## CKGSB MAGAZINE

CHEUNG KONG GRADUATE SCHOOL OF BUSINESS

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## The Innovation Gene: Has China Found it?

- How 3D printing will change China's manufacturing ecosystem
- Can Apple make a comeback in China?
- BGI-Shenzhen puts China on the global genetics research map
- · Can Shanghai's free trade zone live up to its promises?

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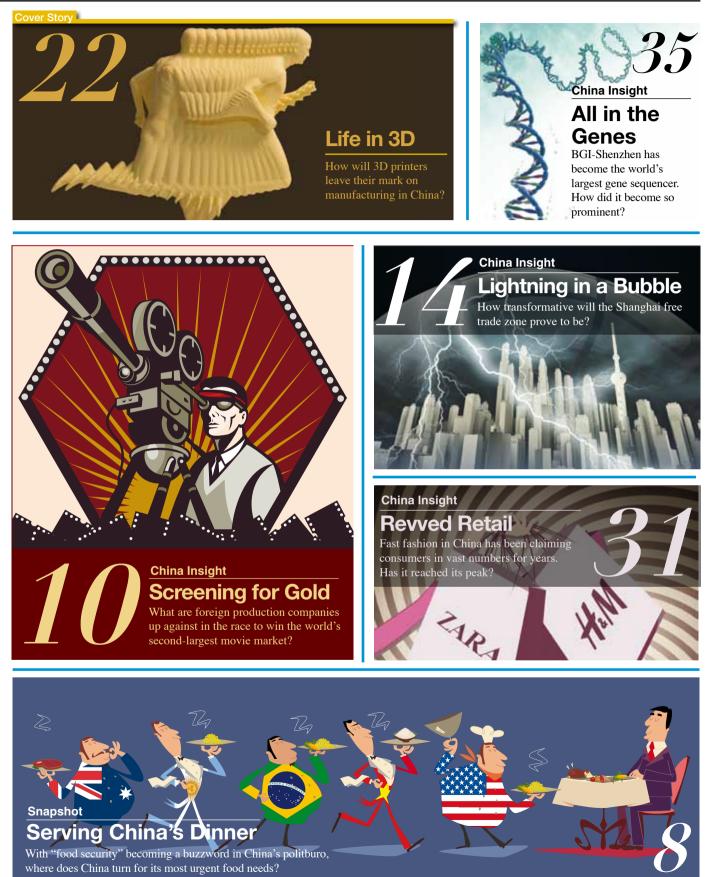
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## **Editor-in-Chief**

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## **China Insight**

## iWho?

Rivals race ahead of Apple in China's smartphone and tablet markets. What does it mean for Apple's future?



## **The Other Dimension**

n our lifetime we have seen quite a few disruptive technologies that have changed our lives. The applications of some of them have the potential to change the economic order of the world. Think of the power the UK got from the steam engine in the 1800s. It helped Great Britain build an empire that "the sun never sets" on.

Right now, with 3D printing, we may well stand at the cusp of yet another technological revolution. 3D printing is already starting to make its presence felt in fields as varied as architecture, automobiles, healthcare, prosthetics and even space technology. Companies are finding ways to use 3D printing to recreate human organs and blood vessels. NASA has '3D-printed' a part of a rocket engine.

Will the advent of 3D printing make China, which has been a bastion of manufacturing for the last 30 years, lose steam?

I gave my view on this in the editorial of the last edition of *CKGSB Magazine*. In this issue, you will find more proof that 3D printing will actually help China enhance its manufacturing prowess. I will not give the whole story away here: turn to page 22 to read our cover story 'Life in 3D'.

While on the theme of innovation and technology, let me draw your attention to the field of genetics. In just about 14 years of its existence, BGI-Shenzhen, an upstart, has become the world's largest gene sequencing entity. It has participated in some of the most important projects in genetic science such as the prestigious Human Genome Project, and is now unravelling a big mystery: the genetics of human intelligence. Our story on page 35 tracks the improbable rise of this maverick research institute that is now starting to make waves across the world.

Talking of genetics, turn to page 42 for a fascinating article on genetically modified (GM) food in China. Food grain shortage and nutritional deficiencies have helped GM food gain ground in China. But just like the rest of the world, GM food has been controversial in China, and is increasingly drawing the ire of consumers and officials. As the legion of skeptics grows, will GM food be able to infiltrate the Chinese market? We answer that question in our story.

Elsewhere in this issue, you'll find our take on the Shanghai free trade zone (FTZ). Experts have raised a very pertinent question: will the Shanghai FTZ spur meaningful reforms or will it follow the less-than-optimal precedent of the Qianhai Special Economic Zone? To know about our take, please read 'Lightning



in a Bubble' on page 14.

In our interviews section, we turn the spotlight to the idea of competitive advantage. Most companies believe in the notion of sustainable competitive advantage, an idea first promulgated by Michael Porter. Rita Gunther McGrath, a leading authority on strategy, argues that the idea of sustainable competitive advantage is now passé. Companies—and individuals—need to adapt to the idea of transient competitive advantage instead. Please turn to page 57 to read the interview.

In this issue, we also have something special for you: research that you can actually use in everyday life. CKGSB professor Juliet Zhu has been studying how our environment impacts our productivity and creativity. Turn to page 68, to read how simple

changes in noise, colors and seating can help you.

I hope you enjoy reading this issue. We look forward to hearing your comments and suggestions.

Please email us at ckgsb-magazine@ckgsb.edu.cn.

Yours Sincerely,

Zhou Li Assistant Dean, CKGSB

For more insights on the Chinese economy and business, please visit the CKGSB Knowledge site: http://knowledge.ckgsb.edu.cn/

## China Briefs

This month saw the breakdown of a deal between heavy hitters Foxconn and Sharp, a new alliance between Bitcoin and Lightspeed, the disappearance of hairy crabs from dinner tables and a jolly welcome to Chinese entrepreneurs from the royal family.



Japan's Sharp scrapped its plans to jointly develop and sell smartphones under the Sharp brand in China with Taiwan's Hon Hai Precision Industry, parent company to iPhone maker Foxconn, *The Wall Street Journal* reported. Sharp cited intensifying competition from local phone makers as the main reason for backing out of the deal but anti-Japanese sentiment due to territorial disputes with China have complicated the marketing process as well. Foxconn, meanwhile, is setting up a manufacturing facility in Philadelphia—and promises to create 500 jobs there. Britcoin exchange platform and the world's largest exchange by trading volume – closed a \$5 million Series A funding from investors Lightspeed China Partners and Lightspeed Venture Partners. Before the investment, BTC China was supported by its three co-founders, Bobby Lee, Linke Yang and Xiaoyu Huang. The PBOC banned Bitcoin from financial institutions in December.

lightspeed

## The Republic of Alibaba

libaba's transaction volume on 11/11/13, Single's Day, compared to the GDP of four other countries. If included in the World Bank's rating, it would be the 148th-largest country by GDP. Surprised? Don't be.





## Vroooom!!

aserati pays no mind to anti-luxury campaigns in China, bullishly charging ahead in grabbing more of the country's \$40-billion luxury car market. The Italian luxury sports car maker announced it will increase the supply of spare parts in Asia in a bid to improve its after-sales service image among the ultra-wealthy consumers of China, *The Wall Street Journal* reported. Christian Gobber, Managing Director of Maserati Greater China, said they want to make their parts supply "more robust".

## **Tea for Two Million**

ong Kong hosted what has been dubbed the first rare tea auction in November, an event that culled tea enthusiasts out of the woodwork to bid on 20 kg boxes and single packs of tea that were fetching between \$51,000 and \$129,000. Organizer Vincent Chu Yingwah told the South China Morning Post that some of the leaves up for auction were among the first to be picked in the 1950s after 20 years of war and little to no tea harvesting. Must be some brew.

## Welcome to the

0



The Queen is rolling out the red carpet for Chinese entrepreneurs. The UK has doubled the number of business entrepreneur visas issued to Chinese nationals from last year, reaching a total of 116, the *Financial Times* reported, encroaching on the figure for US nationals which stood at 127 for this year. If entrepreneurs can show they've created 10 new permanent jobs and generate income of at least £5 million, they may qualify for the business entrepreneur visa.

## To Market, To Market

The world's second-largest economy is launching the world's second-largest carbon trading market this month, not inappropriate for being the world's largest emitter of greenhouse gases. Guangdong, China's most populous province, will host the market that is to aid China in its pledge to reduce carbon dioxide emissions per unit of GDP by up to 45% by 2020. The scheme will cap 202 companies at 350 million tons for 2013.

## "The Sun'll Come Out..."

he beleaguered Suntech Power Holdings, once the world's largest solar panel manufacturer by sales, will pay back 30% of its debts—which total \$2.3 billion—to Chinese creditors in a deal whereby its factories may stay open under new management, *The Wall Street Journal* reported. Suntech filed for bankruptcy in September while its subsidiary, Wuxi Suntech Power, was acquired by Shunfeng Photovoltaic International.

## **China Skins Hairy Crabs**

airy crabs, considered a delicacy in China, are the most recent targets of China's corruption crackdown, the *Financial Times* reported. Yangcheng lake near Shanghai, which has some of China's most famous crustacean restaurants, has seen a drop in government-sponsored banquets this year, and thus business overall, as the hairy crab is considered emblematic of extravagance and corruption in China.



## **Snapshot**



## With "food security" becoming a buzzword in China's politburo, where does the country turn for its most urgent food needs?

In October 2013, China's Ministry of Finance announced it would allocate RMB 600 million to boost food output and China's food security to meet increased domestic consumption, food price inflation, urbanization and the resulting decline in China's arable land. In July, President Xi Jinping said that only China can solve its food security issues, and must not rely on imports to solve the problems. So how much does China currently rely on imports to sate the appetites of its citizens? Where does the food come from? As of 2012, China's key food trading partners in the categories of soy, rice, beef and corn are the US, Brazil, Australia, Argentina and Vietnam.

## Australia

Australia's beef exports to China: **26,650 tons** 

China's domestic beef output: **61,000 tons** 

## Argentina

Argentina's soybean exports to China: **5.8 million tons** 

China had been importing corn from Argentina as well, but froze imports in 2013 due to unapproved genetically modified strains being found among the Argentine corn supply

## Brazil

Brazil's soybean exports to China: **23.9 million tons** 

China's total soybean output: **58.4 million tons** 



Source: CnAgri Database, Wanfang Database, China Customs data, China Ministry of Agricutlure, Xinhua News

## China

While domestic output in China's key food categories is trending upward, the self-sufficiency rate per crop doesn't always correlate directly as consumption growth outpaces supply growth. This is the case for grain, where grain self-sufficiency dropped below **90%** this year, even though output reached record highs at **589.57 million tons**. China's vegetable output also reached record highs at **702 million tons**. China's total meat output reached **82.2 million tons** and the country's fisheries yielded **43 million tons** of aquaculture products. All categories saw year-on-year growth of **3%** or higher.

## Vietnam

Vietnam's rice exports to China: **1.5 million tons** 

China's domestic rice output: **2.3 million tons** 

## US

US corn exports to China: **2.8 million tons** 

China's domestic corn output: **208 million tons** 

US soybean exports to China: **25.7 million tons** 

China's domestic soybean output: **58.4 million tons** 



race to win the world's second-largest movie market?

**BY Jill Petzinger** 

When *Iron Man 3* hit screens in China, audiences were rather unimpressed by the four minutes of extra footage that was added especially for the domestic market. While some deemed the inclusion of an extra scene with Chinese actors Wang Xueqi and Fan Bingbing extraneous, it further signaled just how important China has become to foreign film studios.

Hollywood has had its sights on China's enormous potential box office returns for some years now. *Iron Man 3*, a coproduction between the Walt Disney Company China, Marvel Studios and China's DMG Entertainment, is one of the most successful blockbusters to date in China, raking in \$121 million domestically. Although US studios have managed to score some huge successes in China with blockbusters like *Kung Fu Panda, Transformers* and *Avatar*, there are many risks and few guarantees when it comes to getting their movies on screen in the Middle Kingdom.

"We've got a market that this year is going to be over 10% of the global box office, five years from now it's going to be more like 20% and then in a decade, who knows?" says Rob Cain, partner in film coproduction company Pacific Bridge Pictures and founder of ChinaFilmBiz, a blog that analyzes China's film industry. "There's enormous opportunity there and I don't see how you can ignore it or avoid it, you do so at your peril, it's where the tastes are going to be set for the global film business."

The Hollywood-China relationship is never far from the headlines. The discussion was given fresh fuel recently thanks to China's richest man. Wang Jianlin, owner of the country's largest commercial land development company, Dalian Wanda, invited Hollywood executives and a star-studded group of actors, including Leonardo DiCaprio, Catherine Zeta-Jones and Nicole Kidman, to a groundbreaking ceremony for his massive film park in the northern city of Qingdao, where Wanda is based. Wang announced that by 2016 he would build an \$8.2 billion film complex in Qingdao, the Oriental Movie Metropolis, with capacity to make 100 domestic and 30 foreign films per year.

As US movie companies see their fortunes increasingly tied to China's box offices, what are the key factors driving box office growth in the country? The coproduction framework that many foreign production studios have opted into has allowed many non-Chinese films to enter the Chinese market and bypass the foreign film import cap of 34 movies a year. If the trend continues and expands, foreign movie makers will have other forces to contend with that aren't as black and white as the letter of the law. Rather, foreign movie makers are increasingly facing the realities of a market that is adolescent in many ways.

## **Screens for the Masses**

Beyond stating its ambitions, Wanda has given no clear details on which US companies it will partner with, but the Group's Qingdao plans, its \$2.6 billion acquisition of US cinema chain AMC, and \$20 million donation to the Academy Museum of Motion Pictures Museum in the US demonstrate a determination to make waves in the global movie industry and mastermind a 'Chinese Hollywood'.

An October report in *Variety* magazine says that the Chinese box office grew by almost 35% in the first three quarters of 2013. The data released by the State General Administration of Press, Publication, Radio, Film & Television claimed revenues of \$2.68 billion in the nine months leading up to September 2013.

Despite the government increasing the annual foreign film quota from 20 to 34 in 2012, Chinese films are holding their own in the face of foreign competition, thanks largely to the consumers residing in lower tier cities. Chinese action-adventure *Journey to the West: Conquering the Demons* is China's top-grossing film so far in 2013, making \$189 million at the box office.

"Audience tastes are shifting and there have been more Chinese films that have been appealing to the audience," says Cain. "You've got expansion of theaters more into the hinterlands, into third- and fourth-tier cities, where they are really looking more for domestic movies."

Figures show that China has around half the numbers of screens that the US

has, and as such is still one of the most under-screened territories in the world. Chains like Wanda are reaping the financial rewards of opening up cinemas in second-tier cities and beyond, and a growing middle class are happy to spend their disposable income on movies.

"It's still a very immature market," says Cain. "Even in the big cities there are a lot of screens but they need more, and there are a lot of cities with a half million or million people or more that don't have a single multiplex."

A report this year by EntGroup Consulting cited Panjin in Liaoning Province as an example of a fourth-tier city with a population of 1.3 million, which generated \$4.17 million at the box office, an increase of 867% from the previous year.

While movie going is perhaps not as culturally entrenched as it is in the US and Japan, Dan Mintz, CEO and co-founder of DMG Entertainment, believes that the Chinese are definitely a cinema-loving nation.

"Screens are going up at a rate of around 10 a day so there's a need for it. The habit is really something that people have embraced, it's a water-cooler, cultural element and it's definitely there," he says. "The reality is that the market would probably grow quicker if it was just an open market."

While additional screens should open up box office potential for Chinese film companies, there is no evidence to suggest that the government will increase the quota for foreign movies, nor abandon the measures they take to ensure Chinese films have the advantage in terms of release dates and length of runs. Rob Cain says these are factors in Chinese films' growing success.

"You can't forget that the government has played a big role in, I guess you could use the word 'manipulating' the market, they've used a lot of protectionist measures, because last year it was embarrassing when foreign films had more than 50% of the box office and so the government reacted pretty strongly," says Xin Zhang, a research analyst at *Screen Digest*.

It's unclear whether the protectionist measures of the government are having

any impact on overall industry growth,

"The Chinese market will give the local market the best release dates, for example, on National Day and holidays. So it's difficult to say if local titles will outperform this year because they have more Hollywood blockbusters in the second half of the year," says Xin.

As Mintz notes, the assumption is that an open door policy with foreign movies would grow the market more quickly, but with such a lack of screens to satisfy the initial demand for any movie-going experience, it's hard to say whether the market is crimped by government rules or a shortage of theaters.

## A Dearth of Choice

The current lack of choice on Shanghai screens is something that irritates 28-yearold journalist and translator Celine Song, who often heads to the cinema with no idea of what will be playing.

"It turns out there is indeed nothing to expect—everything on sucks and those films we really thirst for are still only overseas and sometimes we have to wait for more than two months," she says. Even though she says everyone can download any film and watch it for free, going to the cinema is an important part of her leisure time and she goes at least once a month.

"I don't feel there is a big change in terms of wider choice," she says. "Yet I do feel there are now many more unbelievably stupid yet high-cost domestic films getting on the big screen."

Twenty-five-year-old John Liu, a planner at Saatchi and Saatchi Advertising is another young Chinese professional who is not impressed with the variety, but, like Song, hugely enjoys the experience of going to the cinema.

"Going to the cinema is definitely a social activity to me. I have a couple of friends who are my movie buddies and we go to see a film together at least once a week," he says. "Among my age group, I think going to the cinema strengthens bonds with friends or lovers."

Liu adds that "there are signs that Chinese film-makers finally know how to borrow experiences from Hollywood movies. The success of *Finding Mr. Right*, which is like a Chinese version of *Sleepless in*  *Seattle*, and *Lost in Thailand*, already proved that."

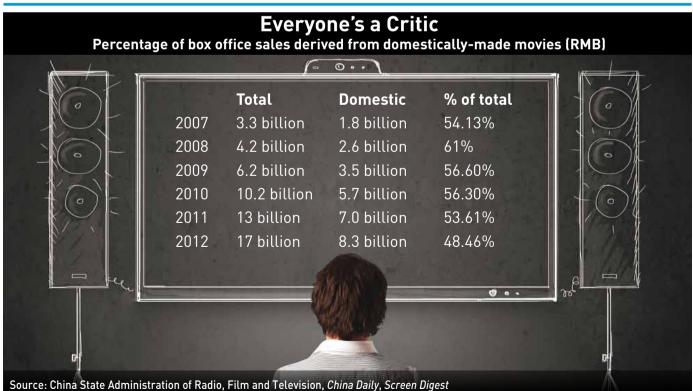
## **Plan of Attack**

In October, IMAX CEO Richard Gelfond publicly predicted that by 2018 China's box office receipts will have outstripped the US, and will be double those of the US by 2025. While it behooves US studios to find ways to work with China, they need strong partners and market knowledge.

DMG's Mintz says that they waited until the time was right before entering the film industry.

"There were two triggers we looked at. One was economic, one was political," says Mintz. "The political one was the Olympics and the fact that the Olympics needed to be finished and done. Number two; we calculated that the market needed to be at about 5,000 screens before it became a legitimate film market in the sense of a steady revenue stream. Both those things happened around the end of 2008."

The big US players have already assumed strategic positions. DreamWorks has established a joint venture called Oriental DreamWorks, partnering with



Shanghai Media Group, China Media Capital and Shanghai Alliance Investment. Legendary Pictures set up Legendary East with China Film Company. Last October, Fox International Productions signed a multi-picture deal with China's Bona Film Group to make Chinese-language films. Fox was reportedly also planning to sign a deal with Wanda last September, but discussions appear to be ongoing.

The majority of US studios try to get one of the 34 quota slots, which will allow them 25% of the box office. If you're not a major Hollywood studio, then the only realistic option for securing theatrical distribution in China is to sell your film to a Chinese distributor in a flat-fee buyout deal, where the studio gets a oneoff payment and no cut of the box office. Then there are co-productions with a Chinese partner, which give the foreign studio roughly 40% of the box office.

Co-productions come with their own risks, such as mandatory inclusion of domestic talent and China location shoots. This year saw a dispute arise between some Hollywood film studios and China over a 2% tax that China wanted to levy from the studio's box office share. Several media reports accounted how state-owned distributor China Film Group refused to share any of the box office profits until the situation was eventually resolved, which means the studios were left waiting for hundreds of millions of dollars.

## Wanda's Wild Ambitions

It remains unclear if foreign movies made in Qingdao will be exempt from the annual quota or guaranteed any preferential screening in the Wanda's cinemas. Wanda could not be reached for comment.

But one company that has benefitted immensely from a partnership with Wanda in China is IMAX. Wanda Cinema Line Corporation has partnered with IMAX for around five years now, and the chain has expanded from 22 theaters in 2009 to over 140 in June 2013.

While erecting cinemas fits within its development remit of cineplexes, shopping centers and hotels, there has been some skepticism within the industry about

<b>Cinematic Expansion</b> Number of Wanda and IMAX theaters in China					
	No. of Wanda cinemas		No. of IMAX cinemas		
	2008	29	2008	11	
	2009	50	2009	28	
	2010	71	2010	33	
	2011	71	2011	41	
	2012	86	2012	113	
				_	
Source: Sohu Business, IMAX, bbs.enorth.com.cn, 163.com, projector.zol.com.cn					

Wanda's commitment to the art of filmmaking. Wanda's *Man of Tai Chi* did poorly at the box office, despite the participation of US action star Keanu Reeves, and *The Palace* made a mere \$7.4 million in its first week.

Further clouding Wanda's film industry image are rumors that have been circulating about the huge sums that Wanda paid Leonardo DiCaprio and others to turn up at the Qingdao event, and the implications of such payments.

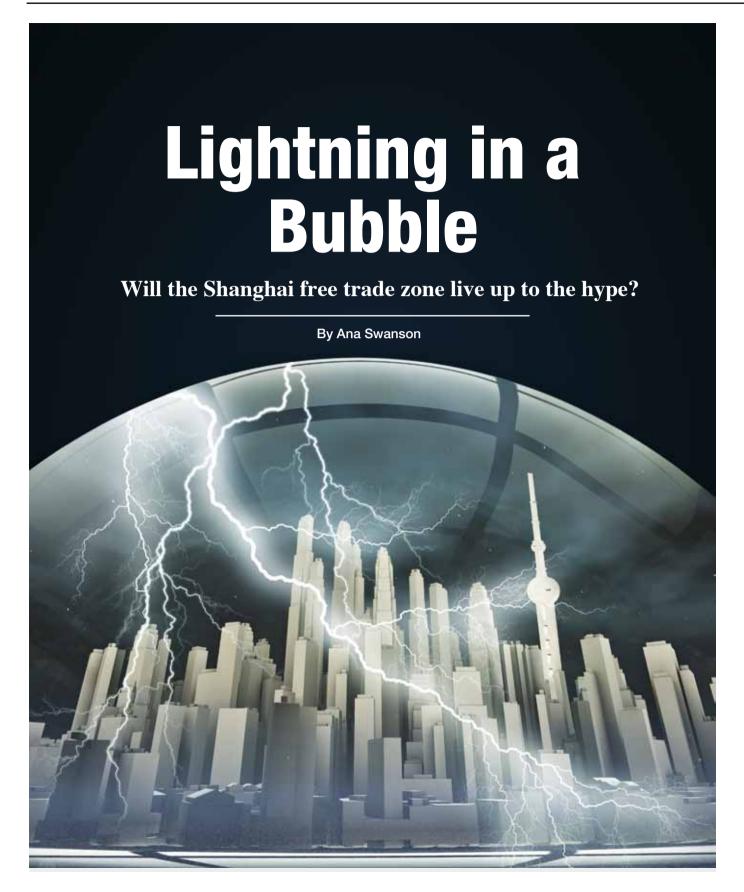
"From their moves so far, buying AMC, donating money to the academy and expanding in China, we can judge that they want to become a major player in this industry," says Xin Zhang. "I think they want to be more involved in production and distribution, but I don't think so far they have made any significant achievements."

Chen Xiaoyun, a professor at Beijing Film Academy, likens people's reactions to the Wanda Group's movies to when Lenovo acquired IBM's PC unit in 2004 and Geely bought Volvo in 2010—a really big splash, but it is a different ballgame.

"Film is much more complicated as it relates to ideological stuff like the culture, nationality and politics," he says. "Although money can solve production problems, it cannot work out problems of creativity and, in my opinion, there is still a considerable gap there between domestic movies and Hollywood."

Ai Wan, founder of Ai Wan Entertainment in Beijing, whose recent international coproduction This is Sanlitun made the 2013 official selection in the Toronto International Film Festival, says, "I think his attempt is very ambitious, but they didn't start as a film production company, they have always been in the real estate business and this is just a branch to them. It's not just going to be a film studio, that's just a very small part of it, it will be a theme park, a tourist attraction, there will be a lot of commercial development all around it, so that is his main reason for doing that. I'm sure to do it in Qingdao he's probably getting a lot of government support and funding plus the finance from the local bank."

Lacking the creative x-factor of timeless movies, Wanda's biggest contribution to cinema may ultimately be a mushrooming chain of venues. More screens is no small contribution however, as China's third- and fourth-tier residents seem to unanimously agree: if you build it, they will come.



n retrospect, one of my biggest mistakes was leaving out Shanghai when we launched the four special economic zones," Deng Xiaoping, the chief architect of China's early economic reforms, said in 1992. The 88-yearold Chinese leader spoke those words during his "southern tour", a trip to generate support for his plan to "open" the Chinese economy. More than 20 years later, the reforms launched by Deng and his followers have transformed China into a booming market economy. This fall, China's new leaders sought to fulfill the rest of Deng's wishes by setting up a special economic zone in Shanghai.

The 29-square kilometer China (Shanghai) Pilot Free Trade Zone (Shanghai FTZ) was formally launched on September 29, and a first batch of 25 Chinese and foreign companies have already been granted licenses to register in the zone. But much about how the zone will operate remains unclear. Expectations for the zone's likely impact range from the pessimistic to the irrationally exuberant, providing a picture of China's reform debate writ small.

The zone's announcement was met with high expectations, as pro-reformists mused about the potential for dramatic reforms, including currency convertibility, interest rate liberalization, rule of law and tearing down the Great Firewall. But opinions subsequently swung toward the pessimistic as the government released a long list of prohibited activities for foreign companies in the zone.

The reality is somewhere in between. Analysts say the zone will initially offer limited but significant reforms to liberalize trade, open the service sector, streamline bureaucratic controls, and open the country's financial sector. Implementation always the issue in China, authorities are likely following Deng's famous economic reform strategy of "crossing the river by feeling the stones"-gradually trialing policies in the zone for potential nationalization.

## A New Source of Growth

One of the loudest proponents of the zone has been Li Keqiang, China's current pre-

mier. In an editorial in Financial Times, Li called for increasing the role of the private sector to sustain growth. "We can no longer afford to continue with the old model of high consumption and high investment," he wrote. "We will explore new ways to open China to the outside world, and Shanghai's pilot free-trade zone is a case in point."

Li and his supporters believe that the dividends are fading from China's current growth model, which relies on manufacturing and infrastructure investment, and they see the zone as playing an instrumental part in reinvigorating growth by helping to rebalance the economy towards consumption and services.

Chen Long, Professor of Finance at the Cheung Kong Graduate School of Business, says falling returns on investment, inadequate funding for small and mediumsized companies, and extremely high grey market interest rates have all convinced the government that it needs to reform. "What's impressive about the free trade zone is that it reveals what the government wants, its intention for the next five to 10 years. And the point is to transform China into a society that is part of international standards," says Chen.

10

2009

Source: HSBC

Chen identifies three major areas of reform that authorities have pledged to carry out in the zone. First, the government plans to reshape the investment environment. These reforms include switching to a "negative list"-in which foreign and private companies are allowed to operate in all sectors from which they are not specifically barred-and allowing companies to set up operations through a registration system rather than lengthy government approvals, says Wang Tao, Economist at UBS Investment Research.

Secondly, the government has promised to introduce financial reforms, including relaxing controls on investment and restrictions that prevent foreigners from investing in China's capital markets and Chinese from investing abroad. These reforms would help Shanghai meet its goal of becoming a global financial center by 2020-a goal that was looking like a dim prospect before the zone's establishment.

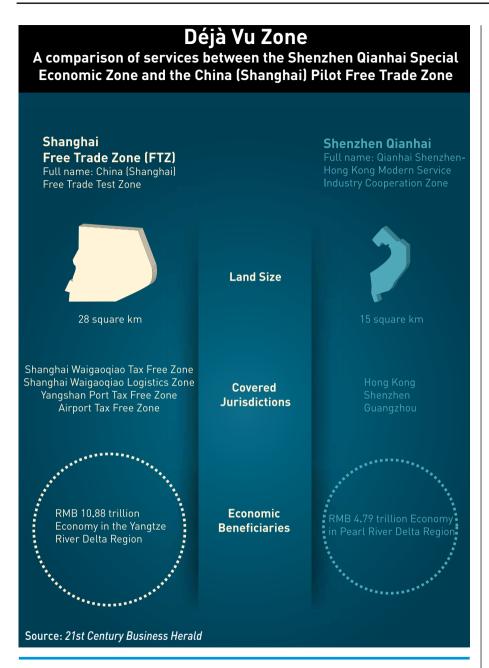
Thirdly, in order to bring the investment environment up to international standards, the government has to redefine its role in the economy, Chen says. Policies state that the zone will standardize regulatory and administrative treatment for all firms, essentially leveling the playing field



2011

2010

2012



for state-owned, private and foreign companies.

Chen argues that these goals have become clear just in the past few months, partly as a result of China's trade negotiations with the US. When the Shanghai zone was initially approved in July, it was meant to be a low tariff zone for trade and shipping. But since July, the zone has been upgraded into a national strategy that could potentially pave the way for China's entry into global trade agreements, such as the Trans-Pacific Partnership (TPP). Talks over the TPP now encompass the US, Japan, Korea, and other countries around the Pacific Rim. Although Chinese officials initially seemed to see the TPP as a way for other countries to contain its rise, recently appear to have realized that not joining the world's foremost economic and trade pacts could weigh heavily on China's future growth. Joining international investment agreements means China must abide by international standards, which includes greatly curtailing the role of the government and carrying out significant domestic reforms with regards to intellectual property rights, state-owned companies, and investment.

The Shanghai zone could be instrumental in helping China carry out the necessary reforms to join the TPP, says Nicholas Borst, China Program Manager at the Peterson Institute for International Economics. "If they get experience with some of these policies measures now, they can scale them up more quickly in the future." However, Borst cautions that there are further necessary reforms not addressed in the Shanghai zone, which prelude China from the TPP.

## **Nay-Sayers**

Not all observers are optimistic about the Shanghai FTZ's role in meaningful reform. Announcements that the zone will not offer lower corporate tax rates, relax restrictions on foreign ownership of banks, or liberalize interest or exchange rates anytime soon have led many to curtail their expectations. The long "negative list" released by the Shanghai government, detailing 190 restrictions on foreign investment in the zone, added to the pessimism. Some critics point to the disappointing precedent of the Qianhai Special Economic Zone, an area on the mainland near Hong Kong for trialing financial reforms that has had little impact on the broader economy.

Qinwei Wang, China Economist at Capital Economics, argues that the impact of the Shanghai zone has been overplayed. "My view is that the Shanghai free trade zone will be consistent with what happened over the last couple years, of China trying to push reform forward but it happens in a more gradual way [rather] than in an aggressive way."

The Shanghai government and proreform officials such as Li Keqiang are clearly pushing for reforms in the zone, but leftists in the government and vested interests that could see their wealth and influence curtailed with financial liberalization, such as the executives of state-owned enterprises, may be dragging their feet.

Another factor that may limit the scope of reform is the stated requirement

that the changes in the zone be replicable elsewhere in the country, writes Ting Lu, China Economist for Bank of America Merrill Lynch, in a note. As a highly developed international city with strong governance and human capital, Shanghai may be ready for dramatic financial and legal reforms, but these standards will be harder to implement in China's hinterlands.

Finally, some analysts say that financial regulators fear that liberalizing exchange and interest rates in the zone, but not elsewhere in China, would create tremendous incentives for people to make money through arbitrage and create risk for the financial system, says Wang of Capital Economics. "I think they will be very cautious, and that's why there are so few details about the financial sector measures."

Borst of the Peterson Institute agrees. "I think there's just a huge concern that interest rate liberalization will lead to unhealthy competition amongst banks, potential losses for depositors, and financial instability, and that's the last thing the government wants. They weigh that very concrete fear against the broader, more diffuse benefit of a more balanced economic model, and the more concentrated fear of a financial crisis wins out."

Chinese economic planners may be looking to the examples like that of South Korea, which pursued an ambitious liberalization regime in the 1990s. While the international community applauded South Korea's efforts, in the end the reforms left the country vulnerable to the Asian Financial Crisis that struck the region in 1997.

### **History Lessons**

Wang of UBS argues that reforms to open the services sector and streamline government administration and supervision will be the most influential, since they are easiest to expand nationwide.

The zone's financial reforms also look transformative, but whether they will have much of an impact on the broader country is less certain. In an announcement in December, the People's Bank of China clarified the financial reforms that it will carry out in the zone, including allowing foreign companies in the zone to invest in Shanghai's securities markets and Chinese companies in the zone to invest in exchanges abroad. Among other reforms, the zone will also promote cross-border financing in renminbi and foreign currencies and allow foreign financial institutions in the zone to borrow renminbi from overseas.

Money will be allowed to flow relatively freely between the zone and the outside world. However, the central bank will set up special accounts in the zone that it can monitor to control flows to the mainland.

When it comes to setting up such a firewall, regulators face a tricky dilemma, says Wang of Capital Economics. A lack of an adequate firewall may lead to destabilizing capital flows. But if they strictly control capital flows, the impact of reforms in the zone could be limited—as the example of Qianhai, set up in 2010, demonstrates.

The Qianhai special economic zone was heralded as a hub for global financial services that would help internationalize China's tightly controlled currency. Chinese companies in the zone would be allowed to receive renminbi loans from Hong Kong banks, while local private equity funds could raise renminbi capital from Hong Kong investors.

Today, these trades are taking place, but their scale has been much more limited than anticipated. One major reason is that authorities set up extremely tight firewalls between Qianhai and the rest of the mainland, such that renminbi flowing in from Hong Kong can still only be used for investment within Qianhai itself.

"Qianhai has erred way too much on the side of containing things within the zone," says Borst. "They really just want to open a very controlled channel between Hong Kong and Qianhai, and not let too much else spill out. But the whole value of the zone is how much they let things spill out of it." Also complicating investment is a lack of clarity on whether money will be allowed to leave Qianhai in the future, and how quickly restrictions may change.

Analysts are quick to point out that the Shanghai zone is happening on a much larger scale and with much stronger backing than Qianhai. Support at the central level is essential for implementing dramatic reforms, especially in the financial sector, says Wang of Capital Economics. And the Shanghai zone has already developed much more quickly than Qianhai did, with regulators in charge of securities, banking, insurance and industry all releasing relevant guidelines: Shanghai "is leaps and bounds ahead," says Borst.

Qianhai is one thing, but those who expect the Shanghai zone to compete with Hong Kong or rapidly lead to comprehensive national reforms need to curb their enthusiasm, argues Lu of Merrill Lynch. Hong Kong still benefits from transparency, the rule of law, low income taxes, and a long history and strong reputation as a financial center. Lu points out that the government has not announced a timeline for yuan convertibility, interest rate liberalization and cross-border use of the renminbi—only saying that the zone can test these policies ahead of other regions "as long as risks can be controlled".

### Window into the Mind

Many in the West argue that liberalizing a sliver of China's economy through the Shanghai zone does not make much sense, as it opens up big opportunities for arbitrage. Looking at history, however, this is the model that Deng and other leaders consistently used to carry out economic reforms.

When China first began its switch from a planned to a market economy, leaders set up a dual-price system, in which some goods were still sold at low, state-determined prices, but excess production could be sold at market prices. That led to massive arbitrage, but it also helped liberalize the Chinese economy, against all Western predictions. The Shanghai FTZ appears to be one more step in the unconventional but effective reform path for China laid out by Deng Xiaoping.

Chen of CKGSB argues that the most interesting part of the zone is not what it can do in the short run, but that it's an insight into the government's longer-term goals. "With this government, it's very clear what it wants to do," he says. "It wants to reform China into a society that is compatible with international standards."

## Black, White and E-read All Over

E-books are the future of publishing. Is China blazing a trail or dragging its feet?

By Suzanne Edwards

No one expected China's electronic book scene to get so steamy in the spring and summer of 2013, but all of a sudden, E.L. James' sexual thriller *Fifty Shades of Grey* was everywhere, though it hadn't actually been published in China.Thanks to a market dominated

by free or near-free content, strict censorship and rampant piracy, *Fifty Shades of Grey* has highlighted the tumult that is China's e-book market.

The book had been translated for Taiwan and released in August of 2012, and through the use of popular filesharing platforms like China's Douban. com, wound up on millions of Chinese computers, tablets, smartphones and ereaders. Eventually, the viral success of the book reached such heights that some mainland printers started printing pirated copies, using the same iconic cover art and selling via e-commerce platforms. It was a huge success, yet hardly anyone was making any money off of the steamy novel.

At this point, China's e-book consumers are hardly willing to pay a cent for e-content, but many industry insiders believe there are signs of a change. China's readers are poised to up their expectations of the reading experience, slowly shedding their tolerance for cheap file quality and lousy user interface. If that's true, can a chokingly censored industry mired in struggles with internet control, a lack of investment in digital formatting, and copyright protection step up to the plate?

## Not so Great Expectations

In 2012, the Chinese Academy of Print and Publication released its ninth annual survey of Chinese readers, indicating that consumers in China did not want to pay much more than \$.50 for an e-book. And the average amount they pay for digital books can be far less than that. The average price for an e-book on Amazon's Kindle Store, meanwhile, is \$9.99.

The main bulwark of this low-tozero price structure is China Mobile, the world's largest mobile carrier by number of subscribers. China Mobile has a vast digital content catalog and allows its massive user base to access it for as little as \$0.50 per month, which in turn sets theprice standard for everyone else in the China market. Major platforms such as DangDang, Shanda, Baidu and Jingdong (JD.com, which was earlier under the domain name 360buy.com), have had to lower their prices to stay competitive.

"We're not sure how the market is going to get itself out of this sort of allyou-can-eat payment model," says Tyler Dimicco, Manager of Publisher Relations for the Asia-Pacific region of Tokyobased Kobo, a digital content provider.

Publishers looking for the silver lining see China Mobile as a marketing tool.

"Data suggests that if white collar workers read a new, front list book that they buy from that platform, they are highly likely to go out and buy the book and it becomes marketing. I think that's been the way publishers view the China Mobile platform, as marketing, rather than revenue," says Jo Lusby, Managing Director for Penguin China.

Dimicco concedes that for all of the monetization issues presented by a China-Mobile monopoly, the Chinese carrier does a great job of making their content available no matter the hardware limitations.

"You [can] have a two-inch screen and you have to scroll constantly, and you have this sort of purple background with dark green text, it's just horrendous, but you can do it. *nongmin*, people who have to ride the train for four hours every day with a sack of peppers tied on their back, they're okay [with it]" says Dimicco.

## **Hard Knock Hardware**

Dedicated e-book readers like Amazon's Kindle, which have been so successful in the West, are rare, and the growing book-reading capabilities of smartphones and tablet computers makes it unlikely that they stand a chance in China in the future, says Roger Sheng, Shanghai-based Electronics Research Director at technology research firm Gartner.

"Hardware wise, Kindle's business potential in the future will still be limited, and will not reach the scale that it did in the United States," Sheng says.

IDC recently lowered its global average forecast for e-readers by 14% between 2013 and 2016, given the research firm's data on global shipments of e-readers show a 28% decline in 2012 from 2011

For most China consumers, it's all about the apps. Market research firms EnfoDesk and Analysys International predicted in a joint 2013 report that the revenue of China's mobile reading market in 2015 will be RMB 10.3 billion (\$1.7 billion), and the number of active users will reach 650 million. The entire US e-book market was measured at \$396.3 million by the Association of American Publishers in July 2013.

Furthermore, the most popular mobile reading apps, such as Zhangyue's iReader (no relation to Apple), Tencent's QQ Reader and Xiaomi's Duokan, can be used on a wide variety of digital devices. Those on the tech side say that the big "aha" moment for the commercialization of China's e-book market will most likely be owned by one of these providers.

Duokan is a home-court favorite, particularly since it was acquired by Chinese smartphone brand Xiaomi in January 2013. Xiaomi smartphones made headlines this year when market research firm Canalys reported that the Chinese smartphone took 5% of the domestic market, eclipsing the iPhone's 4.8%.

Vice President of Duokan Hu Xiaodong says that Duokan has different content platforms that target different readers, dividing non-fiction from internet novels with separate 'easy-to-use' interfaces. Hu says what sets them apart from their competitors is "attitude".

"Amazon includes all the e-books it can, while Duokan does more to guide users who may not know what they should read. We help users to choose the best book or the best edition of one book," says Hu, adding that Duokan tries to stay away from basic file conversion. "If digital reading is going to develop, it needs to have its own independent system, instead of simply digitizing printed books."

Lusby from Penguin Random Houseagrees, emphasizing that China's technological capacity regarding written content is not the issue, but rather the gap between the technical advances, and what China's publishers are willing to do with them.

Complicating matters is the fact that China's publishing industry is highly fragmented, with roughly 40 main publishers—all ultimately state-owned—as opposed to the US market's big four. China's main e-book providers have also not been given the same kind of top-down policy directives from China's General Administration of Press and Publication (GAPP) that the main state publishers have.

"They were left to go off on their own and just do it, but without real input or direction. Because the market is highly fragmented, none of the players are big enough to have leverage on pricing and terms. As a result, you find publishers

are reluctant to invest in new formats and engage with the platforms." Lusby says. "What they've been doing is gradually making books available in digital form which are pretty much unchanged from the print—and so the local content market has been under served."

## **Orwellian Woes**

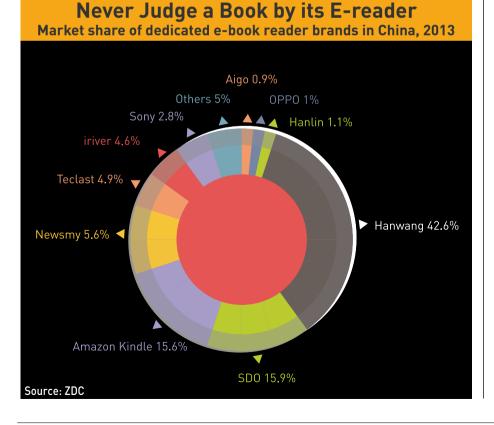
China's traditional publishing ecosystem has two distinct pillars. There are the publishers, all directly owned and controlled by the government, and then there are the "culture agencies", outside companies which produce much of the content and then send their files to an officially registered publisher, who licenses, prints and distributes the product.

E-books are theoretically subject to elaborate approval protocols. All e-book providers must register with, and seek approval from, the authorities to distribute content, and all content is subject to the same rigorous review as printed content. If e-book traders from abroad want to sell foreign content in China, they have to initiate a multi-year process where finding the right Chinese partner is only step one.

"It would be a massive undertaking for us to offer English books into China directly," Dimicco says. After altering all of their major publishing contracts, Dimicco says "we would have to sign on a Chinese entity, and then we'd have to send our books that we got from the publishers to the Chinese company, have them vet everything, run it through their database of forbidden words, and then have them send it back to our new servers in China after they'd done that check."

But another option is to ignore official channels altogether and maintain a lowkey approach. Taiwan's Readmoo.com has been quietly selling e-books to mainland China readers for a little more than a year now without being blocked.

"We are not that big, so the Chinese government hadn't used the Great Firewall to keep us outside of China at the beginning so people were accessing our website without issue," says Sophie Pang, CEO of eCrowd Media, parent company to Readmoo.com, adding that there was no reason to block the site before because there was



nothing provocative about the platform. Pang takes the recent block in stride, adding that she had expected them to "gradually find out," and only 8-9% of their consumers were from mainland China.

The supply gaps in the mainland content market have given birth to a well-established tradition of online literature.

## **E-epics**

Online literature, or content that has been written specifically for the internet, has been booming for 10 years or more, according to Lusby.

Qidian.com, a subsidiary of Shanda Entertainment's Cloudary, allows users to download content for free up to a certain word limit, and then charges RMB 0.01 for every 1,000 words. The writer gets 70% of the revenue and Qidian keeps the rest.

The results of this approach have been investment-worthy. In July of 2013, US investment firm Goldman Sachs and Singaporean investment firm Temasek jointly purchased a minority stake in Cloudary for \$110 million. Another plus for Cloudary is that aside from investment from foreign firms, online literature has almost no foreign players. Cloudary, which consists of 1.6 million members and six million titles as of 2012, has an agreement with China Mobile which names the telecom giant as the only platform allowed to sell and distribute Cloudary's content, other than Cloudary itself, according to Dimicco.

Penguin's Lusby says that such content trends heavily toward young adult, fantasy and romance stories. The pricing of online content is often pegged to its popularity—the more popular, the higher the price. Content providers like Kobo can use this platform to see which books are of interest to the readers, and relay that information to authors when their manuscripts are in need of guidance.

"There's a huge opportunity to create books that stay interesting up until the last word," says Dimicco.

Apparently the need to keep content interesting was so keenly felt that it compelled Qidian founder Lou Li to cut copyright corners, resulting in his arrest for copyright violations and bribery in May of this year. Despite the blight on Qidian's reputation, Lou's untimely arrest may have been just the bargaining chip that Goldman Sachs and Temasek were seeking.

## **Piracy, Friend or Foe?**

In April of last year UK-based sci-fi/fantasy e-book platform Tor Books announced that it would be removing digital rights management (DRM) software from its ebooks, reasoning that piracy is mainly perpetrated by a cash-poor constituency that wouldn't have bought the books anyway. In May of this year, Tor Books revisited the issue and announced that the removal of DRM resulted in no discernable difference in piracy.

"If a publisher wants to distribute without DRM copyright protection, we can do that," says James Bryant, CEO of Trajectory Inc., a Massachusetts-based ebook provider. "It would be a hard path to take, unless it's a tack to introduce people to the book."

The Asia-Pacific director from one prominent e-book platform, who asked not to be named, said if translating for the Taiwan market, while not perfect reading for the mainland given the difference in characters, there is a potential for the content to go viral via underground channels. "We would love to see that," he says.

How much of a role foreign publishers can hope to play in the China market is open to question.

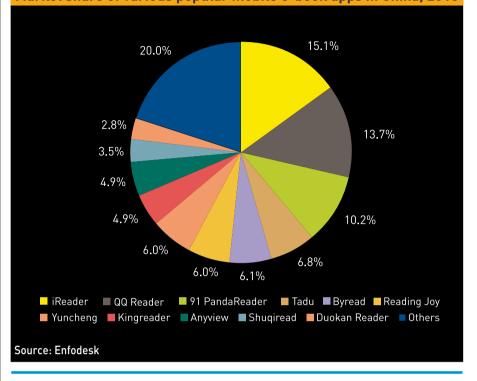
"We've been looking at the China market for two years now, and there's definitely a reason that we haven't jumped in yet," says Dimicco of Kobo, citing the long content vetting process employed by GAPP and the monopoly of China Mobile as a few key reasons.

## **Playing Ball with Big Brother**

Trajectory announced a partnership with state-owned Zhejiang United Publisher's Group in October at 2013's Frankfurt Book Fair, the culmination of a 20-year courtship of the appropriate government representatives and offering global distribution potentials for Chinese content.

"Relationships are really the key, and the true sense of the Chinese preference





of doing business as a way of cooperating, where the Chinese can see the opportunity to partner with an outside company in a way that helps them achieve their goals. Then it's a lot easier to establish a dialogue," says Bryant.

In May of 2012, BIZ Peking, the representative office of the Frankfurt Book Fair in Beijing, released a state-of-play report on China's publishing industry. The report iterated the main channels for access to foreign publishers, and the opportunities and challenges therein.

Foreign publishers have two options for selling books directly into China. They can initiate a one-time cooperation or coproduction with a Chinese partner revolving around a single title, or establish a joint venture where the Chinese partner holds the majority stake.

As the BIZ Peking report notes, joint ventures have suffered a myriad of complications over the years, the more notable of which include delays in payments to foreign publishers as the Chinese companies first need to apply for settlement in a foreign currency, and a drawn out decisionmaking process as bureaucratic obstacles need to be overcome time and again.

## Keys to the Kingdom

As Lusby and Duokan's Hu explain, publishers that step to the forefront of the latest digital content technology will be able to set the market, and when it comes to platforms, Xiaomi is a strong contender.

In addition to favorable market share, Xiaomi has access to all that juicy pulp literature that Chinese online writers are producing in bulk, which Goldman Sachs and Temasek evidently deem quite significant. This is a major advantage over other contenders that veer either all the way toward digitizing printed books, what publishers typically do, to those that deal only in internet novels like Cloudary. For the consumers, publishers should find ways to develop a synergy with the platforms most invested in the user experience.

"The issue with China's e-book market is not a technical one, but a human one," says Lusby. "Chinese readers will pay what they want to pay for, and it's about giving them that choice."

## Cover Story



## LIFE ID SD

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Prophets of doom say 3D printing will overturn manufacturing in China. They're both right and wrong

By Colin Shek

## Cover Story

isps of smoke rise from nowhere as an invisible beam silently traces a path inside one of the three-dimensional (3D) printers at Beijing Longyuan Automated Fabrication System (AFS).

The printer is in the early stages of making a part for an aerospace company. An infrared laser inside the refrigeratorsized machine follows a preset course as it burns a bed of powdered aluminium to fuse it into a solid layer.

It can be a slow-going process. A look through the printer's inspection window shows what resembles pools of liquid on the bottom of the build chamber, while a nearby printout of the final part depicts an intricate concept riddled with nodules and voids.

AFS's factory on the outskirts of Beijing in Shunyi district is small and unassuming. But the eight machines inside the squat, nondescript buildings are blazing a trail in the process known in industry circles as additive manufacturing. Its popular moniker is 3D printing.

Founded in 1994, AFS was one of the first 3D printer makers to emerge in China. Its main line of business is selling the laser-sintering machines that turn software blueprints into objects by building them up in thin layers from particular materials. AFS's printers can use powdered metal or foundry sand on top of each other, says William Zeng, Deputy General Manager at AFS, while other machines extrude molten plastic through a nozzle.

## **Additive Evolution**

Additive manufacturing is not short on hype. Supporters say the technology has the potential to reshape the way we design, produce and manufacture new things and make it easier and more cost efficient to create existing objects. That carries implications for global manufacturing and the country in the middle of it all, China. Additive manufacturing could challenge China's attraction as a large-scale, lowcost production hub—or alternatively augment it.

More than a decade before AFS set up shop, Charles 'Chuck' Hall invented the



The buzz was unprecedented in comparison to other industry events

> Tim Caffrey Senior Consultant Wohlers Associates

first additive manufacturing technique in the United States in 1983. According to 3D Systems' company history, the first thing Hall printed using his method, called stereolithography, was a humble teacup which he gave to his wife.

Hall's process sparked a slew of other 3D printing technologies that have become widely used in a range of niche industrial applications.

"It includes a whole umbrella of technologies. What they have in common is a core process of building up projects layer and layer, by laying down and patterning material," says Anthony Vicari, Research Associate at innovation-focused consultancy Lux Research in the US.

But while enterprise use expanded quietly over the past three decades, public interest did not take off until the emergence of low-cost 3D printers for consumers and hobbyists in the mid-2000s.

"All these processes have been in development for 10, 20, sometimes 30 years, but for the most part, they've been limited to the industrial world, because the cost of the printers has just been enormous. Even today, if you want to print titanium alloys for aerospace, that printer is going to cost you \$500,000 to a \$1 million or so," says Vicari.

Additive manufacturing has also piqued the attention of the global factory that is China. Companies like AFS are riding a wave of local interest in the process, evidenced by the excitement at the second World 3D Printing Technology Industry Conference, held in Beijing in June. "The buzz was unprecedented in comparison to other industry events," says Tim Caffrey, Senior Consultant with Wohlers Associates, a consultancy that tracks 3D printing. "CCTV recorded a Q&A hosted by one of its popular on-screen personalities, and the audience was snapping photos at an amazing rate."

The Chinese government has also picked up on the trend by forming the China 3D Printing Technology Industry Alliance. The group aims to shepherd development of the domestic industry and is involved in planning 10 innovation centers in 10 cities that will cost RMB 20 million in total.

Outside of China, American firms head a pack of about a dozen major 3D printer makers that preside over the global market. Charles Hall's California-based 3D Systems is the largest globally, followed by Stratasys from Minnesota. Both are present in China, where they vie with leading homegrown players such as AFS, Beijing TierTime Technology (which as of May was the largest producer of 3D printing systems in China), Hunan Farsoon High-tech and Wuxi FalconTech.

## **Prototypical**

In China, 3D printing has carved out a niche in the advanced and high valueadded manufacturing sector that involves complex parts and exotic materials.

Take the automotive industry for instance—3D printing is a boon for designers and engineers because it allows objects with complex designs, like interior voids that minimize weight without sacrificing strength, to be made much cheaper than traditional methods. Additive manufacturing cuts out the long lead times and design constraints associated with conventional techniques like metal cutting or molding.

"Today prototyping is still the main news. That's the application that has really built up the industry in the first place," says Vicari. "Things that wouldn't be 'machineable' or moldable at all... are much easier to make."

"If there's something wrong, you can make changes directly... and make it again," says Kim Francois, China Chief Representative for Materialise, a Belgian company specializing in 3D printing. She says the process saves time and money because molds can cost up to RMB 150,000 and take two months to make.

Turnaround can also be significantly shorter in some cases. Sitting on the floor of AFS's boardroom is an aluminium transaxle case for a car that was printed in less than a week, but would have taken 3-6 months to machine from a block of metal.

The efficiency of 3D printing also means production costs can be a fraction of current methods. When Lockheed Martin and the Oak Ridge National Laboratory in the US teamed up to make titanium alloy brackets for the engine of the F-35 fighter jet, they discovered the shape was so complex that machining it left 97% of the material on the floor. With 3D printing though, only 9% was wasted and the money saved from material scrap more than halved the cost of the bracket.

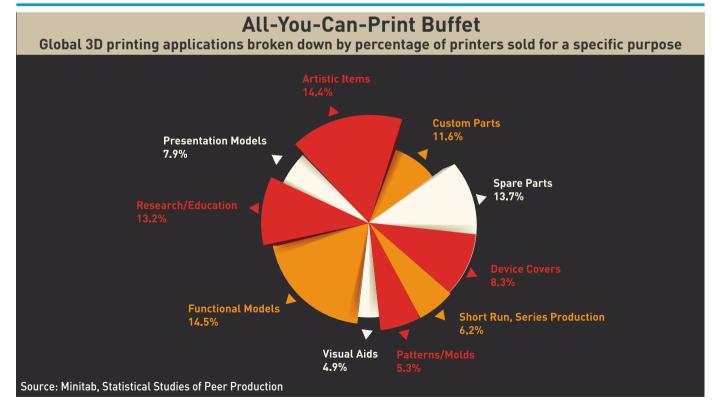
Rapid prototyping generates around 30% of AFS's revenue, and the business counts some of China's biggest companies as clients. Its most expensive 3D printers, costing RMB 1.6 million, are used by Chinese automakers Geely, FAW and Dongfeng Motor to produce experimental engine parts, says Zeng.

Aerospace is another area where 3D printing is taking off. One of the largest printers in the country is about the length of a bus and belongs to the National Laboratory for Aeronautics and Astronautics at Beihang University in Beijing.

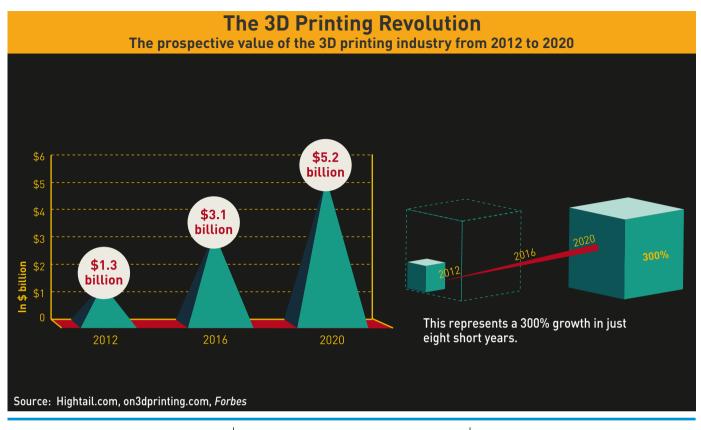
Although AFS did not make it, Zeng says the machine is being used to design large and complicated parts for China's home-grown competitor to the short-haul airliners made by Boeing and Airbus. AFS itself has also worked with AVIC Dongan, a subsidiary of the country's dominant aerospace and defense contractor Aviation Industry Corporation of China.

Rapid prototyping appeals to those designing cars or jets, but another strength has entrenched 3D printing in health care. AFS's cheapest machines—costing around RMB 680,000—are popular with medical companies and hospitals, including Peking University Third Hospital, one of the top clinics in the country.

Infinite customization is behind the health care industry's embrace of 3D printing. The technology makes it possible to personalize products on a massive scaleuseful for a sector where every patient is unique. Today's prosthetics and implants for use inside the human body already come in a variety of sizes and designs, but 3D printing can improve them by tailoring devices to each patient's biology or injury. Bespoke implants mean better compatibility and fewer trips to the hospital, which could potentially ease the strain on China's already stretched social security system, and it is where Materialise hopes to leverage its expertise in 3D printing in China. The Belgian company is looking to work with doctors to design devices like jaw implants from scans of patients' mouths,



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says Francois. The digital models would then be printed in medical-grade titanium.

## Out with the Old

Some of the mania around 3D printing has circulated the potential threat it poses to mass manufacturing—the kind that has come to define China's economy. It comes as no surprise then, that traditional producers have pooh-poohed the idea of 3D printing threatening 'Made in China'.

A "gimmick" is how Hon Hai Precision Industry Co. Chairman Terry Gou reportedly summed up the technology in June. Most of the 1.3 million employees at Foxconn, Hon Hai's giant electronics manufacturer and iPhone maker, are in China and they staff the massive factories that churn out goods for Apple, Samsung and other multinationals.

"If we're talking about the kind of manufacturing that Foxconn does, then for the most part, 3D printing will not be applicable. But within the applications where there is a case for 3D printing, it's definitely not just a gimmick. There's a lot of hype surrounding it today but there's a lot of reality too," says Vicari.

While additive manufacturing looks unlikely to supersede conventional production processes, there is scope for the technology to enhance the kind of lowcost, mass manufacturing that has propelled China's economy over the past three decades.

What has piqued Beijing's interest is that the vast army of traditional manufacturers in China can leverage 3D printing to produce and modify molds for production use with ease.

"It assists the conventional manufacturing processes because you can make or modify the existing mold fairly quickly," says Vicari. "There's definitely an adoption among some of the manufacturers there for some of those uses."

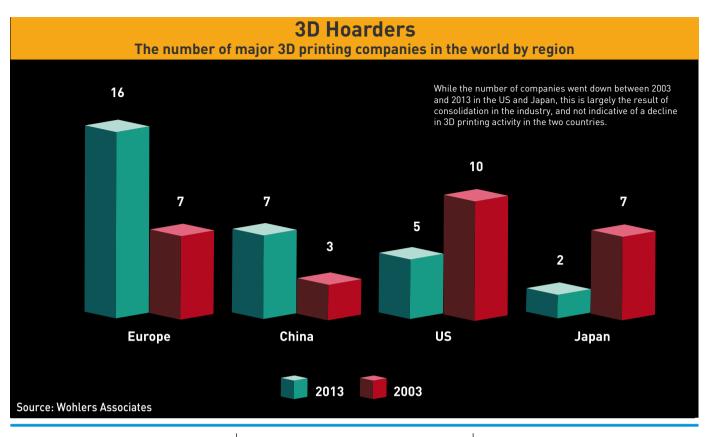
## **Hasta Logistics Baby**

There are other ways where 3D printers could make routine production of parts more efficient. An assembly plant—like those run by Terry Gou's Foxconn for example—with a faulty production line would typically need to order spare parts from an injection molding company, which would then need weeks to shape and ship the items. But a 3D printer onsite could create a replacement in hours.

"You can print on demand, which is one of the big advantages of 3D printing," says Francois. "It's only on request, which is great because you throw away less things. You don't need to rent out big warehouses to put in your stock, and then realize after two years, nothing has sold, [so] throw it away. It saves money and it's good for the environment."

The long-term impact on supply chains could be profound. As companies start using 3D printers to produce parts on demand, on site and only as needed, a plethora of players—from storage to shipping—would lose out in a shorter, simpler supply chain, while consumers would benefit through localized production and leaner inventories.

Take, for instance, an offshore oil rig that needs a component replaced. Today, that would necessitate the replacement part flown in at great expense from inventory stored at a costly warehouse. If stock



no longer exists, then the rig operator will need to fork out for an expensive one-off production run of a legacy part.

With a 3D printer on hand, the same component could be ready in hours. Costs would come down as storage and shipping are no longer needed, and through the elimination of capital investments such as moulds, casts and machine tools.

In a study back in July, IBM disassembled three products—a cell phone, a hearing aid and a washing machine—and determined the cost of manufacturing and distribution in a simulated supply chain based on 3D printing. The washing machine had 63 mechanical parts, each of which can be made by a single 3D printer instead of 63 separate stamping and molding parts and a production line. IBM found that the supplier base could be reduced from between 30 and 60 suppliers to one or two.

Localized production of higher-value goods carries implications for China's position in global manufacturing, especially if the cost of 3D printing comes down and the quality and reliability of printed parts improves. In that scenario, Vicari says there would be less reason to build a factory in China, particularly for highly automated technology.

That could accelerate the so-called 'reshoring' of American and European manufacturing operations, as companies would no longer need to incur the cost of shipping raw materials and components in, and products out, over long distances.

For now, 3D printing is not about to replace mass production—not for another decade at least. "Anything in quantities of tens of thousands or hundreds of thousands of units [is] still going to be made using conventional technologies. The main impact of 3D printing is going to be the prototyping and design phase for highvalue goods. Or potentially even down the road for replacement parts, where having something local on site has additional value," says Vicari.

### In a Material World

Judging by Terry Gou's comments though, additive manufacturing has something of an image problem among China's factory bosses. Though 3D printing can play an evident role, some limitations mean it has failed to gain traction in the mainstream manufacturing world.

Chief among them is that it can take anywhere from hours to days to print an object. While that may be an improvement for applications like rapid prototyping, it is impractical for larger-scale production. An assembly line in Shenzhen can churn out a product in the hundreds of thousands or even millions in the same amount of time it takes to print a component. "It's an order of magnitude slower than what it'd need to be," says Vicari.

Materials are another problem. The compounds used to print objects are expensive and only a handful can be used due to the required performance standards. Titanium is popular for printing industrygrade parts because the metal is lighter and stronger than steel, but Zeng from AFS says titanium alloys made in China cost RMB 3,000 per kilo and RMB 5,000 for imported varieties. Plastics can be pricey too: RMB 1,000 per kilo from the US versus RMB 400 from China. AFS often opts for foreign feedstock, as the better quality

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can be telling in the printed product.

Materials used in conventional manufacturing can cost 10 to 100 times more by weight when sourced for a 3D printer. The mark-up is partly due to the higher purity and composition standards required for 3D printing. It is also because there are still a small number of suppliers. "For many of these materials, you have to buy from the printer supplier," like the way consumers buy ink cartridges from desktop 2D printer makers, says Vicari. But analysts expect material prices will fall and the list of options will diversify, as third-party suppliers enter the business.

Materials are not the only thing AFS imports. Laser systems made in China are too unstable to be used in AFS's industrygrade printers, so the company imports lasers from Coherent in the US that cost more than RMB 100,000 each. The scanners in AFS's machine used to map objects are from Germany and cost between RMB 150,000-250,000. Importing equipment is expensive and trims the cost advantage of 3D printing against today's mass manufacturing processes. While additive manufacturing struggles to take hold on the Chinese factory floor, the advent of inexpensive printers has spawned an expanding 'maker movement' of local hobbyists.

"Huge" is how Materialise's Francois describes this enthusiast side of China's 3D printing market, which she notes is being spurred by the growing low-end printer market. But she cautions that while there is sizeable public interest, a learning curve is involved.

"It's not there yet that *laobaixing* [ordinary people] can just pick a printer up off the street and say, 'this is my desktop printer, let's use it.' It's not there yet: you need to have some knowledge... an interest. You need to be able to play with the software and the machine a little bit to be able to print out a decent product."

Whether consumers will want to print simple goods at home is another question. Zeng and Francois both say no, pointing out that consumers today can print digital photos at home but almost never do, preferring the expensive, high-quality machines found at thousands of photo coun-



A lounge chair produced by a 3D printer at a 2013 Materialise exhibit in Shanghai.

ters and shops.

"If you want to have a nice picture printed, you still go to your printer shop. It's basically the same. If you want to print something that you have made at home, you can use your 3D printer at home. But if you want a really high-quality good, you will still go to the 3D printer shop," says Francois.

At-home printing will not become widespread until printers become more reliable and the tools for using them more intuitive. In the meantime, so-called 'service bureaus' like Francois's Materialise will bridge the gap by offering users a far easier entry point.

The company offers on-demand printing, with 90 printers of differing technologies in Belgium. Customers can upload their schematics to an online platform, select materials and have the final product shipped worldwide.

For designers then, additive manufacturing may live up to the hype. The technology opens up possibilities that were previously off-limits due to the constraints of typical production processes. "Industrial designers are educated in a way that they need to think about what they can make... with 3D printing, you can put that aside," says Francois.

Education in general is poised to reap benefits from the spread of low-cost 3D printing, as schools and academia start integrating the technique into their lessons and curriculum.

Economies of scale and the pace of production mean China's mass production model bests additive manufacturing for low-cost, high-volume goods. But it is difficult to say how long that advantage will last as 3D printing technology improves.

Rather than pose a threat, 3D printing could instead augment China's factories. Opportunities exist to make mainstream manufacturing faster, leaner and more efficient. And with China moving up the industry value chain, the integration of 3D printing makes sense for improving development and central processing at factories. Not a threat, but also not a gimmick—3D printing will build upon what's currently possible to reshape the world.



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After years of extraordinary growth, has fast fashion peaked in China?

By Xin En Lee and Suzanne Edwards

n November, property consultancy CBRE reported that landlords in secondtier city retail properties were courting China's main fast fashion brands to drive foot traffic, going so far as to waive a flat rent rate in exchange for a percentage of turnover to attract these apparel icons, hoping to cash in before the brands peak.

These landlords may be sensing a subtle but key change in China's retail apparel market, which in the main cities has thus far been dominated by fast fashion titans such as H&M, Zara, C&A and Uniqlo, all specializing in the high-speed/highvolume production cycles characteristic of fast fashion.

"Customers in the larger Chinese cities like Beijing and Shanghai are moving out of the phase when they just crave the big names," says Nels Frye, the blogger behind Stylites, one of China's most influential street style blogs. "They are dramatically more stylish these days and for instance, multi-label stores are a response to this change, where a more personal style can be defined."

These "multi-label stores", also called "concept stores", sell multiple labels and focus on curating to convey the store's attitude or style. Famed examples include Colette in Paris and Opening Ceremony in New York while in China there is Triple-Major and ink Beijing in Beijing's hipster Gulou neighborhood.

Concept stores in China aren't numerous enough to be considered a movement (yet), but there's enough activity to signal the coming of age of China's fashion world, which leads to the question: can China's fast fashion success stories continue their growth at unabated rates?

Inditex's announcement in September that they were scaling back the number of new store openings globally to give their flagship Zara stores a facelift caused speculation as to whether the market was wavering. Then Zara reported only a 1% increase in year-on-year first half global profits for 2013, beating forecasts but still its weakest performance in years. The fast fashion business model that has thrust foreign brands to the forefront of shopping centers across China is also up for grabs. More and more local apparel companies are scurrying to ratchet up their production cycles and match, if not outdo, the inventory turnover that has worked so well for foreign fast fashion brands, according to Alexandra Daniel, Business Consultant at fashion and apparel technology solutions company Lectra.



"If they [local retailers/clients] don't go with this transition, they'll go bankrupt," says Daniel.

CBRE's Shanghai Manager Shirley Hu, who also contributed to the CBRE fast fashion report, says that because of the surge of new retail property supply, particularly in second-tier cities, the near term growth prospects for foreign fast fashion brands remain strong. "The substantial new property supply will allow fast fashion brands more chances for expansion," she says.

But in the face of increasing fragmentation in China's apparel industry and the growth of online shopping, who will be the long-term winners in China's fast fashion ring and how will they maintain the title?

## **Apparel Smorgasbord**

Fast fashion is defined by the velocity with which apparel companies can get styles from the catwalk to the consumer. For traditional apparel retailers, it is usually many months, while fast fashion retailers make new styles available to consumers in just weeks, sometimes turning over inventory up to 12 times a year. Fast fashion is also characterized by affordable prices that cater to a wide consumer demographic.

The most notable success of fast fashion in China is Spanish company Inditex, which owns brands such as Zara, Massimo Dutti and Pull & Bear. Since entering the Chinese market in 2007, Inditex now has more than 100 stores in 40 Chinese cities, opening 72 stores in the first three quarters of 2012 alone. To put that speed in context, Inditex entered the Indian market in 2010 and now has 12 stores in India. Similarly, Inditex took 14 years to reach 40 stores in Brazil.

Likewise, Inditex's Swedish rival H&M also stresses the China market. CEO Karl-Johan Persson has said that China is the country in which H&M will open the most stores, and that H&M is looking to increase its presence in lower-tier cities. Between 2011 and 2013, the company more than doubled its number of stores to the current total of 170.

Other companies with ambitious expansion plans include European fashion company C&A which has more than 40 stores and plans to have 150 by 2015, while Japanese fashion label Uniqlo, one of the early-comers in China's fast fashion scene, has proposed to open 100 new stores in China annually.

What is key about the expansion tactics is not just the volume, but also the geography. Hong Kong-based Fung Group, which offers solutions in trade, logistics and distribution, reported that more than 80% of new stores opened by Zara and H&M were situated in second- and third-tier cities in 2012, meaning China's global fast fashion heavyweights are confident their fashion schematics can appeal to various income levels and socioeconomic backgrounds, and that there will be no shortage of retail space available in these places.

Keeping a China-focus has significant rewards. The domestic apparel market has some of the healthiest projections of any sector in China, with a market worth RMB 854 billion in 2012, according to market research firm Marketline. Good China performance also means good global performance. Inditex's profit rose by 22% between 2011 and 2012, while H&M reported a 22% yearon-year growth in the third quarter of 2013. Swedish bank Handelsbanken attributed this to strong sales in China, and has said that H&M is more profitable in China than in any of its other markets.

## **Tastes and Turnover**

BCG Partner and Hong Kong Managing Director Vincent Lui, who co-authored BCG's report on the fashion market, says the success of these brands stems from consumers, particularly young urbanites, being exposed to global offerings and becoming more aware of global trends than in the past.

"Things in the fashion market have changed pretty quickly, and the post 1990s generation has the pulse of global trends down pat—they watch TV shows and spot global trends, so the international brands which are successful in China, and the reasons for why they are successful, are similar to why they are successful globally."

Shanghai-based trends consultancy Style-Vision Asia CEO Genevieve Flaven

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Things in the fashion market have changed pretty quickly, and the post-1990s generation has the pulse of global trends down pat

## Vincent Lui Partner Boston Consulting Group

also puts it down to evolving tastes of Chinese consumers.

"I see women becoming more influenced by the European style and looking for more simple elegance," she says. "Three, four years ago, Zara was a bit 'flat' for the Chinese market because of the muted colors and more simple style, but it's doing extremely well now, and I'm pretty confident it will keep getting better."

Taste can't be overlooked, but the business model of high inventory turnover rates, shorter production cycles and rapid on-the-ground feedback from key outlets have helped the likes of Zara and Uniqlo capture market share globally and in China.

"High inventory certainly has its advantage in casual wear as China's growing middle class are looking to spend more on apparel," says Erica Ng, Business and Retail Editor for London-based fashion forecasting agency WGSN. "Zara's model is strong because they've grasped listening 'on the floor' and localization, and that's the business model trait which brands will need to grasp. Chinese consumers are radically fast in learning about global fashion brands and brands need to catch up in understanding their tastes and demands."

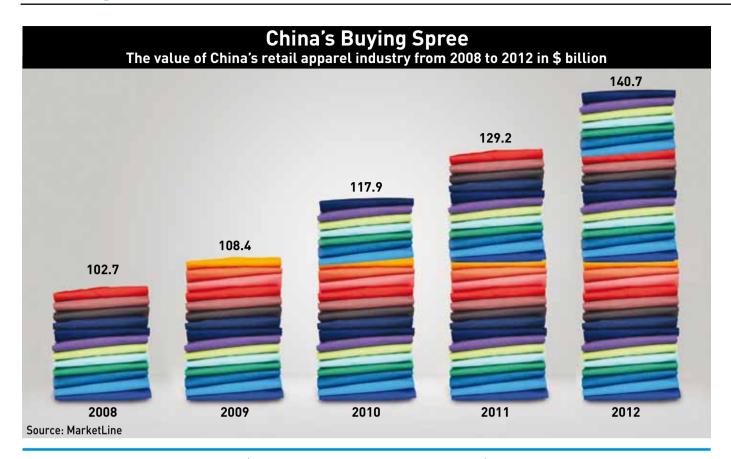
## Sizing up the Competition

Chinese brands still make up most of the market, save for strong results from earlycomer Denmark-based Bestseller Group, which owns brands like Vero Moda and casual wear brand ONLY.

The China National Commercial Information Centre estimates that in terms of ladies' wear, Vero Moda and ONLY have impressive 10.9% and 9.9% shares of the market respectively.

While Western consumers have probably never heard of Metersbonwe, the Chinese fast fashion giant is one of the largest Chinese apparel companies and manufacturer of men's, women's and children's apparel. A pioneer of the apparel industry in China, Metersbonwe opened its first store in Wenzhou, Zhejiang province, in 1995, grew rapidly to more than 5,000 stores mainly in China's interior cities, and achieved profit growth of more than 30% annually until 2011, according to company reports.

But like the much-discussed inventory problems of the domestic sportswear industry, Metersbonwe's similar business model ran into serious issues. In 2012, the company had 3,817 franchise stores, which accounted for 74% of its total stores and 49% of its total revenue, according to company statements. In March this year, the company announced that its net profit attributable to shareholders plunged by 30% after market rumors said that its inventory figures had been manipulated, and in the fallout Metersbonwe closed 142



## stores in the first half of 2013.

The inventory problem extends beyond a single company. The China National Garment Association warned in 2012 that inventory of domestic apparel enterprises had far surpassed warning levels and had enough stock on hand to satisfy demand for three years even if all domestic apparel makers halted production.

Flaven says stagnant style, often a result of inventory glut, will be detrimental to Chinese fast fashion retailers. "Metersbonwe and Girdear have not changed their styles for years now, it's always been very basic. For winter, it's a down jacket and checked shirts all the time and I don't think they understand the changes in fashion attitudes in China. For the other Chinese brands which are a bit more creative, their prices are as expensive as foreign brands like Zara while their designs are not that original."

Case in point, in the month of October, a black 'flounce skirt' from Ochirly was being sold for RMB 439 online, while a nearly identical skirt from H&M was priced at a mere RMB 182 online. But contrary to Flaven's assertion, the price difference hasn't been an issue for Ochirly, which recently got a \$200 million boost of confidence from L Capital Asia, the financial arm of luxury giant LVMH.

Liu says "identity and style" could usher in a higher price tolerance from Chinese consumers.

## **Future Fashion**

The online component of fast fashion retail is not as automatic as one might think given that apparel accounted for half of all Taobao sales on Single's Day this year, according to statements from Alibaba.

"The fashion market is incredibly fragmented, and once you get a 1% or 2% share, you're considered a major player. Ecommerce will just be one more channel for retailers to compete in," says BCG's Lui.

CBRE's Hu agrees, emphasizing that the focus for foreign fast fashion brand expansion will continue to be the physical store, and the benefits of e-retail will be more of a bonus for the main players.

Lui says that ultimately, success de-

pends on products being able to capture the aspirational feelings of Chinese consumers.

"Chinese society is about upward mobility, and that characteristic stands out from the perception of fashion in other countries, where it's more indulgent, artistic and aesthetic. In China, fashion is an expression of achievement, and retailers will do well if they manage to translate that into apparel."

Ng highlights that a key characteristic of the fast fashion market in China is that the consumer landscape is changing even faster as compared to Western markets. Thus, retailers will need to learn how to keep up with this pace, especially now that local players are emulating the production cycles of their international counterparts.

"Chinese consumers are looking for more innovation, personalization, interaction, value in money, convenience, and they know what's in demand globally. Large players will have to be very clear on what their brand stands for and how that's translated to every customer, online and offline."

# All in the Genes

In just 14 years, BGI-Shenzhen has become the world's largest gene sequencer. How did it become so prominent?

By Neelima Mahajan

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Question: What does a 700,000-yearold calcified horse bone found in Canada's Yukon region have in common with a varied assortment of plants and animals including silkworms, potatoes, corn, rock pigeons, chickpeas and pigs?

On the outskirts of Shenzhen, Maersk containers whiz to and from the port through highways on the lush green rainsoaked hills. The Shenzhen special economic zone, known for its cheap labor and low-cost manufacturing, is in many ways the factory of the world. It is where your iPhone and New Balance sneakers come from. It is also where the somewhat derogatory term of *shanzhai* took root, thanks to cheap knock-offs that are churned out by the minute in countless sweatshops that have given this place its hard-to-match competitive advantage.

Faceless buildings flank the roads. Inside, armies of workers go about their jobs busily, supplying the world with everything from smartphones and cheap electronics, to garments and shoes.

An army of a different kind is hard at work in one such building. An hour away from downtown, BGI-Shenzhen's headquarters stick out like a sore thumb from the gentle slope of a hill. The building has not much in the name of character—it used to be a shoe factory until it was handed over to its current occupants. A sign at the entrance says: "Decode life".

Youngsters clad in shorts, T-shirts and sneakers troop into the reception shaking rainwater off their umbrellas on to the linoleum floor before they begin their workday. These kids, who make up the bulk of BGI's 5,000-strong workforce, have made it the world's largest sequencer of human, plant and animal DNA.

China is known for many things such as low-cost manufacturing and the economic miracle. Not genetics. BGI is out to change that.

## **China's Genetic Powerhouse**

Barely 14 years old, BGI already rubs shoulders with the big boys of genetics research—like the Broad Institute in the US and the Wellcome Trust Sanger Insti-



BGI wants to make bioinformation very cheap so that everybody knows their genes, and are able to control their genes

> Zhu Yanmei Associate Director Strategic Planning Committee BGI

tute in the UK. It has sequenced more than 57,000 human genomes, more than 6,000 microbe genomes, 5,300 metagenomes, and in plants and animals, more than 580 species and 28,200 variation genomes. While Broad and Sanger are almost exclusively focused on health care, BGI has firmly planted its feet in three areas: health care, agriculture and bio-energy. It is also becoming a force to be reckoned with in the bio-informatics space. It has multiple locations in China and has set up entities in Japan, Hong Kong, Denmark and America.

On the top floor of BGI's Shenzhen office is a trophy room of sorts. It was built for former Chinese president Hu Jintao's visit (he ultimately passed up the visit because his security personnel deemed the hill on which BGI stands a possible security threat). The room houses pictures of many BGI collaborators and well-wishers, such as Premier Li Kegiang and Microsoft founder Bill Gates who visited BGI several times-the Bill and Melinda Gates Foundation has tied up with BGI for 16 projects on agriculture and they are in talks for health care projects in Africa. There's also a wall dedicated to BGI's publications in top journals such as Nature and Science. For a young institute, BGI has a fairly high publication rate-and now it even has its own open access research journal called GigaScience.

BGI's work is already getting attention globally. People like James Watson, co-discoverer of the DNA structure, molecular geneticist George Church and Maynard Olson, one of the founders of the prestigious Human Genome Project, sit on its advisory board. In his latest book, *The Future: The Six Drivers of Global Change*, former US Vice President Al Gore says that beginning in China (referring to BGI's work), humans will "seize active control over [our own] evolution".

## **How Did BGI Get Here?**

Unlike other research institutions in the same league, BGI isn't funded by wellendowed foundations. It gets some funding through occasional grants or government projects, but it is not significant. BGI makes the bulk of its money by selling sequencing services, relatively inexpensively (for the full genome sequencing, BGI charges around \$4,000). BGI's research division, bio-bank and the college are nonprofit while the technology services and the health care division bring in the cash.

Founded in Beijing in 1999 as Beijing Genomics Institute (it has since changed its name to BGI-Shenzhen), in 2003 BGI moved under the aegis of the Chinese Academy of Sciences (CAS), a highly respected research institute in China. While the CAS affiliation had a significant ruboff on BGI in terms of prestige, it was also stifling. To become one of the best in genomics, BGI had to be nimble to spot opportunities quickly and act on them accordingly. CAS insisted on a traditional regimented approach which emphasized, among other things, educational credentials and experience. BGI didn't. Tensions grew and by 2007, BGI's funding and state support had ebbed, and it had to reduce headcount to 20 people from 400. And so when the Shenzhen government offered BGI the old shoe factory and RMB 90 million over the next four years, the institute jumped at the opportunity. Independence gave BGI a fresh lease on life-and the ability to work on projects as it pleased.

To make it big in gene sequencing— BGI's bread and butter—one needs two things: high-tech sequencing machines and brainpower. In 2010, BGI bought 128 DNA sequencing machines from Illumina, an American company that develops tools

for genetic analysis. This was a very risky move. Sequencers don't come cheap-BGI reportedly shelled out \$500,000 for each-and technology could change, suddenly rendering the investment useless. BGI calculated that it would have at least a two-year opportunity with these machines. Overnight, BGI got tremendous sequencing capacity. "That sort of cornered the market for sequencers-they are not like dumplings that you can increase their production overnight. There are (only) so many that can be built in given time," says a BGI watcher. "The strategy was to become the dominant purchaser or user of the machine which would give them capacity and also block others, even though 'blocking' was not an intended consequence."

In March this year, BGI acquired its biggest competitor, the US-based Complete Genomics (CG), for \$117.6 million. This acquisition came under the scanner when Illumina's CEO Jay Flatley insinuated that this was like giving away the formula for Coke to the Chinese government (even though BGI is private). Despite that, the deal went through. Now BGI has access to CG's customers, sequencing technology as well as its genetic information database. "The Chinese industry does not have high-level sequencers, and that has been a bottleneck for BGI. If you don't have your own weapon, how can you fight?" says Zhu Yanmei, Associate Director for the Strategic Planning Committee at BGI.

BGI had already cornered 40% of the gene sequencing market globally. By acquiring its number two rival, it will now have 50%. "There is a great fit," says Radoje Drmanac, CG's co-founder. "The two companies had the same vision to implement genomics on a massive scale, to sequence millions of human genomes to improve human health and prevent diseases. CG has advanced sequencing technology

The Making of a Behemoth BGI-Shenzhen's work broken down by numbers and areas of focus
BGI's global market share (combined with Complete Genomics) 50%
Number of employees 5,000
BGI has sequenced 50,000 human genomes to date
BGI sequenced 1 % of the human genomes for the International Human Genome Project
BGI sequenced 10% of the genomes for the International Human HapMap Project
BGI launched the <b>1,000</b> Rare Disease Project
BGI launched the <b>3million</b> Genomes Project
BGI launched the 1,000 Cancer Genomes Project
BGI launched the 1,000 Genomes Project

### China Insight

and expertise to further develop it, and BGI has the ability to scale it and use it in all applications, access to big markets and funding."

BGI's secret weapon-like a lot of manufacturing companies in Shenzhen-is competitive costs. "The core competence of BGI is the low-cost and high-throughput platform," says Zhu. And that's possible because of the scale at which BGI operates and relatively inexpensive manpower. BGI employs nearly 5,000 people, out of which 3,000 are based in Shenzhen. In a sense, BGI has a somewhat unconventional approach to staffing. It doesn't care about credentials and degrees and has hired some college dropouts as well (it can train them in its in-house college which can grant degrees via affiliations with prestigious universities). It takes them in young-usually at the age of 22 or 23. Some of them live in 'on campus' dorms. Most of them earn RMB 100,000 a year (about \$16,500).

Despite the comparatively low pay, people tend to stick on, and appear to be highly motivated. Take Zhao Bowen, who recently made it to *MIT Technology Review*'s list of '35 Innovators under the Age of 35'. Zhao, a high school drop-out who is now 21, is leading a multi-million dollar project to uncover the 'intelligence gene'. Similarly Li Yingrui, now CEO of BGI Tech Solutions, dropped out of Peking University. Yet today he has published nearly 30-40 papers in leading journals.

At the heart of this is flexibility, freedom and an almost hierarchy-less organization-everyone, including the president and the CEO, sits in cubicles. "This is a very different organization. People here are all working based on their (own) inner driving force, the curiosity in the data that they are playing with," says Xu Xun, Deputy Director and the person leading BGI Research. "The senior people at BGI make the young guys stand on their shoulders," adds Zhu. A case in point are two of the co-founders-Yang Huanming and Wang Jian-who voluntarily stepped away from active management to make way for younger people with new ideas.

### **Geek Quotient**

A youngster with a thick mop of hair steps into the elevator. His T-shirt says: '1000 Genome Project', and he wears it with a sense of pride. The 1000 Genome Project, an ambitious effort to track human genetic variations, is one of many marquee projects that BGI has actively pursued. The idea was to sequence the genomes of 1,000 individuals from several different ethnic groups, and BGI joined hands with other participating research teams from countries like the US, the UK, Italy, Japan and Kenya.

The 1,000 Genome Project is just one of many jewels in BGI's crown. When BGI was set up in September 1999, the founders somehow managed to get BGI in as a participant in the prestigious Human Genome Project (HGP), an ambitious attempt at decoding the human genome.

BGI got to do 1% of the work in the HGP. It may sound insignificant to many, but it was a very big deal. In more ways than one, this helped BGI get a solid foothold in the world of genomics research. It was the only institute from a developing country to have participated in this project, and suddenly it was rubbing shoulders with the US-based National Human Genome Research Institute, UK's Sanger Institute, Germany's Max Planck Institute for Molecular Genetics, and various research institutes from universities like MIT and Stanford.

For BGI the HGP was the first big hurrah. Ever since, the institute has been even more agile in spotting lucrative research opportunities. BGI went on to contribute 10% to the International HapMap Project, the Sino-British Chicken Genome Project, the 1,000 Plant and Animal Genomes and the First Asian Genome Map (See 'The Making of a Behemoth').

#### **Doing 'Good' Science**

In a forlorn corner of BGI's trophy room is a small aquarium. One half of the aquarium houses two fish—the 'mother' and the 'father' of a rather disinterested looking hybrid grouper that occupies the other half. The hybrid grouper grows three times faster than a normal grouper—and is apparently "tastier". A two-hour drive away from the Shenzhen headquarters is BGI's

### **BGI-Shenzhen Milestones**

1999	2001	2003	2007	2008
BGI is founded with the mission to sequence 1% of the human genomes for the International Human Genome Project. China becomes the sixth member country of the International Human Genome Organization after America, UK, Japan, Germany and France	BGI Hangzhou is founded	BGI decodes the whole ge- nome sequence of four kinds of SARS viruses, and develops the diagnostic antigen, anti- body and related tags	BGI relocates headquarters to Shenzhen	The 1000 Genome Project launched by BGI-Shenzhen, The Wellcome Trust Sanger Institute (UK) and National Human Genome Research Institute (US)
	A paper titled 'Initial Sequenc- ing and Analysis of the Human Genome', the result of the Human Genome Project, is published in <i>Nature</i>		It finishes the 'First Asian Genome Map' project	BGI embarks on a project to decode the panda's genome

cloning farm, which houses, among other things, a bunch of cloned pigs that glow in the dark.

The grouper and the glowing pigs, in some ways, represent BGI's approach towards science: one that is guided by insatiable curiosity and an altruistic goal to do 'good' science. BGI proclaims that it wants to make the world better by improving health and food security, and protecting the environment.

This means using genetics not just for screening, prevention and treatment of diseases, but also using bioengineering to improve livestock and crops. BGI has mastered a cheap technique it calls 'handmade cloning' to clone sheep, mice and pigs, among other things. It is bio-engineering superior strains of crops designed to improve nutrition and help alleviate hunger. It has sequenced the genomes of living beings, plants and organisms as varied as the panda, potatoes, chickpeas, rice, silkworms, soft shell turtles, asparagus, rock pigeons, human gut bacteria, chickens, and the frozen horse in Canada's Yukon region. "A lot of people refuse to sequence the whole genome because they think that 98% of DNA is junk and only 1-2% is functional DNA," says Zhu. "But BGI thinks everything is useful... For the bio-economy everything has to be backed by basic research... If you don't know the DNA well, you'll never know where cancer comes from."

In health care, BGI has already made

significant advances in the treatment and prevention of SARS, e-coli, autism, Down's Syndrome and the dreaded HPV (human papillomavirus). Doing 'good' science also means that BGI has ventured into territories where others don't bother to tread. "BGI tends to work on things that are significant, like autism," says Fred Dubee, former Senior Advisor to the UN Global Compact and currently advisor to BGI. "There are also things that BGI works on that other people are not interested in, primarily what we call 'orphan diseases', the diseases that affect people in the poorest parts of the world." For instance, BGI recently published a paper on dengue fever, a disease that at this point has no cure and is not lucrative to pharmaceutical companies because it is primarily a developing world problem.

Using scale, BGI is already driving down the cost of diagnostics to near-impossible lows. Take HPV screening, in which BGI has introduced a new testing technique which has driven the cost down from RMB 300 to less than RMB 100 with improved accuracy. In 2013 alone they would have finished over 1 million HPV screens in China.

#### **Pushing the Boundaries**

BGI's sudden rise has also ruffled quite a few feathers. They have been accused of being 'biology's version of Foxconn' and a 'bio-Google' in the making with access to unlimited amounts of genetic data. Often Sino-phobia comes in the way. Projects like Zhao Bowen's attempt at decoding the intelligence gene have raised concerns regarding China getting the ability to bioengineer genius babies. Zhu pooh-poohs such concerns. It's not about creating 'designer babies', she says, it's about making healthier babies. "BGI wants to make bioinformation very cheap so that everybody knows their genes and are able to control their health."

Going forward, BGI is set to make personalized medicine a reality. "We are about to, or in some fields we have already, entered the era of personalized medicine," says COO Yin Ye. "Personalized 'omics'based 4P medicine (prevention, prediction, personalized, participatory) will be a growing trend in this field."

BGI plans to launch a simple personal genomics platform in a year's time. "We want to build the platform and the database first, and then the business. We are not in a hurry to make money," says Zhu. She adds that out of the 7,000-8,000 single gene diseases in the world, BGI already knows enough about 400. Next come multi-gene diseases, cancer, problems from the environment, etc. "(We'll move) from simple to complex: BGI wants to do it step by step."

In future, maybe babies will come into this world with a 'gene book', something like their personal product manual. Chances are BGI will have something to do with it.

2009	2010	2011	2012
BGI Hong Kong established The 10,000 Microbial Genomes Project launched	BGI Americas founded and headquartered in Boston	Autism Speaks and BGI partner to create the world's largest library of sequenced genomes of individuals with autism spectrum disorders	BGI partners with Novo Nordisk, GE Healthcare and Bill and Melinda Gates Foundation
	BGI Europe founded in Copenhagen, Denmark		
	BGI launches a research journal called <i>GigaScience</i>		BGI acquires Complete Genomics

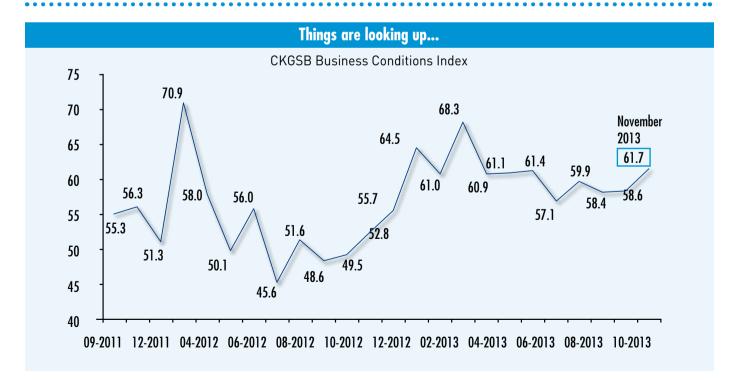
## **A New Leaf**

### The latest CKGSB Business Conditions Index shows that businesses are gearing up for growth

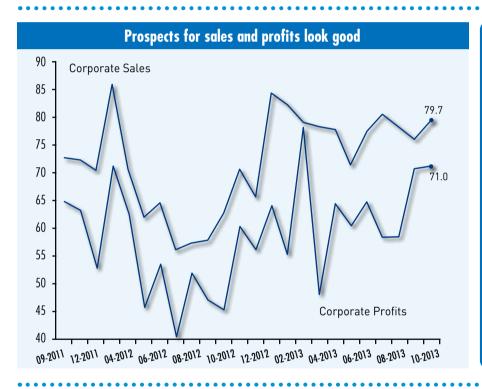
Business sentiments seem to be warming thanks to betterthan-expected economic data released in October and November, and optimism surrounding the Third Plenary Session of the 18th Communist Party of China Central Committee. Each month CKGSB's Case Center and Center for Economic Research conducts a survey of leading entrepreneurs in China to gauge and track changes in their business sentiment. The result of this survey, the CKGSB Business Conditions Index (CKGSB BCI), produced under the guidance of Li Wei, Professor of Economics and Emerging Markets Finance, provides a barometer on the state of the economy as viewed from the eyes of China's entrepreneurs. The CKGSB Business Conditions Index for November 2013 shows a positive reading of 61.7, which is 3 points higher

than last month's figure of 58.6 (see CKGSB Business Conditions Index). As 50 is the threshold between a positive and negative outlook, the 2013 average of 61.2 (7.3 points higher than this time last year), shows that most of our sample of business leaders in China is optimistic about business conditions over the next six months.

The CKGSB BCI questionnaire asks respondents to indicate whether their firm is more, the same, or less, competitive than the industry average. From this we derive a sample competitiveness index (see Industry Competitiveness Index). Consequently, as our sample firms are in a relatively strong position in their respective industries, the CKGSB BCI indices are higher than government and industry PMI indices. Thus users of the CKGSB BCI index may focus on changes over time to forecast trends in China's economy.







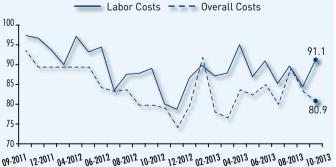
The corporate sales index rose 3.4 points from 76.3 to 79.7. However, the expectation of higher sales has led to an increase in the corporate profit index of 0.3 points to 71.0 (see Corporate Sales and Corporate Profits). Together these two indices show that firms are comparatively optimistic about the next six months.

The labor cost index increased from 84.4 to 91.1 while the overall cost index decreased from 83.5 to 80.9 (see Labor Costs and Overall Costs). It appears that the majority of sample firms anticipate costs rising on last year.

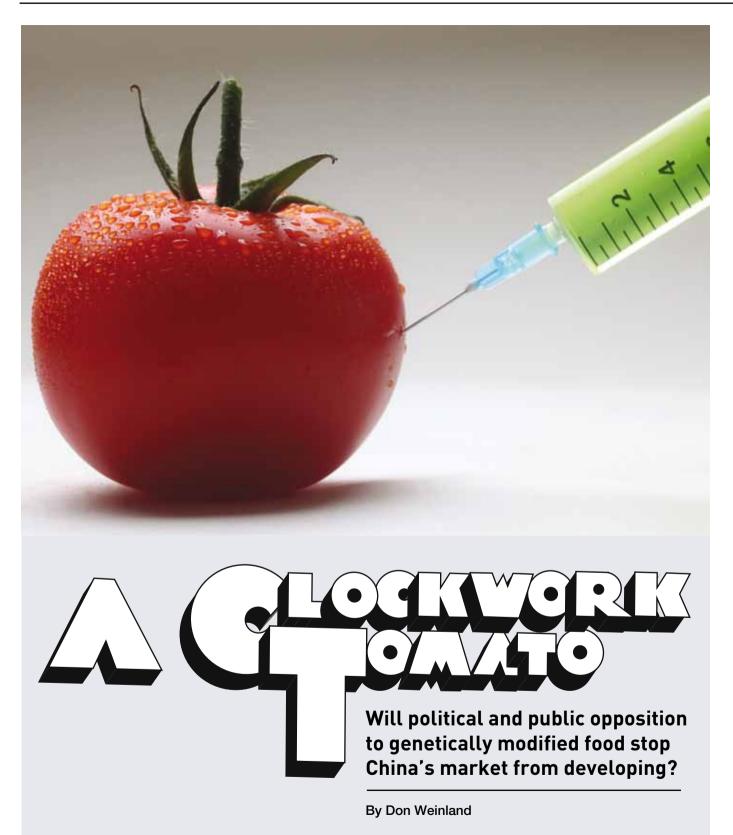
The consumer prices index rose 9.8 points from 63.2 to 73.0 (See Producer Prices and Consumer Prices). The producer prices index rose 12.4 points to 47.4, a reduction in exposure on last month. The rebound in producer prices is indicative of a potential for export inflation next month.



Labor costs will rise while overall costs will decline



### China Insight



t's the Cold War again, only this time the caches are filling with grains, not missiles, and battles are mapped out on wet rice paddies instead of dry plains. At least that's how People's Liberation Army Major-General Peng Guangqian seems to view the fight between genetically modified crops and traditional farming techniques in China.

From Peng's point of view, the West's "ultimate battle strategy" is to drive up the cost of seeds and grain by making China utterly dependent on its patented versions of genetically modified (GM) seeds, or seeds that have been genetically engineered to include genetic material from other organisms that it would otherwise not have encountered in nature.

Until August, when the high ranking military man railed against GM food in an editorial in state-run newspaper *The Global Times*, the Chinese government had maintained a united front on genetic technology and bioengineering for nearly 30 years. During that time, China spent more in GM and biotechnology research than any other country, outlaying \$3 billion in 2008 for a single project alone.

"Since the founding of New China, the facts have proven that no enemy can conquer us by force," General Peng proclaimed. "However, these kinds of subtle and underhanded biological weapons are likely to make us lose our vigilance. GM crops could become just such weapons, and the consequences could be greater than those of the Opium War."

Fitting Peng's article into the narrative of China's agricultural development over the past few decades is not easy. The modernization of agricultural technology has been a key stated aim of many Chinese leaders such as the late Deng Xiaoping and has featured in many of China's policy plans. In 1986, the government launched what it called the High-Tech Industry Development Plan, which cited bioengineering as a key area of focus. GM development has garnered support in consecutive five-year economic plans between 1991 and 2005. So from the outside, support for GM at the top level of the government seemed undivided, even a few

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We always thought that China would move boldly into GM food crops. Obviously we missed that one

> Scott Rozelle Agriculture Professor Yale

years ago, given the rigor of the programs delving into GM research, China looked like it was on the path to becoming a major GM food producer.

"We always thought that China would move boldly into GM food crops," says Scott Rozelle, an Agriculture Professor at Yale and a former researcher at the Chinese Academy of Sciences. "Obviously we missed that one. I don't see it happening anytime soon."

The pessimism stems not just from the PLA's anti-GM statement, which touched on everything from economic objections to safety hazards. Years of delayed approval on experimental crops sitting in Chinese laboratories are a clearer indication that China's GM program is facing significant opposition that goes far beyond technological glitches. Amongst other things, China's leaders are facing a public increasingly vocal in opposition to GM food on safety grounds, which is no doubt one reason why regulators are dragging their feet with approvals.

Meanwhile, companies are waiting. The area sown with GM products in China in 2012 rose by 3% to about 4 million hectares in 2012, according to a report from the International Service for the Acquisition of Agri-Biotech Applications (ISAAA). And firms like Origin Agritech, a Beijingbased bioengineering company, are poised to take advantage of what they see as massive commercial potential in the country, which produces 20% of the world's food. Desertification also teases companies that have designed drought-resistant seeds and are salivating at the chance to exploit vast areas of traditionally non-arable land.

The result is a multitude of organizations in the research and experimentation area of GM product development, waiting for a political breakthrough.

### Not your Father's Papaya

There are a few exceptions to the GM ban. Chinese diners would mostly be surprised to learn that the chunks of papaya floating in their sago puddings may be from a homegrown genetically modified crop. Papaya is one of the few GM products, along with tomatoes and sweet peppers, approved by the government to be commercially produced and consumed domestically. Most of the papayas that Chinese eat today are not GM variants, as the amount cultivated is only 6,000 hectares according to the ISAAA. But the journey of genetically modified papaya in China is illustrative of the slow march of GM food toward China's dinner plates.

Why engineer papaya, or indeed many others plants? A genetically modified organism is one that has had its genes changed with the hope of improving it—at least that's the philosophy. For example, scientists can add genetic material to a plant in order to make it resistant to some pests or herbicides, or remove a gene that makes it susceptible to a virus. Crops can be designed to withstand drought or even yield more nutrient-rich harvests.

In the late 1980s, *The Los Angeles Times* told the story of Steve Lindow, now

### China Insight

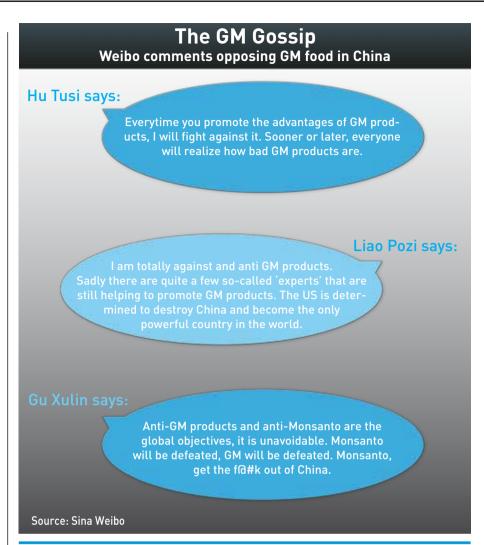
an American pathologist and professor in California, and his discovery of a mutantstrain of bacterium in 1977 which lacked a particular protein that was fundamental in ice-formation, in other words, the protein primarily responsible for the collection of frost on organisms in cold environments. Lindow was able to isolate the mutantstrain of the bacterium he called P. svringae, and apply it to plants, thereby allowing them to resist frost. Under the initial commercial name of Frostban, the substance went on to be developed and field tested in 1987 on a crop of frost-resistant strawberries, with successful results, becoming the first GMO to be released in the environment. The test drew the ire of the public, ensuing vigilant protests and lawsuits opposing the use of Frostban, derailing the product's commercial progress.

Genetically modified tobacco was introduced in 1983, with China becoming the first country to commercially cultivate the genetically modified crop. In 1993, China approved GM tobacco and by 1995 it had grown 2.5 million hectares of the cash crop, according to the ISAAA. However, that approval was withdrawn in 1997, reportedly due to a lack of demand for GM tobacco in export markets.

#### **Grey Harvest**

Since then, GM crops have become the norm rather than the exception in countries like the US. The vast majority of US corn, wheat and rice are genetically engineered. That trend has swept into other regions like South America, where Brazil and Argentina produce and export large amounts of GM corn and soybeans. Farmers cultivated an estimated 170 million hectares of bioengineered crops globally in 2012, a year-on-year increase of 8%, according to the ISAAA. That's a 100-fold increase from 1996. The forerunners in the industry have been US-based firms Monsanto and DuPont Pioneer.

While not considered a primary GM exploit, the genetically modified version of papaya has become so ubiquitous in global markets that imports during the past 15 years slowly seeped into China under the nose of regulators. Huang Dafang,



the former Director of the Biotechnology Research Institute in Beijing, said tests he participated in showed the GM version of the fruit had already entered the market in large volumes.

"In the beginning, by no means were we paying attention to papaya," Huang says. However, the large amount of the GM fruit coming into the country coupled with the scant regulations at the time—led the government to approve it for cultivation and consumption simply because it was already here, he says.

GM imports didn't stop with papaya. But the approval to cultivate on Chinese soil did. In the past four years, huge quantities of GM soy products have entered the China market, much of it in the form of edible oil. One anti-GM activist, Chen Yiwen, says up to 50 million tons of Monsanto-developed soybeans, which are resistant to powerful herbicides, are already found on Chinese store shelves, though he did not cite the source for this figure.

The Ministry of Agriculture in 2002 said all GM food must be labeled as such. Some bottles of soy oil indeed note that the product was made with genetically modified crops, although according to Chen, many bottles are not accurately labeled.

Like the papayas, the soy imports started without official approval only to be officially ushered in later. China likely started importing GM soybeans in 1997 as US yields of the crop increased, Chen says. It was at this time that GM beans slowly infiltrated supply chains that were already in place. The product wasn't formally approved by Beijing until 2004, by which time GM soybeans were commonplace in shipments from the US. For many of the imported GM crops such as soybean, corn, rapeseed and canola, the government has held off on approving cultivation at home. At present, the only commercial GM crop that is grown in China at any scale of significance is cotton.

### Standstill

Industry watchers are puzzled by the delays. Beijing has outspent all other countries on research into genetic modification, genomics and bioengineering, according to Rozelle. Several products are ready for commercialization, Huang says. Yet policymakers continue to shirk the final step: approving cultivation and consumption of GM foods.

"It's a mystery," Rozelle says over the phone from Beijing. "How do they spend more money than any other country in the world on public biotech research but they don't extend it?"

In theory, China has good reason to put GM crops into practice as soon as possible. Arable land is shrinking due to desertification and has approached what Huang calls the "red line", or around 0.087 hectares of arable land per capita. That's 40% lower than the world average. China feeds 20% of the world's population on 7% of the world's arable land.

Harkening back to the mindset of Deng Xiaoping in the 1980s, Huang says only advances in technology, such as GM products that supposedly increase yields, will secure China's grain supply for generations to come. Some of the products are also designed to carry more minerals, something that could help alleviate the hunger of some 12.7 million children that UNICEF estimates suffer from malnutrition in China.

Aside from keeping Chinese wellfed, GM food could also earn the country some cash. Researchers in China have focused on several niche products such as flowers, peanuts and fish, according to a paper from the US Department of Agriculture. The paper noted that this could give China a competitive edge in smaller markets at home and in other developing countries.

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Diversity and flexibility are critically important in a food system

> Jim Harkness Director Institute for Agriculture and Trade Policy

### **Securing the Rice Bowl**

Ironically, while food security is the main argument for GM foods in China, it's also the fodder for the fight against it. This is exactly the note that Major-General Peng sounded in his August rant.

If China were to approve the cultivation of new GM crops today, the patents for many of the seeds used in growing those crops wouldn't be held by China.

Peng's rhetoric may sound better suited for before the fall of the Soviet Union at the end of the Cold War, but trepidation over a level of foreign control over China's staple crops isn't all military rabblerousing.

If Chinese farmers became dependent on foreign-produced seeds for their crop, this could put the country's rice basket at the whim of US and European companies. The global commercial seeds market is consolidated with the top four companies accounting for over 50% of the total share in 2011 according to a 2012 Transparency Market Research report on the global GMO seed market. Monsanto was the largest company in the market and accounted for a share of over 20% in 2011, followed by DuPont Pioneer and Syngenta.

"Diversity and flexibility are critically important in a food system. If a large variety of seeds is available from a large number of companies, then you still have options if there is a shock to the system or you need to change," says Jim Harkness, director of the Washington DC-based Institute for Agriculture and Trade Policy. "GMOs have been associated with a very small number of companies that have forced out or bought up their competitors until farmers can only buy from those companies."

### **Sticky Residue**

The opposition to GM foods isn't all political and economical.

Globally, there is considerable resistance to GM products due to safety concerns. Chen Yiwen, an Advisor for the Committee on Natural Disaster at China's Geophysics Society, has led a loosely organized campaign since 2009 to try and keep GM foods out of public schools. Sentiment against GM rice flared in August 2012 after a US-China research team was found testing a product on primary school students in Hunan province without the consent of parents, state media reported. Parents expressed worry over the lasting effect of the beta carotene-enriched rice.

The fears are understandable. Many studies have raised concerns over the safety of genetically modified products around the world. China has conducted several of its own. One performed at the Northeastern Agricultural University showed that genes from Monsanto's Roundup Ready (Roundup is a Monsanto herbicide) entered the surrounding soil, disrupting the balance of bacteria. The effects on human health are unknown. International research to date has been inconclusive about the safety of crops grown in Roundup-soaked soil.

Still, Roundup Ready crops have caused much distress for the health conscious. As the name implies, ample amounts of the herbicide can be sprayed on the crops without hurting the plant, while killing off any other harmful weeds. Chen says that the active ingredient in

### China Insight

Roundup, glyphosate, could be found in actual foodstuffs, heightening the possibility that consumers could end up ingesting the herbicidal ingredient.

Public opinion is highly divided on the use of GM products in China. Netizens often rant on the dangers posed by GM crops and Monsanto's dominance in the field in particular. But others are less concerned with the proliferation of genetically engineered food.

"The government supports [GM]. It's a necessary development not just for China but for the world," says a retired professor, surnamed Yao, at a restaurant in downtown Shanghai. "I'm not afraid to eat it."

### Seeding the Market

Despite the worries surrounding Roundup Ready products, entry into the China market is extremely important for brands such as Monsanto and DuPont Pioneer. In 2013, both companies saw some developments that showed China was moving closer to overall acceptance of GM products.

In June, Chinese officials approved Roundup Ready soybeans for import, along with a German-developed version of the crop. In August, it cleared shipments of GM corn from Argentina and Brazil, a sign that GM products were gaining traction. Monsanto stocks rose on the announcements.

For a foreign company to plant its GM seeds on the mainland, the Ministry of Agriculture requires it to establish joint ventures. Monsanto entered a joint venture with SinoChem in 2001. Since then it has started several other JVs and has primarily developed different types of seeds that it hopes will eventually be planted in China.

DuPont runs several joint ventures with Chinese firms in developing similar products. Its seed company, Pioneer Hi-Bred International, signed a joint venture with one of China's largest seed distributors, Dunhuang Seed, in 2011.

Now these major international firms are waiting to move forward on the products they have developed in China as domestic research continues to grow.

China's agriculture sector is, by most measures, extremely fragmented. The vast majority of crop production occurs



From a scientific angle, commercialization could start tomorrow

Huang Dafang Former Director Biotechnology Research Institute

on small, family-run farms as opposed to industrial-scale plantations prevalent in most developed countries. If GM products are approved by the central government, several of the country's massive seed companies, such as state-owned China National Seed Group and Biocentury Transgene, will look to sell to these numerous smallscale farms.

While the seeds might be ready, ownership is still a muddy issue. China National Seed, like Monsanto, also partners with Sinochem and has co-developed seeds with the Chinese company. Before cultivation, the companies must sort out who owns the rights to specific seeds.

Some Chinese companies are determined to innovate away from foreign technology. Origin Agritech, a Nasdaqlisted firm, has developed a GM product called phytase corn, mainly for use as pig feed. Origin owns the patent on the corn variety but DuPont Pioneer owns the patent on the technology used to modify the genes, Huang notes. Origin must pay Du-Pont royalties on the technology to make the seeds, but not on the seeds themselves, showing at least some independence from Western-developed technology. Origin is still waiting for commercial approval.

"We are getting more and more patents in this area," Huang says. "This shows that local companies will compete with the US some day."

Some 80 Chinese organizations, which include companies, research labs and universities, are working on GM products that could one day compete with bigger foreign firms.

Zhejiang Wuwangnong Seedling and its long-term partnerships with the China National Rice Research Institute and Zhejiang University is one Chinese company that has drawn on domestic research to move closer toward commercialization. It has produced a long list of GM foods including rice, cotton, pumpkin and beans, but, like its cohorts, is waiting on government approval to cultivate.

### Later, Rather than Sooner

Companies, domestic and foreign, will continue to wait for the market to open. China has spent far too much time and money to abandon genetically modified crops. But as time passes without approvals for the new products, industry watchers are increasingly pessimistic. Rozelle at Yale sees no date in sight.

The recent controversy at the highest reaches of China's leadership hasn't brightened the outlook. Instead, opposition from the Chinese military has only shown that the country's position on GM products is not as united as previously thought. Huang says the genetic modification debate has been taken up by political factions as a tool to hurt rivals.

Still, from the perspective of scientists who have worked on GM technology for more than a decade, like Huang, the obstacles have little to do with the issues of food security and consumer safety.

"I'm a scientist. From a scientific angle, commercialization could start tomorrow," he says. "Politically, there are many more things to think about. I believe that [GM] will be approved sooner or later. That's because without new technology, agriculture in China will not develop."



## iWho?

Rivals race ahead of Apple in China's smartphone and tablet markets. What does it mean for Apple's future?

By Christopher Beddor

### China Insight

i Tingting unwraps a new iPhone 5S outside the Apple store in Sanlitun, a glitzy shopping district in Beijing. She's had her eyes on an iPhone for some time, she says, and after a few months finally saved up enough money to buy one. Li bought the iPhone because it looks good and is easy to use. But she is an exception."Almost all" her friends own a smartphone made by Samsung, HTC, Huawei, or another non-Apple brand, she says.

These smartphones and tablet computers based on Google's Android (and to a much lesser extent, Windows) operating software have made impressive gains over the past couple years. Their generally lower prices and wide carrier reach have pushed Apple down to fifth place in China's smartphone market as of the third quarter of 2013, according to Canalys, a research firm. While the company still retains a lead among tablets, its share of the market almost halved over the past year. Combined with tepid demand for its new mid-range smartphone, the iPhone 5C, some tech pundits are wondering if Apple has lost its mojo in China.

Not necessarily, say some analysts. True, Apple faces growing competition in China. But it is playing a very different game than many of its rivals—and a much more profitable game at that. For now, the company seems content to preserve its high margins and lure customers into its content ecosystem, even if that means losing its market dominance.

"It all comes back to the question: what is it worth to gain market share if they have to sacrifice billions of dollars of profitability?" asks Wayne Lam, a senior analyst at the research firm IHS. "Because that's the calculus they're doing at Apple."

### Siri, Interrupted

The Cupertino-based company's travails are hardly confined to China. While iPhone sales are up, Apple's share of the smartphone market fell to 14% from 19% between the third quarter of 2013 and a year earlier, according to Gartner, a research firm. By contrast, the share of Android-based smartphones rose to 79%



It all comes back to the question: what is it worth to gain market share if they have to sacrifice billions of dollars of profitability?

> Wayne Lam Senior Analyst IHS

from 64%. Similar slides have occurred in the tablet computer market, and the entire notebook market appears to be in a structural decline.

Falling market share, along with a dearth of new product lines since the iPad was released in 2010, has triggered feverish speculation among tech types about whether Apple, who didn't respond to a request for comment, has lost its edge. At the very least, it has put pressure on the company to look for new sources of growth, especially outside of the saturated US and European markets.

"China is important to Apple because it is the last untapped market out there," says Lam of IHS. In 2011 some 118 million smartphones were shipped in China, about the same as the US. This year that figure should be about three times higher, at 360 million, according to IDC. China's tablet computer shipments have been growing at only a slightly slower pace, making the country the world's secondbiggest tablet market behind the US.

The rising tide of tech in China has been lifting all ships, including Apple. iPhone sales in the country increased by 32% in the third quarter of this year from a year earlier, according to Canalys. Estimates by IDC suggest iPad sales rose by 28% year-on-year in the second quarter. Overall, Apple notched up \$5.73 billion in revenues in the Greater China region for the latest financial quarter ending in September. That's a 6% year-on-year rise, compared to just 1% growth in the US and zero growth in Europe. China currently ranks as Apple's second-biggest market, accounting for over 15% of global sales (a slightly higher proportion than the year before). The company's CEO, Tim Cook, has said he expects China to become its largest market in future.

But like elsewhere, the company's market share in China is slumping. iPhones accounted for just 6% of smart-phones sold in the country during the third quarter, down from 8% last year, according to Canalys. It retains a lead among tablet computers, but analysts at IDC reckon the company's market share was 28% in the second quarter, down from about half a year before.

In its place, devices based on Android operating software have thrived and now account for about 80% of the smartphone market alone. Among global brands, Samsung has enjoyed strong growth; the company's 21% market share makes it China's largest smartphone device maker. Analysts say Samsung's position can be largely chalked up to a combination of both wide carrier availability and its presence at both the middle and high ends of the market (most companies concentrate on only one). But it is local Chinese companies-such as Lenovo, Yulong (maker of Coolpad phones), ZTE, Huawei and Xiaomi in the smartphone business, and Acer and Asusteck in the tablet market-that have enjoyed huge gains and media attention.

Local players have some clear advantages. They are unencumbered by the import taxes that have effectively shut foreign manufacturers out of the low end of the market. They are also generally more responsive to the needs of Chinese consumers, says Teng Bingsheng, Associate Professor of Strategic Management at CKGSB. Perhaps the best example is Xiaomi, a Chinese smartphone company with a near-obsessive focus on consumer feedback that provides weekly software updates based on user requests. The firm's boss, Lei Jun, has been feted as "China's Steve Jobs". In the second quarter, Xiaomi, then less than three years old, briefly overtook Apple in terms of market share.

### 'Gateway Drugs'

But these gains do not necessarily come at Apple's expense. For starters, the company has a fundamentally different business strategy than its rivals. "Apple is unique in that they're not just trying to sell a piece of hardware," says Ben Bajarin, San Jose-

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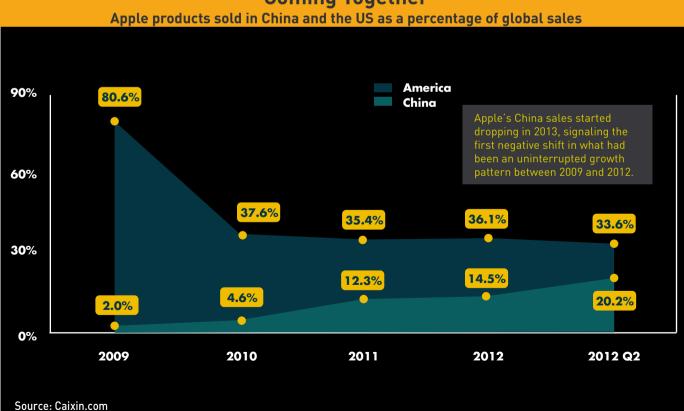
(Local companies) are generally more responsive to the needs of Chinese consumers

> Teng Bingsheng Associate Professor, CKGSB

based Director of Consumer Technology at the research firm Creative Strategies. He notes that Android-based smartphone companies generally make money by selling consumers hardware (the device), and then waiting for them to buy another in a year or two. Aside from price and a few features, there is little to set hardware competitors apart. This "commoditization" of the market means profit margins are thin to non-existent, especially at the low end. The same dynamic applies to the tablet computer market, in which dozens of companies crank out ultra low-cost tablets but few actually turn a profit.

By contrast, Apple views its smartphones and tablets as stepping-stones for consumers to enter its "ecosystem" of online content. Not only does the iTunes store provide a good source of revenue it makes about twice as much money as Google's app store—but Apple also believes it makes the brand "sticky", says Bajarin. Once consumers invest in Apple's music, movies, apps and so forth, they'll





### China Insight

be more likely to stick with the company for their next phone or tablet. For China in particular, it helps that Apple has been generally more successful at directly distributing its global content (such as apps, movies, and music) in the country, he adds. The upshot is that while Apple may control only a fraction of the global market, it raked in a whopping 69% of all smartphone profits in 2012, according to data from Canaccord. Its nearest rival, Samsung, took in less than half that figure. Together the two accounted for over 100% of industry profits because all other companies, on average, lost money. The situation is similar in the tablet market, where Apple's profit on each iPad sold is reckoned to be multiples higher than its competitors.

Furthermore, Apple and other device makers mostly compete for different consumers in China. The explosive growth of Chinese tech companies can be largely chalked up to a surge among Chinese consumers entering the low- and middle-end of the smartphone and tablet markets. Apple is decidedly uninterested in such users.

"Apple's market strategy within China has always been more akin to a luxury brand than a consumer electronics company," says Lam of IHS. In both absolute terms and relative to local incomes, the iPhone and iPad are much more expensive in China than in the US or Europe. The company's cachet and cutting-edge innovation help it sell at prices well above what Lam calls the "magic marker" of RMB 3,000-3,500. Moving down-market would not only squeeze Apple's margins, it might also threaten its high-end status.

Many thought the company would make an exception earlier this year, when rumors swirled that Apple was preparing to launch a lower-range product to gain back market share, especially in China. That product, the iPhone 5C, went on sale in September alongside the more advanced iPhone 5S. The 5C is unusual: it is cased in plastic (not the traditional metal) and offered in a wide variety of colors. But at RMB 4,488 (\$737), it is only a bit cheaper than the RMB 5,288 (\$868) of the flagship iPhone 5S.



It's very obvious that they don't want to go for a low-cost strategy. They don't want to compromise their brand

> Nicole Peng Research Director Canalys, China

"It's very obvious that they don't want to go for a low-cost strategy," says Nicole Peng, Research Director for China at Canalys. "They don't want to compromise their brand." Instead, Apple is using the 5C to appeal to a younger crowd such as those in their teens and early 20s, she says.

The new iPhone line-up also contained a little-noticed technical change: both the 5C and the 5S are compatible with TD-LTE, a 4G technology unique to China Mobile, the country's biggest carrier. Apple had resisted signing a deal with China Mobile because the latter's weird 3G and 4G technologies are incompatible with the standard formats found in most other countries. But the latest tweak paves the way for a tie-up that is all but official.

There's no question a deal would give

Apple a shot in the arm. China Mobile has almost 750 million phone users, and plenty will want to switch to an iPhone. Moreover, China Mobile could help Apple extend its reach into third- and fourth-tier Chinese cities, says James Yan, a Shanghai-based analyst at IDC. In all, he estimates a deal would probably goose iPhone sales by 10-20%.

### **Apple's Red Queen**

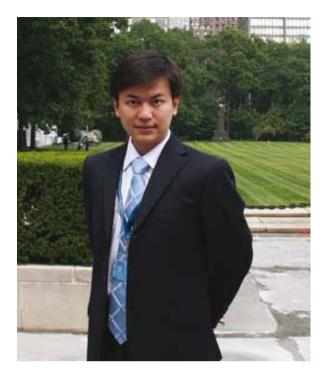
That may bode well for Apple's future in China, but the country presents some unique landmines as well. In March the state broadcaster launched a series of scathing reports on the company's warrantee policies in China, prompting speculation about whether the government was trying to shake Apple's position in China. The fiasco ultimately led to a public apology by Tim Cook.

The reports probably did weaken Apple's reputation among Chinese in general, but brand damage among the company's more cosmopolitan (and independentminded) consumer base was minimal, says Teng of CKGSB. Moreover, the attacks seemed too opportunistic to be part of a concerted effort to weaken Apple and boost its Chinese competitors. "I don't think state media has [an industrial] agenda," he says. "They just need to get their ratings up."

Teng argues that the biggest challenge for Apple in China will be maintaining its position as an innovation leader. Some degree of falling market share is inevitable as Chinese consumers snap up cheaper phones. But if Apple cannot continue churning out cutting-edge technology and new products it will lose its grip on highend consumers. That would force the company to slash margins and move downmarket to stay competitive.

"It only takes a couple design cycles for them to be disrupted by another upstart," says Lam of IHS. "So the overall thought process at Cupertino is: how can we keep this up? They're trying to innovate as fast as they can and keep that market leadership, because they know once the jig is up–once you step across that line and start going down-market–it's a race to the bottom."

### Viewpoint



# What's the Big Deal?

China has the will to leverage big data analysis, it just needs to find its way

By Li Yang

Much and more has been made of how the multi-billion dollar 'big data' industry might play out in China, where the sheer size of China's various consumer markets belie a seemingly massive potential for this particular brand of information technology service. But to properly assess China's big data potential we have to first understand the big data pyramid, and where China's capacity stands in the various layers of that structure.

The definition of big data has actually very little to do with the data itself, as analysis of large quantities of data has been around for quite a while. Big data, as the term is used today, is defined by the technology, which can process mass volumes of data of various types at faster speeds than ever before. The applications of big data analytics are most visible in hyper-targeted marketing campaigns, but in truth the applications are as vast as the data.

The three layers of the pyramid that construct big data optimization start with the bottom layer, which is data collection. The simplicity of the term 'data collection' is misleading. There are heated debates even in the world's most mature 69

The source of the data is still choked in areas where the government has the monopoly on the data itself

markets over what rights consumers have to maintain privacy and control over personal information, backlashes to data collection that perhaps went too far. Credit card agencies swap information with credit rating agencies, internet aggregators sell user data to various consumer product companies and so on and so forth. China's current challenges in data collection are situated on the other end of the spectrum. Simple access to data has been complicated for private organizations in China as key sectors of the economy are still by and large under the purview of governmentcontrolled organizations. One very clear example is in health care. Public hospitals have the greatest potential to generate extremely useful data, but companies in the medical field face hefty road blocks in trying to access any kind of statistics on medical conditions, use of medicine and disease. So while the technology to harvest the data is in place, the source of the data is still choked in areas where the government has the monopoly on the data itself.

In recognition of the positive applications that can come from higher-level data analysis, the Beijing Municipal Government recently launched a web portal

### Viewpoint

where browsers can see different varieties of public data. One example is the availability of traffic data, which can be used by GPS software developers like China's AutoNavi Holdings to provide information on optimal routes and routes to avoid based on traffic. It may be a modest step on the government's part to provide data for would-be analysts, but perhaps more key is that the launch of the website is a signal that the government is willing to up its transparency game and become a supplier of highly useful consumer data. So to summarize China's position in the bottom of the big data pyramid, it is clearly behind more developed markets like the US in terms of data access, but the rigorous demand for the information is calling forth a higher degree of government cooperation, and the actions of the Beijing government bode well for the future.

The second layer of the big data pyramid is data analysis. This is where the technological advances are most in play. Rapid cross referencing of seemingly unrelated data sets has allowed for unprecedented market knowledge, and in this layer of the pyramid, China is extremely well-positioned. A promising example is the collaboration between social media aggregator Kong Ming Inc. and Nike. Kong Ming monitors social media and was able to help Nike better target their Chinese consumers by curating a consumer survey combining responses to both questions of Nike loyalty and personal sporting habits, the results of which Nike used to adjust its China advertising and marketing campaign. The example of Kong Ming is highly illustrative of what media monitoring agencies are facing in China. It's very difficult for them to monetize straight data products, especially with Chinese clients who are not as accustomed to paying for intellectual property as their multi-national counterparts. In addition, weak intellectual property protection also causes firms to hesitate in sending their data products out digitally for fear of the information being copied and pirated. So for a firm like Kong Ming, it's much more strategic to build a long-term relationship with an international client and provide a more



Google employs economists to apply big data findings, not computer scientists. This will be key going forward if Chinese companies want to reap the true benefits

comprehensive service that incorporates data analytics and consulting, thereby entrenching themselves in the client's marketing framework.

Another way that data analytics firms could handle the issue of monetization, particularly with regard to weak IP protection in China, is to abstain from releasing data products all together, and instead hold a forum or conference and charge premium prices for tickets to the conference, and then release the reports to attendants, this is where they'll reap much of their revenue. So while Chinese firms and indeed foreign firms that provide similar services are finding alternative ways to commercialize their services, China's data consumers will have to mature into paying premium prices for premium quantitative analysis before China's position in the second layer of the big data pyramid catches up to that say of the US.

The third and top section of the pyramid, and where we see the greatest need for improvement in China, is the actual application of the data findings. China's current big data technicians have a background in information technology and computer science, but there arises a significant disconnect between analyzing the data and applying the analysis to decision making within an organization. Google employs economists to apply big data findings, not computer scientists. This will be key going forward if Chinese companies want to reap the true benefits of big data. We can look to the China-based collaborations between famed IT firm Cisco, equally well known market research firm Nielsen, and local firms as a step in the right direction. The original industry knowledge must come together with the data analysis so that specific business decisions may still be rooted in economic principles and market realities.

Lastly, an advancement that awaits companies on a global scale is the forecasting capacity of big data. Presently, most data is collected from history and past trends, but if a company wants to assess the market viability of a new, neverbeen-tried promotional activity, they would be best served by field testing that promotion and assessing the results of the test. In this scenario big data breaks away from the confines of only encompassing past market behavior.

What Chinese companies must remember, is that while seeking correlations in the market is interesting and useful, at the end of the day we're still making business decisions. To unlock big data's potential, Chinese companies must realize that there is no substitute for original market knowledge, big data is just another tool by which we increase the power of business decisions.

Li Yang is Assistant Professor of Marketing at CKGSB

## **Conversations**

"Our strategy was indeed China for China, not China for global, or China for the region, or China for the area"



COO and CFO at 3M China



"We need a different strategy or framework to deal with the situation in which competitive advantages are transient"

Associate Professor at Columbia Business School

"If you are lucky enough to have a business, design or engineering education, you have a broader responsibility to society"



*CEO of Imperative and author of* The Purpose Economy



"Use of capital is rational, but it is not necessarily fair or inclusive from a human perspective"

CEO of United Way Worldwide

## In China for China

Francis Hu, COO and CFO at 3M China, talks about the company's 'location management' strategy and the opportunity in China's push towards domestic consumption

By Neelima Mahajan



M, the American multinational giant that gave the world Post-it Notes and Scotch-Brite scouring pads (and also adhesive tapes for Frank Gehry's iconic Walt Disney Concert Hall in Los Angeles), is considered one of the most innovative companies in the world. Unknown to many, 3M was also one of the first multinational companies to set up operations in China long before the country even had a foreign enterprise law. From humble beginnings in 1984, 3M China has grown to a \$3 billion business, or 10% of 3M's global business. The company's China research and development center is already the largest one 3M has outside the US.

Clearly, the Chinese subsidiary is very important for the global parent. So much so that in September 2013, Greater China was carved out as a separate region. Francis Hu, COO and CFO, is practically a 3M China veteran. He joined the company in 1992 and watched closely as it grew to the size it is today. In this interview, Hu talks about 3M's China strategy and how it is trying to realign it to match the Chinese government's priorities for the economy. Excerpts:

### Q. 3M entered China in 1984, long before the country was on any big MNC's radar. How easy was it to get in at that time and make a place for yourself?

A. (Setting up a company in China back then), from a legal infrastructure standpoint, was very difficult. In 1984, China did not even have a foreign enterprise law. It only had joint venture laws. You could not, theoretically speaking, be a company that was 100% owned by foreigners. From that perspective, the legal environment at that time was not even ready. But the Chinese government allowed us to establish (3M), almost in a similar fashion to a joint venture, which is proof of the courage that they had at that time to attract foreign investment.

(Back then) I don't think 3M had any strategy to grow to be worth \$3 billion (in China). From a broader strategy base standpoint, we have been growing the company slightly differently than other manufacturing companies. Most of the companies use their China operation as a manufacturing hub. Rather (we have) set up a company purely for China. We set up manufacturing and R&D much later. Our strategy was indeed China for China, not China for global, or China for the region, or China for the area.

The other thing is capability. You say, 'I'm going to set up an operation for China.' How are you going to develop that capability? (It) is not simply a local capability, even including the effort (of) pulling in the other resources 3M has. Considering all these things, we have been developing very much on the self-reliance model. You can have external support-company support, regional support, area support-but after all, you have to be reliant on yourself. Talent is the first thing. 3M is probably one of the best companies in China today as far as localization is concerned. With only a couple of exceptions, virtually all in the management team are local. Localization doesn't only mean people. In product development, obviously the technology base, in most cases of multinational companies, cannot be entirely local. You have to leverage your global resources and technology. But the aim is always local products. From a strategy standpoint, we want to be very local.

### *Q.* What is the scale at which 3M China operates right now?

A. At this moment, the Greater China region accounts for around more than 10% of the company's total global portfolio (\$3 billion). We just formed a new area in September 2013. We used to be part of APEC. (Now) we will have China, Hong Kong, Taiwan and Mongolia as the Greater China region. These four locations will form a new area at the same hierarchical level as APEC.

### Q. So, in effect, it shortens the line of control between you and headquarters. A. Yes.

### *Q.* Why have they carved out Greater China as a separate region?

A. There are many reasons. Size matters. 3M was a \$30 billion company last year. The China region will be more than \$3 billion this year. 3M USA is about \$9.5 billion. We are number two, if you consider the US as a subsidiary, and Japan is number three. When you elevate the area, China is bigger than the size of west Europe in terms of profit (Europe is divided into three parts: central, eastern, and western Europe). Developing countries' revenues (are now on) par with developed countries.

There are many (other) reasons too. Inner region obviously, (they have) virtually the same Chinese culture and language. A lot of business, especially export business, is held at a regional level. Even though now our focus is becoming more about domestic consumption, export is still a very active sector of our business.

### Q.What does this change for you?

A. The resources will be much more focused. Originally we had area resources covering the whole area. Now we will have dedicated area resources focused on China.

### Q. A lot of MNC subsidiaries have a constant tussle with the headquarters regarding control over resources and decisionmaking. Does this also mean you also get a greater share of mind at the board level?

A. 3M is very unique. (3M's) subsidiaries are basically local organizations. We have more business units than any other (multinational) company. (3M China) has 33 or 35 big business units from a division standpoint. All are managed on a local basis. Everybody reports to the local MD. There are always pros and cons. (China) is not a mature market. You really have to leverage the resources, learn from each other and have a stronger location management.

We are basically a matrix organization because we still have a close alignment with the business back in the US, but we have a stronger influence on a local basis: not only 3M China, but also other areas. You have to respect culture. If you really want to push hard for interference, you may hit a wall. The UK, Italy, Spain and France are probably different—they are very much like a US division extension. The Europe area business organization (is) directly connected with the US, because it is a very mature, developed market.

### *Q.* What are the things that have worked out really well for 3M China and what are the things that didn't?

A. When I joined the company in 1992, it was only a \$20 million, or RMB 140 million, business. So in 21 years, from \$20 million to almost \$3 billion, is pretty good. But I don't want to give ourselves too much credit because we are simply lucky. We followed (China's) economic development. When I joined the company, two businesses accounted for about 85% of our business then: telecommunication (primarily connectors) and transportation (basically traffic signage, part of a business known as Traffic Controlled Materials (TCM)). Telecommunications accounted for about half of our business. There weren't many roads at that time. The first highway in Shanghai was built in1994 or 1995. So, of course, TCM is a booming business. At that time, TCM was not a very a big business for 3M globally and telecommunications was about \$300 million. All of China was booming because we did not have other business.

China started becoming an export power in the late 1990s. So for 3M, industrial products started to kick in because you do everything virtually: mobile phones, TVs, electronics. Industrial is now our biggest business. Telecommunications and TCM are now very small. Moving onto this century, (we started on) automotive: manufacturing, after-market and car maintenance.

Lately when the government started talking about domestic consumption, the health care business started. Who would have thought that 3M would do health care in the mid-1990s? It was too expensive to afford, even the import. Two, who's going to grant a foreign company a health care supplier license? No way.

We've been lucky because at every stage of development, we have applicable products to sell. Obviously, we did a lot of localization.

## Q. 3M China is recalibrating from exports-oriented businesses towards private consumption-led businesses in line with the country's priorities. What does it really take to make that jump?

A. This is not a jump. This will be gradual. The competitiveness of the Chinese manufacturers is decreasing and demand has become weaker because the spending power in developed countries has become less. I don't think the Chinese government is saying, 'let's do less exports'. The industry itself is evolving from exports

### C-Suite

to domestic consumption. Take mobile phone companies, especially local ones. Originally, their portfolio may be 80% for export-import and 20% local. The portfolio of the local phones, or if you want to define them as domestic consumption, is now more than 50% for sure.

The challenge for any multinational company, not only 3M, (is that they are) not very familiar with local business. Foreign companies used to export 60%, now all of a sudden, they export 30%. It forces them to do something they do not know. They start to make products applicable to that segment.

Luckily, the industry we're facing has not changed. It's not like you do automotive today and people say all of a sudden, 'Automotive has no future, you have to go to electronics'. (It's just that) you used to do Audi and BMW, and now all of a sudden vou do Great Wall (Great Wall Motors, a Chinese auto company). (Or) maybe they're the same company, but the application is different. That's a test for you on how quickly you can transform your technology, your manufacturing, your localization effort, into a different platform. Other people, even with less technical capability, in most cases Chinese companies, are moving up very quickly by the way. They are very familiar with that area.

### *Q.* As an organization, how do you start prioritizing to make the change?

A. (Our strategy is) China for China. In other words, play as a local. The 'how' question is very difficult. Everybody knows what the end state is or what the ideal situation is. Take manufacturing. (Earlier) I could bring in a line from the US because they are pretty efficient and high-tech. Now you look outside and everybody can make the same machine at a third of the price. They operate with their salary being half of yours. You're not going to say, 'Because I can sell my brand. I can charge people double'. Those days are gone. So, they force you to prioritize.

I went to an OEM company. That single factory has 120,000 people manufacturing for several brands, not just for one. Think about the difficulty of managing 120,000 people in one site. Does 3M have that capability? No. That company's model-they just make 2% margin maybe-is mass production. (There is) no risk because they have the confidence to manage 120,000 people. That's their core competency, not 3M's. Our competency is technology. If your product is two times more expensive than other people's, why should people buy from you? We have to cut a long tail: you have so many staff, you cut them off simply because they will not pay off because we are expensive. Is this company expensive? Indeed. So we have to compete using our core competency. We will have to prioritize and work on our core competency. Of course, we need to improve manufacturing efficiency but there's not an assumption that you want to do this and you'll be as good as Foxconn.

#### Q. What about the weightage between different businesses in your portfolio? Are you changing that? I am assuming health care will now be a big business for you.

A. Of course. We moved people, especially this year. The energy business has been shrinking because the external environment has changed. So we have reassigned many people from that business into a faster-growing business. An example of a fast-growing business is water purification. We grew it from RMB 6 million to RMB 25 million in two years. That's the beauty of location management. You have a lot more flexibility. Automotive is flying for us. The safety, or personal care business—e.g., respirators—are good businesses.

### Q. Who do you consider competition, given the fact that you have really diverse businesses? Do you think Chinese companies are starting to pose a serious threat?

A. Definitely! Originally, we had strong competition from multinationals because we are a technology-driven company. Then, obviously, we try to move down the (income pyramid). We have to expand our tier strategy from A to B to even C, in some cases. Originally, we were concerned about other multinationals doing similar things like localization. From a localization-drive standpoint, I think 3M is better than many of the foreign companies. On the other hand, the improvement of the local companies was surprising to us. So you think about having two groups: the foreign company trying to be local; the local company is trying to be high-tech or move up in the portfolio. I think the (local) group is doing better than the (foreign) group.

### Q. How do you plan to compete with them?

A. We want to be local. We want to put more resources into technology and R&D. (We) have to start thinking of the alignment with many local companies: customers and suppliers; trying to become part of them. From a strategy standpoint, you want to consider competitors and customers a little more seriously. Your suppliers used to be foreign, now they are local suppliers. You're actively looking for local suppliers and customers. You only used to look for high-end stuff, (like) BMW. Now all of a sudden, they think maybe Great Wall has a better opportunity. You try multiple things because you have different touch-points.

### Q. What about the future? What do you see yourself doing more of in China? I believe there is also a push to go from the east towards the north.

A. Yes and no. From a manufacturing standpoint, if we're going to move over to the west, the reason is not cost because 3M is not a low-cost manufacturer. If we're going to move inland, we will because we want to be close to our customers. The government is promoting investment, promoting (the) industrialization of those regions so we follow our customers. We just set up a north region organization in Beijing. It's a regional headquarters for the execution rather than management. It covers 8-9 branch offices in the north like Dalian, Shenyang, Jilin and Tianjin. The business used to be managed by business. In other words, if you're industrial, you'd report back to industrial Shanghai. Now they report to the regional office. When we become bigger in China, we want to adopt a regional approach. We're going to set up a south (regional office) in the future, midwest too. 

### The Thinker Interview



Rita Gunther McGrath, Associate **Professor at Columbia Business** School, is one of the world's leading experts on strategy in highly uncertain and volatile environments. She is the author of Discovery Driven Growth: A Breakthrough Process to Reduce Risk and Seize Opportunity (2009) and co-author of The Entrepreneurial Mindset (2000) and MarketBusters: 40 Strategic Moves that Drive Exceptional Business Growth (2005). Most recently she has authored The End of Competitive Advantage. McGrath was listed 6th in the 2013 Thinkers50, an annual ranking of business and management thought leaders. She also won the 2013 Thinkers50 Strategy Award; and her most recent book, The End of Competitive Advantage was shortlisted for the Thinkers50 Best Book Award.

## **Getting Strategy Unstuck**

Rita Gunther McGrath on the end of competitive advantage

n 1979, the high priest of management thinking Michael Porter laid out the building blocks of the idea of competitive advantage in a seminal *Harvard Business Review* article titled 'How Competitive Forces Shape Strategy'. In this article Porter introduced his now-famous Five Forces Model of *Competitive Advantage*, the five forces being the threat of new entrants, the threat of substitute products or services, bargaining power of consumers, bargaining power of suppliers, and intensity of competition. He followed it up with

#### By Neelima Mahajan

a book titled *Competitive Advantage*. According to Porter's definition, competitive advantage accrues from either providing value at a lower cost than competitors, or by giving the good or the service at a comparable cost but in a unique way that creates more value than rivals. A firm can thus command a premium in terms of price. For decades now, Porter's ideas of competitive advantage and sustainable competitive advantage have wielded tremendous influence over the world of business and academic research.

But something else happened along the way—the world changed.

Rita Gunther McGrath, Associate Professor at Columbia Business School, believes that in this new world, companies can no longer rely on the idea of sustainable competitive advantage. In fact, relying on that can threaten their very survival. We must, instead, focus on something McGrath calls transient competitive advantages. In this interview, McGrath, the author of *The End of Competitive Advantage: How to Keep Your Strategy Moving* 

### The Thinker Interview

as Fast as Your Business, talks about the idea of transient competitive advantages and how companies can continue to stay relevant in this new world.

### *Q.* You say that strategy is "stuck". Where are you really coming from and why?

A. The book was motivated by the chronic problem we have in strategy, which is this quest for sustainable competitive advantage. The motivation behind the book was this deep unease that I had with this prescription that we offer people about strategy. That the ultimate goal is to create competitive advantage that is sustainable. We need a different strategy or framework to deal with the situation in which competitive advantages are transient. The problem with strategy is that it depends on this idea of sustainable competitive advantage. But when strategies last for short periods of time, the logic doesn't apply. So I feel we need a new way of thinking about strategy that could be used to deal with these situations.

### Q. The lifecycle of competitive advantage has changed drastically over the last couple of decades. Can you share a historical perspective or perhaps some examples to show how this has come down?

A. Well, if you take something like the lifecycle of manufacturing a car, the design cycle used to be anywhere from 24 to 36 months, now it is down to 12 or less. If you look at rates of adoption of various kinds of technology, it took 19 quarters for dial-up internet (in the form of America Online (AOL)), to reach 20 million users. It took nine quarters for the iOS to reach 60 million users. It is a dramatic difference in the amount of time these things take.

#### Q. What are the forces at work here?

A. All the usual suspects—(it) would be things like globalization, the drop in entry barriers, changes in regulation that cause more parts of the economy to be deregulated. The whole digital revolution means that instead of dealing with physical things in more and more places, you are dealing with digital assets. That's the effect of speeding things up as well.

### Companies can no longer rely on sustainable competitive advantage

Q. You say that companies should focus instead on transient competitive advantages instead. What do you mean by transient advantages and how do they work in a company?

A. Transient competitive advantages have a complete lifecycle. So there is a period of searching for insights as to what could be a candidate to become the next generation advantage. Then there's a bit of time in which the company incubates and ramps it up. Then you'll have a time when you can exploit the advantage, which is lovely. But then comes imitation and competition, which puts pressure on your advantage. A great example would be broadband Internet. It used to be the dial-up internet. Many companies such as AOL and a lot of the internet service providers took advantage of that. But today it's only relevant to about 3% of all internet users in the US. The internet service providers have changed in favor of the broadband providers.

### Q. You've also mentioned in your Harvard Business Review article that companies can use a portfolio of different advantages all playing out at the same time. Do you have an example of that?

A. Look at Factset, which is an American provider of data services. Their maturing businesses would be things like physical devices. Their growing businesses would be things like cloud-based internet solutions for client self-service. They are doing them all at the same time.

### Q. Let's take an old, established company, like General Electric (GE). What would it take for a company like that to retool itself to create these transient advantages?

A. I am actually working with General Electric. I am teaching them a program called Entrepreneurial Leadership. And we are trying to equip them with the capabilities to manage each of these stages in their lifecycle, and dealing with recognizing the differences in skills and capabilities that the different stages require. One business they are launching now started in a transportation division but then it moved to energy and power. They are beginning a launch process. In a few years it will be a mainstream business for GE, and will be run very differently than it is today, in its start-up phase.

Q. So, what does it take for such an old, established company to make that shift? Shifting from that old world where sustainable competitive advantage was key, to this new world. What kind of changes would it entail in how the organization is structured, the direction in which it is focused, how the leadership views things or how staff responds to changes?

A. Well, I think it is all of the above. A big shift for strategy is when you think about how you organize and reorganize. So I talk about continual reconfiguration. Rather than trying to have changes all at once, you continually adjust your resources to your environment. Then you need to build in practices for healthy disengagement which is to be able to recognize the erosion of a competitive advantage and to move resources out of those situations. Then you should be really careful about your resource allocation process and that's where companies struggle because the powerful people in established businesses tend to control where resources are spent. Fine if the existing businesses are doing well, but again very dangerous if existing businesses are at risk. For example, one company right now would be Blackberry. The company spent a fortune trying to claw its way back into the smartphone

market, even though it was unlikely to be a growth driver for the future. They would have been better off spending that money on new types of services and shrinking the phone business. In this new way of thinking about strategy, leaders need to be prepared to face facts, especially if the news isn't good, and move the resources appropriately. Innovation needs to be continuous, not something you do once in a while. You have to be prepared to do it continually. And there are big implications for individuals and their careers. So your talent needs to be managed in a different way. You need to put different skill sets on a project.

### Q. An example that comes to mind is that of Nokia. For a very long time it was known to be an innovative company that was doing very well and very strong in emerging markets. Suddenly it went down. From your perspective, where did Nokia go wrong? What could it have done differently?

A. Nokia had all the technology that it needed to compete in the smartphone business. What its problem was, and it's what I talk about in the book, was its leaders were so interested in the quarterly performance of the basic phone-based business that they didn't really invest enough in other options. So the smartphones were embedded structurally underneath the basic phones, and guys running the basic phones didn't have much of an interest in investing in the smartphone business.

### *Q.* How does our view of competition and what really constitutes competition need to change?

A. The traditional way in which we looked at competition was we treated other companies in your own industry as primary competition. We need to get away from it to look at what are called "arenas", which are pots of resources which can be contested by different players. So, if you look at households for example, there's stunning evidence that households in the US that are spending more on telecommunications, less on automotive products, eating out and clothing than what they had prior to the introduction of the latest generation smartphones. So, your real competition, if you are selling dresses or something, is not other dress companies. It is the telecommunications sector.

### Q. One of the things that you say must be kept in mind while operating with transient advantages is to be able to identify a declining advantage and exit it well in time. What are the signals one must watch out for to be able to do this well?

A. I think the first thing would be in your operating model, is your operation or business getting less return for it? Is the competition driving the price down? Another clear warning sign is when a new entrant comes into your market with an offering that's cheap, or less complex, that does as good a job as yours does. Other warnings are your employees are unexcited to work on a particular item, or the good people are leaving your company to work somewhere else. And then additional (warning signs) are you begin to lose market share, business slows down, your good people defect...

In the book I talked about a small number of firms that I call Growth Outliers, which were able to do this on an ongoing basis. So you see them very rhythmically exiting older lines of businesses and getting into new lines of businesses. Companies like Infosys for example, or HDFC Bank in India is another case where they seem to be really probing new areas all the time and simultaneously moving their resources from maturing businesses into growth ones.

At Infosys, for example, they budget the whole company every quarter, and they measure performance very tightly. So if a particular area doesn't look like it will deliver the business, they start withdrawing resources from it quickly. As their head of strategy told me, we don't have to chop it off—we let it live its life, but eventually it finds its way to insignificance.

Q. You speak of 'healthy disengagement'. How does it work because a lot of people in companies often develop a sense of ownership or create fiefdoms, so cutting

### something out may not go down very well.

A. That's a political problem you have to deal with. I think it takes strong leadership. The choices that have been made about your strategy, you (have) to start dropping things that don't fit the strategy. The two examples that come to mind are when Alan Mullaly came into the CEO role at Ford, he made a strategic decision that he was going to discontinue the Mercury brand that was a very well-known brand but was not a growing brand. It was also distracting people from the Ford brand. Another case was when Ivan Seidenberg, the CEO of Verizon, took office. He looked at the portfolio and said physical phones will not be a growing area. You should get rid of that, which he did.

Q. One issue that comes to mind if we are to operate in a world of transient advantages, is that of visibility, or the lack of it. When we are looking at opportunities with a quick turnaround, there is often not enough time to test, or to be sure that this will be worth the risk that the company is taking. How do companies evaluate that and make sure that what they are doing will bear results?

A. You don't always know going in, so you need to be good in investing in a number of alternative options. You may have 3-4 mutually exclusive options. As far as investment goes, you want to keep your downside contained, so you invest as cheaply as you can, in things like prototypes, laboratory experiments, mock-ups and different tests, business plans, technical plans, in quick succession.

### Q. Given what you've talked about in your book, where do the traditional strategy models such as Michael Porter's Five Forces model lie?

A. The Five Forces model is still a very useful framework and the concept of sustainable advantage makes a lot of sense where the right boundary conditions apply. Those boundary conditions would be relatively stable industry boundaries where there are strong barriers to entry. All I'm saying is there are fewer and fewer places where those conditions apply.

### The Aaron Hurst Interview



## **The Pro Bono Evangelist**

Aaron Hurst, CEO of Imperative and author of *The Purpose Economy*, on making pro bono a crucial part of the non-profit ecosystem

By Melody Tu and Major Tian

aron Hurst, CEO of Imperative and author of *The Purpose Economy*, is out to reinvent corporate philanthropy. In 2001, Hurst launched Taproot, a company that aims to make pro bono service a part of every business. The idea is simple. Many non-profit organizations face a major handicap when it comes to two things: funding and talent. That, in turn, hinders scalability and societal impact.

According to Hurst, the talent issue is easily solved. Skilled professionals, according to him, have a responsibility to society. "If you are lucky enough to have a business education, design education or engineering education, you have a broader responsibility to society," he says. By offering their services pro bono to non-profits, they are fulfilling, what he calls, their 'professional social responsibility'. Hurst has been an evangelist of the pro bono movement for more than a decade now. In this interview, he explains how pro bono works and the challenges confronting nonprofits.

### Q. Are you happy with how most companies implement their corporate philanthropy strategies and their involvement in pro bono work?

A. The first time a company tries to do philanthropy or corporate social responsibility (CSR), it's not very satisfying but it evolves over time until it becomes fully integrated into the company. Some of the best companies in Silicon Valley and other places don't even have CSR or philanthropy; it's just built into their DNA. Some of the older companies didn't have it before, so they add it on, and it feels like it is more of an appendage to the company. Over time it starts to seep into the company. So I think I'm happy, but I'm impatient.

Pro bono work to me was always something different though. A lot people think of pro bono as being about companies. To me if you think about CSR, pro bono is about 'professional social responsibility'. If you are lucky enough to have a business, design or engineering education, you have a broader responsibility to society. You are so lucky to have these talents, (so you must) make sure that what you have is (not) only accessible to those who can pay for it, but (also) to those who need it most. One of the biggest challenges (is) that in society, these skills are becoming more and more necessary for success. But they are becoming more and more expensive so only the big companies can afford them. It's more about an individual designer, business professional or accountant making sure that you spend some of your time helping those who couldn't afford your talents because you believe that it's necessary for a good society.

### *Q.* How do you define your role in this pro bono work?

A. If you look at the history of lawyers, accountants or doctors, they already had the sense of broader responsibility to society. But the other professions didn't. With the Taproot Foundation, the work we did was to bring awareness to these other professions and to say you are just as important as doctors and lawyers and accountants, and non-profits need your help. (We) exposed them to that first opportunity. Once they have that opportunity and they experience it, they are usually hooked for life because it is so rewarding.

When I started doing Taproot in 2001, most people did not do pro bono. It was considered 'you get what you pay for'. By the time I left Taproot, there was probably between \$15-20 billion a year in pro bono being done in the US.

#### *Q.* What are the incentives for a corporation to encourage their employees to do pro bono work?

A. Professional services firms and consulting firms see it as a really critical way to grow and engage their talent, so it's a pretty easy business case. For bigger companies that aren't consulting firms, the biggest value has been reducing turnover of top talent. (For) top technology (or) marketing professionals, it's such a competitive labor market that they see this as one of the key ways to differentiate the experience of an employee at Hewlett-Packard versus (that at) another company. We've also seen a lot of R&D come out of doing pro bono. Because people are used to solving problems the same way over and over again at a company, when they go out and see things can be done differently, they bring that back to the company. IBM in the US is a great example. They've developed many patents based on the work they've done pro bono for non-profits and government.

#### Q. You talk a lot about a major shift in the US. How do you view the situation in China?

A. In China many of the NGO and GON-GO [government-affiliated NGOs] organizations are very, very small. They are not yet at that point where they can take that training to learn how to use pro bono. That market (has) to mature so that they really are able to be strong clients for these professionals.

Funding is difficult—there (are) not (a lot of) charitable foundations here to support a lot of this work. But luckily some key companies—Intel, Hewlett-Packard and some Chinese companies—are starting to embrace pro bono. We will start to see the rise of corporate funding and staffing to support it in the next couple of years. At the core, the Chinese business community and government community is very aligned with this vision of having professionals not just be mercenaries, but (also) be actually committed to society's health overall.

### *Q.* What's the biggest challenge for Chinese organizations and NGOs?

A. The biggest challenge is capacity. I think the professionals want to do it and the companies are willing to do it if they understand it. They just need to have the staff time and staff skills to know how to manage a pro bono project because pro bono is a combination of knowing how to manage volunteers but also how to manage consultants. Working with consultants is wonderful but challenging. Being able to build that capacity and knowing how to get the most out of a consultant, not to expect them to be superheroes and instead realize they just become part of your team and you need to work with them.

### The Aaron Hurst Interview

### Q. Why are non-profits so complicated?

A. Non-profits are complicated firstly because of the funding stream. Most of the funding for non-profits is not from the customer. So you end up with twice as many customers. You have the actual customer and then you have the people paying for it. You are expected to satisfy both these needs. Then you've got a board of directors, which is another 'customer' that represents the community and you need to keep them happy. Then you've got staff to which you are not able to pay market rates so you've got to find ways to incentivize people beyond cash to make them want to stay. Then you've got to figure out how to measure success. A company bases it on net revenue, shareholder value and sustainability to some degree. But it's usually quarter-to-quarter or maybe one year. In a non-profit, the impact is not felt for three years or five years, and it's multiple variables that are somewhat subjective. So it's really hard to know what success is. As a CEO of a non-profit, you can't just say, 'we had a very successful quarter, we had net revenue of X, we had shareholder value of Y.' As a non-profit it's not that binary, so you have to lead with much more relationship and nuance to connect people to what you are doing.

### Q. China has a lot of non-profit organizations. We also see a lot of foreign companies want to work and partner with local Chinese NGOs, but it can be quite challenging. What are your thoughts on this?

A. The most important skill in business and in life is empathy. The ability to understand other people and to listen before you talk. That's the number one challenge with pro bono and it's the number one challenge for American or European or other companies going into either a nonprofit in their own country or in another country. They start by giving advice, they start by trying to make a difference, instead of realizing the first step is to shut up and listen and understand first. I don't think it's really an issue of China or another country-just in general with any relationship, listen first. If you do that, you are fine.

To me, If you think about corporate social responsibility, pro bono is about professional social responsibility

### *Q.* How do you envision this area evolving in China in five years?

A. My hope is that the government will play a bigger role and celebrate those who are leading this in the professions, and start to really play a role in challenging the marketing community, the HR community and MBAs to make pro bono part of what it means to be a professional. China, almost uniquely, is in a position to do that, even better than in the US, because there is such a strong tradition of the people being dedicated to the nation and to the people first. So it's a very natural reflection of the Chinese values.

Q. You also talk about how local NGOs need to engage in capacity building. What are the challenges here compared to foreign organizations?

A. Capacity building for non-profits is very difficult in the US. If it's not funded well, donors don't want to give money for it. In China it's that times 10. The challenges are really great. One is that there are not enough organizations in China to help build the capacity of those organizations. Secondly, there's no funding to support the staff time to do so. Finally it's just the maturity of the overall field. If you are a donor, you want to give money to help a child, you don't want to give money to build a website to help the non-profit that helps the child. So everyone complains about funding in the US-it's a major problem, and in China it is 10 times worse because it is a less mature field and people don't yet understand charity.

### Q. In this area there are three players. One is the government, the second is private companies and the third is non-profits. What is the best possible way for them to work together?

A. The best way to build any kind of partnership is to have a shared vision. Too often partnerships are built around strategies, not around vision. The second the strategy falls apart, the partnership falls apart. So for government, civil society and corporate partners to work together in China or anywhere, the key is for the leaders to develop a common vision and know that they will fail many times along the way, but know that they are committed to that long-term vision and keep trying. That vision has to be something that they all get real value from, they all believe in and they are all willing to fail a little bit to get there. That is where pro bono is so powerful because that is one of those visions: to say that by 2020, pro bono (will) become part of the ethics of professions in China, you have this multi-billion dollar resource for NGOs and civil society for the future. That kind of vision is something that all three can work together on and in the end they know they have achieved something remarkable.

### (To read the full interview and watch the video log on to http://bit.ly/16KnFuW and http://bit.ly/1aIwJgA)



O&A

## Philanthropy For Community Impact

Brian Gallagher, CEO of United Way Worldwide, on making philanthropy more effective

By Neelima Mahajan

A s a charitable organization, United Way Worldwide (UWW) enjoys two unique advantages: the benefit of scale, and the ability to organize and manage community impact projects locally. UWW, a 125-year-old institution now, is an umbrella organization that supports a network of nearly 1,800 community-based United Ways in 41 countries and territories. It is the world's largest privately funded non-profit (it raised over \$5 billion in 2011-12).

When he took over at the helm, CEO Brian Gallagher's biggest mandate was to redefine UWW's mission from merely raising funds to creating community impact and changing people's lives. Among other things, he also placed a lot of emphasis on things that are often neglected in philanthropic efforts, such as, measuring impact, accountability and transparency.

In this wide-ranging interview, Gallagher discusses implementing the shift in mission at UWW, measuring philanthropic impact and enforcing transparency and accountability:

### Q. When you took over at United Way, you reoriented the organization to create more community impact. Can you walk us through the 'why' of doing that?

A. The shift we went through was really because the economy had shifted so much. We started as a result of the Industrial Revolution more than a hundred years ago. So the business proposition was to raise money for a group of NGOs that then collectively would provide services to people. As the economy globalized and became more technology- and knowledge-driven, the way people made a living and how they earned money, changed. The idea that either individuals or families alone could take care of their social service needs, or government alone could take care of social needs, was breaking down. It was more important for us to focus on the issues that people were facing at scale, instead of defining our success as how much money we raised.

Q. What were some of the changes you brought about, and how easy was it to

### reorient an organization which was now more than 100-plus years old?

A. Businesses, governments or NGOs that go through change, get focused on purpose. Once we set a vision around trying to respond to compelling human need, then it's easier to get people to understand how you move toward that, and why you raise money and why you partner with different organizations. Once we got agreement within [there are the 2.5 million volunteers and more than 10,000 employees across the world], you have to get everybody to agree on what the purpose and future vision is. Once you do that, change comes faster than you think.

We historically defined our success (at) United Way, as how much money we raised—and we still raise more money than any private NGO in the world. We changed our mission statement to improve people's lives by mobilizing the caring power of communities across the world. (We had) to define our success by our ability to create change in people's lives. We focused on three big areas—educa-

### Q&A

tion, financial stability and livelihood, and health. The big shift was getting all of our 1,800 local United Ways across 41 countries to start focusing on those issues. Secondly, we tightened up all our of governance and management requirements to get ourselves much more tightly managed as a network.

### *Q.* How did you arrive at education, income and health as key focus areas?

A. If you look at all the academic data and United Nations data and so forth, it almost always comes down to education, income and health. The UN Millennium Development Goals (are all about) education, income and health. The other (determinant) is quite honestly, intuitive. As we looked at communities around the world, we kept finding that communities were working on the same issues. Education, income and health are the building blocks of a good life.

### *Q. It seems like there are many amorphous entities involved in UWW so how does your model work?*

A. The best way to think about us is as a franchise. So we, UWW, own the name and the brand mark 'United Way'. We license that brand to local groups and volunteer groups around the world to operate as United Way or a United Way affiliate. So if you are United Way in New York City or United Way in Mumbai, you abide by the same governance and operating principles and you adopt a certain mission, but you are locally incorporated. We share knowledge, do professional development and manage relationships together, whether government or corporate or NGOs. We're big because in aggregate, it is more than \$5 billion. But we are small, in that we are organized locally and managed locally.

When we start a United Way anywhere in the world or support United Ways, we teach them how to raise money from corporates and individuals, how to use technology, how to tie the fundraising to social and community projects. But then we also have relationships with foundations and corporations that go across national geography. So we raise money as a network and then distribute it into our network across the world.

### Q. It sounds like there are a lot of moving parts in the UWW model. How do you enforce the same rigor, transparency and accountability across the board?

A. Any organization that is as big as we are with as many different operations as we have is always going to be a challenge to manage. There's no flexibility as it relates to governance of organizations. The need to be transparent in your operations and your finances, to be locally operated, to have volunteers and community members involved in your operation, that's consistent across the world. Where there's variability is how these United Ways and their affiliates work on social issues across the world, because economies are different, politics are different, cultures are different. Even though it may look unwieldy to manage, it allows you to stay close to communities, so you don't try to manage from the center. When it relates to how you respond to human need, I find our decentralized structure to be very helpful as long as you keep the operation and the governance consistent across the network.

#### Q. A key issue that many non-profits struggle with is measuring the ROI of what they do. How do you deal with this?

A. What we've gotten very good at within United Way is measuring a project or a program. There's very clear protocol on what we call 'logic models' where you can look at an education support program or a disease prevention program and you can measure it's success predicated on what you are trying to achieve, the magnitude of what you are trying to achieve, and over what period of time. What gets more challenging is if you take a hundred different programs or projects that are funded by government and NGOs and others, they don't necessarily add up together to create community-scale change. You then have to do community-wide intervention on awareness and media, students have (to be) involved and so forth. That one is more difficult, quite honestly, to be able to tie media campaigns, for instance, or broad-based

educational awareness campaigns, to community-level results, because what you're really focused on is normative change.

### Q. Sometimes NGOs and charities end up creating a culture of dependence where people are just waiting to be given money or help. How do you deal with such issues?

A. The way we try to respond to that question within United Way, is that the thing a person in a family needs most is a way to generate an income in order to sustain themselves. If you look at the millions of people that have been pulled out of poverty in emerging markets around the world, it had very little to do with non-profits, NGOs and civil society. It had a lot to do with market expansion, job creation and opportunity. Having said that, markets by themselves are not always fair. Use of capital is rational, but it is not necessarily fair or inclusive from a human perspective. What's critically important in terms of our work is not creating dependence, but creating support for people to take advantage of market expansion, and to hold accountable businesses and government to make sure that economic expansion is inclusive.

### *Q.* What, to your mind, is the future of philanthropy?

A. Millennials are going to change the way philanthropy is done. (It will be) much more issue-oriented again. My generation turned philanthropy into special interest. If you look at the people 45 years old to 65 years old, everybody wanted their special interest. They wanted to support their NGO. If you look at the 20-yearold to 30-35-year-old, that person is much more issue-oriented. They want to take on the environment, or trafficking, or health issues. Increasingly, (they) will connect with each other and create social movements to deal with causes and issues. Institutions like ours and government and others are going to have to work to keep up with the more informal movements that get facilitated by technology but more ordinarily are driven by a cause. 

(For the full interview and to watch the video, log on to knowledge.ckgsb.edu.cn)

## Your Convironment And You

### **CKGSB** Professor Juliet Zhu explains how environmental factors impact our cognition

By Major Tian

**U** nable to come up with a punch line for your carefully orchestrated marketing plan? Try this: change the desktop image of your laptop to the blue sky and go sit in a dimly lit coffee shop. Chances are the chitchat and laughter in the background, the clatter of cups and the whirring of the coffee machine will get your creative juices flowing.

Environmental factors—color, lighting and noise—have significant influences on how your brain works.

Over the past few years, Juliet Zhu, Marketing Professor and Co-Director of the Branding Center at CKGSB, along with her colleagues, has conducted a series of field experiments to examine the relationship between personal environment and creativity. They have found that various environmental cues impact people's cognition and behaviors, even though the process happens in milliseconds and is very hard to notice.

In this interview, Zhu talks about the real-life implications of her research:

### **Sound: The Right Notes**



People normally think that if you want to focus on coming up with an idea, you (should)

stay in a quiet room. But we found that noise is not necessarily bad. In fact, a moderate level of noise, around 70 to 80 decibel (dB) points, is actually facilitating in terms of creative thinking.

In one of our experiments, we recorded different types of noises in real life and superimposed a noise track. We placed that in a lab and told the participants that we were interested in understanding how



people perform or think in a restaurant setup, and we were going to create some background noise resembling a restaurant.

We manipulated the noise to reach three levels-high (85dB), moderate (70dB) and low (50dB). Then we gave people a number of creative tasks that have been traditionally used to measure creativity.

People in the moderate noise condition were able to generate more correct solutions compared to those in the really low or really high conditions. Background noise makes people feel a little distracted from their focal task. That distraction causes, what we call in psychology, a sense of 'disfluency'.

When you're 100% focused on the focal task, you're so narrow-minded that you can't think out of the box. But creativity is all about generating distant as-

sociations to the current stimulus and, therefore, generating novel insights. So this 'disfluency' created by noise allows you to temporarily move away from the present task—you start to 'mind wander'. That is the basic process even though it is happening very fast and at an unconscious level.

We (also) had participants evaluate new products and then asked them how much they were likely to favor these products against more traditional products. People in the moderate noise condition were more willing to try these new products.

Based on this research, somebody created a website called Coffitivity. You can download different noises from the site and presumably it will facilitate your creative task performance. It was a top-rated app by *The New York Times* this year.

### **Color: Blue Sky Thinking**

My approach to studying color comes from the psychological literature, where we found this discrepancy—some people suggest red versus blue color will enhance cognitive performance, while others suggest exactly the opposite.

We did a very extensive literature review and eventually came up with a moderator, or another factor that can determine when red or blue will be more helpful. We argue that, basically, if the task is more detail and accuracy-orientated, red will be more helpful, but if the focal task is more creative in nature, blue is better.

We ran more than 10 experiments, and in one of the studies we printed on pa-

### Special

per 20 parts commonly used by designers to design toys, in either blue or red. We showed each to two groups of participants and asked them to (create) a toy design for a three to five-year-old kid.

We took black and white pictures of their designs and showed them to three professional designers, who were asked to judge the creativity and originality of these designs. The designs produced in the blue color condition were rated as more creative compared to those created under the red color condition.

The kind of associations people have with blue color are the ocean and the sky, so they are more likely to be in an approach mindset. This mindset can get people to be more open-minded and risk-taking, (helping) generate creative ideas.

On the other hand, red gets people to think about red light, blood, ambulance, emergency and stop signs—danger (or) mistake signs. When people think about these things, they tend to be in avoidance mode and are more cautious. As a result, you perform better on the detail-orientated tasks.

#### **Temperature: Hot or Cold?**



For simple tasks—tasks that people can easily solve but precision is important—cool temperature can be helpful;

but, if the task is really complex, a moderately warm temperature will be helpful.

There are usually two types of processing people engage in. One is cognitive processing, where you process information systemically, sequentially and you process each piece of information and analyze them to find the best solution. The other one we engage in is called affective processing—we don't process all the pieces of information, we go with our gut feelings and intuition when making decisions.

A higher temperature usually activates affective processing because heat depletes resources, or the amount of cognitive energy one has, so you only process a subset of information and you go with your gut feeling. Therefore, if you're presented a simple task, you're likely to make mistakes in a warm temperature. However, when we move onto complex tasks, because our working memory is limited, if you are in a cool temperature and use cognitive processing, you won't be able to finish processing all the pieces of information in a limited amount of time, so your performance is inevitably going to decrease as the (amount) of information increases. But if you use affective processing, the quality of your decisions actually doesn't decrease as the amount of information increases. So relatively speaking, when the task is complex, affective processing can lead to better evaluation.

We asked people to choose one out of four cars. There's one correct answer: this is the one that has the best quality out of the four. We manipulated the complexity of the task by varying how many attributes we present people. In the simple task scenario, we gave people only four attributes for each of the four cars: there were 16 pieces of information that they had to process. In the complex task scenario, we gave people eight attributes for each car model, so altogether they had to process 32 pieces of information. In the end, we measured the percentage of people who were able to choose the correct answer. We found that when the task becomes complex, warm temperature leads to better performance. But when the task is simple, cool temperature leads to better performance.

#### Lighting: Bright vs. Dim



If you think intuitively, in what condition would you actually be more creative bright room or a dim room?

People always say bright room but what we found is quite opposite.

In one of the experiments, we separated people into a dark room and a bright room. We presented each group with two print ads for a camera. In one ad, the images were very clearly related to the camera— there was a camera case, a zoom lens and a remote control. It doesn't require much creativity to understand this ad. In the other ad, we had a road sign, a hotel bedroom, a car key and a globe. All these things are seemingly unrelated to the focal product but if you think more abstractly, you will be able to decipher the theme of this ad: travel. And that is very closely related to the focal product—camera.

People in the dark room were able to decipher this second ad more easily and appreciate it more.

The logic behind this is 'dis-inhibition'. People normally control their behavior. In an office environment, we always regulate our behavior-how to sit, how to talk, etc. When the room is well lit, you feel like every single part of your body can be observed and judged by others, so you regulate yourself more. But, in a dim room, where you feel that other people can't see you clearly, you feel that you don't have to control yourself rigorously. So this physical freedom, or physical 'disinhibition', also influences your mental 'dis-inhibition' and you will be more open to new things and be able to come up with new distant associations-all these are the antecedents of creativity.

### **Space: Circular or Angular?**

People always attach meanings to different shapes round means harmony; angu-

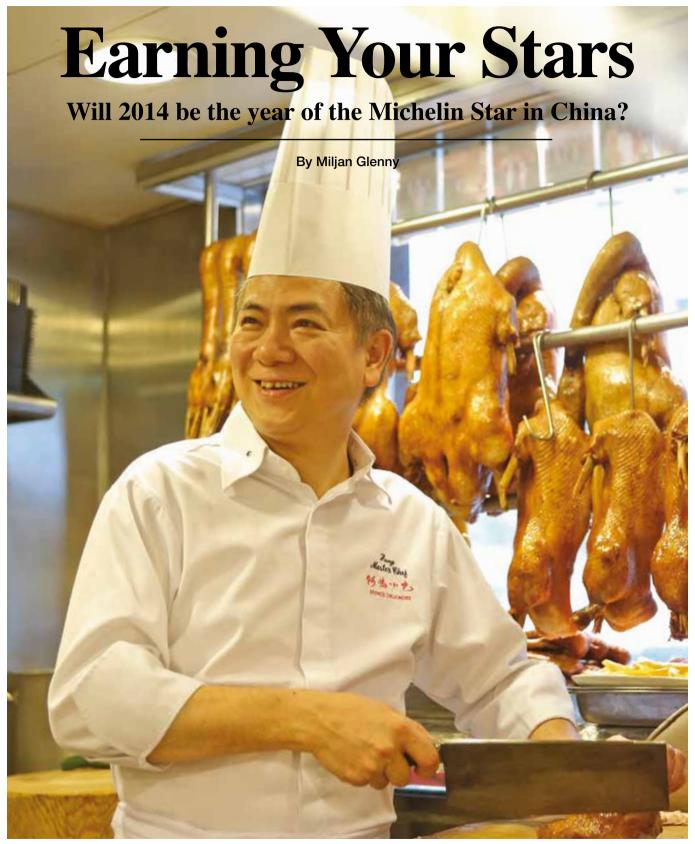
lar means confrontation. So we borrowed that idea in a more business or consumer context. We argued that the shapes of the seating arrangement affect people's cognition or the way people behave in groups.

We had some participants sit either in a circle, and others in an angular shape such as an L shape. We found that people in the circular shape are more likely to conform to the majority. For example, if we tell them that this product has been endorsed by 80% of the consumers, they're going to like it more than if we tell them that the product has been endorsed by 20% of consumers. But an angular shape works differently. When (sitting) in an angular shape, the need to be unique is actually the underlying process, people in this condition are actually more interested in minority options. So if we tell them that the product has been endorsed by 20% of consumers, they tend to show more interest in it.

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(To watch the video and read the full transcript, log on to CKGSB Knowledge: http://knowledge.ckgsb.edu.cn)

### Downtime



Chef Lai Wai-Hung at work in Hong Kong's Michelin starred Hung's Delicacies

### Downtime

t the turn of the 20th century, brothers André and Édouard Michelin published the first ever Michelin Guide for restaurants in France. The guide was intended to draw potential customers out of their immediate vicinities and drive to the starred establishments, which meant more mileage on the cars, and thus greater necessity for replacing their tires with Michelin tires. A century has now passed since the books' first publication, and the Michelin Guide's Michelin star system has become globally recognizeable: one star, "A very good restaurant in this category", two stars, "Excellent cooking, worth a detour", or three stars, "Exceptional cuisine, worth a special journey". The guide has spread to 24 different countries and territories, most of them in Europe. Only three territories outside of Europe have been privileged with Michelin Stars, those being the US, Japan, and Hong Kong/Macau. But Mainland China, a country with the world's second-largest economy, largest population and one of the richest culinary histories, has yet to receive its first Michelin Star.

### **Neighbourly Advice**

There are currently 62 restaurants with Michelin stars in Hong Kong and eight in Macau, an impressive amount considering these destinations have only been on Michelin's radar since 2008, and their geographic coverage is relatively small. Japan and France for example have between them 911 Michelin Star restaurants.

Eva Kwok, Assistant Chef at Hong Kong's Hung's Delicacies, earned her Michelin Star in 2010 and says that consistently good food and freshness is what makes or breaks a restaurant's chance to earn the stars, and a clean toilet or kitchen wouldn't go amiss either. Luckily, the emphasis on quality, fresh ingredients does not necessarily mean high overhead.

One of the primary differences between starred restaurants in Hong Kong and Macau and those in other countries is price. The world's cheapest Michelin Star restaurant, Tim Ho Wan, located in the heart of Hong Kong, sells its worldfamous dumplings for less than \$2 a pop.



Signature beef dish from Mandarin Oreintal's Fifty 8° Grill in Shanghai

This should bode well for the mainland.

On the other end of the price spectrum there's Richard Ekkebus, Chef at Mandarin Oriental Hong Kong's Amber, where he has earned two Michelin Stars for four consecutive years. Ekkebus, who also works as a consultant chef at the Fifty 8° Grill at the Mandarin Oriental Shanghai, breaks down the Michelin pursuit into three main components: "prepare food well, consistently [use] top-quality ingredients, and good presentation," he says.

#### **Michelin Mechanics**

Restaurants in China may find that beyond expense of certain ingredients, logistics is an equally if not more challenging supply issue. Mr Harry's restaurant in Shanghai serves traditional British food, and owner Harry Spencer says he would like to obtain a Michelin star when the *Guide* comes to China (rumoured for early 2014). But some ingredients can be very hard to procure, especially as some ingredients are only produced in Europe. One such dish is the Apple and Rhubarb crumble, a traditional British pudding. "Rhubarb can be both hard and expensive to find here, but once you have a good supplier, the quality and consistency tends be of a good level."

High-end establishments can afford to pay prices to buy expensive imports, but restaurants that are the size of Mr Harry's, which has only been open for three months, must wade through a murky environment of good and not-so-good suppliers until landing on a reliable source for each and every imported ingredient.

It is not only a difficulty for China, but also for Michelin. The French company's manpower may not be enough to cover China. In a now infamous 2004 exposé,



Pascal Remy, a former Michelin inspector, told the *South China Morning Post* that in fact there aren't unlimited numbers of agents that can cover all corners. According to this tell-all interview, which preceded the publication of his memoir, a mere seven inspectors covered the entire US. Hong Kong and Macau being significantly smaller territories present a far lesser challenge to the Michelin inspectors, so top restaurants can be easily discovered in a short space of time.

Remy went on to say that Europe only has 39 inspectors to cover 21 countries, hence why you only see a few restaurants in the guide from Poland, Monaco, Portugal and Austria. Transposing those limitations to China, Michelin inspectors will likely confine their search for China's best restaurants to the capital cities of Beijing, Shanghai, Shenzhen and Guangzhou. Beyond the logistical obstacles, perhaps the more fundamental question to ask is whether or not Chinese restaurants want Michelin stars.

Michelin stars have become a burden for some chefs around the world with huge amounts of pressure resulting from the award of a Michelin star; one chef even took his own life as he found the expectations too great. In 2003, three-star chef Bernard Loiseauhad was downgraded two stars by a rival guide, and in fear of a corollary Michelin downgrade, committed suicide. But for many, it's a powerful incentive. "No doubt there is pressure, which eventually turns into positive motivation for me," says Kwok.

Ekkebus says that as long as the food is consistent with good quality ingredients, and the customer is happy, he is happy. "If a Michelin Star comes our way, then it is merely an added bonus to our hard work." A conclusion much more easily reached by a chef awarded Michelin stars several times over.

#### **Anti-Sinocism**

Hong Kong and Macau have become testing grounds for the Michelin star in the China region, but some foodies aren't so enthusiastic about the development.

Samantha Pong and Fergus Fung, founders of WOMGuide.com, (Word of Mouth Guide), say that Michelin stars were originally intended for European countries only and it may not sit well that yet more regional cuisines are being included in the mix. "Michelin started in France and the (original) system is better suited for rating restaurants in Europe. When it first launched in the US, people got confused because some of the restaurants were not 'typical' Michelin restaurants."

The same confusion arose in Japan. Michelin has redefined its rating system to focus less on the restaurant's amenities and more on the food itself, particularly in consideration of Asian restaurants. Pong says "rating a restaurant in France with three stars means everything plus amenities such as enough bathroom stalls for the customers. A three-star restaurant in Japan might only have one unisex bathroom stall."

Kwok and others feel China is ripe for Michelin star status. More and more Michelin star chefs are coming to China, such as Brian McKenna, Executive Chef of The Courtyard in Beijing. McKenna left a starred restaurant in the southern English city of Hampshire to launch new culinary ventures in China's capital city. If China can maintain chefs like McKenna, and indeed foster home-grown worldclass chefs as in Hong Kong and Macau, there will be a red *Michelin Guide* book with China printed on the front in the near future, particularly if the rumours of a 2014 China debut hold true.

Ekkebus mentioned that it is important for China that Michelin create a guide for the country. It "will attract tourists from around the world, and bring much more respect for Chinese culinary art".

### "On Leadership"

Guo Xin, CEO of Career International, shares how John Gardner's book applies to China today



n Leadership is not a new book, and its author, John W. Gardner, is not a contemporary management guru. But it is nonetheless very pertinent to the management challenges faced by leaders in today's business world.

That world, however, has fundamentally changed. The go-go years known to two generations of Chinese are no longer automatic. Sustainable growth and prosperity requires new sets of leadership skills. In today's China, we are reconciling with issues that plague numerous developing economies: over-capacity, fast commoditization of ideas and products and fierce competition. The conventional concept of a leader who can outsmart others or be better connected than the competition will not guarantee prolonged success.

John Gardner's book elaborated in detail the critical leadership capacity of institution building. Most indigenous leaders in China have experienced all 'seasons' of business. The market is gradually maturing. Many industries now have a competitive environment similar to that of developed countries, competing in quality differentiation. The once prominently important leadership traits of being incisive, tough-minded, well informed and connected, have yielded to traits that serve in a slightly lesser known capacity-building a sustainable institution.

Growth is one of the most significant factors in securing an organization's well-being. As an organization grows, a leader's personal handling of business events and activities will not be as crucial. "Whole" leadership will be a leader's pivotal contribution to an organization. We have witnessed countless stories where "...leaders enjoy the brilliant moment and then disappear without a trace because they have no gift for building their purpose into institutions," Gardner writes. The European Union's original architect Jean Monnet once said, "Nothing is possible without individuals; nothing is lasting without institutions." This statement deserves a banner space in most of our business leaders' offices. Leadership is no more than the collective capabilities of all the followers. "... The sheer size of an organization can create grave problems for leaders interested in vitality, creativity and renewal." Gardner wrote. The most important role for a leader is to ensure that each member of the organization can function well individually and collectively.

Abundance of opportunities could also be a distraction for business leaders. Building a sustainable business in this day and age requires a leader who is less of an opportunity finder and more of a direction setter. The most challenging demand for an ambitious leader is to stay focused, learning to cast aside certain opportunities and outsource some non-essential functions, and ultimately harness the resources of an organization, broader community and the government.

There are many different schools of thought on whether leadership is innate or learned. Whatever you believe, reading this book will definitely help you in the act of leading.

### **Business Bestsellers in the US**

No. 1	Outliers by Malcolm Gladwell
No.2	Jab, Jab, Jab, Right Hook by Gary Vaynerchuk
No.3	Thinking, Fast and Slow by Daniel Kahneman
No.4	The Tipping Point by Malcolm Gladwell
No.5	Lean In by Sheryl Sandberg
No.6	The Wolf of Wall Street by Jordan Belfort
No.7	Blink by Malcolm Gladwell
No.8	Daring Greatly by Brene Brown
No.9	How To Win Friends and Influence People by Dale Carnegie
No.10	The Power of Habit by Charles Duhigg
Source: An	nazon (not including repeats based on format)

### **Business Bestsellers in China**

No. 1	Big Data by Viktor Mayer-Schonberger
No.2	How will you Manage a Team? by Zhao Wei
No.3	Shi Yuzhu's Bio: My Marketing Mystery by Shi Yuzhu
No.4	The Effective Executive by Peter F. Drucker
No.5	Influence by Robert B. Cialdini
No. <mark>6</mark>	Positioning by Al Ries and Jack Trout
No.7	The Solution Tango by Louis Cauffman
No.8	The Minto Pyramid Principle by Barbara Minto
No.9	The Way of Doing by Kazuo Inamori
No.10	Hai Di Lao: It Can't Be Taught by Huang Tieying
Source: Da	ngDang.com

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