-term, so is the learning from the nineteen failures; not

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idUSTRE8081RT20120109.

64 Matthew L. Wald, *Panel Says Chinese Imports Hurt U.S. Solar Firms*, N.Y. TIMES, Dec. 3, 2011, at B4.

65 *Intellectual Property News: ITC Affirms Amsted's Victory Against U.S. and Chinese Cast Steel Railway Wheel Competitors*, RFC EXPRESS (Dec. 8, 2009), http://www.rfcexpress.com/news/article.asp?ID=4783.

66 Eric W. Schweibenz & Alexander B. Englehart, *SI Group Files New 337 Complaint Regarding Certain Rubber Resins*, LEXOLOGY (May 22, 2012), http://www.lexology.com/library/detail.aspx?g=cd5b22d9-34ff-40dd-82de-9f7b344645dc.

67 *See U.S. wind firm presses theft charge against China rival*, WIND DAILY (Feb. 6, 2012), http://www.winddaily.com/reports/US_wind_firm_presses_theft_charge_against_China_rival_999.html; Andrew Lee, *AMSC and Sinovel due in China's Supreme Court over wind IP*, CHINA INTELL. PROP. (Oct. 25, 2010), http://www.chinaipmagazine.com/en/news-show.asp?id=5353 ("The legal battle between AMSC and Sinovel—formerly its biggest customer—centres on theft of wind turbine IP by a former employee of the US company in Austria, allegedly at the behest of Sinovel. The employee was jailed by an Austrian court last year."); *see also* WHITE HOUSE, ADMINISTRATION STRATEGY ON MITIGATING THE THEFT OF U.S. TRADE SECRETS (2013), *available at* http://www.whitehouse.gov/sites/default/files/omb/IPEC/admin_strategy_on_mitigating_the_theft_of_u.s._trade_secrets.pdf.

68 *See Protection of Undisclosed Information (Trade Secrets or Knowhow)*, BUSINESS PORTAL INDIA, http://business.gov.in/legal_aspects/undisclosed_information.php (last visited Apr. 23, 2013).

69 *See Wayfinder Digital's alphabetical list of terms, words, jargon, patentspeak, concepts, and buzzwords about patents and intellectual property*, WAYFINDER DIGITAL, (last visited Apr. 23, 2013), http://wayfinderdigital.com/glossary.html#N.

only because scientists in the future can avoid replicating those experiments, but also because they convey a deeper knowledge of the process of innovation. Understanding of process is, of course, at the heart of manufacturing excellence.

Negative know-how is hard to acquire without investment over a length of time and without trying multiple unsuccessful solutions. It often involves collaboration. It seldom is written on a single piece of paper or described as a specific formula. It's the culmination of time and effort that resides within the DNA of a successful enterprise. It can be shared with a willing partner who brings complementary knowledge and expertise to a common objective. It is summed up in the observation that "dead ends can sometimes be very enlightening."[70] Negative know-how, however, often can only be protected as a trade secret. So China's poor record of trade secret protection tends to discourage multi-nationals from collaborating on process improvements with Chinese enterprises.[71]

In other words, negative know-how, despite being often not chosen as a subject for patent protection, is a good example of a "win-win" outcome. There appears to be a tendency to sometimes view any desire for "win-win" as a sign of weakness. But this is counter-productive because it discourages collaboration. OECD research suggests, for example, firm-specific advantages of collaboration. "[F]irms that collaborate on innovation spend more on innovation than those that do not [perhaps because] collaboration is likely to be undertaken to extend the scope of a project or to complement firms' competencies."[72] The implication, of course, is that collaboration allows companies to succeed more and expand further and faster than they could acting alone. In order to have a relationship based on mutual trust and mutual respect, the question *each* collaborative partner should ask is: "how do I make my partner successful," rather than, "how do I make myself successful at the cost of my partner?"

In sum, China's current emphasis on numerical goals, amidst the context of other impediments to cross-national collaboration, does not appear to be the most impactful strategy for achieving its desired ends.

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[70] Teresa M. Amabile, *How to Kill Creativity*, HARV. BUS. REV., Sept.–Oct. 1998 77, at 83.

[71] *See supra* notes 64–66 and accompanying text.

[72] OECD, MEASURING INNOVATION: A NEW PERSPECTIVE, 27 (2010), *available at* http://www.oecd.org/site/innovationstrategy/measuringinnovationanewperspective-onlineversion.htm#agenda.

IV. POLICY IMPROVEMENTS TO FOSTER MUTUALLY–BENEFICIAL COLLABORATION

As China continues to consider improvements in its innovation policies, thought should be given to factors, forces, and policies that improve the ability of Chinese companies to create sustained collaboration with multi-national companies, especially the global innovators who have demonstrated ability to foster breakthrough innovation.

The first step is, of course, to remove current barriers to collaboration, such as the procurement, technology-transfer, and intellectual property rights issues detailed above.[73] As explained in that prior discussion, the application of "Indigenous Innovation" policies, that link procurement decisions to the ownership of intellectual property by Chinese companies to the detriment of non–Chinese firms, along with the application of policies that seem to require transfer of technologies from non–Chinese companies to their Chinese partners, matched by the lack of effective protection of intellectual property rights of Chinese and non–Chinese companies alike are all seen by multi-national companies as problematic and an obstacle to true collaboration.[74] The current emphasis on quantitative targets for patents is a more subtle obstacle, but an important one.

The second step is to improve the measurement of innovation—a challenge that is shared by developing and developed economies alike.[75] The challenge is not simple, but neither is it unique; venture capital firms and other investors often assess the innovation achievements and potential of a firm. Better measurement tools would allow China to create incentives for innovation, from Chinese and non–Chinese firms alike. Policies connected to procurement, subsidies, and standards-setting should be better tailored to boost true innovation, rather than preferring innovation, of whatever quality, that is produced or owned only by Chinese entities. [76] Similarly, high-tech multi-national investment in R&D facilities should "be further encouraged because of its significant spillover effects, the reputational gains for those Chinese cities that are fast becoming science hubs, and the contribution this research can make to industrial upgrading."[77]

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[73] *See supra* Parts II, III.

[74] *See supra* Part III.

[75] Both the OECD, and the U.S. Department of Commerce have focused specifically on how to improve measurement of innovation. *See* OECD, *supra* note 72, at 11–17; Rachel Barker, *Measuring Innovation*, WOODROW WILSON INTERNATIONAL CENTER FOR SCHOLARS (Mar. 21, 2011), *available at* http://americaandtheglobaleconomy.wordpress.com/2011/03/21/measuring-innovation/.

[76] PRUD'HOMME, *supra* note 8, at 119.

[77] CHINA 2030, *supra* note 5, at 35.

Alongside such progress should come specific reform of the intellectual property protection regime in China. Of course, protection of valid intellectual property rights, without regard to the identity or nationality of the owner is vital. In addition, China's patent laws also should be reformed to more closely require substantive innovation achievements as a pre-requisite to granting of utility model patents.[78] And trade secrets should be better protected. The judicial administration of trade secret litigation is problematic, both because of questions of the independence of the judiciary from governmental or political decisions and because evidentiary requirements in Chinese courts place unnecessary obstacles in the way of plaintiffs seeking relief from trade secret misappropriation. For example, a plaintiff must prove to a Chinese court that: (1) its business secret meets the statutory requirements, (2) the information of the defendant is similar or substantially similar to its business secret, and (3) the defendant has used unfair means.[79] Yet, "[b]ecause there is no U.S.–style discovery in China, plaintiffs must collect and submit their own evidence to meet their burden of proof regarding, inter alia, trade secret misappropriation and damages [and] Chinese courts rarely accept evidence unless in its original form; therefore, documentary evidence is practically the only form of evidence that carries significant weight in a Chinese court."[80]

The Chinese government additionally should consider direct policies that incent collaborative cross-border success. For example, a tiered R&D tax credit could be made available to Chinese and multi-national firms that form a collaborative innovation-based enterprise. The amount of the tax credit could be increased after three years, and again after five years if the collaborative enterprises remain productive. That would boost the continuation, not just creation, of collaborative enterprises.

Indeed, as a general matter, it is important for China to consider the impact of its innovation and intellectual property rules and regulations on the incentives for cross-border collaboration and R&D investment in China.[81]

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78 MOGA, *supra* note 13, at 31.

79 Interpretation of Supreme People's Court on Some Issues Concerning the Application of Law in the Trial of Civil Cases Involving Unfair Competition art. 14 (Announcement of the Supreme People's Court) (Jan. 12, 2007), *available at* http://www.fdi.gov.cn/pub/FDI_EN/Laws/law_en_info.jsp?docid=76558.

80 J. Benjamin Bai & Guoping Da, *Strategies for Trade Secrets Protection in China*, 9 NW. J. TECH. & INTELL. PROP. 351, 362 (2011). In addition, evidence that originates outside of China is only admissible in China if it is notarized in the foreign country, confirmed by a Chinese embassy or consulate and then translated into Chinese in China by a translation company that is authorized by a Chinese court. *See* J. Benjamin Bai, Peter J. Wang & Helen Chang, *What Multinational Companies Need to Know About Patent Enforcement and Patent Litigation in China*, 5 NW. J. TECH. & INTELL. PROP. 449, 459 (2007).

81 For example, SIPO released a set of Draft Regulations on Service Invention in November

CONCLUSION

This Article has briefly reviewed China's current emphasis on the number of patents that are filed by Chinese enterprises, concluding that such quantitative measures may not foster the kind of innovation, especially breakthrough innovation, that China seeks. At the same time, those kind of numerical metrics, alongside other barriers to multi-national participation in the extant China innovation ecosystem, such as inadequate protection of intellectual property rights, discourage cross-border collaboration of the kind that provides a robust pathway to breakthrough innovation and that would benefit China's innovation goals. This Article concludes with suggestions, based on the authors' experiences, for the evolution of China's innovation policy, in a world of mutually–beneficial innovation. The authors look forward to continuing a conversation with technology and innovation experts in China, to foster mutual understanding, and facilitate improved collaboration.

2012 for public opinion. Service Invention Remuneration Regulations, State Intellectual Property Office of P.R.C. (proposed Nov. 12, 2012), *available at* http://www.sipo.gov.cn/tz/gz/201211/t20121112_769843.html. The draft Regulations intend to encourage innovation by providing incentives to inventors, however, "language in the draft Regulations would create an unreasonable cost burden on companies conducting R&D in China by driving up compensation levels well above international norms and creating significant administrative burdens for companies with active patent portfolios. These high costs and administrative burdens would make it difficult for domestic and foreign companies to invest in R&D in China, ultimately reducing the amount of innovation that occurs in China." US-CHINA BUS. COUNCIL, COMMENTS ON DRAFT REGULATIONS ON SERV. INVENTIONS 1 (2012), *available at* https://www.uschina.org/public/documents/2012/12/service-invention-comments.pdf.