1. The cores and contexts of China’s 21st-century national innovation system

Ken Shao

INTRODUCTION

China’s innovation economy is something we cannot afford to overlook. ¹ Fuelled by an alluring national innovation system (NIS) that strategically supports ‘self-driven innovation’, China is increasingly becoming (or in my expression re-emerging as) a global innovation enthusiast.² The government actively seeks the effective provision of nutrition to innovators and has clearly set its goal: by 2020, China will have a fairly

¹ There are now various statistics pointing in that direction. As the Global Innovation Index stated in its 2012 report, ‘China’s performance on the key knowledge and technology outputs pillar is outpaced only by Switzerland, Sweden, Singapore, and Finland’. See INSEAD & WIPO, The Global Innovation Index 2012: Stronger Innovation Linkages for Global Growth, p. 39. In the last few years, there have been many emerging studies on China’s patent statistics. For instance, the Third Asia-Pacific Innovation Conference held in October 2012 at Seoul National University had quite a few submissions on this topic.

² China’s re-emergence as a global innovation leader has deep historical and cultural roots. See Ken Shao, ‘History is a Key Decoder: Why China Aims at Re-emerging as a Global Leader of Innovation’, Law in Context, Vol. 29:1, 2013, pp. 117–132. For describing China’s innovation boom, ‘self-driven innovation’ is arguably better than ‘independent’ or ‘indigenous’ innovation. See Ken Shao, ‘Zizhu chuangxin and China’s Self-driven Innovation: Calling for a Holistic Perspective’, Cardozo Law Review de novo, 2013, pp. 170–71. In this book, we do not specifically distinguish the meanings of innovation, creativity, innovation economy and knowledge-based economy. In China, the term chuangxin (creativity or innovation) covers all these aspects.
well-established national innovation system that supports China’s construction of a comprehensive well-off society. Numerous challenges remain but if we are in general impressed by how China has achieved its economic miracle in the last 30 years, then we could be equally impressed by its innovation potentials – a key part of China’s next-stage reform objectives. And as we know, China can move fast.

This book, titled Innovation and Intellectual Property in China: Strategies, Contexts and Challenges, is a unique response to this striking phenomenon. In this book, we attempt to discuss the contexts of and challenges to China’s ongoing innovation and intellectual property (IP) strategies, which blossom under the wide spectrum of China’s comprehensive national innovation system. In particular, this book represents an effort to create a platform for a number of Chinese IP authors to introduce to the English-speaking audience a variety of ‘insiders’ perspectives’, which are followed by constructive perspectives of international authors. Importantly, ‘intellectual property’ in this book is not analysed from the popular, normative piracy perspective, i.e., viewing China as a leading pirate of foreign IP rights. Rather, it is discussed as a catalyst to China’s innovation economy, together with other catalysts such as talent plans, funding, industrial parks and creative clusters, and government support.

There exist many confusing, misconstrued impressions of China’s innovation boom, which is a result of ill-contextualized narratives of China that diffuse under broader cultural and ideological backdrops. For over a century, our world has accumulated an excessive amount of plausible ‘China information’ that needs to be replaced by ‘China knowledge’. This requires a holistic perspective of China, which can only

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4 For the latest debates on this, visit http://business.sohu.com/s2013/18shq/.  
5 This can be seen, for instance, from China’s new President Xi Jinping’s recent speech delivered in China’s foremost innovation park – Zhongguancun Science Park. ‘Xi Jinping: Implementing Innovation Drive cannot Wait, Window-shop or Slack’, Xinhua News, 1 October 2013.  
6 For instance, Western critics have used the term techno-nationalism and threats to describe the nature of China’s current innovation efforts. See Richard Wallace, ‘China Eyes “Creative” Industries in Intellectual Property Push’, Elec. Eng’g Times, 29 August 2005, p. 1.
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occur in pace with de-ideologization and when an authentic micro-perspective of China’s culture, history and present is adopted. For example, are China’s innovation efforts aggressive or inherently nourished by its creative cultural DNA? Where is China’s reform heading? Yet, China knowledge and the holistic perspective do not automatically mean insiders’ opinions, because China’s own heritage is, too, deeply misunderstood by many Chinese. But we believe that this book’s insiders’ perspectives, accompanied by the international perspectives, at least can serve as a better information seafood platter for our readers’ selection.

China’s 30-year reform has now entered into complex deep water. Solutions do not simply come from naive mimicry or irrational rejection of foreign experiences. China needs to enter into an era of ‘mature self-consciousness’ that has been fundamentally absent in China’s search for its own destiny since the early 20th century. Mature self-consciousness longs for a culturally self-conscious, independent and critical thinking soul that converts essential and often buried Chinese values and legacies into an internal driving force for the exploration of practically feasible ways of China’s future development. It should be rooted in an improved understanding of China’s own tradition and meanwhile actively assess the pros and cons of non-Chinese experiences. Many of China’s current efforts, including those about an innovation economy, increasingly reflect such a trend. Only a holistic perspective, not a cold-war aftershock or a yellow peril mentality, can help foreigners understand China’s future and have confidence in this.

The above will be further analysed in Chapter 1, which has a dual function. First, it will critically assess certain intriguing core components of China’s national innovation system from a holistic perspective. Such assessment also benefits from discussions with various innovation park officials in Wuxi region, Jiangsu Province. Second, it will provide a brief introduction to other chapters. As a whole, this book is well organized

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8 This now represents a top agenda for the Chinese government. See Zhou Rui, ‘Xu Shaoshi on Five Challenges to the Reform’s Deep Water’, *China News*, 31 May 2013.

but it by no means amounts to ‘uniform views’. Quite the contrary, the opinions and standpoints expressed by the authors are diverse. The relevant research in China is at an early stage, and there could be obvious differences in patterns and styles of writing and thinking between non-Chinese authors and their counterparts living in mainland China. As this is an edited book, the authors are solely responsible for their own works. Collectively, this book attempts to form a dynamic discussion forum of a cutting-edge topic.

1. A MULTI-LAYERED NATIONAL INNOVATION SYSTEM

It looks like China has almost suddenly come up with a multi-layered national innovation system. This includes many components such as innovation strategies and policies, implementation measures, R&D funding, talent plans, innovation parks, cultural industries, government procurement, technical standards, tax and financial services, venture capital, higher education and research institution reforms, schemes supporting new and emerging industries, technology commercialization, regional strengths, integrated planning, and of course, IP strategies and law-making. Collectively, these components do not have exact counterparts in other countries, and are systematic and coordinated by China’s ongoing legislative and institutional reforms. The term ‘national innovation system (NIS)’ was initially defined by Christopher Freeman, one of the most eminent researchers in innovation studies. All countries, if they can, should have such a system. This is justified by the necessity of establishing a self-determined ‘development impact assessment’ (DIA) framework, which Graham Dutfield has proposed. The WTO/TRIPS regime does not explicitly provision such a


11 For understanding the systematic and coordinated nature of China’s national innovation system, see, e.g., Ministry of Science and Technology, 2011 China Science and Technology Development Report (Chapter 2), Beijing: Science and Technology Documentation Press, 2012, pp. 17–34.


13 Graham Dutfield, ‘Making TRIPS Work for Developing Countries’, in Developing Countries and the WTO: Policy Approaches (Gary P. Sampson & W.
mechanism to its member countries living at very different development stages. It is thus left to each member country to create one. Yet, many countries do not have such a system, and are not even aware of such a necessity. They rely on the globally institutionalized, highly automatic IP pipelines, believing that this alone will create prosperity.\textsuperscript{14}

For decades, China’s market economy has been growing at high GDP rates, thanks to cheap labour, manufacturing and the world export market behind. Without playing a significant role in global innovation, does China seem to be eating its fill? There can be different answers to this question. A conventional argument is that China, through its labour-manufacturing model, connects itself with global trade and thus has dramatically developed its economy. This argument omits the keyword: the ‘value chain’ of the global trade, an inherent characteristic of the global market. Overall, Chinese manufacturers survive at the bottom of the chain. For instance, Apple controls 51.8 per cent of its profit in its entire value chain while its Chinese manufacturers only get 1 per cent.\textsuperscript{15}

As a world-leading economist Alan Deardorff has stated, welfare effect in developing countries can be affected by global owners of maximized patent monopoly.\textsuperscript{16}

Even worse, within that small profit range, Chinese manufacturers need to budget for everything, including cleaning up their factory sewage, which remains a fundamentally critical challenge for China. With profit-driven appetites in the small export nutshell, a dramatically improved Chinese environmental protection framework may not see an expected force, not to mention that the US industries and IP law practice discourage effective clean technology transfers to China.\textsuperscript{17} In addition, China has so many other domestic challenges, such as wealth gap, regional imbalance, low knowledge level that contributes to overall social

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underdevelopment, an unhealthy economic structure, and proven institutional deficiencies. All of them are waiting to be addressed. Only a knowledge-based and pro-innovation society can do a proper job.

A heartbreaking lesson learnt from the global financial crisis of 2008 (GFC) is that over-dependence on other economies should not be seen as a desirable outcome of globalization. Rather, there is always a sovereignty agenda in our globalized society. This agenda is, too, important to an innovation economy. The international IP regime tends to erode the city walls of national sovereignties. International standards, minimized trade barriers and IP harmonization work together to delude sovereignty. All of them maintain the existing global value chain, giving little flexibility to newcomers. Without a strategic, self-determined national innovation system, China can only let things drift. But this is precisely not what China wants. For a long time, China has had a plan for re-emerging as an innovator.

In China, the term ‘to construct an innovative country’ or ‘self-driven innovation’ is more popularly known than ‘national innovation system’. The milestone of modern China’s national innovation system is the *Guidelines on National Medium- and Long-term Program for Science and Technology Development* (2006–2020), which is a highly systematic master plan for a comprehensive national innovation system that suits China’s extremely complex economic and social transition. Self-driven innovation means that Chinese enterprises perform with their own power source, depend less on external or third-party intellectual fruits, and thus increase their share in the global value chain. Self-driven innovation can and should be achieved through different means, such as home-developed patents and original cultural goods, foreign technology acquisition, share control, takeover, exclusive licences, collaborations, and marketing and branding strategies. It certainly is not a synonym of ‘independent’, ‘indigenous’ or ‘self-reliance’, which means entirely home-grown, often in an isolated, duplicative or handicraftsman manner.

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18 Shao, note 2, p. 188.
19 The concept of sovereignty in national IP law and policy making is elaborated on by Peter Drahos. See Drahos, note 14, p. 4.
20 This was issued by the Ministry of Science and Technology of the People’s Republic of China on 9 February 2006. Available at: http://www.gov.cn/jrzg/2006-02/09/content_183787.htm. For its implementation policies, see http://www.gov.cn/ztzl/kjfzgh/.
21 SIPO Director Tian Lipu has defined it as ‘belonging to oneself, human created and new’. SIPO, ‘SIPO Director Tian Lipu on the Important Role of
The US government has expressed its concerns over China’s ‘indigenous’ innovation, in particular the Chinese policies on setting new technical standards and government procurement. In a lengthy investigation report by the US International Trade Commission, which criticizes China’s self-driven innovation policies, it appears that the writers were reluctant to not view the China–US relationship as simply one between ‘one of the world’s most innovative countries’ and ‘a globally dynamic manufacturing base’. China’s self-driven innovation is thus viewed as a major challenge to the US commercial interest in China. But soon the US turned to recognize that the two nations ‘share an interest in seeing China emerge as a prosperous technological innovator.’ This is an appropriate gesture because all countries have the right to become innovators.

As I have elaborated on in a 2012 paper, a ‘holistic perspective’ of China can dramatically reduce foreign concerns. Overall, a holistic perspective requires putting today’s China through a stretched lens and under micro-level contexts, which should include the above-mentioned international frameworks, domestic problems and solutions that are the major focus of this book and, very essentially, undistorted views of Chinese culture, both historical and present. I wrote:

A holistic perspective of China’s self-driven innovation needs to start with a proper understanding of history. Holding our historical treasure map, we will not stop at the Cold War or the China-West conflicts in the nineteenth and twentieth centuries. Rather, our precise destination is where China’s self-driven innovation and Chinese high-end cultural DNA converge. Here is where my holistic perspective of China’s history of innovation, creativity, and intellectual property – which is widely ignored in Western, and even Chinese, communities – is located.

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24 China is not alone. For national innovation systems of the BRICS, see José Eduardo Cassiolato et al., BRICS and Development Alternative: Innovation Systems and Policies, London: Anthem Press, 2009.
25 Shao, note 2, p. 172.
Only by understanding the firm roots of respecting creativity and innovation in the Chinese cultural DNA, can we view China’s self-driven innovation boom today as inherently natural, peaceful and useful for making China better under critical international and domestic conditions. Thus, a holistic perspective can create a more tolerant and mutually beneficial environment for both domestic and foreign stakeholders in China’s innovation waves. It can also shift our focus from ideologized concerns to possible improvements of China’s innovation system. In contemporary China’s complex social and economic transition, constantly portraying China’s national innovation system with plausible terms such as techno-nationalism, threats or even yellow peril might talk down an otherwise fairly healthy situation.

2. CORE COMPONENTS AND THEIR CONTEXTS

China’s multi-layered national innovation system is generated in external and internal contexts under which there are specific needs and challenges facing China. In my view, a good way of understanding this is to contextualize each core component of China’s national innovation system, e.g., funding policies, industrial preferences, talent plans, innovation parks, IP strategies, and integrated planning in a particular sequence. This section now proceeds to provide a contextualized analysis of four core components of China’s national innovation system.

Surprisingly, the very first agenda is probably not IP. Many may doubt China’s innovation capacity because they believe China has a very weak record on IP protection. But a knowledge-based economy is much more than IP; not to mention that the international IP regime is not automatically supportive of innovation growth in developing countries. China has since 2006 become a global top spender of R&D funding and there has been much discussion on this. This enables me to move to the next immediate question: once the money is put on the table, who is going to innovate?


27 Shao, note 2, p. 181.

2.1 Talent Plans

Who is going to innovate in China? This very first challenge is hardly attended to by Western IP scholars. In the 2012 China Business Climate Survey conducted by the American Chamber of Commerce in China, human resource constraints received a 43 per cent dissatisfaction rate, which topped the entire survey questions, including that of IP infringement. The survey concluded: ‘[f]inding qualified talent – both at the managerial level and below – is a major concern … This year AmCham China members ranked management-level human resources constraints as their top business challenge.’

This high dissatisfaction rate with China’s human resource quality should not lead to a totally irrelevant concern that a large proportion of China’s poorly educated population may pose uncertainties to world stability. Rather, a cultural-historical perspective can shed some light on it. Chinese culture by its nature used to be highly civilized and based on education and knowledge. For complex external and internal reasons, China’s quality of human resources has sharply declined in the last few centuries. The Cultural Revolution (1966–1976), in particular, drastically damaged China’s education foundation. When Deng Xiaoping re-opened China’s door, China had an exploded, poorly educated population that was only suitable for labour-intensive manufacturing in the then well-established global trade network dominated by key players such as the US and Western Europe.

However, the reformist government believes in Deng’s famous saying: ‘science and technology are the number one productivity’. For China, a civilization based on knowledge and talents, the labour-intensive model, which had never been Deng’s goal, can only be an interim anomaly.

Reconstructing China’s human resource foundation is as difficult as building the Great Wall. China has spent 30 years on preparation work. This includes re-establishing foundation areas of scientific research, higher education reforms, sending students back overseas and so on. The Strategy of Rejuvenating China with Science and Education (the RCSE

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30 For these external and internal factors, see Ken Shao, History is a Key Decoder, pp. 124–125.
Strategy) was created in 1995, representing a major milestone in post-1978 China’s human resource rebound. So far, there have been various talent plans created to suit China’s needs. One of the early policies is the Hundred, Thousand and Ten Thousand Talents Project. In 2010 the Chinese government issued the National Medium and Long-Term Guideline of Talent Development Plan 2010–2020 (the Talent Development Plan). It covers comprehensive aspects of stimulating the knowledge-based economy by properly rewarding all kinds of talents and innovative efforts. In an early study of China’s innovation economy, I mentioned that the Talent Development Plan is designed to become a final resolution of bringing China back to a knowledge-based state.

For the last 30 years, a major talent strategy for China has been encouraging Chinese students and scholars to study abroad. The reason is very clear: for decades China had been left far behind by developed countries and learning from them is one of the most feasible ways to catch up. The latest research shows that for over 30 years China has sent 2.24 million students overseas, of which 36.5 per cent have returned. A fundamental dilemma facing international students in developed countries is the accessibility of career-enhancing training and work experience that take years to build up. Thus, China could not be too impatient to bring its ‘expats’ back before the harvest season comes.

In 2008 China launched a massive overseas talent scheme – the Thousand Talents Program. Developed by Li Yuanchao, former head of the Central Committee’s Organization Department, the Program creates a multi-layered strong incentive system for attracting senior and junior Chinese talents working in overseas institutions and companies to return.
to China.\textsuperscript{39} Certainly, in a globally free market, China is free to release policy incentives that attract its expats to return. Despite the ‘not-quitesure’ feelings among many overseas Chinese expats, the ‘war for talent’ is emerging between China and key international innovators.\textsuperscript{40}

The 15th-century English patent privilege was devised to introduce existing technologies from more developed states in Europe.\textsuperscript{41} China today lives in an entirely different world, in which patent laws are no longer territorial or imitation tolerant. What England used to do is today defined as piracy. The US immigration schemes are appealing to foreign talents but their Chinese counterparts are not.\textsuperscript{42} Resources such as substantial financial rewards, housing benefit and access to opportunities arising from China’s economic boom are the real incentives. By providing strong incentives, the Chinese government clearly understands that overseas Chinese talents may bring back knowledge, experience and technology that meet international standards.\textsuperscript{43} From this comparative perspective, the Thousand Talents Program precisely hits the point.

Other incentive programmes attracting overseas returnees and domestic talents include the 530 Project of Wuxi City, Jiangsu Province and its rivals in neighbouring cities and other competitive regions. These projects aim at providing different categories of substantial seed funding to Chinese domestic high-tech and cultural projects that are at an early stage of commercialization.\textsuperscript{44} Recent noteworthy progress can be found in the Nanjing Nine Principles issued in 2012 in Nanjing city, the capital of

\textsuperscript{39} The Program’s official website is http://www.1000plan.org/. For its policy background, see http://news.xinhuanet.com/newscenter/2009-01/07/content_10620815.htm.


\textsuperscript{42} For how migrants support the US innovation economy, see the Partnership for a New American Economy, \textit{The Role of Foreign Workers in the Innovation Economy}, 20 November 2012.


\textsuperscript{44} For a discussion, see Shao, ‘Patent Law, National Strategies and Policy Incentives’, p. 101. The 530 Project is now completed and upgraded to post-sale supporting schemes. But in other surrounding cities such as Yixing, projects such
Jiangsu Province, one of China’s most developed provinces adjacent to Shanghai. This policy aims to relieve employees (including both domestic talents and overseas returnees) in Nanjing-based universities, research institutions and companies, as well as university students, from their normal workload so they can engage in commercial activities meeting their innovative specialties. These activities will count towards their promotion assessments or course credits. This further allows the distribution of up to 95 per cent of the profit of employment inventions to the employee-inventors in universities, research institutions and companies, and allows patents to account for up to 70 per cent of a company’s equity. These policies all reflect a philosophy of upgraded, dynamic and after-scaffolding support that aims to give talents elevated platforms for contributing in the real ‘battlefields’. The Implementation Plan for the Hundred, Thousand and Ten Thousand Talents Project issued in early 2013 represents the latest example of this philosophy.

A key objective of China’s government reform in recent years has been to improve the capacity of government services. Local governments in developed regions have made genuine efforts to upgrade their infrastructure and experience in serving talents’ projects and needs. Suzhou City next to Shanghai is one of China’s richest cities. Suzhou has established a coordinated, supportive and well-funded implementation platform for serving talents. In 2011 Suzhou’s talent funding was about US$150 million. Some appointees of the Thousand Talents Program have quickly stimulated the establishment of hundreds of upstream and downstream companies for Suzhou in just a few years. In 2011 the total sales created by companies established by overseas returnees in Suzhou reached US$1.17 billion.

There are of course many problems and challenges. Despite continued efforts in reforming China’s education, funding and scientific systems, China needs to further improve its overall environment – including funding distribution and salaries – for talents to deliver their creative contributions. The remaining problems continue to fuel significant as the Talent Program for the Pottery Capital still remain to serve the same function.

48 For existing problems, see the State Council, Report on the Allocation and Use of the State Fiscal Sci-Tech Fund, 22 October 2013, available at:
outflows of Chinese human resources to developed countries. Studies show that talent plans in China’s less-developed regions are not very attractive. Overall, appointees of the Thousand Talents Program mainly contribute to research rather than entrepreneurial activities. However, these challenges may not represent a crisis. Talent outflow, if being viewed as future talent reserves, may create long-term international linkages for the Chinese economy. China’s institutional deficiencies may be of real concern for returnees but further reforms are under way and those who have successfully returned may contribute to institutional improvement. In fact, economic studies indicate a positive net effect of the Thousand Talents Program.

Concerns over regional gaps on attracting talents do not really make sense. The effect of talent plans, including their industrial effect such as shown in Suzhou, must first be examined in developed regions which lead China’s innovation economy. Less developed regions are not yet ready for a substantial inflow of talents but can start from their regional competitive potentials such as biodiversity, labour cost and less pollution. It is noteworthy that China’s new leadership is determined to improve regional and urban–rural balances in public services, such as education and health care, in China’s next-stage urbanization. This, together with other factors such as regional competitive potential and more affordable


52 Shao, note 2, p. 189.
54 Chinese provinces and major cities all have their own ambitious and competing talent plans. For details, see Shen & Zhu, ‘The Provincial Comparative Analysis of Global Experts Import Policies in China’ (No. 10CRK004).
55 Urbanization was China’s ninth most important reform measure in 2013. For a recent discussion, see http://cppcc.people.com.cn/n/2013/0530/c34948-21665862.html.
housing prices, will eventually see more talents flowing to less developed regions. Chengdu Tianfu Software Park in Sichuan Province is a classic example.56

The challenges to China’s talent plans and the overarching national innovation system are ultimately a human resource issue. The quality of Chinese human resource limits the capacity of China’s political, legal, institutional, economic and educational reforms.57 For instance, the extent to which the environment for talents to innovate can be improved is often subject to the local human resource quality in venture capital management, government service and market development capacities. Thus, human resource is both the core crux of, and the core solution to, China’s overall transitional reforms as well as its innovation-based economy.

2.2 Innovation Parks and Industrial Preferences

In addition to supporting academic researches, China’s talent plans encourage talents to lead industrial development of intellectual fruits. The above-discussed Nanjing Nine Principle and Wuxi’s 530 Project are efforts that focus on how to motivate innovators to commercialize their knowledge fruits. This can be further demonstrated by the crucial roles that China’s innovation parks and policy-driven industrial preferences play under the national innovation system.

Modern Chinese economy has an established position in the global value chain discussed in Part One of this chapter: a labour-intensive and export-driven manufacturing model. This unsustainable model, to a great extent, has already lost its chance in competing in existing high-tech industries owned by developed nations. China thus has to turn to key and emerging industries, such as biotechnology, new materials, new energies and LED technologies, in that all countries arguably stand at the same scratch line.58 This understanding is fully reflected in the Decision on Speeding up the Cultivation and Development of Strategic Emerging

56 For details, visit its official website: http://www.tianfusoftwarepark.com/.
57 Shao, note 2, p. 187.
Industries (2010) issued by the State Council.\textsuperscript{59} Government support such as reward, tax and procurement are not a Chinese invention.\textsuperscript{60} They are justifiable due to the high uncertainties of these industries.\textsuperscript{61} Since recent years, many of these emerging industries have been fostered and supported in China’s leading innovation parks and creative clusters where domestic and overseas Chinese talents engage other components of the national innovation system, such as R&D funding, venture capital investment, tax and financial services, government procurement, and the creation of technical standards.

The construction of innovation parks is a striking phenomenon in China’s recent progress of modernization.\textsuperscript{62} Back to the 1990s, China started to build innovation incubators in many cities but these early-stage practices were different from the innovation parks that have appeared in recent years. As have been mentioned, China’s innovation parks engage with various new policies that are part of the national innovation system and have diverse functions aiming to suit the needs of companies developing at different stages. Incubators remain a part of innovation parks, but not the central part. Now in many cities innovation parks are up and running but those in developed regions attract more experienced management personnel and thus possess greater capacities of supporting innovation and technology commercialization.\textsuperscript{63}

In various leading innovation parks, the government’s initial scaffolding is crucial but companies are required by policies to fly by themselves

\textsuperscript{59} For its official copy, see http://www.gov.cn/zwgk/2010-10/18/content_1724848.htm.
\textsuperscript{60} For instance, South Korea’s technical standard-setting is viewed by OECD as a powerful driving force for innovation. OECD, \textit{Reviews of Innovation Policy: Korea}, 2009, p. 244. For the government’s supporting roles, see Zhou Yingchun, ‘The Effect of Government on the Developing Emerging Industries of Strategic Importance’, \textit{Forum on Science and Technology in China}, No.1, 2011, pp. 20–24.
after certain stages. In provinces such as Jiangsu and Zhejiang, many innovation parks have their own on-site governments. This strategic deployment aims to improve the accessibility of government services to the knowledge-based companies in the parks. These governments are formed by different offices that try to provide all-in-one support. The context of the above needs to be considered: that is, the quality of government service in China remains as a known area of deficiency, which has been identified as a fundamental target of the next-stage reform by China’s new leadership group.

The planning and designing of innovation parks represent another essential feature of China’s innovation system. New-generation Chinese cities and innovation parks embrace an elegant, bright and Chinese-humanistic philosophy of design. Innovation parks, often close to universities, industrial parks and/or scenic areas, are designed to be inspiring, grand and energy-boosting spaces for work, living and entertainment combined. In recent years, many parks have built quality apartments and houses exclusively for talents working in the parks. Cities such as Hangzhou and Suzhou, which have substantially inherited Chinese high-end tradition, are good examples of harmonizing natural environment, Chinese culture and innovation parks for stimulating creativities and pleasing busy minds. Studies show that high-level planning and designing of China’s innovation parks have proven positive impacts on attracting talents to work and thus form a cumulative power of gathering more people.

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65 As being found on my fieldwork to various innovation parks in China.

66 For instance, the government holds decision-making power over 18,000 administrative approval items. A recent news report shows that government officials attribute this phenomenon to poorly designed government-industry relationships. The planned economy era and its poor human resources are clearly the cause. See ‘China Still Has 18,000 Administrative Approval Items’, *Beijing Youth Daily*, A03, 20 October 2013.


It is not surprising that China’s innovation parks play a vital role in implementing innovation policies. For instance, in Zhongguancun Science Park, China’s foremost innovation park located in Beijing, there are more than 5000 enterprises with at least 15,000 overseas returnees. The number of listed companies in it adds up to 224. It also accommodates 67 state-level laboratories, 27 national engineering research centres, 28 national engineering and technological research centres, 24 university S&T parks and 29 overseas student pioneer parks. Zhongguancun enterprises have formulated 86 important international standards like TD-SCDMA, McWill and IGRS. In 2012, the gross income of companies in Zhongguancun was US$407 billion.69 Most of these successful companies focus on emerging industries.

To further boost China’s emerging industries, in mid-2012 the State Council issued the Development Plan of the Strategic Emerging Industries during the 12th Five-Year Plan. A noteworthy focus of the Plan is environment protection technology, which so far has not been rapidly developed for treating China’s critical air, water and soil pollution. Another very important focus is to improve financial and banking services for innovation companies, which remain a major area of institutional deficiency. The improvement includes dynamic models for short-term financing, medium-term note, growth enterprise markets, private funding, etc.70

This new Plan is expected to create an improved financial environment additional to the existing R&D funding and reward schemes, in that access to bank loans is a major challenge for China’s innovative companies, which usually start small. As a 2011 survey conducted by China’s Ministry of Industry and Information Technology shows, only 15 per cent of Chinese light industrial SMEs obtained a bank loan in 2011.71 These companies also face big challenges from China’s venture capital sectors, in which the lack of qualified fund managers has been identified by various studies as a major bottleneck.72 To implement the Plan, in August 2012, China issued a detailed policy that has established a State Sci-tech Finance Innovation Centre for providing a synergized financial

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69 Data obtained from Zhongguancun Science Park’s official website: http://www.zgc.gov.cn.
70 For its official release, see http://www.gov.cn/zwgk/2012-07/20/content_2187770.htm.
72 Shao, note 2, p. 190.
service to innovative companies in Zhongguancun Science Park.\textsuperscript{73} Financial reform in China must be prudential and a Zhongguancun-based pilot centre is a practically feasible solution.\textsuperscript{74}

However, whether China’s pro-emerging industry policies will, in Peter Drahos’s words, ‘be capable of making the jump into the patent-walled gardens of innovation’ occupied by multinational companies remains uncertain,\textsuperscript{75} although several Chinese industries such as its IT industry have emerged to lead the Chinese market.\textsuperscript{76} A substantial analysis conducted by the Research and Information System for Developing Countries (RIS) in 2009 warned developing countries of the potential patent barriers, in particular in biofuel and wind energy sectors.\textsuperscript{77} An OECD survey in 2008 showed that Brazil, India, China and Russia collectively only own about 6 per cent of renewable energy patents, while the EU, the US and Japan own almost 80 per cent.\textsuperscript{78} Although China’s PV industry occupies 50 per cent of the world market, it mainly specializes in PV module manufacturing, earning only 8-10 per cent in the global PV value chain.\textsuperscript{79} Statistics show that China’s car industry is predominately controlled by foreign core technologies.\textsuperscript{80} This situation has eased the US concerns as American companies ‘appear to have

\textsuperscript{73} The policy is available at its official website: http://www.zgc.gov.cn/zcfg10/bjs/88140.htm.
\textsuperscript{74} The same philosophy applies to China (Shanghai) Pilot Free Trade Zone, which was established on 29 September 2013. The Zone, focusing on financial reforms, may be one of China’s most significant economic developments in over three decades. \textit{See} Tom Phillips, ‘Shanghai free trade zone launched in major economic pilot scheme’, \textit{The Telegraph}, 29 September 2013.
\textsuperscript{80} Yu & Chen, \textit{Current Situation and Challenge of Technological Innovations in Chinese Strategic Emerging Industries}, p. 693.
continued to expand production of vehicles in China’. For competition purposes, minimizing China’s profit in the global value chain is a desirable effect for multinational companies.

These external challenges are deeply linked to the established international environment of IP gambling and can interact with domestic challenges, especially human resource constraints that lead to inexperienced investment mindsets, institutional deficiencies and limited capacity of financial service. For instance, as the China Sustainable Development Strategy Report 2011 has warned, most Chinese provinces list clean energy as a key development area, which can easily lead to overproduction and resource waste. This risk is caused by real inexperience in understanding regional specialties, local technological capacities, supply and demand, and market return and risks. It can also lead to real estate speculation, given China’s increasing urbanization. The interaction between external and internal factors might also have pushed China to a ‘treasure hunting’ approach. Innovation parks and their funding schemes, for instance, rely on a speculation that the government will be able to pick up some successful or landmark high-tech companies from those selected. While China may have sufficient funding capacity to sustain all these risks, given the complex internal and external factors discussed in this chapter and elsewhere, it remains uncertain whether this government-oriented approach can generate desirable results.

2.3 IP Strategies

IP strategies play a crucial role to the above-mentioned core components of China’s national innovation system. Until very recently, however, discussions concerning IP in China had been dedicated to the violations

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82 See Chapter Ten for more details.

83 These internal challenges were identified, for instance, at the latest Development Forum of China’s Strategic Emerging Industries 2013: http://finance.sina.com.cn/focus/2013zgzlxxyfzhl/.


of foreign interests. Harvard Law Professor William Alford’s work on China’s history of IP has lead – to borrow Peter Yu’s words – ‘a whole generation’ of Western IP scholars to believe that IP protection and China simply do not match. This psychology-driven reluctance has contributed little to the recognition, as observed by Richard P. Suttmeier, a pioneer in the research of China’s innovation economy, that in China ‘there have been many changes in … a variety of legal and institutional steps … taken to protect intellectual property’.

Suttmeier’s observation was made two years after China issued its National Intellectual Property Strategy Outline 2008 (hereafter the IP Outline), and can be supported by more recent statistics. In the American Chamber of Commerce in China’s AmCham-China Business Climate Survey (2011), IP violation is not a more severe problem than others. Human resources constraints, as previously stated, is. Overall, the dissatisfaction rates for IP, protectionism, corruption, bureaucracy, contract enforcement difficulties and other challenges are close to each other. This finding can be further supported by a conclusion in the 2011 American Business in China White Paper: ‘We are pleased that 2010 closed with IPR highlighted as a Chinese government priority and recognize that the special IPR campaign has been active and well-conceived.


89 See Chapter Two for details.

90 The American Chamber of Commerce in China, AmCham-China Business Climate Survey, 2011, p. 11.

The above is not the focus of this chapter. The focus is China’s use of IP strategies in boosting its domestic innovation economy, which will be further discussed in Chapters Two and Five. The *IP Outline* is a state-level strategic deployment that was a result of four years of hard work of the Leading Group of the National IP Strategy Formulation Working Group chaired by former Vice Premier Wu Yi. The term ‘strategy’ in China’s own context means the highest-level planning. China understands that as compared to tangible properties, IP is an essential part of public policies that must consider domestic conditions in a changing global environment. IP laws and policies thus must support China’s overall development sailing under the flag of the national innovation system.

Since the promulgation of the *IP Outline*, China has seen the establishment of local IP strategies, implementation measures, continued IP law-making and various supporting infrastructures and actions for an improved environment for innovation. Since 2008, China has amended and created about 54 IP-related laws and policies; most Chinese provinces, major cities and key industries now have specific IP strategies; IP offices exercise coordinating networks together with various departments and commercial sectors (including innovation parks), and their human resources have been improved, thanks to multi-layered education and training programs. There are now many studies on China’s patent surge and its globally leading status, though the quality of these patents may need further assessments.

In a recent study, Xuan-Thao Nguyen concluded that quantitative and qualitative researches demonstrate that over 95 per cent of the IP litigations in China are brought by Chinese firms and China is quickly moving to a strong IP regime, a phenomenon that is not really seen by

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92 The official website of China’s National Intellectual Property Strategy is http://www.nipso.cn/.


the Western normative – or as I stated earlier – ‘Alford-style’ thinking. From 2008 to 2013, Chinese courts have accepted over 245,000 IP civil cases with an annual increase of 37.6 per cent. This number does not include that of administrative measures and criminal enforcements. As Chapter Five will show, the IP judicial interpretations and polices issued by China’s Supreme People’s Court demonstrate a high-level understanding of IP’s roles in China’s overall development.

As we have already shown, China’s IP strategies operate under the national innovation system and thus must consider domestic conditions in a changing global environment. China is aware of the danger of unreasonable global IP expansions. Benefiting from the interpretive flexibilities under the harmonized international IP principles and rules, China has been able to establish stricter patentability criteria and universal prior art pools in specific technological areas for reducing incoming junk patents from developed countries. Chinese IP courts have made efforts to attend to different and balanced interests in China’s transitional economy. In 2012, Measures for the Compulsory Licensing for Patent Implementation was revised to allow China’s State Intellectual Property Office (SIPO) to issue compulsory licenses to local firms in cases of state emergencies, unusual circumstances or in the interests of the public. That being said, it remains uncertain the extent to which China’s IP strategies can stretch legs in the packed global patent garden, especially when regional and industrial human resource capacities of initiating and implementing IP strategies require further improvements.

To summarize, China’s national innovation system is not limited to the above-mentioned four core components. Ultimately, all components of China’s national innovation system require national, regional and industry-specific integrated planning, which involves sophisticated coordinating capacities across numerous sectors. All of these should be understood in China’s transforming reality that contains sharp regional gaps and complex social conditions in a locally and globally challenging environment.

98 Drahos, note 14, p. 232.
99 See Chapter Five.
100 See Chapter Two.
101 See Part Four of Chapter Four for some of these challenges.
3. THE CHAPTERS

This book has ten chapters. Chapter One is contributed by the present author and offers a holistic perspective that contextualizes certain characteristics of and specific challenges to four core components of China’s national innovation system, i.e., talent plans, innovation parks, industrial preferences and IP strategies. These core components are analysed in a particular sequence relevant to China’s internal and external conditions, together with other important components such as financial service, venture capital and technology commercialization. Chapter One argues that China’s national innovation system takes place in unique, forward-looking backgrounds and is operated by integrated planning efforts that will be more visible in China’s next-stage reforms. This contextualized and micro-level approach may help to shift the Western normative impression of China being a rampant pirate to the understanding of why and how China aims to re-emerge as a global innovation leader, amid numerous external and internal challenges.

Chapter Two, contributed by Dr Zhang Zhicheng, Deputy Director General, Protection and Coordination Department of SIPO, focuses on the ‘roadmaps’ of China’s National Intellectual Property Strategy Outline 2008 (the IP Outline). It contextualizes and depicts what was in the mind of Chinese policy-makers when the IP Outline was formed, issued and implemented. One of the fundamental challenges haunting the Chinese IP policy-makers was how to make the IP Outline suitable for China’s development. Chinese policy-makers face various key agendas that do not necessarily go along with each other. Knowledge-based economy, regional interests, a labour-intensive model, pollution, industrial preferences, international competitiveness and, of course, foreign requests are some of the examples. Many of these challenges hardly exist in today’s developed countries and thus are not straightforward for non-Mainland-Chinese readers. The method that Chinese policy-makers used in designing the IP Outline reflects an essential Chinese way of thinking: comprehensive, long-term and balanced.

Chapter Three, contributed by Associate Professor Yang Lihua, provides an outlined overview of post-1949 China’s political thoughts, policies and laws concerning science, education, intellectual property and innovation. The author takes a rather Marxist approach to this. Ideological hormones do not have to be released when reading it, in that...

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102 For details, see Chapter Two.
every author has the freedom to express his/her own views. However, it should be noted again that building a dynamic innovation-based economy in the global context could not have happened during China’s era of planned economy, during which China had missed out on golden development opportunities after the World War II. As has been previously demonstrated, this critical challenge stimulated Deng Xiaoping’s reform policies. Because there have been so many issues facing the reform agendas of Deng and his successors, political wish lists of ‘rejuvenating China through knowledge’ did not have a chance to generate desired outcomes during the 1980s and the 1990s, and this task still remains a real challenge today.

Chapter Four, contributed by Professor Feng Xiaoqing, opens by pointing out a crucial but widely ignored fact that China’s self-driven innovation does not mean re-inventing everything but improved ownership of innovation fruits. Chapter Four also attempts to identify various important institutional and legal challenges faced by China’s innovation efforts. For instance, laws and policies are not detailed enough to provide sufficient support to key stakeholders; implementations of IP strategies are not strong in many Chinese firms. As Chapter One has demonstrated, many of these problems, to their very inherent origins, derive from China’s poor human capital quality, which has been a key reform target since Deng Xiaoping’s era. Readers should not misinterpret some of the problems mentioned by Chapter Four. For instance, many problems Chapter Four has identified are more evident in innovation parks and firms in less developed regions. Innovation parks in developed regions of course face challenges too but can better facilitate the understanding of China’s innovation policies.

Chapter Five, contributed by Dr Kong Xiangjun, President of Intellectual Property Tribunal, the Supreme People’s Court of China and his colleague Du Weike, is a systematic presentation of the first-hand, leading experience of China’s judicial role in the IP area. The IP judicial interpretations and policies discussed in Chapter Five represent Chinese courts’ high-level legal skills that attend to the details of many controversial IP cases. The key words of Chapter Five are ‘efforts’ and ‘tendencies’. Statistics discussed elsewhere clearly endorse these efforts. As Chapter Five shows, there are notable tendencies that see adapting the judicial IP practice to China’s transforming economy and society. This means a balanced but challenging approach for the needs of knowledge-based economy, the public interest, regional differences, social conflicts,

103 See Chapter Four, Introduction.
and foreign investment. It needs also to be pointed out that Chinese courts and judges have an incredibly heavy workload. Efforts must have been huge.

Chapter Six is contributed by Professor Michael Keane, the first non-Chinese scholar to write about China’s creative clusters. Broadly speaking, creative clusters can be viewed as part of China’s innovation park strategies but mainly focus on fostering cultural industries (also called creative industries) such as arts and media. Chapter Six draws a thoughtful analogy between the status quo of China’s creative clusters, most of which ‘remain in the first stage’, and the 1990s early-generation innovation incubators in China, most of which ‘inevitably failed to deliver measurable innovation and ultimately served as revenue generating sources for district governments via real estate speculation’. Despite successful stories of modern China’s nascent creative industries, such as those from China’s increasingly original film productions, we are reminded by the delicate study of Professor Keane that there could be a long way to go for China to enhance cultural creativity. As Chapter Six also points out, it is too early to assess the effects of China’s creative clusters. Such an assessment is not the aim of this book. What we can learn from Professor Keane’s work is that China is yet to acquire further experience, both at institutional and human capital levels, for driving its creative industries and innovation economy.

Chapter Seven provides us with a detailed understanding of how foreign investment in China influences China’s indigenous efforts in innovation. Dr Peter S. Hofman, Dr Alexander Newman and Dr Ziliang Deng used data drawn from the annual reports filed by industrial firms with the National Bureau of Statistics over the period 2005–2006 – the early development stage of China’s present innovation system – to examine the main factors determining product innovation in private Chinese small and medium-sized enterprises (SMEs). One of its findings is that higher levels of foreign direct investment (FDI) in industries at the provincial level impact negatively on product innovation in SMEs, and thus the general belief that FDI creates knowledge spillovers needs to be refined. In fact, uneven allocations of financial and administrative resources occur not only between foreign and Chinese firms, but also among Chinese firms. Other studies show that in an innovation park, for instance, big companies naturally occupy more resources than small ones. One solution is to encourage different firms to explore different

104 See Chapter Six, Introduction.
markets. But this solution can be less effective in a global context, in which multinationals possess far advanced resources.

Chapter Eight, contributed by Emeritus Professor Seamus Grimes whose research interests include multinational R&D in China and China’s innovation policy, represents a study of the more recent R&D activities of multinationals in China. This study benefited from his 50-hour interviews with Shanghai-based multinational R&D centres in 2009–2011. This chapter attempts to understand how multinationals have been transforming their profit models in China since the 1980s in an evolving environment that now gives China a very strong bargaining position for pushing multinationals to contribute to China’s innovation output as a prerequisite for gaining greater access to China’s vast market. This, as Chapter Eight argues, seems to be in contradiction with those multinationals’ traditional strategies in China, which saw China as a low-cost manufacturing centre for generating maximized profit for foreign companies without the need for effective technology transfer. Multinationals may not be willing to let China and their labs and competitors in China to have access to their core IP, which is traditionally controlled by their headquarters outside of China. However, the general tendency is that multinationals are aware of the benefit of engaging innovation in China, at least at certain levels where there are many other new players to compete with. I think this highly dynamic reality reflects China’s struggle in a challenging global climate of IP and innovation. China is gambling on the view that the Chinese market remains much too attractive for multinationals to relocate to other regions and the result remains to be seen.

Chapter Nine, contributed by Professor Wei Shi, and Chapter Ten, contributed by Chair Professor Peter Yu, bring us to an elevated landscape of the international realities. Benefiting from a delicate examination of various economic and empirical studies of the functions of IP in national development, Chapter Nine insightfully points out that ‘IPR can either … promote or hinder economic growth, depending on how it is oriented on the “ladder of development”, and … developed countries are attempting to “hide the secrets of their success” and “kick away the ladder”’. The hidden secrets are ‘tolerant’ or weak IP laws and policies that had been strategically used by many developed nations for their development needs. These strategies had been part of their innovation

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plans and may explain why nations such as the US and Japan are leading the world’s innovation economy. This, again, reminds us of one of the core arguments in Chapter One: the first agenda of China’s innovation system is probably not IP, but others such as talent plans, emerging industries, funding and financial services.

Unfortunately, through international IP law harmonization, the development ladder has been largely kicked away by developed countries. As Chapter Ten points out, although the TRIPS Agreement had to include certain flexibilities and transitional measures to help countries ‘buy time’ to update their intellectual property systems, each country’s capacity to strategically use these flexibilities is different and can be limited by TRIPS-plus bilateral and multilateral agreements – such as the Anti-Counterfeiting Trade Agreement (ACTA) – that restrict how the TRIPS Agreement is implemented in developing countries. Together with other tactics such as a networked operation of patent offices, the TRIPS-plus magic will worsen the kick-away effect. It seems that China is better positioned than many other developing countries. In addition to using IP strategies for a more development-friendly environment, China has been able to start its innovation engine by other powerful means, including pushing multinationals to innovate within China. However, to what extent China’s other means can overcome the kick-away effect of global IP powers remain uncertain.

CONCLUSION

China aims to return as a global innovation leader in the near future. Overall, China has now put in place a multi-layered and forward-looking national innovation system. In it, talents and human resources, which remain a fundamental challenge for China, are a major target of China’s innovation policies. China invites quality talents to contribute to the country’s innovation efforts, in particular to the commercialization of knowledge fruits in internationally key and emerging industries. Many of these commercial projects are supported by well-designed, intellectually stimulating innovation parks in China’s developed regions. Improved domestic IP systems, together with other mechanisms, aim to provide support to innovation as well as various other interests in China’s transforming economy. Making all of these happen is not easy for China,

106 See Chapter Nine, Parts One and Two.
107 For how powerful patent offices involve in this, see Drahos, note 14.
a country with huge regional gaps and complex social conditions across its vast population. Integrated planning capacities thus form another key target of China's national innovation system.

The above efforts are accompanied by many critical challenges, which have existed and continue to develop in both domestic and international contexts. China’s policy designing and implementation capacities are yet to be upgraded to facilitate better market-oriented conditions for innovative and creative industries, closer academic-industrial linkages, more efficient funding assessments and allocation pipelines, and improved commercialization of intellectual fruits. Many of these are identified as key obstacles to China’s innovation capacity in a recent State Council policy release in 2012.108 On top of it is the critical international environment where powerful companies have put up fairly strong IP garden fences for late comers.

It is important to note that this chapter as well as the entire book is not necessarily a study of the outcomes of China’s innovation policies and laws, which are too new to be substantially tested. Certainly, there is a time gap between the grant of patents and their successful commercialization, not to mention that many nascent Chinese patents may not be high quality. The effect of education and talent plans can be long-term. Cultural industries continue to suffer from overall creative malnutrition. Institutional reforms represent a major challenge and must be accelerated to improve government efficiency in supporting knowledge-based companies in both developed and less developed regions in China. All of these will take years to get evaluated. But if we apply a holistic perspective of understanding China’s self-driven innovation, then we could be positive about the future.

Overall, a holistic perspective requires putting China’s striking innovation phenomenon into micro-level contexts, which should include the above-mentioned international frameworks, domestic challenges and solutions that are the major focus of this book and, very essentially, undistorted views of Chinese culture, history and present. This approach suggests that China’s re-emergence as a global innovation leader is natural, can be peaceful and should be seen as mutually beneficial. Global interdependence 'does not relieve the need for re-generation by

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one’s own efforts but enhances it’.109 To put it another way, the right to develop is a fundamental right for any nation and China is simply doing what has to be done.

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