



Open Research Online

Citation

Little, Stephen (2008). Disruptive dragons: can China change the rules of globalisation's game? *Prometheus*, 26(4) pp. 387–397.

URL

<https://oro.open.ac.uk/22196/>

License

None Specified

Policy

This document has been downloaded from Open Research Online, The Open University's repository of research publications. This version is being made available in accordance with Open Research Online policies available from [Open Research Online \(ORO\) Policies](#)

Versions

If this document is identified as the Author Accepted Manuscript it is the version after peer review but before type setting, copy editing or publisher branding

**This is a preprint of an article submitted for consideration for publication in
Prometheus, Vol. 26 no.4, December 2008.
[copyright Taylor & Francis];**

Review Article

Disruptive Dragons: Can China Change the Rules of Globalisation's Game?

STEPHEN LITTLE

Dragons at Your door: How Chinese Cost Innovation is Disrupting Global Competition

Ming Zeng and Peter J. Williamson

Boston, MA, Harvard Business School Press, *xi+239 pp.*, US\$29, ISBN: 978-1-4221-0208-4, *hbk*

What's it All About?

In early 2008, viewers of UK prime-time television saw corporate advertisements identifying Cisco Systems as synonymous with the internet. This compelling campaign by an established and dominant company was a response to the emergence of a significant Chinese competitor, Huawei—founded in 1988 as a private domestic telecoms equipment manufacturer. Since its foundation, Huawei's entrepreneurial flare had flourished across the globe. It employs more than 80,000 people, but China's new colossus does not sell directly to consumers and the sheer size of its influence often goes unnoticed. All of Huawei's shares are owned by 60 per cent of its employees and its founder, Ren Zhengfei, a former officer in the People's Liberation Army, only retains one per cent of the equity. Yet, Zhengfei and his fellow directors do not give interviews and Huawei's board members are not mentioned in its annual report: they are merely part of an 'executive management team'¹, which is commensurate with 'the Chinese way' where boasting of personal success risks scorn and opprobrium. Over the last two decades, Chinese business has gone global by exploiting processes that hardly

appear in the Western management and business texts. Chinese connections straddle the globe as China's global organisations learn to play in different markets and, along the way, develop the power of change the 'rules of the game'. Suddenly, a new form of organisational 'beast' has emerged that is capable of astute learning and unconventional tactics. For a while, such beasts might go unnoticed. But suddenly they seem able to breathe a form of fire that burns the competition. And there is not need to cross the globe to find these Chinese 'dragons', because they will come to you.

In *Dragons at Your Door* Ming Zeng and Peter Williamson argue that the new Big Beasts of global business—the Chinese Dragons—evolved from their capacity to exploit 'cost innovation'. And their clear sense of what they mean by this term is explained with elegant effectiveness in an account that covers the components, strengths and vulnerabilities of cost-innovation disruptive strategies. Their account of China's Dragons describes the dynamics of growth in market share and global reach of a number of significant Chinese companies, such as Huawei, which have achieved prominence across a range of different industries. It argues that China is not simply a low-cost competitor since its emerging business models are truly disruptive. Superficially, the book might seem to fit the "dire warnings" genre. However, the authors are not proposing a zero-sum engagement between China and the developed economies; instead, they suggest that there are responses to the challenging "cost-innovation" developed by Chinese enterprises which can enhance the innovative capacity of established firms. But, is it possible that the Chinese Dragons share significant 'DNA' with forms of business life that have evolved in other places?

The description of cost innovation presented in *Dragons at Your Door* reflects many of the elements of 'open innovation'². Chesbrough argues that companies can innovate across their own boundaries by buying or licensing relevant technologies and derive value from their own unused intellectual property and intellectual capital through outward licensing agreements or joint ventures and spin-off enterprises. Zeng and Williamson describe how Chinese companies have made use of the availability of alternative intellectual property to create competition for established high technology products. At the same time, cost innovation has allowed these firms to address the large domestic market sectors untouched by expensive foreign offerings. This aspect of cost innovation reflects Prahalad's arguments that major companies routinely ignore the potential of the vast 'bottom of the pyramid' population

of billions who may have limited resources individually but who represent collectively a vast untapped market of considerable aggregate value³.

While Zeng and Williamson's concept of a *Dragon* is not mere modification of 'made in West' ideas (they developed their insights from first-hand familiarity with 'what Dragons do'), critical connections might be made between case studies of Chinese Dragons and the West's way of conceptualising Asia's rapidly developing economies. Even if such efforts established the *lack* of connections and the need for radically different conceptual models, there would be a potential to learn about deficiencies and develop tractable approaches to research. We might then be able to conceptualise the differences that 'make a difference'; for example, in comparisons between China and India⁴. The promise invoices breathtaking possibilities. But, to get to there from here, we have to make sense of 'the world as we see it' and the concept of a Dragon could be an invaluable aid to traction in notoriously slippery territory.

Fresh Thinking and the Birth of Dragons

Peter Williamson has been engaged directly with China for over 25 years and has followed the scope and impact of successive changes over that period both for China and the world economy. He has been a consultant to corporations, governments and international agencies working across the Asia Pacific region and is a consultant and academic in Europe and North America. Chinese-born Ming Zeng holds a chair in strategy at the Cheung Kong Graduate School of Business, Beijing. Both have been faculty members at INSEAD, Zeng returned to China in 2002 and Williamson is currently a Visiting Professor at the Judge Institute, Cambridge. Zeng and Williamson's dramatically different but complementary experiences energise the book with an easy—even breezy—flow of prose that penetrates China's often baffling façade: the anatomy of Dragons and their vital functions is laid bare. The book comprises an introduction and conclusion, which sandwich five numbered chapters: three of which explain what cost innovation can do for the Dragons, while the other two suggest what we might do about cost innovation and its fire-breathing exponents.

So, what is cost innovation? First, Chinese companies offer high technology at low cost. Second, they present a large choice in what were considered mass-market environments. Third, they use their low cost base to offer specialty products at low prices. These principles

are exemplified with a description of the impact of the China International Marine Containers Group (CIMC) on the global shipping container business. CIMC's first container rolled off the line in 1982, 'but a combination of inexperienced management and a downturn in the market led the company near disaster' (p. 4). By 1996, one every five new container made in the world was made by CIMC (p. 7). Progress, Zeng and Williamson argue, is all about how Chinese players find 'loose bricks' in their competitors defences: if you worry away at the right loose bricks, the target's competitive wall can become less stable and ultimately crumble. According to Zeng and Williamson, attacking loose bricks is fundamental to the processes by which Dragons move from the periphery to the core of global economic expansion.

The growth of cost-driven outsourcing allowed smaller companies to contribute to large-scale production. In the past, vertically integrated firms were difficult for new entrants to mimic in terms of capacity and capability. However, the distributed nature of contemporary outsourced business models means that experience of global conditions can be gained within the global production network, without the need for direct competition with established transnational companies. A 'modularisation of manufacturing' allows participation in global production and opens a development pathway of the type that has been exploited by Taiwan's electronics sector. Here the domination of key components – in particular mother-boards and hard drives led to the development of integrated products typified by the emergence of Acer as a global computer brand⁵.

Participating in the global system, even at a junior level, reduces or at least shortens the period of protectionism and promotion of national champions—as seen in other Asian economies. In contrast to Japan, which nurtured infant industries with naked protectionism, China has been open to large-scale inward investment at an early stage in transformation to technological and economic superpower. The comparative openness of China, coupled with the lure of an immense potential domestic market meant that inward investment rapidly became available to supersede the initial support of family-based capital-controlling-networks from Chinatowns around the globe. Zeng and Williamson illustrate this development pathway with the example of Wanxiang, a company that has moved from the role of provider of automotive suspension components and bearings to a major global player. The blistering pace of what is possible is illustrated with regard to Wanxiang's path from

start-up to dominant national provider of components to foreign first-tier subcontractors onward to direct competition with international leaders (pp. 44-45).

Cost Innovation as Market Disruption

Actions that undermine taken for granted assumptions about a market can loosen crucial bricks. Zeng and Ming's case studies show how some Chinese companies were able to circumvent foreign propriety technology with alternative intellectual property. For example, the China Aerospace Science and Technology Corporation (CASC) was able to make use of Russian line-scanning technology to set up a spin-off, Zongxing, to market an alternative to the highly protected flat panel technology adopted by Philips and GEC for digital x-ray equipment.

At the same time, necessity remains the mother of much that is deemed innovative. Technova, a company developing medical diagnostic equipment were forced to seek an alternative to application specific chips (ASICs) which made low volume digital ultrasound devices prohibitively expensive. Since they could not replicate this element of the design they substituted semi-programmable chips developed for internet devices, a much higher volume market. They also leveraged this core cost innovation by substituting generic peripheral equipment - data storage and printers - for the expensive dedicated items bundled with the products offered by the established manufacturers.

Both Technova and Zongxing demonstrate the relevance of key aspects of open innovation to the Chinese practice of cost innovation. However, having entered a market with a new product cost innovators are willing to sacrifice the large margins and premium created by restricting the latest technology to only the high-end models and products in return for market penetration. Zeng and Williamson argue that the pay-off is significant, disrupting the western model that extracts maximum value from a new technology through high prices, only diffusing it to lower cost products as it becomes relatively mature.

In medical diagnostics, cost innovation has created a greater range of Chinese alternative products priced much more cheaply than those of established foreign competitors. As a consequence a vastly expanded market was developed among second tier hospitals and

clinics which were formerly unable to consider this class of equipment due to high costs. The delivery of state-of-the-art-technology to the health system rather than only to leading research and teaching hospitals echoes the bottom of the pyramid sensibility. Subsequently Zongxing's competitors in the digital x-ray market either withdrew or halved their own prices. Zeng and Williamson identify this ability to create mass markets for formerly elite products as one of the keys to the rapid growth of Chinese firms. However, the approach can be equally successful in relatively mature sectors.

Haier, a 23-year-old appliance maker entered the US market in 1994, with three mini-refrigerator models created for Chinese domestic conditions which filled an unrecognised niche in the US market but by 1999 was making full-size models in South Carolina. Haier also built market share in an established high value niche product - the refrigerated wine chiller. In this case a radically lower pricing structure supporting volume production was used to attack a niche market. Such cost-innovation undermines the strategy of developing niche markets since any retreat to niche volumes by an established company reduces the resources available to them for re-investment and development.

Attempts to repel Dragons by developing a niche can be akin to defending a few remaining bricks after the wall has crumbled. But the experience of destroying the bigger structure can buoy a Dragon's sense of growing momentum. And, without a wall to give it identity, an individual brick is not much of defence. In the case of CIMC, mentioned earlier, revenue generated through economies of scale generated high-volume in existing markets, while the relentless targeting of loose bricks—through the ingenious coupling of cost-effective novelty to the evolving needs of customers—opens access to new markets. Moving from specific Dragons to conceptual models, the CIMC example emphasises the questions raised by Kaplinsky and Morris⁶ over the viability of export-led manufacturing as a route to development for less developed economies, especially in sub-Saharan Africa. The growing dominance of China and India in many areas of manufacturing appears to relegate the region to the role of provider of the commodities required by these dominant economies. Even Brazil and Australia, both commodity driven economies with advanced technology sectors, might meet difficulties in maintaining a meaningful manufacturing base in the longer term. But how do Dragon's loosen bricks?

Loosening Bricks

Many loose bricks lie at the bottom of big structures, where the smallest margins which are most vulnerable to cost-innovation. Winning by a minimal margin can be sufficient to render the rival uncompetitive and thereby reach a tipping-point with absolute consequences. If the competitor is driven out of business, a brick is removed to reveal a market opportunity. This tactic indicates an appreciation of the value delivered by the sheer volume at the “bottom of the pyramid”⁷. Cost innovation is added to cost competition to maximise the return on these volume sales. This approach has been applied by others to peripheral markets where there is less competition for the limited value available. For example, Korean consumer electronics companies established local production for eastern European markets soon after the fall of the Berlin wall. Access to these markets both contributed to overall volume and allowed a relatively safe learning space for companies new to western markets.

Additionally some Chinese companies have identified troublesome customers as a learning resource. The specific needs of SE Asian neighbours have provided this opportunity. Comfortable incumbent market leaders may well dismiss local requirements as simply too troublesome in relation to market size to bother with. Zeng and Williamson provide the example of the mobile phone company of former Thai Prime Minister Taksin Shinawatra. Huawei was prepared to meet esoteric requirements and high pressure deadlines and were rewarded with a repertoire of eighty unique features in mobile telephony which could then be used to develop customised solutions for further customers.

In summary, cost innovation begins with the pursuit of higher volume sales at lower margins for an innovative technology. This generates a cash stream that allows further research and rapid development of the product range and the targeting of higher value niches. The examples presented in *Dragons at Your Door* demonstrate a powerful combination of elements of open innovation⁸ with the use of the “bottom of the pyramid philosophy”⁹ in the creation of high-volume demand for previously low-volume technologies and products. But is cost-innovation everything?

Responding to Cost Innovation

The fourth of Zeng and Williamson's five numbered chapters is entitled 'Weak Links'. Cost innovation has its limitations, together with implications for the development of Chinese manufacturing and product innovation. They also indicate what responses are available to established players faced with the challenge of cost innovation.

As Zeng and Williamson are quick to concede, the success of the model they have described is dependent in part on the modular nature of much of current manufacturing. However, there are both products and, equally importantly, services which require a more integrated and systemic approach. These are less amenable to infiltration by relatively inexperienced start-up companies. Emergent industries where there is no dominant technology and no established pattern to which to respond also present a significant barrier to the application of cost innovation.

Using a graph that plots 'impediments to cost innovation' against 'global gateways' (p. 132), Zeng and Williamson contrast products such as toys, clothing, personal computers, home appliances, and consumer electronics—where the Chinese Dragons enjoy compelling advantages—with petrochemicals, medicine and aircraft, where the complexity of challenge cannot be reduced to discrete 'bricks' and the 'gateway' to global markets is blocked by difficult-to-master 'intangible assets' that have been accumulated by the established players. These constitute complex systems in which 'knowing how to carve opportunities from shifting patterns of uncertainty' cannot be reduced to a tangible target for cost reduction. Meanwhile, less obviously esoteric sectors—such as ready-made foods, snacks, personal care products and other fast-moving consumer goods—exploit the art of branding and marketing in ways that cannot be reduced to costs in a linear manner: 'getting it right' involves the capacity to sense what is required and act in concert with colossally complicated coordination systems (p. 128). Even in China's ultra-price-sensitive markets, overseas players—such as Procter and Gamble, L'Oréal, Unilever and Henkel—occupy robust positions as purveyors of fast-moving consumer goods. Clearly, some organisations are able to more than hold their own against the Dragons—at least for now. So, what could the Dragons teach us about winning in the global game?

Zeng and Williamson's fifth and final chapter sets out the responses that are available to current leaders seeking to defend their profitability and market share in the face of disruptive cost innovation. Hitherto, the influence of Chinese Dragons has entered the world

arena through the 'global gateway' of manufacturing. But a second wave of attack is surging both upstream into R&D and downstream into branding and services (p. 153). While the book is clear about the scale of the Chinese challenge, interacting with the Dragons need not become a zero-sum game. Zeng and Williamson urge readers to accept the need for a global integration, seeking mainstream customers in China, not simply high value minority markets. They argue the need to shift high value activities into China to tap intellectual property and intellectual capital, and suggest that siting some global activities in China will change relationships with local subsidiaries in a way that facilitates better two-way exchange of capacities and capabilities.

Dragons at Your Door presents Cisco as one company that is responding effectively to the challenge presented by cost innovation. The adverts on prime-time UK TV were a means of protecting brand identity in the face of innovative competing products, not simply lower cost substitutes. However, Cisco has developed an alliance with Huawei's principal Chinese rival, ZTE Corporation in order to engage in equivalent innovation. Zeng and Williamson propose such tactics as options available to counter the threat of cost innovation. They cite the establishment of research activities within China by Intel and Microsoft among others and suggest that these are not simply directed at market presence or intelligence, but are designed to tap local intellectual assets and human capital in order to maximise the gain from their inward investment. For Zeng and Williamson, however, the greatest gain would come from the integration of Chinese cost innovation sensibilities into their global practice.

Cost Innovation in Context

How typical are the firms described in *Dragons at Your Door*? Zeng and Williamson describe many new high performing start-up, high growth companies. However, these operate against a background of parallel routine industrialisation in which more modestly performing companies are engaged in learning to serve the domestic market.

Simple cost competition is still in play within China and with her neighbours. Lower value manufacturing has moved from China to other countries, most obviously in textiles and clothing, but already routine pharmaceutical production is being sourced from Vietnam.

These regional movements reinforce the Western view of Asian manufacturing in general and China in particular as a source of low-cost support for established activities.

The size of China is both an advantage and a disadvantage. The potential market is a strong draw for engagement and investment by the developed economies. However, continuing large scale infrastructure development is needed to support both continued growth and the diffusion of benefits from the most to least developed regions. The current five year plan indicates the recognition of these challenges by the central government ¹⁰.

Zeng and Williamson are operating at the level of the firm and its strategic choice which necessarily avoids or by-passes many issues of institutional context. While they acknowledge some institutional dimensions, their intention is to reveal the keys to rapid success in global markets. In doing so they have identified a new and disruptive mode of entry.

Nevertheless the extent to which firms in China are free to challenge or mimic external models varies across sectors. For example the Chinese government retains significant control and oversight of transport and communications infrastructure, in keeping with established practice for developmental states. Government concerns over the need for a more coherent automotive supply chain have led to intervention and enforced consolidation of firms in the automotive sector, with similar rationalisation applied to airlines.

Western companies have had to respond to previous disruptive innovations originating in East Asia. The cost and quality challenge posed by Japanese companies in the 1970s and 1980s led to an understanding that Toyota's lean production model represented a refined and re-circulated form of Fordism.

The Ford Motor Company itself was able to leverage its stake in its Japanese partner Mazda into a learning opportunity through an AJ (After Japan) programme to identify components of the Japanese system that could be integrated with established North American practice¹¹. General Motors took advantage of Toyota's desire to explore the potential of replicating their supply chain and system in North America by participating in a joint pilot venture NUMMI at Fremont California. This delivered complementary learning for both companies.

For Zeng and Williamson the key to dealing with Chinese cost-innovation is comparable collaboration including access to the novel Chinese intellectual property and intellectual capital which is becoming available as the fruits of government funded research are made available for commercial exploitation.

Dragons at Your Door describes this unlocking of the intellectual property and intellectual capital in China's significant scientific and technical infrastructure. This has been achieved by the marketisation of organisations and institutes from the Chinese Academy of Sciences downwards, resulting in an available active R&D population of around 1 million.

Established Chinese firms have benefitted from these resources. For example, in comparing the process of corporatisation of older government firms with the establishment of joint ventures, Shen identifies the acquisition by the corporatized and privatised Luoyang Telephone Equipment Factory of intellectual property from the Centre for Information Technology a research laboratory established by the Peoples' Liberation Army¹². This was a key to improving their competitive capacity relative to new joint venture competitors such as Shanghai Bell¹³.

However, the ability to retain and protect intellectual property within China is a concern to many potential foreign collaborators. The tradability and robustness of intellectual property is a requisite of open innovation¹⁴ but problems and concerns over brand dilution through counterfeiting and IP leakage deter many from risking inward transfer of propriety knowledge.

With WTO accession China has begun the development of appropriate intellectual property protection mechanisms. Nevertheless, the transition from legislation to litigation, already in evidence with claims pursued between Chinese companies, will inevitably take time.

Dragons at Your Door points out that in the interim wholly owned foreign enterprises (WOFEs) are becoming more attractive than joint ventures since they are regarded as more leak-proof. However, in key areas of technology transfer the Chinese government maintains pressure for joint ventures. For example the Airbus assembly line opened in partnership with the Chinese Industry Consortium in 2008 in the Tianjin Free Trade Zone is a means to safeguard access to a domestic market estimated at up to 1900 narrow-body jet airliners.

Complementarity of Disruption

Zeng and Williamson identify areas where the cost innovation model is able to disrupt the position of current market leaders. However, as a global player, China is exposed in turn to disruptive innovations originating in the developed economies. China has entered the global mainstream of high technology manufacture, but still relies upon a relatively undeveloped domestic services sector. Recent disruptive innovations originating in the most developed economies have been precisely in these areas, with innovating companies such as South West Airlines, Ryanair, Amazon and Walmart impacting significantly on air transport and retail sectors.

It is in the sophisticated service areas that Zeng and Williamson acknowledge difficulties for the cost innovation model. Some comparison between India and China will assist appreciation of the nature of these difficulties. Both countries are utilising aspects of open innovation in their economic development, both are of obvious relevance to the bottom of pyramid argument and their combined populations ensure that the consequence of choices made in either country will carry global implications.

China's domestic aviation is more regulated than India's and has been less able to mimic the new loss-cost carrier model. Both China and India lack the quality of infrastructure necessary to the new lean service delivery models, but both are exhibiting innovative solutions – for example cash on delivery and cycle couriers for Chinese internet retail – which are creating the opportunity to develop appropriate business models while the infrastructure catches up.

Appreciation of the role of intangibles in both countries is shown by the acquisitions of a variety of established brands. Dragons describes the role of established brands for Pearl River piano who acquired the German Rittmueller brand and by Lenovo who have moved away from the IBM brand to a \$200m contract for brand building with Ogilvy & Mather well within the period of use agreed with their former partner.

In consumer packaged goods Procter and Gamble and Unilever have demonstrated that the growing middle market segment can be accessed though a strategy of price stratification and value added though acknowledgement of Chinese understandings from traditional medicine. Such cultural adjustments demonstrate the key to sustainable strategies that re-interpret the

niche market as one in which a subset of customers are enrolled in a process of open innovation and co-design.

Prahalad argues out that companies who want to invest in bottom of the pyramid markets must them part of their core business¹⁵. Companies in both China and India are of necessity developing strategies to reach the lower levels of the economic pyramid. In India Bharti Airtel has created a cell-phone business model adapted to low-value high-volume market which delivers significant aggregate value. In China Technova has shown how a market can be dramatically expanded from elite to mid-range health care customers by un-bundling components, accepting lower margins to create higher volumes through cost advantage and attention to the needs of marginal potential customers hitherto disregarded by their western competition. Both approaches are of benefit to markets outside the developed countries.

Chinese cost innovation as exemplified by Technova reflects the objectives of open innovation and co-design and contributes a potent additional ingredient to the strategy mix. Zeng and Williamson rightly emphasise the dangers of a retreat to niche markets by threatened firms. However, much movement to higher value in the established production networks represents not niche retreat, but value chain movement. This higher value requires continuing relationships with customer and suppliers, as with the 'power by the hour' model for aerospace engines. This in turn demands a cultural embeddeness which provides an additional barrier to newer entrants including Chinese companies.

The key to overcoming this particular barrier lies in the circulation of intellectual capital – the key workers. The mobility and availability of highly educated workers is one of the precepts of open innovation and a key means of knowledge flow between firms. Saxenian¹⁶ suggests that Asian engineers working in 'Silicon Valley' retained and cultivated links with engineers and businesses back home through various social networks and aided development in their countries of origin by providing knowledge and market access. Kale et al.¹⁷ showed the important role of overseas Indian scientists working in the development of R&D capabilities in Indian pharmaceutical firms. Both China and India have government policies specifically intended to ensure that 'brain drain' becomes 'brain circulation'.

China has benefited from such circulation of human capital since the Indemnity Scholarships, set up by the United States in the first decade of the twentieth century with money taken from

China as compensation for the Boxer uprising. These skill transfers set a pattern for the return of educated individuals which continued after the Communist revolution in 1949. This intellectual capital flow contributed to key modernisations and technical developments in science and technology in the 1950s and it continues with specific encouragement from the present government.

Conclusion

Three key components contribute to the success of the cost innovation strategies described in *Dragons at Your Door*. Firstly the modularised nature of much of modern manufacturing, itself an enabler of the development of global production networks set up in pursuit of cost savings. This has allowed Chinese companies to experience early exposure to a global system and global standards but more systemically integrated products and services present problems. Secondly a focus on market volume by Chinese companies prepared to use innovation to extend market share rather than increase margins. The volume is used to generate the resources to attack higher value niche markets. Thirdly an appreciation of both the principles of “open innovation”¹⁸ and the contribution of the volume market of the “bottom of the pyramid”¹⁹ in supporting market entry and development.

Zeng and Williamson offer a valuable inside-out perspective on China’s entry into the global economy as a key participant rather than a low cost contributor. They challenge comfortable assumptions about the dynamics of the “knowledge economy.” These often mirror the old model of the diffusion of material, production from an advanced core to peripheral regions²⁰. *Dragons at Your Door* shows that critical knowledge can be created and applied at all points of the economy. Those observers waiting to see the first unequivocally Chinese global brand before according China a substantive role in the development of a new socio-technical paradigm may miss the point in way in which companies such as Cisco have not.

Zeng and Williamson’s analysis of cost innovation presents a challenge to the advocates of open innovation. Can the intense focus of Chinese cost innovators be incorporated into the networked approach to the investigation and development of market opportunities? The cost innovation model is disruptive not just for established competitors. Has the development pathway for other countries been blocked by the growing domination of manufacturing by

China and latterly India? China's awareness of the dangers of a rapid but uneven economic growth can be seen in the increasing engagement with the country's own "bottom of the pyramid". As this develops cost innovation may provide more insights for innovators in both developed and less developed economies.

Notes and References

-
- ¹ Andrew Murray-Watson, 'Huawei? Who are they? Meet the coy colossus of China', *The Independent* (online), 2007, <http://www.independent.co.uk/news/business/analysis-and-features/huawei-who-are-they-meet-the-coy-colossus-of-china-401773.html>
 - ² Henry Chesbrough *Open Innovation the new imperative for creating profit from technology*: Harvard Business School Press, Boston, 2006.
 - ³ C.K. Prahalad *The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits*, Wharton School Publishing, Upper Saddle River, NJ, 2006.
 - ⁴ See Alan Winters and Shahid Yusuf (eds) *Dancing with Giants: China, India and the Global Economy* The World Bank and Institute of Policy Studies, Singapore 2007 and also R. Kaplinsky and D. Messner 'Introduction the Impact of Asian Drivers on the Developing World?' *World Development*, 36, 2, 2007, pp. 197-209.
 - ⁵ See for example Teresa S-C Poon *Competition and Cooperation in Taiwan's Information Technology Industry Inter-firm networks and industrial upgrading*, Quorum, Westport CT, 2002.
 - ⁶ R. Kaplinsky and M. Morris 'Do Asian drivers undermine export-oriented industrialization in SSA?' *World Development*, 36, 2, 2007, pp. 254-273.
 - ⁷ Prahalad op cit. Chapter 1
 - ⁸ Chesbrough op cit. Chapter 3 and Chapter 9.
 - ⁹ Prahalad op cit. Chapter 2.
 - ¹⁰ S. Little 'Models of Development: finding relevance for Africa in China's experience of development' in: M. Kitissou (ed) *Africa in China's Global Strategy*, Adonis and Abbey, London, 2007, pp. 182-197.
 - ¹¹ William J. Abernathy, Kim B. Clark and Alan M. Kantrow, *Industrial Renaissance: Producing a Competitive Future for America*, New York, Basic Books, 1983.
 - ¹² X. Shen, 'China Reconstructs: the Transformation of Management in two telecommunications-technology producers' in Thorpe R. and Little S. (eds) *Global Change: the Impact of Asia in the 21st Century*, Palgrave, London, 2001.
 - ¹³ For an overview of the relationship between government and private research and innovation in the Chinese telecommunications sector see Q. Mu and K. Lee (2005) 'Knowledge diffusion, market segmentation and technological catch-up: The case of the telecommunication industry in China' *Research Policy* 34, 6, August 2005, pp. 759-783.
 - ¹⁴ See J. West 'Does appropriability enable or retard open innovation?' in H. Chesbrough W. Vanhaverbeke and J. West (eds) *Open Innovation: Researching a new paradigm*, Oxford University Press, Oxford, 2006 pp. 109-133.
 - ¹⁵ See in particular Prahalad op cit. Chapter 3, pp.55-58.
 - ¹⁶ Analee Saxenian (2002) Trans-national communities and the evolution of global production networks: The case of Taiwan, China and India, *Industry and Innovation* 9, 3, 2002, pp. 183-202
 - ¹⁷ D. Kale; D. Wield; S. Little; J. Chataway and P. Quintas, 'Diffusion of knowledge through migration of scientific labour in India' Paper presented at Colloquium on Researching Innovative Themes in Skilled Mobility, Centre for the Study of Law and Policy in Europe (CSLPE), University of Leeds, May 2005.
 - ¹⁸ Chesbrough op cit.
 - ¹⁹ Prahalad op cit.
 - ²⁰ See for example Seev Hirsch. *Location of Industry and Industrial Competitiveness* Clarendon, Oxford, 1967 and Louis T. Wells *The product life cycle and international trade* Harvard Business School Press, Boston, 1972