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China's innovative nation and what it means for Australia



*China is emerging as an innovation superpower.
Can Australia benefit from this disruptive transformation?*

The rapid rise in China's economy over the last 38 years is an extraordinary phenomenon with profound implications both for disruption of the geopolitical balance of power and economic relations worldwide. This is in large measure attributable to the very clear ambition of China's

government following its opening up in the late 1970s, the unleashed energy and drive of its private-sector companies and the vast unfulfilled market demands of the Chinese people. A key priority of the Chinese government throughout this transformation has been creating an innovation ecosystem.

By innovation I mean the creation of a commercially useful product, process, service or business model that serves human needs in a new or improved way. Innovation is often incremental, but a creative business model based on technology can be disruptive when it provides value in a radically different manner. The foundations of an innovation ecosystem include not only research institutions in science and engineering, but also mechanisms to allocate funds to high-quality research, taxation policies to stimulate business investment including venture capital, incentives to commercialise ideas, and strengthening of a culture supportive of science and entrepreneurship through education.

China's success has been built on all of these foundations. It spends today 40 per cent of what the US spends on R&D, has built 146 high-tech parks across the country¹, exceeds the US in domestic patent applications, has almost caught up with the US in publications in scientific and engineering journals, leads the world in high-tech manufacturing output and exports and has bred companies that are now formidable global competitors.

Chinese firms' evolving innovation capabilities

In our three-year study of innovation in China, my colleague George Yip and I identified three phases in the development of China's innovation capabilities². In the initial phase firms got started by copying products from the West to satisfy exploding demand. Their products were often shoddy, but customers soon demanded better

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quality, forcing firms to provide products that were fit for purpose: with only essential features and reasonable in price.

In the second phase, companies aspired to reach world standards so as to enter new sectors and deal with foreign competitors. Examples of such companies are: Alibaba.com (successful in forcing eBay out of the China market); internet-based giants such as Baidu, Alibaba and Tencent; telecoms equipment suppliers Huawei and ZTE; domestic appliance makers Haier and Joyoung; and a host of entrepreneurial start-ups.

¹ State Council, PRC, August 6, 2016. http://english.gov.cn/news/top_news/2016/08/05/content_281475409885715.htm

² George S. Yip and Bruce McKern, *China's Next Strategic Advantage: From Imitation to Innovation*. Boston, MA: MIT Press 2016.

In the third and most recent phase, Chinese companies are deploying the capabilities they acquired in China together with the cash they have earned, to invest in the markets of the developed world. Their emphasis now is on securing brand-names, market access, global managers and technologies where needed. They are expanding beyond China to become competitors inside the markets of the developed world. Established multinational corporations (MNCs) now have to compete with them in their home markets.

How foreign companies can learn from China

An important lesson for business anywhere is that there are capabilities that foreign companies can strengthen by operating inside China. We identified the following:

- Bold experimentation and rapid iteration
- Innovation through creative adaptation
- New category creation
- "Lean value" focus
- Development of mixed teams and global leaders

These are addressed in detail in our book and a recent *Forbes* article³. Although the ideas are not revolutionary, Chinese companies practice them as a matter of course and other companies should be applying them, even if not operating R&D facilities in China.

The specific implications for Australia

Government: China's innovation drive demonstrates that there is an essential role for government in establishing the context in which innovation can take place. Government funding of basic research, as well as applied research, provides technologies that can be tapped by companies, generating spill-overs into private sector innovation⁴. The caveats are that when government funds research, it should focus on three priorities: creating an innovation ecosystem; supporting fundamental research; and ensuring there are incentives and mechanisms to commercialise ideas generated by researchers.

The task of supporting fundamental research in Australia rests primarily with the federal government. In 2014–15 Australia's GERD (Gross Expenditure on R&D by government, business and institutions) was \$33.5 billion, or 2.1 per cent

³ George S. Yip and Bruce McKern, 5 Strategy Lessons Companies can learn from China. *Forbes Asia*, June 6, 2016

⁴ Marina Mazzucato, *The Entrepreneurial State: Debunking Private vs. Public Sector Myths*. London: Anthem 2013.

of GDP⁵. While comparable to the EU average, this percentage is a reduction from its peak of 2.25 per cent in 2008 and less than the US GERD of 2.7 per cent of GDP. Of the 2014-5 amount,

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\$10 billion was funded by the federal government to support R&D. The balance (56 per cent of total GERD) was performed by the business sector and mostly funded by it. As in other countries, business spends most of its R&D expenditure on development.

Why is fundamental research important?

Can't we simply rely on ideas created by researchers elsewhere in the world and license what we need? The answer is that we do this; it is one reason why firms in Australia have less incentive to perform research locally. But even if we were to use only ideas from abroad, we would still need the capability to absorb foreign inventions, adapt them to our market, and improve on them. That requires local researchers.

More importantly, Australia needs engaging and remunerative employment for more of its people, from companies in Australia. That requires a scientific base to generate ideas entrepreneurs can turn into local innovations, which can also be licensed worldwide and exported as products and services. Breakthrough technology is not essential for every innovation, but technology coupled with new business models is a foundation of new businesses.

Prime Minister Malcolm Turnbull has made innovation a priority with incentives for collaboration and business access to research; refocusing of the Cooperative Research Centres (CRC) programme towards commercialisation; an Industry Growth Centres Initiative aimed at strengthening industry clusters in five sectors of the economy⁶; nine National Science and Research Priorities⁷; and actions to foster education in science, technology, engineering and mathematics subjects.

⁵ Gross expenditure on R&D (GERD), 8104.0 – Research and Experimental Development, Businesses, Australia, 2013-14. Canberra: Australian Bureau of Statistics, 19 April 2016.

⁶ The five sectors are food and agribusiness; mining equipment, technology and services; medical technologies and pharmaceuticals; advanced manufacturing; and energy resources.

⁷ These priorities are: food, soil and water, transport, cybersecurity, energy, resources, advanced manufacturing, environmental change and health (all priorities for China in its latest five-year plan).

Innovation is in the public eye and scientists and engineers are receiving publicity⁸ – a positive move towards changing Australian culture. But the support has not yet translated into increased funding. In the 2015-16 Commonwealth budget \$9.7 billion was allocated to R&D support, a decrease from the previous year. Funding of medical research, where Australia has undoubted strengths⁹, was reduced from the previous year by 10 per cent.

Many small countries invest more intensely in R&D than Australia: Israel spends 4.1 per cent of GDP, Sweden and Finland each spend 3.2 per cent and Denmark 3 per cent. Innovative companies based in these countries have become global leaders. So Australia's R&D budget should be increased to at least 3 per cent of GDP. This would mean total R&D investment reaching \$47 billion, including a further \$5 billion in government spending. Equally important would be an increase in private sector investment of roughly \$9 billion. Foreign corporations have deep R&D pockets: one US pharmaceutical company, Merck, spent US\$7.2 billion on R&D in 2015¹⁰ – as much as the Australian government and half as much as the entire corporate sector. Encouraging the private sector to increase its development spending locally would not be easy, but achievable.

Another issue for government is Chinese foreign direct investment (FDI) in Australia. In principle, FDI is beneficial to the host economy if it is additional to total investment. The caveats have to do with pricing, monopoly, taxation, where business decisions are made and how they can affect local output, employment and tax revenues.

It is therefore appropriate that the Australian government has a review process for inward FDI on a case-by-case basis. While investments by private entities, including Chinese, enjoy high thresholds, for state-owned enterprises the threshold is zero. China also has an approval process for inward FDI which is more restrictive than that of its major trading partners and not highly transparent. The Australian approach is more transparent and the chief criterion for approval in Australia is the national interest, in that respect not too dissimilar to China's.

⁸ The naming of Emeritus Professor Alan Mackay-Sim, a pioneer in the field of adult stem cell research, as Australian of the Year in 2017, sent an important message.

⁹ Australia was ranked number 3 in publications in the Health Professions field in 2015. But its ranking in molecular biology and related fields is closer to its average for all fields. SJR Scmago, Journal & Country Rank. [Schttp://www.scimagojr.com/countryrank.php](http://www.scimagojr.com/countryrank.php)

¹⁰ 2015 Global Innovation 1000 study. Strategy&, 2015.

Start-ups: In recent years Australia has become the home to many more start-up ventures than before. There is a developed venture capital industry and angel investor groups in the major cities. Some thirty incubators and accelerators, several not-for-profit, are operating across the country. They offer working space and a collegial atmosphere, as well as advice from mentors and entrepreneurs. The CSIRO also has two accelerator programs, which require a CSIRO researcher along with business entrepreneurs in mentor-supported teams.

New start-ups cover a great variety of fields, with internet applications and financial technology most popular. There are a few sizeable new companies, including at least one unicorn,¹¹ Atlassian, and half a dozen multi-million dollar companies¹². In fintech alone, there are already nine Australian companies in the Global Fintech 100¹³. But not enough startups have yet the basis for scaling up to billion dollar companies. Scale is a question of the business model, time, the size of the local

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market and whether the product has application to global customers. To grow to unicorn size, Australian entrepreneurs need to aim at business models that are scalable to global markets and relevant to customers beyond our borders.

China has such a market and there are many opportunities for good ideas. Fintech in China is

attractive because the banking sector is inefficient, the market is huge and it is under-served. Internet and mobile banking are well advanced in China, with 688 million Chinese on line and high acceptance of mobile commerce. On the negative side, fintech is difficult for newcomers because there are many local start-ups and the established companies hold strong positions¹⁴.

There are many other areas in China where new ideas and businesses are needed. These include healthcare and health products; robotics and artificial intelligence; advanced manufacturing; agriculture, safe food and environmental remediation; services such as insurance,

¹¹ Over \$1 billion in revenue.

¹² Australia's top 32 start-up tech successes and why they matter, *Australian Financial Review*, December 21, 2015

¹³ *2016 Leading Global Fintech Innovators*. H2 Ventures and KPMG, 2016.

¹⁴ Five Chinese companies are in the Global Fintech top ten. See: *2016 Leading Global Fintech Innovators*, *op.cit.*

superannuation and investment management: and facilities for retirement and the aged.

Entry into China is difficult, but with the right advice and risk mitigation, including protecting IP

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with a Chinese patent, the opportunities are enormous. Some of the incubators can help: Stone & Chalk, a Sydney fintech incubator, has a team focused on China, while Fishburners, based in Sydney and Brisbane, has set up an incubator in

Shanghai's Caohejing High-tech Park, an ideal place to develop business models for the China market.

New Australian opportunities in China: There are many Australian companies active in China, but some have withdrawn due to market adaptability, bureaucracy and other difficulties. With China's new emphasis on internal consumption, advanced manufacturing and importantly, environmental improvement, there will be good opportunities for Australian firms whose businesses fit the new priorities mentioned above. Environmental remediation is a very important part of the 13th Five-year Plan and related initiatives will get support. But it is essential to collaborate with a local research institution or business if government funding is sought.

Manufacturing in Australia has steadily declined, to 6.5 per cent of GDP in 2015 with a heavy toll on companies and workers. Given our relatively high labour costs, a focus on high-tech manufacturing is

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the only way the sector could enjoy a renaissance. The goal should not be to bring back labour-intensive industries, but to build advanced manufacturing through innovation, as proposed for the new US administration¹⁵.

Areas for focus should obviously be based on intellectual property rather than unskilled labour. An example where

Australian firms are already active is engineering and architectural consulting. Local firms also have experience in agriculture, food safety, managing

¹⁵ Andrew N. Liveris (Chairman of Dow Chemical), *Make it in America: the Case for Reinventing the Economy*. Hoboken NJ: Wiley, 2011

hospitals and medical systems and specialised fields of health, such as blood, plasma and vaccines¹⁶. These are all priorities for China.

Advanced manufacturing is not only about new product invention. Japan taught the world in the 1960s and '70s that management was equally important. Rapid prototyping, improving the production process, economising on materials, combining components, eliminating steps, outsourcing ideas, just-in-time inventory control, robotics, TQM – these are all innovative approaches used by Chinese companies.

A successful example of this approach is Germany, which, despite being a high-cost country, excels in a range of high-technology industries, where Mittelstand¹⁷ companies are widespread. Long-term vision, niche focus, technological education including at vocational level, and collaborative relationships between workers and management have been part of the German manufacturing miracle. A concerted program in Australia could create a new export-oriented high-value manufacturing sector, for which Asia would be the closest market.

Australia: innovating for the world?

Australia has not been a major attractor for multinational R&D centres due to its small domestic market and labour costs. However, a few firms have used Australia as a base to develop products and services for the Asian region (for example the French company Thales) and an opportunity may be emerging. China has become more demanding of MNCs and some have decided to quit China¹⁸. For companies that had set up R&D in China primarily to satisfy government or to get access to researchers, Australia could provide an alternative location.

Such a shift would be more attractive to MNCs producing global products, where little adaptation is needed from one market to another. But those companies have the choice of locating their R&D centres in other advanced countries, so Australia would have to have a competitive taxation regime and leadership in the relevant fields of science. A long-term vision is needed.

¹⁶ Australian multinational CSL is active in these fields, investing \$US463 million worldwide on R&D in 2015.

¹⁷ Middle-sized companies (SMEs)

¹⁸ Why foreign companies are shutting shop in China, *South China Morning Post*, February 2, 2017.

Another development is the announcement by Alibaba.com in February 2017 that it is setting up in Australia. Throughout China, the company has made a major contribution to the viability of ten million small businesses¹⁹ with its Taobao platform. eBay already provides a platform for companies and individuals in Australia, but Taobao provides its Chinese sellers with financial, marketing and logistics support. If Alibaba does this in Australia, small companies will get support for selling to global markets, including China.

There are many opportunities for established companies and start-ups in China. And a business innovation that works for China will often suit other markets in Asia and the developed world, as MNCs have learned through “reverse innovation”²⁰. In every case, the key factors will be understanding the customer and the foreign culture – the institutional and competitive environment – together with a scalable business model founded on capabilities. The foundation is there, but much needs to be done to accelerate the momentum. Government, research institutions, education, business and above all, Australia’s entrepreneurial young generation, will determine our success.

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¹⁹ Alibaba Group Holding Limited, Form F-1 Registration Statement, Securities and Exchange Commission, Washington 2014.

²⁰ Jeffrey R. Immelt, Vijay Govindarajan and Chris Trimble, How GE Is Disrupting Itself, *Harvard Business Review*, October 2009.