Number 15

Making It

Industry for Development

- China in Latin America
- Beyond CSR
- Peru
- Industrial symbiosis
- Green finance

Our industrial future

A quarterly magazine. Stimulating, critical and constructive. A forum for discussion and exchange about the intersection of industry and development.

NUMBER 14
● Denmark's Minister of the Environment ● Dani Rodrik – The right green industrial policies ● Recycling in Russia ● Intra-BRICS cooperation ● Hot topic: Is business doing enough?

NUMBER 13
● Resource scarcity as a catalyst for green development – Novozymes ● Ethiopia's soleRebels ● Arnold Schwarzenegger on implementing a sustainable future ● Hot topic: ICT and development

NUMBER 12
● Fernando Pimentel on doing business in Brazil ● Profile of China's trail-blazing Broad Group ● Devaki Jain on the feminists of the South ● Hot topic: Fracking

NUMBER 11
● Mei Yi, president of AIESEC, on the keys to effective youth engagement ● Perspectives on the Arab Spring ● Sustainia – the world of tomorrow ● Hot topic: The 'Girl Effect'

NUMBER 10
● Klaus M. Leisinger, chair of the Novartis Foundation for Sustainable Development, on the intersection between industry and health ● D-Rev's Krista Donaldson on designing health care equipment for the developing world ● Hot topic: Gas flaring

NUMBER 9
● Jeremy Rifkin on the Third Industrial Revolution ● Morgan Bazilian and Kandeh Yumkella on the new economy: inclusive and sustainable ● Hot topic: Climate change, climate action

NUMBER 8
● Closing the gender gaps – Michelle Bachelet on overcoming the barriers that prevent women from seizing economic opportunities ● Engineering eco-friendly solutions – Carolina Guerra on hazardous waste in Colombia ● Hot topic: Growth: the end of the world as we know it?

NUMBER 7
● The globalization paradox – Dani Rodrik ● Unfair share – Thomas Pogge on affluent countries' responsibility for increasing global poverty ● Hot topic: Is nuclear power necessary for a carbon-free future?

NUMBER 6
● Feeding a crowded world – IFAD's Kanayo Nwanze argues that smallholder farmers must have opportunities to be entrepreneurs ● Nestlé CEO Paul Bulcke on 'Creating Shared Value' ● Hot topic: Does energy efficiency lead to increased energy consumption?

NUMBER 5
● A window of opportunity for world trade? – Peter Sutherland assesses the prospects for the conclusion of a multilateral trade agreement ● A path to mutual prosperity –Xiao Ye on trade between sub-Saharan Africa and China

NUMBER 4
● Strengthening productive capacity – Cheick Sidi Diarra argues that the LDCs should – and can – produce more, and better quality, goods ● Patricia Francis on climate change and trade ● Hot topic: The relevance of entrepreneurship

NUMBER 3
● China's stunning economic rise: interview with minister of commerce, Chen Deming ● Towards a more productive debate – Ha-Joon Chang calls for an acceptance that industrial policy can work

NUMBER 2
● The International Energy Agency's Nobuo Tanaka looks at energy transitions for industry ● Energy for all – Kandeh Yumkella and Leena Srivastava on what needs to be done to improve energy access

NUMBER 1
● We must let nature inspire us – Gunter Pauli presents an alternative business model that is environmentally friendly and sustainable ● Hot topic: Is it possible to have prosperity without growth? Is 'green growth' really possible?

Editorial

Industrial development fell out of fashion in the so-called "North" in the 1990s due to the hike in the services sector and the prevailing gospel of Washington Consensus policies. Ironically, at the very same time, industrialization was slashing poverty rates in East and South Asia. In fact, it is largely through industry that the Millennium Development Goal (MDG) Goal 1 – to halve extreme poverty and hunger – will be met at the global level.

Since the turn of the millennium, things have changed immensely. Industry is back! Manufacturing and entrepreneurship are now recognized as the key drivers to create the growth rates, jobs and economic structures needed to eradicate poverty and provide sustainable livelihoods for all.

Industrial policy – government policies directed at affecting the economic structure of the economy – is firmly back on the agenda in countries around the world and at all stages of development. The standard argument was that markets were efficient, and there was no need for government to intervene. But the global crisis of 2008-2009 showed that markets were not necessarily efficient. Furthermore, without strong government intervention, the market economies of the United States and Europe may have collapsed. Today, the relevance and pertinence of industrial policies are acknowledged by mainstream economists and political leaders from all sides of the ideological spectrum.

In this issue, our contributors look at the future of industrial development from a variety of perspectives but each with a common pursuit: the goal of inclusive and sustainable industrial development for all countries.

MakingIt
Industry for Development

Contents

Editor: Charles Arthur
editor@makingitmagazine.net
Editorial committee:
Thouraya Benmokrane, Jean Haas-Makumbi, Sarwar Hobohm (chair), Kazuki Kitaoka, Jo Roetzer-Sweetland, and Ravindra Wickremasinghe
Cover illustration: Matt Herring
Design: Smith+Bell, UK–
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Fax: (+43-1) 26926-69
E-mail: unido@unido.org
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34

Cover illustrator **MATT HERRING** has 18 years experience working with a long roster of international clients on a diverse range of illustration and design projects. His career began as a commercial illustrator producing full colour, silkscreen prints for newspapers and magazines, and his roots in printmaking still influence his current digital practice. Based in London, Herring uses a montage of found and self-generated graphic material to produce vibrant images for the publishing, design and advertising industries. His clients include *The Times*, Adobe, NatWest, Nike, British Airways, MTV, Pepsi Co, *Vanity Fair*, EMI, *The Financial Times* and BBC Worldwide. www.mattherring.com

GLOBAL FORUM

The Global Forum section of *Making It* is a space for interaction and discussion, and we welcome reactions and responses from readers about any of the issues raised in the magazine. Letters for publication in *Making It* should be marked 'For publication', and sent either by email to: editor@makingitmagazine.net or by post to: The Editor, *Making It*, Room D2142, UNIDO, PO Box 300, 1400 Wien, Austria. (Letters/emails may be edited for reasons of space).

LETTERS

I like the interview with Walter Stahel on your website ("The circular economy"). He said, "Reusing, repairing, re-manufacturing and re-marketing goods and components in an industrial context is where you get the biggest financial benefit." Check it out.

● **Nina Reed, website comment**

Photo: Deutsche Welle Global Ideas

Left: Medellín (Colombia's second city), recently awarded 'most innovative city in the world' by the Urban Land Institute and the *Wall Street Journal*.

Megacities

Interested to read your 'Business Matters' piece (*Making It* issue 13) on Medellín being awarded 'most innovative city in the world' by the Urban Land Institute and the *Wall Street Journal* – with its improved transportation and social equity promotion, Colombia's second city sounds like it has some inspiring municipal leaders.

And how the world's cities need them! I came across an astonishing article on the web recently which said that 200,000 people are added to the population of the world's cities and towns every single day! This is about five million a month or 60 million a year.

It also talked about 'megacities', those with a population of ten million plus. In 1950, there was only one – New York City (curiously one of the runners-up to Medellín in that award I mentioned!). In 2000, I think it said there were 15 of these huge conurbations and in 2015, there will be 20, mostly in the developing world. Half of these megacities, such as Tokyo, Dhaka, Mumbai, São Paulo, Delhi and Mexico City, will have more than 20 million residents.

This astonishing growth I understand to be because although for many the quality of urban life may be poor, the countryside is poorer still. Despite appalling conditions for many in our megacities (such as poor housing, high unemployment and minimal healthcare) the urban poor are 'better off' than their rural cousins and move to these cities.

In these circumstances, we need all the innovation we can get.

● **Wilhelmina Young, New York City, USA, by email**

A contradiction we have to solve

Great to read Arnold Schwarzenegger in your magazine (*Making It* issue 13) on financing sustainable low-carbon projects at sub-national levels in order to reduce greenhouse gas emissions and fight global warming.

These projects are urgently needed if industry is to respond to this problem – but can we "scale up in order to meet the UN sustainable energy for all targets", as Arnie says?

'Economic growth' is still the mantra of world leaders seeking to alleviate the problems of the world economy. But in order to sustain economic growth we must expend vast amounts of energy. Yet our main source of energy, fossil fuels, is also the main contributor to climate change. And climate change, if unchecked, will halt growth. It's a contradiction we have to solve. As Arnie put it, "humanity is facing inextricable challenges due to climate change."

Please can we have more analysis and discussion in *Making It* about this?

● **Martina Peter, by email**

No fracking

Very interesting debate in *Making It* issue 12 ("Fracking – yes or no?") on hydraulic fracturing to extract natural gas from the earth – better known as "fracking". But I thought the guy in favour of fracking (Nic Grealy) was irresponsibly dismissive of some of the arguments against.

For example, he suggests extra water usage in the process is "minimal". Yet fracking uses huge amounts of water. A single well may use over five million gallons over its lifetime. Some of the big fracking areas, like north Texas here in the US, are in semi-arid plains where the subterranean aquifer is the only water source. Though not the only cause, fracking contributes to the on-going drought that has plagued the American Midwest in recent years.

He also suggests all the water used can be recycled. But the fluids used in fracking are a combination of water, sand and chemicals. Energy corporations do not publicly report what chemicals they use (as Grealy seems to acknowledge, yet does not address properly). There are many instances where toxic wastewater has migrated back into the local aquifer, poisoning

For further discussion of the issues raised in *Making It*, please visit the magazine website at www.makingitmagazine.net and the social networking *Facebook* site. Readers are encouraged to surf on over to these sites to join in the online discussion and debate about industry for development.

well water for entire communities.

What wasn't mentioned was that every fracking injection creates a mini-earthquake. They often trigger local fault lines to cause more serious earthquakes. In north Texas there have been 24 since 2006, compared to just one in the previous 100 years. These quakes allow gas and toxic wastewater to escape from their shale strata, into aquifers or even escaping to the surface.

Health problems can result from fracking pollution. For example, the biologist Sandra Steingraber says, "There are reasons to suggest that air pollution and other stressors from drilling and fracking operations in the Barnett Shale area of Texas may be playing a role in the story of breast cancer."

● **Ray Evans, by email**

The real currency of life

Making It issue number 6 ("Agribusiness: from farm to fork") had a fascinating interview with the eco-activist Vandana Shiva in which, amongst other things, she talked about how to "feed the cities". In *The Guardian* newspaper, at the beginning of November 2013, she wrote about "anti-life economics" and how "limitless growth is the fantasy of economists, businesses and politicians." She especially questioned how we use the gross domestic product (GDP) to measure the wealth of nations. As she puts it, "...nature's amazing cycles of renewal of water and nutrients are defined as non-production. A living forest does not contribute to growth, but when trees are cut and sold as timber, we have growth." She argues "growth is based on creating poverty both for nature and local communities", and goes on to look at water extracted beyond natural capacity to create soft drinks; modified seeds which lead to debt for poor farmers; and the privatization of public systems leading to costlier services for people who find it difficult to heat their homes any longer.

For those of us working to develop industry to benefit the planet's ever-growing population, we need to listen to people like Vandana. As she says, Nobel prize-winning economists like Joseph Stiglitz and Amartya Sen have admitted that GDP does not "capture the human condition" and have urged the creation of different tools to gauge the well-being of nations. We need to create measures beyond GDP, and economics beyond the global supermarket, to rejuvenate real wealth. We need to remember that the real currency of life is life itself.

● **Lesley Allen, London, UK, by email**

China's rise has created an unprecedented demand for Latin American and Caribbean goods, particularly commodities, which has helped boost the region's growth. Ultimately, however, such export growth may prove unsustainable. Perhaps even worse, Chinese manufactured goods are more competitive than those from Latin America in both home and world markets. **Kevin Gallagher** considers how Latin America can preserve its prospects.

China in Latin America

Latin America was hardly on China's radar screen until the turn of the century, when the Asian giant's entry into the World Trade Organization allowed it to integrate more fully into the world economy. China's subsequent rise has created an unprecedented demand for Latin American and Caribbean (LAC) goods, particularly commodities, which has helped boost the region's growth for over a decade.

Boom times in China have been good for Latin America, whose exports to the Asian powerhouse increased nine times between 2000 and 2009 in real terms, far outpacing the region's overall export growth, which didn't even double over the same period. However, this windfall was not widely shared: a handful of products account for just over 80% of all regional exports to China, chiefly iron, soy, crude oil and copper.

China is increasingly investing in many of these same Latin American sectors. Hard statistics are difficult to come by, but Chinese firms have invested at least US$25bn in Latin America between 2005 and 2009.

Over the longer-run future, it is hard to predict whether China will be a sustained source of demand for Latin American commodities. Even if China's appetite for LAC resources remains undiminished, the consequences may still be mixed. Demand from China could accentuate Latin America's over-reliance on commodities exports and jeopardize the region's ability to diversify its export basket toward manufactures and modern services. It could also drive long-lasting social and environmental change with unknown effects.

KEVIN P. GALLAGHER is Associate Professor of International Relations at Boston University, USA, and is co-founder of the Triple Crisis blog www.triplecrisis.com. He is the author, together with Roberto Porzecanski, of *The Dragon in the Room: China and the Future of Latin American Industrialization.*

Economists also express concern that China's tug on the LAC export basket will infect the region with "Dutch disease," a common affliction among primary commodity-dependent countries. Over-dependence on commodities has been shown to lead to deindustrialization because the discovery of valuable natural resources and their subsequent export raise the value of a nation's currency, thus making its manufactured and agricultural goods, as well as its services, less competitive. This in turn eventually leads to increasing imports and decreasing exports, creating balance-of-payment problems and leading to poor economic performance.

In terms of competitiveness, it is fairly certain that China is outcompeting Latin America in world manufactures and services exports. In 1980, China was not even ranked in terms of global

A worker walks past by containers from China Shipping company at Brazil's main ocean port of Santos city, September, 2012.

Photo: Nacho Doce/Reuters

competitiveness, but by 2009, China's manufactures had become the most competitive in the world. Argentina, Brazil and Mexico are the only Latin American nations with significant world export share, and all three have struggled to maintain competitiveness.

These analyses should not be taken as the latest reason to blame China for another country's ills. China is not to blame. These trends are largely the result of policies put in place by Latin American countries. Many had adopted "shock therapy" or the "Washington Consensus." Governments rapidly liberalized trade and investment regimes and reduced the role of the state in economic affairs, often through privatizations that, in a number of cases, went painfully awry. China has taken a more gradual approach to integrating with world markets.

Rather than blaming China, Latin America can build on some of its own recent successes and learn from its Asian competitor in order to maximize the gains from its new economic relationship with China.

First, the additional revenue generated by exports to China and elsewhere can provide new sources of funds for stabilization and growth programmes. Chile and a handful of other Latin American nations have created stabilization funds that save some of the proceeds from commodities exports for periods when prices are low or ➤

➤ the nation needs macroeconomic stimulus. Chile's fund, which comes from copper exports, enabled that nation to put together an effective stimulus package in response to the financial crisis.

There is no reason why such funds need only be earmarked toward macroeconomic stabilization. Revenue from commodities exports could also be used to invest in environmental programmes to mitigate the negative effects of commodity-driven growth and, perhaps most importantly, in programmes to boost industrial competitiveness.

It is in terms of industrial competitiveness that Latin America can learn the most from China. That country's path to integration with world markets has been gradual and strategic, whereas most Latin American nations rapidly relinquished the role of the state in economic affairs. While China may not be an ideal model for development given its autocratic state, it certainly should be a motivator for nations with manufacturing capabilities to think hard about competitiveness and upgrading.

Even though Latin America and China began their reforms at roughly the same time, their motivations for reform were quite different. Whereas Latin American reform began around 1982 as a reaction to the collapse in oil prices, Chinese economic reforms began in 1978, two years after the death of MAO Zedong and the end of the Cultural Revolution, as the country began to cautiously reopen to the world. In that year, China embarked on a programme of economic reform aimed at strategic integration into the world economy by following a "dual track" policy. The policy consisted of liberalizing FDI and inflow of imported inputs to selected industries, while at the same time buttressing those sectors to the point of maturity and nurturing other sectors until they were ready to face competition with imports.

"Even though Latin America and China began their reforms at roughly the same time, their motivations for reform were quite different. Whereas Latin American reform began around 1982 as a reaction to the collapse in oil prices, Chinese economic reforms began in 1978, two years after the death of MAO Zedong and the end of the Cultural Revolution, as the country began to cautiously reopen to the world."

China's industrial strategy has been three-pronged. First, government policy has focused on creating endogenous productive capacity by targeting specific industries through state-owned enterprises (SOEs) or government support, paying increasing attention to science and technology policy and linking the SOEs with the private sector and research institutes. Secondly, and very importantly, Chinese support for domestic industry has always had an eye on foreign markets: China has gradually and strategically integrated into world markets in order to gain access to technology and finance. Thirdly, in undertaking economic reform, China's new leaders have taken an experimental approach, using the market and trade as a means to development. Hence, in the eyes of Chinese policy makers, the market and government policies should complement one another, while the weight of each should be allowed to change as the economy develops.

Such an approach stands in stark contrast to Latin America. The region experimented with industrial policy during its Import-Substituting Industrialization period (roughly 1940 to 1980). The approach was a modest success at best. The policy did help industrialize nations like Brazil, Mexico, Argentina and others in the region. Yet, with a few exceptions, the firms within those industries were extremely inefficient by global standards because there was too much focus on domestic markets. In addition, Latin American industrial policy was financed largely by debt, as opposed to export revenue and savings in the Chinese case. By the time LAC countries began their economic reforms in the early 1980s, dissatisfaction with the import substitution model had led to skepticism about any government intervention in the economy. There was an abrupt transition to free trade and market-based economies,

Mexico's President Enrique Pena Nieto shakes hands with China's President XI Jinping during a news conference at Los Pinos Presidential Palace in Mexico City, June 2013.

Photo: Edgard Garrido/Reuters

which were seen largely as ends in themselves: it was taken for granted that free markets would lead inevitably to enhanced learning through trade, the deepening of industrialization and growth.

Both import substitution and unfettered free markets have proved less than ideal paths for Latin American and Caribbean development. Chinese investment in Latin America could be an opportunity for LAC countries to undertake new development strategies. Increased export revenue could be used to invigorate and expand stabilization funds and provide the capital for an innovative approach to industrialization. There are some signs that this is taking place. As previously mentioned, Chile's stabilization fund allowed it to weather the global economic downturn. Brazil has also begun to take industrialization and modern services seriously again, particularly through its national development bank.

A business-as-usual approach, on the other hand, could be dangerous. Over-reliance on primary commodities could cause macroeconomic, employment and environmental problems in the longer term. What's more, China is already swiftly out-competing Latin America in world manufacturing markets. As China has shown, nations can conduct economic reforms to great benefit. Latin America should follow suit.

HOT TOPIC

Beyond corporate social responsibility

Richard Brubaker and **Mike J. Thompson** consider what doing 'good' business actually means in practice.

Big companies like Unilever, Wal-Mart, and Standard Chartered have ambitious plans to alter their conduct, recalibrating toward a business model that is "good". The slogan at Standard Chartered, for example, blends longevity with beneficence: 'Here for Good'. These plans will put them on a different trajectory than their peers. They see that 'business as usual', with its growing social, environmental and economic imbalances, has no future.

Yet, for all the corporate social responsibility (CSR) announcements, there have been few success stories that illustrate going beyond business as usual, or even going beyond traditional CSR practices.

RICHARD BRUBAKER is founder of Collective Responsibility, a Shanghai-based knowledge base, catalyst and facilitator, and Adjunct Professor of Sustainability, China Europe International Business School.

MIKE J. THOMPSON is co-founder of GLO – Good Leaders Online, a global leadership selection, assessment and development platform, and is visiting Professor of Management Practice, China Europe International Business School.

Ben & Jerry's, The Body Shop, Patagonia, Whole Foods Markets and Interface are often cited, but these firms were founded by leaders who had a different purpose in mind from day one. They have been characterized by their care for people and the environment, finding a balance between economic efficiency and the common good. But their molds were set before they grew into multibillion dollar firms.

Established multinational companies start from a different place and many CEOs argue that moving beyond business as usual is not realistic given investor constraints and prevailing management norms. Modest shifts beyond CSR compliance are all that is possible, they say. But corporations, like Unilever, Puma, IBM, GE and Danone, have challenged that paradigm by fusing innovation with sustainable and social enterprise, creating new sources of value across their business.

Recalibrating a firm towards sustainable practices is both challenging and risky for traditional forms of business management. Compliance becomes the default position with strategic tweaks for reputational benefits. But an increasing

number of business leaders are beginning to understand that compliance is a short-term strategy with long-term consequences. For example, Tim Cook of Apple eventually had to engage with the Fair Labor Association (FLA) to address environmental and labour concerns throughout Apple's supply chains in Asia.

In the wake of incidents in Bangladesh, including the appalling loss of more than 1,000 lives in the Rana Plaza factory collapse, textile brands have had to recalibrate rapidly. H&M was among 50 prominent international companies to

Cashier on the tills at Whole Foods Market in the US.

Photo: WFM

sign the Accord of Fire and Building Safety in Bangladesh in 2013. The accord covers wide-ranging employee safety conditions and includes a provision for legal enforcement, a new breakthrough from previous ineffective and voluntary codes of the past.

With brands thus tied to risk, buyers will be required to select vendors on the basis of multi-partner, legally-backed agreements such as the Bangladeshi Accord. We may even see the emergence of brand-based manufacturing plants in the future.

Vocal stakeholders demand more than compliance

Many of the more vocal stakeholders are no longer satisfied with compliance processes, and executives are seeking to integrate 'good' into their strategies so as to meet these expectations. Increasingly, it is the institutional investors that are required to report on environmental, social and governance criteria in their investment portfolios. For some, integrating sustainability into strategy has led in innovative directions. They are discovering a competitive edge that late adopters cannot easily replicate. Late adopters are more likely to fail to engage fresh customers and generate excitement in the marketplace.

CSR is a process whereby a firm becomes aware of these risks, engages them as an organization (leadership first), builds capacity for change (reduction of risk or positioning for opportunity), and then proceeds through various stages of strategic execution. It is not simply volunteering, nor is it philanthropy. It is developing a wide scope of understanding around the company's value.

This means that a proper CSR assessment must include:

- the risks and opportunities that exist within the workplace (such as environment, health and safety, employee wellness and diversity);
- the transparency and oversight of decisions, processes and individual actions (governance issues);
- environmental footprints (emissions, water usage, energy reduction);
- communities impacted by operations; and
- the attitudes and expectations of customers, as well as citizens.

There are three key areas of corporate responsibility that have consistently shown to be of critical importance to the viability of companies: environment, governance, and workplace.

1. Environment

While global discussion on the environment tends to focus on planetary warming and what to do about it, environmental issues for the average firm are still mostly local or internal. Water shortages, air pollution and other negative impacts are now significant business concerns. There are three main causes. First, the impacts of social, financial and environmental regulations ➤

HOT TOPIC

➤ and citizen campaigns. Second, the increased costs of doing business due to natural resource supply constraints. Third, economic pressures have forced attention toward resource usage, biodiversity impacts and environmental externalities. As environmental failures continue to grow in size and frequency, the firms that understand how these failures align with their value chain will ultimately mitigate the risks and maximize the opportunities.

2. Governance

One of the factors that is bringing greater transparency to company boards is greater scrutiny by institutional investors and fund managers of environmental, social and governance issues.

While the US Securities and Exchange Commission, the New York Stock Exchange, and state laws in the United States have complex and contradictory regulations which have led to charges of confusion and ineffectiveness, investment hubs in Asia, notably Singapore, Hong Kong and India, are stepping up their regulatory environments along different lines. All three have updated their governance codes within the past 18 months to ensure greater transparency in meeting the code. If companies do not meet the standards, then listed companies are required to explain why not. This so-called 'comply or explain' principle was first established in the United Kingdom code. It places firms under pressure from the market and the media to explain why governance standards are not being met, rather than clogging up courts with legal teams arguing about differing interpretations of legal rules.

The international growth in legal and regulatory requirements for open governance requires a new breed of managers. This affects recruitment and talent management. Financial services companies are already embracing full-blown ethical background checks on employee candidates. In time, such checks will become best practice for firms wishing to attract quality investors.

3. Workplace

In South-east Asia, one of the greatest economic and social changes is the rise of employment standards. Illicit and exploitative conditions for workers are declining across the region as wages and conditions improve. Progress is also being made in environmental health and safety, and independent monitoring and reporting is being enforced by companies and governments. To maintain competitiveness in the labour market, many firms are now moving from ad hoc labour arrangements to firmer employment contracts which offer a career path and consideration for personal development and for work-life balance.

Laggard firms, on the other hand, are finding it difficult to attract workers and are under pressure by local governments and communities to clean up or close down.

Six steps to a higher purpose

The starting point is a genuine belief that business can do good in the world, and profitably. This requires what John Mackey, founder of Whole Foods Market, calls conscious leadership. Conscious leaders are motivated primarily by service to the firm's higher purpose and creating value for all stakeholders. They reject a zero-sum, trade-off oriented view of business and look for creative, synergistic 'win approaches' that deliver multiple kinds of value simultaneously.

A vision for a higher purpose needs to be rooted in the particularities and culture of the company. Such a purpose goes beyond CSR awards or positive media coverage. So what does doing 'good' business actually mean in practice? We suggest the following six actions:

1. Rethink

Explore and analyze your value chain to identify areas of risk, opportunity, and action. For many firms, this is a critical first step that provides the data needed to identify and understand where the firm is misaligned with best practice options for sustainability, and aligned with market opportunities and internal capacity. Rather than accept a boilerplate definition, determine what sustainability means for your own company, in your own terms, as a guideline for all you do.

2. Re-vision

Be committed to a crystal clear vision and purpose. In the cases of Interface, Unilever, Whole Foods Markets and many others, this vision came from the CEO or founder who personally drove it forward. For Ray Anderson, founder of Interface, the process was ongoing for 20 years. Before his passing, Anderson had built the capacity within Interface's ranks to maintain their path toward achieving their 2020 goals of zero waste and zero virgin material usage.

3. Restructure

Create a blueprint for applying the new vision. In the case of Interface, this required a review of their processes to see where efficiencies could be found. This led to redesigning products so that processes could be eliminated and material usage and waste could be reduced. In turn, this led to a restructuring of equipment specifications, buying practices, and positively engaging employees, suppliers and customers in the journey.

Paul Polman, Unilever's chief executive officer.

Photo: Unilever

4. Realign

Strategy needs to be aligned with stakeholder needs, interests, and capacities. Review your investments with an eye toward long-term engagement. Short-term CSR exercises should be reviewed and energies should be devoted a program that is aligned with the firm's vision and purpose. Internal energy should be committed to engaging employees and capturing their interest so that everyone owns the agenda behind the vision.

5. Recalibrate

Conduct a series of pilot projects that are meant to test, tweak and prepare for a systemic recalibration over time. Interface is 20 years into their process. Wal-Mart and Unilever are both five years into theirs. Failures will occur, but firms that operate with sustainable principles, that make investments in energy, water and carbon reduction, tend to see positive paybacks over time. Interface, for example, has reportedly reaped more than US$450m in savings in the last ten years from executing on Anderson's 'Mount Sustainability' vision.

Eccles, Ioannou and Serafei, experts in integrated reporting at Harvard Business School, have provided evidence that 'High Sustainability' companies significantly outperform their counterparts over the long term. They say that firms perform better on return on equity (ROE) and return on assets (ROA) and that this outperformance is more pronounced for firms that sell products to individuals (i.e., business to customer [B2C] companies), compete on the basis of brand and reputation, and make substantial use of natural resources.

6. Remain committed

For firms in the manufacturing space, and who spend capital on equipment, the commitment is embedded the moment the asset is brought online and the process is changed. Any activity that involves the ongoing engagement, training, and measurement of people requires more intensive and challenging processes that can be supported by the culture of a firm as it aligns to the redefined mission. This is especially difficult for CEOs of publicly listed firms who are required to be more sensitive to the short-term demands and expectations of investors. One way of dealing with this pressure is to follow Paul Polman's example in announcing that Unilever only wants to attract longer-term investors and not short termers such as hedge funds. For others the strategy can be to indicate short-term wins along the way such as reduced energy and water costs.

What you want are "trustomers"

Building a 'good' business demands the wholehearted adoption of ethical and sustainable business behaviours.
Who wants to deal with a dishonest or inconsistent firm? Going beyond a basic CSR agenda to a higher purpose for your business builds trust.

Envero, a European brand consultancy, has examined the relationship between corporate behaviour, customer trust, and customer advocacy with more than 30,000 adults, across 17 European countries and 14 industry sectors. They found in their studies one consistent customer truth across all industries: People recommend companies and brands that they trust to be honest with them and that care about their well-being as customers. Customers decide which companies and brands are trustworthy based on what they see of their corporate behaviour.

Doing 'good' business is a challenging path. But the investment will have positive returns through better products, more productive employees, a better alignment of brand and consumer needs and a legacy of trust.

● Originally published by Policy Innovations
http://www.policyinnovations.org

Nearly a third of the world's economic output will come from countries facing "high" to "extreme" risks from the impacts of climate change within 12 years, according to the *Climate Change Vulnerability Index*, an annual report produced by UK-based risk analysis firm, Maplecroft. The index ranks the vulnerability of the world's countries to the impacts of climate change by evaluating their risk of exposure to extreme climate events, the sensitivity of their populations to that exposure and the adaptive capacity of governments to respond to the challenge.

According to the report, the combined GDP of the 67 countries classed as facing "high" or "extreme" risks is projected to nearly triple from US$15trn to US$44trn by 2025 – meaning nearly a third of the global economy would be coming under increasing threat from extreme climate-related events.

Countries in South and South-east Asia, which accounted for one-third of all "extreme" risk nations, were likely to face an increased risk of severe flooding due to projected changes in seasonal rainfall. These would also increase the likelihood of summer droughts and, in turn,

BUSINESS MATTERS

Committed to business with integrity

Liberty and Justice is Africa's first fair-trade-certified apparel manufacturer, making tops and bottoms for brands like Prana, FEED Projects, Haggar and other large buyers in the United States. The company not only employs hundreds of women, but focuses on an age group that usually gets ignored in the garment industry – women who are over 30.

The workers at Liberty and Justice's factories in Liberia and Ghana are 90% female, and on average are paid 20% higher wages than their peers. "We really try to be worker-focused," CEO, Chid Liberty, told *Fast Company*, "and we actually think that's what gave us a cutting edge at the end of the day: having really devoted workers. People don't really believe in these types of factories in Africa, because they believe that African workers aren't motivated. I think that's hogwash."

Photo: Liberty and Justice

Women workers at a Liberty and Justice factory.

Soon after the first factory opened in 2009, the company hired a consultant who informed Chid Liberty that he had done "pretty much everything" wrong, including hiring an initial workforce of women in their 30s, 40s, and 50s. "For the typical garment factory," Liberty says, "the average age is probably 23. I just assumed any able-bodied person could sew."

Rather than replacing the women, Liberty decided to bite the bullet and really invest in the workforce he had in place, a risk that has led to competitive productivity levels, as well as an inspiring workplace vibe.

"These older women really set the culture of the Liberian Women's Sewing Project, our first factory," Liberty recalls. "They come to work an hour early – we never asked them to do that – they pray and sing

declining crop yields. The most susceptible populations in these areas were in areas with high levels of poverty, and where large populations had clustered on marginal land such as flood plains or coastal regions in cyclone-prone areas.

■ Renewable energy now provides one-fifth of the world's electricity and has added about half of the world's new generating capacity each year since 2008. Excluding big hydro dams, renewables got US$250bn in private investment in 2011 alone, adding 84GW, according to Bloomberg New Energy Finance and ren21.net. The results were similar in 2012.

Asia's energy revolution is gathering speed. China is the world's #1 energy user and carbon emitter, accounting for 55% of world energy-consumption growth during 2000–2011. Yet China now also leads the world in five renewable technologies (wind, photovoltaics, small hydro, solar water heaters and biogas) and aims to lead in all. Its solar and wind power industries have grown explosively: wind power doubled in each of five successive years. In 2012, China installed more than a third of the world's new wind capacity and should beat 2015's official 100GW wind power target by more than a year.

India's power generation is still mainly coal-fired, but India's coal is only abundant, not cheap. As in China, vibrant private-sector entrepreneurship in renewables should be capable of far outpacing the state-owned industries that dominate coal and nuclear power. India, the world's #3 wind power market, has already installed nearly four times more wind than nuclear capacity. Solar power too added 1GW in 2012 and is taking off briskly. (Rocky Mountain Institute)

together before they get on the machines, they're very serious about the details of how your uniform should look, and you just wouldn't have got that out of a bunch of 19-year-old girls the first time. So, that's a mistake that turned out pretty well."

In 2012, Liberty and Justice expanded into Ghana, launching the Ghanaian Women's Sewing Project by taking over an existing garment factory there. "Ghana in 2011 was the fastest growing economy in the world," he says. "Great business environment. Amazing infrastructure for West Africa. Very favourable business conditions. If you're not investing in Ghana, you're kind of a weirdo."

Liberty and Justice is now adding 45 employees per month to its Ghanaian factory, with the goal of reaching 700 employees by 2014. The goal in Liberia, where they've recently moved to a bigger building, is 500.

● Source: *Fast Company*, fastcoexist.com

Twelve potentially economically disruptive technologies

The noise about the next big thing can make it difficult to identify which technologies truly matter. The McKinsey Global Institute has attempted to sort through the many claims in order to identify the technologies that have the greatest potential to drive substantial economic impact and disruption by 2025. The technologies identified below have potential to affect billions of consumers, hundreds of millions of workers and trillions of dollars of economic activity across industries.

Mobile Internet Increasingly inexpensive and capable mobile computing devices and Internet connectivity

Automation of knowledge work Intelligent software systems that can perform knowledge work tasks involving unstructured commands and subtle judgments

The Internet of Things Networks of low-cost sensors and actuators for data collection, monitoring, decision-making and process optimization

Cloud technology Use of computer hardware and software resources delivered over a network or the Internet, often as a service

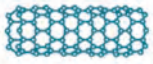
Advanced robotics Increasingly capable robots with enhanced senses, dexterity and intelligence used to automate tasks or augment humans

Autonomous and near-autonomous vehicles Vehicles that can navigate and operate with reduced or no human intervention

Next-generation genomics Fast, low-cost gene sequencing, advanced big data analytics, and synthetic biology ("writing" DNA)

Energy storage Devices or systems that store energy for later use, including batteries

3D printing Additive manufacturing techniques to create objects by printing layers of material based on digital models



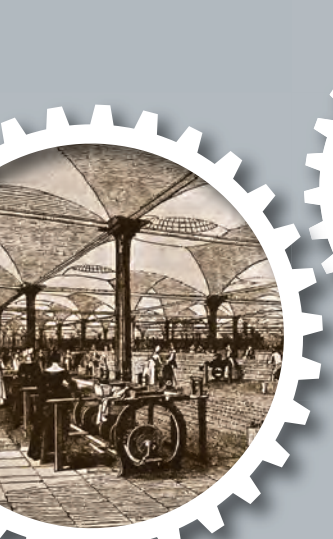
Advanced materials Materials designed to have superior characteristics (e.g., strength, weight, conductivity) or functionality

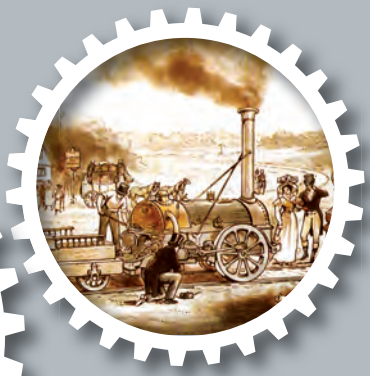
Advanced oil and gas exploration and recovery Exploration and recovery techniques that make extraction of unconventional oil and gas economical

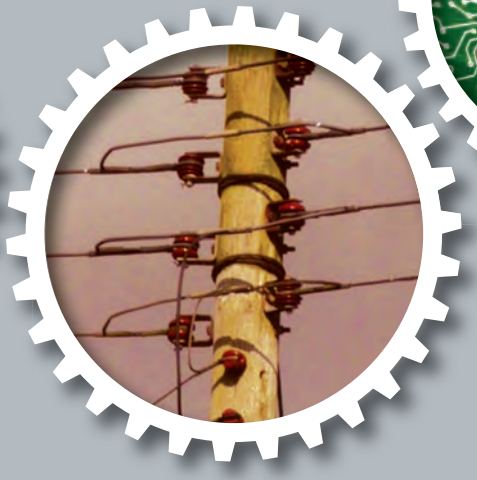
Renewable energy Generation of electricity from renewable sources with reduced harmful climate impact

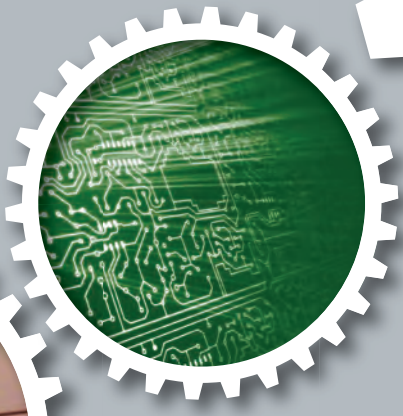
Source: *Disruptive technologies: Advances that will transform life, business, and the global economy* – McKinsey Global Institute

Peter Marsh is the former manufacturing editor of the *Financial Times* and author of *The New Industrial Revolution: Consumers, Globalization and the End of Mass Production.* Here he takes a look at the imminent manufacturing transformation.









THE NEW INDUSTRIAL REVOLUTION

The world stands on the brink of a new industrial age, which will create many opportunities in manufacturing for those with the talent and imagination to capitalize on them. The changes will have a deep impact around the world.

The effects will be apparent in the rich, established industrial countries – centred on Western Europe, North America and Japan. However, the impact of the new industrial revolution will go much beyond the developed world. For those "developing" economies that in recent years have been starting to "catch up" with the lifestyles and standards of living seen in the well-off, Western nations, the period of change could well accelerate the advances. There will be opportunities to capitalize on a spectrum of ideas and new developments that promise to build on the platform for economic expansion that – in many less developed nations – is already in place. In such so-called "emerging economies" – led by nations such as Brazil, China and India – manufacturing has played a key role in the past 15-20 years in delivering a sizeable economic boost. The new industrial revolution will give such nations a new platform for further economic development. In some cases, the latest period of change could enable certain regions of the world – such as much of Africa and parts of South America, the Middle East and East Asia – to develop a new form of manufacturing that could trigger a period of valuable economic growth.

In examining the latest period of change, some historical context is required. The new industrial revolution is the fifth key epoch where manufacturing capabilities have experienced a sizeable shift. The first such change was the first industrial revolution that ushered in the new era of manufacturing from the late 18th century onwards, with the start of this process taking place in Britain.

The first industrial revolution – with its impact speeding up during the 19th century – was why Britain took over as the biggest country in terms of factory production just before 1850. Britain's position as number one in manufacturing lasted only for about 50 years. By around 1895, the United States had usurped Britain as the leading country by this measure. It held this position until 2011, when China took over.

The second revolution was the transport and communications revolution. It occurred from about 1850. It took shape around improvements in ship construction; the emergence of railways (driven originally by steam power); and the invention of electrical telegraphy.

The third revolution was a broad set of changes based around new scientific thinking. Key disciplines were mathematics, chemistry and physics. The shift had its impact from 1890 onwards when, for the first time, electricity was made available on a 'made to order' basis. This new form of power was capable of driving a range of disparate industrial processes. Linked to this were changes in production technologies, leading to (among others) cheap and plentiful steel and a broad spectrum of new chemicals, among them drugs, dyestuffs and industrial commodities such as sulphuric acid.

The fourth industrial revolution had its impact well into the 20th century. Taking shape from around 1950, and with its effects gathering momentum for 30-40 years after this, the fourth revolution was about computers and electronics. It made possible the personal computer, high-speed data routers and the internet.

The impact of the first four revolutions was largely confined to the rich countries, as they are currently defined. It was why these countries – which were the first to gain from the fruits of modern industrial development starting from around 1800 – not only leapt ahead in the early years of this era but stayed ahead. The period in which these countries remained in the lead lasted until around 1990.

It was only after this that the changes ushered in by all the four periods of industrial shift built up sufficient momentum for their impact to be felt by countries outside the main developed bloc. This is how – over the past 15-20 years – the leading emerging nations, led by China, started to become important industrial players for the first time in about 150 years.

This first industrial revolution was – without doubt – the most important of the five. But of the four to have occurred since the latest one – the fifth – will be the one that will have the most impact. There is no single theme behind the new industrial revolution. It is being driven by nine main factors.

The nine elements powering the latest change are:

- an explosion in the development of new technologies in fields from electronics to new materials, many of which can now be applied

in combination much more effectively than before;

- a greater facility in product customization and 'personalization';
- a rise in the importance of manufacturing sectors covering narrow area of products and services – the so-called "niche" industries;
- greater use of global networking – the coming together of supply chains for goods and information pathways for ideas;
- the enhanced importance of 'clusters', or concentrations of businesses, located in specific localities, which can interact together effectively, while often also being linked to collaborators around the world via global networking;
- the greater participation in the world's manufacturing operations of emerging economies, such as China and India;
- the bigger influence of environmental factors in determining the operations of manufacturers, whether these concern the types of products they make, or the processes they use to create them;
- the larger use of services to help support manufacturers' core activity in making products; and, finally,
- a bigger role for 'maverick manufacturers' – people with unorthodox ideas who are not afraid to go against the norm but who often need at least some support from others to achieve their aims.

Most of these themes are, in themselves, not new. But the degree of success by manufacturers in applying them – often in combination – will separate out the winners from the losers as the new industrial revolution gathers pace. By making use of some, if not all, of these nine factors, a range of industrial companies based in high-cost nations will find they emerge, over the next 10-20 years, in a stronger condition.

Businesses in a good position to exploit these ideas include big and small groups, well-known names as well as companies barely known outside their own industrial sectors. They include:

- Luxottica, a Milan-based group that is the world's biggest maker of spectacle frames and produces its items in a highly diverse and high-tech set of processes carried out in production bases in Italy, China and the US;
- Trumpf, a German business that is the world's biggest maker of laser-cutting machines for metals, and whose competitive advantages are combining technological advances with the ability to connect up with thousands of customers globally;
- ABB, a Swiss-Swedish engineering giant that makes new forms of automation plus electricity distribution hardware; and
- Whitford, a US maker of fluoro-polymer coatings for an immense array of applications, from oil platforms to the food industry.

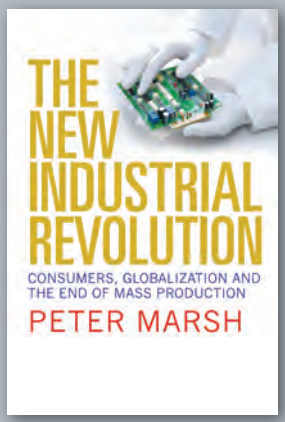
Companies from the so-called developing world which look as if they will likewise do well from the new period of change include

- BOE Techonology Group, a fast-expanding Chinese company that is a world leader in flat-screen electronic displays;
- Natura, a Brazilian pioneer in cosmetics and health products;
- Medical Diagnostech, a South African producer of medical diagnostic kits; and
- Tata Motors, the Indian multinational automotive manufacturing company.

What will be important for business people and policymakers will be first to understand the nature of the new industrial revolution, and to spot the themes behind it. The second key step will be to put in place policies and ideas that will help entrepreneurs to make the most of the changes. Among the most important policies will be those that:

- encourage efforts to inculcate an interest in combining new technologies in a sophisticated way;
- develop new ideas about making the most of existing and emerging business clusters; and
- help enterprises to fit in with global supply chains and information networks so that businesses in one corner of the world can link up effectively with those elsewhere.

The companies and countries that do all these things most effectively will have a greater chance than the others to emerge from the changes of the next 20 years as potential global winners whatever other challenges the 21st century brings.



***The New Industrial Revolution: Consumers, Globalization and the End of Mass Production* by Peter Marsh was published in June 2012 by Yale University Press.**

Busting the myths

Carlos Lopes on the importance of industrialization for Africa's development

Africa's need to aggressively pursue the industrialization path has become more compelling in light of the need to sustain current growth standards. With carefully developed backward and forward linkages, industrialization has the potential to diversify economies and reduce exposure to external shocks. At the United Nations Economic Commission for Africa (ECA), we are working the case for industrialization and we do not apologize for that. We are convinced that, if properly done, it opens doors to address most of Africa's many challenges. It has the potential to reduce poverty, deal with the inequality provoked by the rent-seeking practices persisting in many countries, and it can allow leapfrogging into a green economy model. Several myths are bandied around about why Africa's industrialization has been stunted. Let me address a few fallacies that continue to plague Africa's industrialization drive.

MYTH 1: industrialization is a fashionable development word that will soon be forgotten

There continue to be strategic and policy changes in the posture taken by African states regarding development strategies. We remember buzzwords like 'structural adjustment', 'trickle-down effect' and 'poverty reduction strategies' that influenced national policy direction. Although industrialization has always been in development literature, this is the first time it is likely to take centre stage. The call for industrialization is now linked to a structural transformation of the state. The Plan of Action for the Accelerated Industrial Development of Africa (AIDA), supported by the African Union, ECA, the African Development Bank and the New Partnership for Africa's Development (NEPAD), demonstrates how the link between industrialization and structural transformation is being taken seriously.

AIDA is based on four pillars – using Africa's own natural resource endowment as a basis for industrial transformation; developing an infrastructural system including energy and transportation; increasing research and development and the adaptation of technology and promoting private sector development especially the role of small and medium scale enterprises. It is hoped that these enablers will lead to the structural transformation of the continent's economies. In the 1970s, the Republic of Korea had neither the skill, nor raw material for developing a world-class shipbuilding industry but decided to follow this path based on a well-developed policy. Today, the Republic of Korea is one of the three largest shipbuilding nations. We need to think about examples like this. Although we need African solutions and priorities, we can learn from such successes.

MYTH 2: industrialization is all we need to develop

African countries must begin to see industrialization as a tool for the social and economic transformation of their societies, with structural transformation as the end result. Deng Xiaoping's transformation of China's economy is an example of the need to address industrialization as part of a wider integrated and intergenerational process of development. In this regard, I define structural transformation as a significant change in the sectoral composition of GDP with the share of the primary sector in employment and output shifting to industry and modern services. Structural transformation can be realized by giving attention to key developmental elements, one of which is industrialization. We have to still deal with a demographic challenge and transform it into a dividend, not to mention the social cohesion that should result from reducing inequality, embracing diversity and increasing human security and inclusive governance.

CARLOS LOPES was appointed by Secretary-General Ban Ki-moon as Executive Secretary of the United Nations Economic Commission for Africa, in September 2012. He previously served as Executive Director of the United Nations Institute for Training and Research, and as the United Nations Development Programme Resident Representative in Brazil. He joined the UNDP in 1988, following service in the public sector of his native Guinea-Bissau.

MYTH 3: African countries have tried industrialization before and it failed, so why now?

In the 1960s, newly independent Africa emulated other regions of the world in undertaking import-substituting industrialization. This led to some remarkable progress but was ultimately stymied by the limits of the model and global political economy. This is why, today, Africa should be mindful of a very different global context. Africa needs alternate models that play to its strengths and satisfy the need for transformation. Brazil's Bolsa Familia programme, which took 30 million Brazilians out of poverty, was designed to achieve economic growth with social equality. With up to 90% of Africans still heavily reliant on the agricultural sector, commodity-based industrialization speaks to our strength. Commodity-based industrialization also offers immediate scope for value addition and plenty of opportunity for exploiting consequential linkages. Botswana's decision to add value to rough diamonds before exporting them ensured an extra US$6bn in diamond sales are now going through the country's financial centres. This created new jobs for its youth, whilst boosting the infrastructure and tourism sectors.

MYTH 4: It is too late for Africa to industrialize without polluting the environment

The world has changed since the time of the Industrial Revolution. Coming late to the club gives Africa the opportunity to industrialize differently. It is not about privileging export-oriented or import-substitution models. The new industrialization model must be closer to the commodities' production centres, look at the leapfrogging technological potential and have the African growth market in mind. It should ensure strong forward and backward linkages and of course, understand the sophisticated global value chains.

MYTH 5: Africa's current economic growth will lead to job creation

Based on demographic growth projections, Africa will need to create up to 10 million formal jobs annually as more young people enter the job sector. Current economic growth models do not create enough modern jobs.

Illustration: istock/Tashatuvango

In fact, the fastest growing African economies also have the highest levels of youth unemployment. Although growth is robust in many countries, it is propelled by internal consumption that does not benefit all. To reverse this trend, proper planning should focus on modernizing the economies through more manufacturing production taken from other parts of the world where unit values are increasing fast and start by positioning Africa in relation to its natural resources and potential renewable energy assets. These, combined with a younger, more educated, urbanized and connected workforce, make Africa quite unique.

MYTH 6: investors are not attracted to 'risky' Africa

Intra-African investment has, since 2007, been growing at a 32.5% compound rate, with South Africa leading with US$18bn invested across several sectors, followed closely by Morocco and Nigeria. In 2011, the rate of return on inward foreign direct investment (FDI) in Africa (9.3%) was the highest compared to other regions of the world (8.8% in Asia and 4.8% in the developed economies). This is important because it means Africans are not just asserting themselves in a political narrative. They are also investing more in their own continent. Fortunately, others are following. FDI will reach US$50bn this year, an all-time high. More people now realize Africa is not as risky an investment decision as it may appear. In fact, it has the best return on investment. Africa needs to better brand and market itself.

In conclusion, if the news on growth is good, Africa wants and needs more to be able to deal with the challenge of having to industrialize and grow when its population and cities are growing quicker than any previous historical experience. It is high time we turn the story of the 'no hope' to 'rising' continent into meaningful change and prove the sceptics wrong.

"To achieve inclusive and sustainable industrial development, all of UNIDO's tools will be used"

Interview with LI Yong, new Director General of the United Nations Industrial Development Organization (UNIDO)

Since taking office in June this year, you have travelled to all the regions of the world to meet with representatives of member states and leaders of industry. One of the things that you have stressed in these meetings is your vision of 'inclusive and sustainable industrial development'. Could you explain what that is?

When I went to the United Nations General Assembly debate in September 2013, I listened carefully to the leaders' statements about the three dimensions of sustainable development – economic, social and environmental – and the call for a comprehensive list of Sustainable Development Goals. I was impressed that there is a global agreement that our societies and economies must find a path of sustainable development if we want to tackle the challenges of our times. How else can we meet the growing challenges of job creation particularly amongst our youth; advance gender equality and women's empowerment; address social issues, like education and health; *and* find solutions to all the looming environmental issues on our planet?

How can we possibly achieve all these development goals? For UNIDO, poverty eradication is all-important. This is the crucial and urgent task, and all member states have agreed that it can only be achieved through strong, inclusive, and sustainable economic growth, and the effective integration of the economic, ➤

Photos: Eva Manasieva/UNIDO

"The benefits produced or generated by this process of

➤ social and environmental dimensions of sustainable development. UNIDO wants to put the emphasis on industrialization because industry is the effective driver of economic and social development, and thus the basis for achieving all the other goals. We believe that industry is a primary creator of jobs and the motor for growth and prosperity worldwide.

The international community is working very hard to achieve a new set of strategic development goals for the coming decades, and UNIDO's work, our goal, our mandate, should be in line with international efforts. UNIDO will focus on supporting *inclusive and sustainable industrial development.*

I take "inclusive" to mean that all countries, all peoples, the private sector, civil society organizations, multinational development institutions, and all parts of the UN system, are all partners with UNIDO in promoting industrial development to achieve the eradication of poverty. There should be equal opportunity for all peoples to create industries, to create manufacturing activities. All countries should have this kind of opportunity, and the benefits produced or generated by this process of industrial development should create shared prosperity. The UN slogan which I support very much is 'Leave no one behind', and that is relevant to us, to UNIDO, when we promote industrial development. By participation and sharing, no one will be left behind.

As for the meaning of "sustainable" in this context, we are clear that industry generates the wealth needed

industrial development should create shared prosperity"

to address critical social and humanitarian needs. At the same time, however, it is also clear that this growth must urgently be decoupled from increased raw material use and negative environmental impacts. As a key driver of this growth, industry must play its part by becoming significantly cleaner and vastly more energy- and resource-efficient, to guarantee the health, prosperity and security of our peoples. In short, when we promote industrial development and manufacturing activities, we should try to incorporate the environmentally sound production methodologies available to us, such as energy efficiency, clean production technologies, reduced emissions and more effective use of resources.

Can you explain the relevance of partnerships as a way to create the enabling environment for this inclusive and sustainable industrial development?

To achieve inclusive and sustainable industrial development for our member states, all of UNIDO's tools in its own tool-box will be used. In addition, we need to develop stronger partnerships to make our development impact even bigger. This means further expanding the strategic partnerships that we have now with our member states, with the UN family members, and also with private sector companies, with whom we are developing the Green Industry Platform and many other important programmes.

These kinds of partnership should be expanded, because industrialization is not about building one or two factories, or just one or two assembly-lines. Industrialization is a holistic movement that helps countries to rise from a lower level of development to a higher level. This is a set of processes that is beyond the capacity of any single institution to support fully, and requires strong partnerships with all related stakeholders, including bilateral and multilateral development agencies, international financial institutions, the private sector, academia and civil society.

You have stressed the importance, the centrality of industrial development. Is this a message that resonates with the stakeholders that you have been meeting?

I have recently travelled to Africa, to the African Union headquarters in Ethiopia and to South Africa. Leaders of the African Union told me that industrialization is high on the agenda for Africa in the next 50 years. That is important news. They told me two things. One is that they do not want to depend indefinitely on official development assistance. Second, they want to use their natural resources more effectively. Only through diversifying their economies and transforming towards manufacturing, adding value to their natural resources, can they create jobs, create wealth and raise the living standards of their people. For more than ten years, some of the countries in Africa have achieved relatively high growth rates. For example, last year Ethiopia's growth rate was 9.7%, almost the fastest growth rate in the world. That group of countries is moving up.

At the moment, two-thirds of the Least Developed Countries are located in Africa, mainly dependent on agriculture. They can go one step further and we can help them to develop, to create higher value added, more output, and then on to manufacturing, food-processing, food-packaging, leather-processing, wood-processing, furniture making, all these kinds of manufacturing and industrial development. These countries will develop. This is their leaders' vision, not one only promoted by UNIDO. I was so glad to hear that and very happy that UNIDO has been invited to participate in this process.

The financial crisis taught us many lessons. One of them is that we should re-focus on the development of the "real sector". This is not a developing countries' concept, nor a middle-income countries' concept. This is accepted by many countries. I am very happy to see that many advanced countries are re-focusing on industrialization. They are promoting some new policies, supporting manufacturing, employment, small and medium-sized enterprises and exports. When I went to the European Union, I was pleased ➤

"The common goal remains: achieving inclusive and

➤ when they told me that industrialization is also a priority for them, just as the African leaders have told me before.

Why do countries now all accept that industry is crucial? Look at history. In the two or three hundred years since the start of the industrial revolution, a large number of countries have transformed themselves from agriculture-based economies to industrialized ones. And then, in the 20th century, countries like Japan and the Republic of Korea moved very fast after the Second World War, and have now become members of the Organization for Economic Cooperation and Development. One of the most useful policy tools in this context was manufacturing. What created the 'miracle' of the South-East Asian countries? Manufacturing, industrial development. Those 'tigers' and 'dragons' moved quickly up to the middle- and high-income country level. China learnt from them in the 1980s, and we opened up a very, very poor country with a big population to the world. You can't imagine that in 1978 GDP per capita at current prices was US$228, and now, after more than 30 years of opening-up reforms, last year GDP per capita was over US$6,000. What was the driving force? Agriculture? No. We transformed from an agricultural-based to a more industrialized country in 30 years.

Regarding the concept of inclusive and sustainable industrial development, some might say that this is a contradiction, that industrial development requires resources, which are becoming scarcer, and produces waste, which is becoming a bigger threat to the future of the planet. How would you respond to this?

This is a very good question and an important challenge. UNIDO is promoting inclusive and sustainable industrial development to try and overcome the negative impacts of industrialization. When we are manufacturing products to use and to trade, and for growth, we need to consume raw materials. We need to use energy, water, electricity, oil etc, and we create some pollution – damaging forests and arable land. The international community is working very hard to avoid such negative effects, to reduce them and to eliminate them. But it is, and will remain, a learning process.

Look at the Western countries; for instance, London in the United Kingdom. When I was young, I learnt that it was the smoky city, the city of smog, but now it's so clean. They could do it. It proves we can do it. They learnt a lesson, and now you don't see these kinds of things happening, yet industry is still there, flourishing. Many countries are developing their industry on a very big scale but now they can still keep a clean environment.

Do you think that improvements in resource efficiency and energy efficiency, and the scaled up use of clean energy can offset the impact of the growth in the world's population?

Industrial development is an inevitable process. For any country to move up from low levels of development – and high levels of poverty – to an advanced level of development, they need industrial development. Many countries that have already advanced still have clean air. What makes this possible? The answer is technology. We don't only have one choice, industry or pollution. We can move ahead with an effort to reach truly sustainable growth. For achieving this, South-South cooperation will be an important complement to the huge scaling up of investments required for infrastructure and industrial growth. We therefore must create the necessary enabling policies and institutional environment to allow for more South-South knowledge exchange so that we can all learn from each other's experiences and create more opportunities for investment, joint ventures and trade.

The challenge is to move towards sustainable production and consumption patterns, while still enjoying the benefits of economic growth and without exacerbating social tensions. Policies and technical programmes are needed to realize the idea and concept of sustainability across all its dimensions. To achieve these goals, UNIDO focuses on

LI YONG has had an extensive career as a senior economic and financial policymaker. As Vice-Minister of Finance of the People's Republic of China and member of the Monetary Policy Committee of the Central Bank for a decade, LI was involved in setting and harmonizing fiscal, monetary and industrial policies, and in supporting sound economic growth in China. He accorded great importance to fiscal and financial measures in favour of agricultural development and small and medium-sized enterprises, the cornerstones for creating economic opportunities, reducing poverty and promoting gender equality.

sustainable industrial development"

implementing programmes and providing policy advice to support the building of industrial capacities and qualitatively improving industrial capacities. The thematic focus may vary from creating opportunities in agribusiness, to building quality and standards infrastructure, to supporting the creation of industries delivering environmental goods, depending upon the specific requirements of the countries concerned. But the common goal remains the same: achieving inclusive and sustainable industrial development.

To sum up, all countries have realized that industrial development is a necessity for achieving durable and resilient economic growth, but if industry is to be sustainable in the long run, it must undergo a rapid transition. In short, it must quickly adopt a business model that enables it to produce more of the goods and services needed by an expanding world population, while using ever fewer resources and producing ever less waste and pollution. Nobody should be left behind in this process. We must make sure that this industrial growth is inclusive and prosperity is shared. UNIDO wants to lead in forging partnerships, where governments, the private sector and other actors work together to create the enabling environment needed for this transformative change towards this goal of inclusive and sustainable industrial development. If we all work together on this, I believe that we will be able to eradicate poverty relatively quickly. ■

'Bottom-up' development in

Milford Bateman suggests that new forms of industrial policy are (re)emerging, including at the local level, and are beginning to transform the continent's industrial structure in a positive direction

Latin America is undergoing something of an industrial policy revolution of late. Having ditched its destructive neoliberal policies from 2000 onwards, and then having seen the supposed efficient-market foundations of the entire neoliberal model effectively blown apart by the global financial crash of 2008, it was inevitable that a major policy change was in order. Yet, today, the speed with which a new industrial policy movement is taking place has surprised many observers. These new policies are being informed both by important prior experience in Latin America, principally the import substitution industrialization (ISI) policy period (1950-1980), as well as by significant 'best practices' from elsewhere, notably from China, Italy, the Republic of Korea, Scandinavia and especially from Latin America's own star performer, Brazil.

Perhaps the most interesting aspect of the rebirth of industrial policy in Latin America, however, is that there is a very definite focus on the specifically *local* aspects of industrial policy formulation and implementation. This specific focus arises for two reasons. First, many governments in Latin America have deliberately chosen to decentralize many of their activities and operations. Local services provision is not only more cost-effective. It also serves to promote greater accountability and transparency in governance. Decentralization has also been seen as a way of more directly involving ethnic and social groups long marginalized under authoritarian rule.

Second, there is also the growing acceptance that the continent's *de facto* local economic policy model for many years – microfinance – has been a disaster. The vast microfinance industry has absorbed scarce financial flows which were then overwhelmingly recycled into millions of the very simplest forms of informal 'no-growth' retail and street trade, handicrafts and petty services. At the same time, growth-oriented small and medium-sized enterprises (SMEs) were increasingly 'crowded out' of the market for financial support, while also struggling to compete against rafts of informal microenterprises that pay no tax, offer bare survival wages and have no interest in ensuring decent health and safety conditions at work. The overarching result has been the de-industrialization, informalization and primitivization of Latin America's local economies. Even the neoliberal-oriented Inter-American Development Bank now laments the fact that Latin America's financial system channelled so much of the continent's scarce financial resources into informal microenterprises and self-employment ventures, a market-driven process it now concedes achieved nothing more than "the pulverisation of economic activity into millions of tiny enterprises with low productivity".

Ecuador is perhaps the most obvious example of the new counter-trend towards pro-active local industrial policy. Its central government under President Correa has made a determined effort to devolve power and resources down to local governments, and so much closer to poor and marginalised people. Local governments are now the centre of much pro-active industrial development activity. One policy common to many parts of Ecuador is to establish farmer-owned cooperatives linked to new state-of-the-art food processing units. These programmes not only help to ensure quality affordable outputs for local consumers, the use of appropriate environmentally sensitive packaging and phytosanitary certification to enable export, but also ensure that the bulk of the value added generated goes back down to the basic producers, not up to rich intermediaries or out to shareholders of multinational corporations.

In Brazil, we are all aware of the impressive track record of the state development

Photo: Simone Carneiro/UNIDO

Photo: Eco Images/Getty Images

bank, BNDES. But it needs to be remembered that BNDES also has a very important role to play in *local* industrial development, through its local branches and programmes. In fact, BNDES has long promoted many new innovative SMEs through its loan programmes. It also increasingly promotes SME suppliers through the local content agreements that it attaches to its loans to larger companies. A new generation of community development banks are also helping to support sustainable new businesses in many communities. Funding comes from higher levels of government in order to support the poorest regions and localities that otherwise might not be able mobilize as much as they need locally in order to do a good job.

It must also be remembered that Chile's long-held status as the 'role model' for neoliberal policies is based on a myth. The Chilean government actually established a very impressive range of 'interventionist' local/regional state-led infrastructures and, moreover, generously financed these institutions through the very heterodox policy of retaining state ownership of the world's most profitable copper facility, Codelco. Thus, both Fundación Chile and CORFO (Corporación de Fomento de la Producción de Chile) were able to patiently develop and finance important new industrial enterprises and enterprise clusters, and even entire agro-industrial sectors from scratch, the most famous examples being farmed salmon and soft fruits. Most recently, the Chilean government has established an innovation fund to support SMEs that is managed locally and is directly financed by its revenues from Codelco.

MILFORD BATEMAN is a freelance consultant on local economic development and, since 2005, Visiting Professor of Economics at Juraj Dobrila Pula University in Croatia. He is the author '*Why Doesn't Microfinance Work? The Destructive Rise of Local Neoliberalism*', published in 2010 by Zed Books.

Pictures (left to right): Worker at a small enterprise in Masaya, Nicaragua; Family company manufacturing ponchos, La Paz, Bolivia; Processing manioc at a rural cooperative in north-east Brazil.

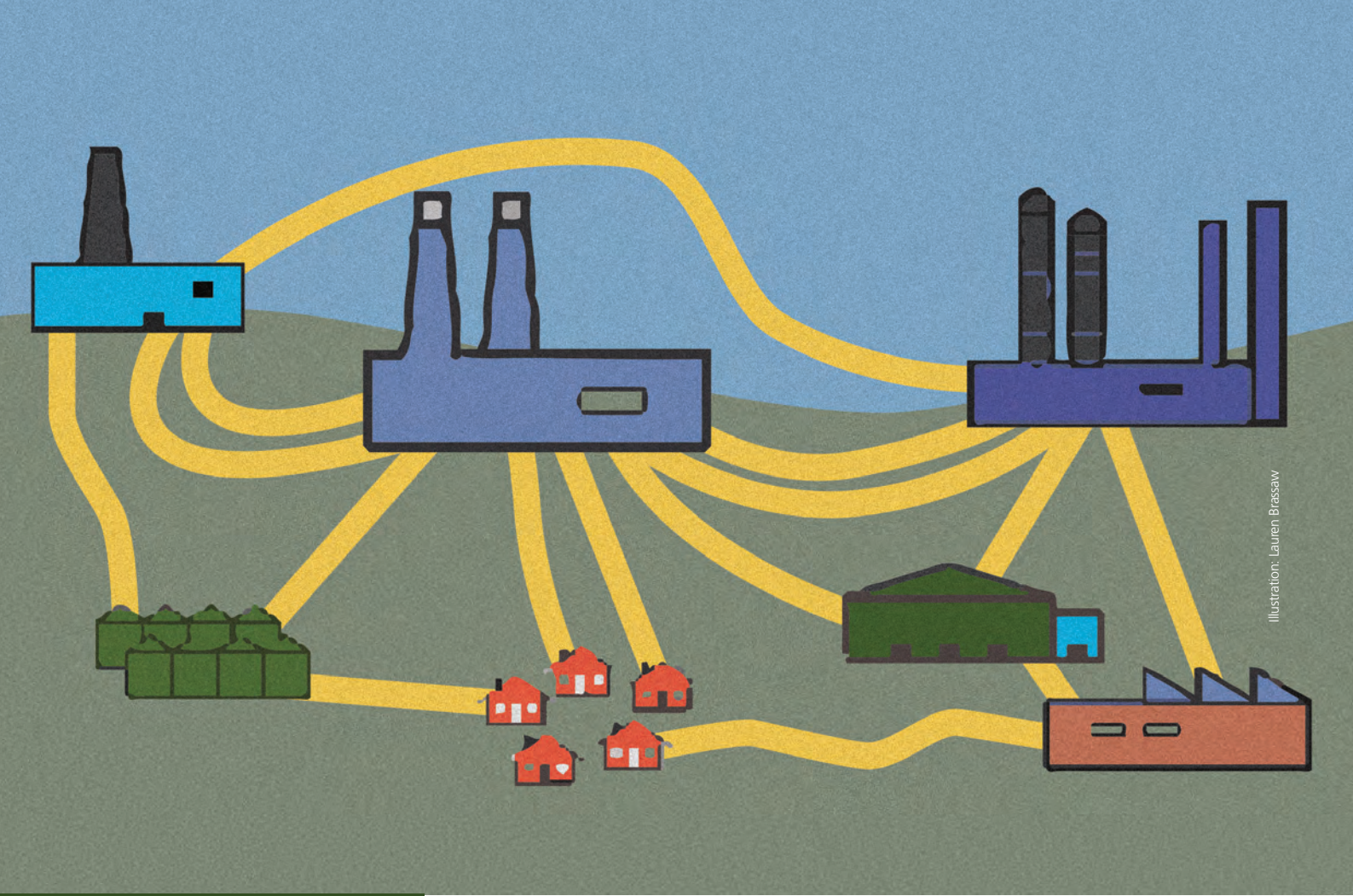
Leftist governments in Bolivia and Venezuela have also developed innovative local industrial development policies, notably involving the establishment of cooperatives. The aim here has been to use oil and gas industry revenues to establish 'local production for local consumption' measures that directly serve poor communities for the very first time. Thanks to traditionally weak bureaucratic capacities and resistance from the entrenched private sector, many problems remain. But these new forms of local industrial development policy, allied to industrial democracy-building measures, have nevertheless demonstrated much potential to respond to genuine need, while also promoting greater equality and social justice.

Finally, even in traditionally centralized and neoliberal-oriented Colombia, local governments and provinces were allowed to experiment with novel forms of industrial policy. The city of Medellín, for example, has pioneered many new forms of engagement with and support for local industry and the community, helping to create many new industries and service sectors as its traditional textile industry declined. Crucially, the Municipality of Medellín was willing to take a leaf out of Chile's book and retain ownership of Empresas Públicas de Medellín (EPM), the main utilities provider in the province of Antioquia, resulting in 30% of EPM's profit being channelled into the Municipality's budget. This largesse was creatively used to finance a wide variety of programmes that upgraded the region's industrial and service base, as well as to (re)establish Medellín as one of Latin America's most exciting tourist destinations.

Latin America has embarked on a new voyage of discovery. New forms of industrial policy are (re)emerging, including at the local level, which are beginning to transform the industrial structure in a very positive direction. There are many optimistic portents to suggest that we might be seeing the start of a new, much more positive, 'bottom-up' development episode in Latin America's economic history.

post-neoliberal Latin America

Photo: Scott Wallace / World Bank



SYMBIOSIS

Mutually beneficial

Peter Laybourn, Chief Executive of International Synergies Limited, looks at how developing countries are starting to use the industrial symbiosis approach to support a speedier transition to sustainable development.

Industrial symbiosis is recognized across the world as a driver of green growth, acknowledged for its contribution to eco-innovation, job creation, securing critical materials and resource efficiency. However, although maturing in many developed economies, including the United Kingdom (UK), Finland, Denmark and Belgium, the developing world has yet to learn about the benefits of such an approach.

Industrial symbiosis has the potential to yield significant economic, environmental and social benefits, yet requires no international agreements and only modest investment from governments to make it work at scale. The principle behind industrial sym-

biosis is simple; instead of being destroyed, undervalued as a by-product or sent to landfill, waste streams and other under-utilized resources generated by industrial processes are redirected for use by companies typically from different sectors, providing a mutual benefit or symbiosis.

Although it is easy to focus on materials when discussing industrial symbiosis, the real opportunities lie in applying the methodology in a wider, more holistic way. For example, the approach can indentify reuse outlets for effluent or used water supplies, as well as potential energy streams. It also offers a means to optimize the capacity of industrial assets and logistics, and increase the transfer of technology and eco-innovation – in effect increasing the productivity of all available resources, which in turn generates economic and environmental benefits. What is often an established practice or solution for one industry sector can be an innovation for another.

The facilitated model

The approach sounds simple enough, however, unlocking the value embedded within industrial resources requires more than merely brokering a transaction between two or more companies. While there are a number of different models of industrial symbiosis, to date, the facilitated model of industrial symbiosis is the most successful thanks to its ability to be applied at scale and to generate rapid results. It is this facilitation element, together with the engagement model, that is key to bringing together producers and users of waste resources with innovators and entrepreneurs, especially as most industrial symbiosis transactions occur between partners outside traditional supply chains.

For example, International Synergies introduced the National Industrial Symbiosis Programme (NISP) in the UK in 2005 and, within seven years more than 15,000 companies were participating. Together they generated just over €1.7bn in additional sales, cut costs by over €1.2bn as a whole, reduced carbon emissions by 39 million tonnes and diverted 45 million tonnes of material from landfill. The NISP also saved or created over 10,000 jobs.

Since then, the NISP has been globally acknowledged; in 2011, the World Wide Fund for Nature (WWF) credited the NISP as being one of the world's top 20 Green Game Changing Business Innovations, while, in the same year, the Organization for Economic Development and Cooperation cited industrial symbiosis (à la NISP) as a means of "systemic innovation, vital to future green growth".

Around the world

The experience of implementing the NISP in the UK has enabled International Synergies to evolve the model for application around the world. China, for example, is in the process of implementing its third regional scale industrial symbiosis project with our support – the most recent being established in Jiangsu province. Both Brazil and Turkey also have established programmes and we have most recently begun work in Western Cape in South Africa, again building capacity to develop a programme based around the NISP model.

Across Europe, International Synergies is working with in-country partners to support implementation in, for example, Belgium, Finland, Hungary, Italy, Northern Ireland and Poland. Indeed, Europe is starting to embrace industrial symbiosis at scale; it is written as a policy recommendation within the European Commission's *Roadmap to a Resource Efficient Europe* and subsequently championed as an approach for making immediate resource and economic gains by the European Resource Efficiency Platform, a high-level working group led by the Commissioner for the Environment, Janez Potočnik, which helps turn political will into action on the ground.

Although industrial symbiosis is not yet widely acknowledged as a mainstream political instrument to help develop sustainable green growth in developing economies, this might be about to change. The historical lack of awareness of industrial symbiosis has started to be addressed by international forums such as the third Global Green Growth Forum (3GF) held in Copenhagen in October 2013. At 3GF 2013, International Synergies hosted a session on industrial symbiosis that was attended by representatives from across the world, including developing countries from Africa and Asia. International institutions that are accustomed to working in developing countries, such as the World Bank, are also beginning to recognize the benefits that industrial symbiosis can bring.

In many ways, it is even more beneficial to introduce industrial symbiosis to developing economies as it provides an opportunity to 'get it right' from the beginning. In those economies that have developed in the traditional linear way, there is a need to 'retrofit' industrial symbiosis in order to move those countries towards a circular economy.

Who pays?

However, based on experience of supporting industrial symbiosis schemes all over the world, perhaps the largest barrier to wide-scale implementation is a lack of cross-sector working, which prohibits the 'flexibility' industrial symbiosis requires. Internal silos within governments and industry make it extremely difficult to categorize industrial symbiosis, which in turn begs the question – who pays? Some governments provide investment through their climate change committees, others through their environmental department (including the UK through hypothecated landfill tax), while in Denmark their national industrial symbiosis programme is supported by the Ministry of Business and Growth.

Further, given the substantial gains businesses achieve through industrial symbiosis, some governments believe companies themselves should pay; despite the same governments receiving more taxes from said businesses as a direct result of them becoming more profitable. In the UK for example, the consultancy company, Manchester Economics, found that the government received between €6 and €9 in direct taxation for every €1 invested in the NISP. All our projects to date work on a public private partnership model with public investment and a private sector delivery agent driving business engagement. Experience has shown that removing public investment and asking businesses to pay, results in a rapid reduction in the number of companies willing and able to take part, especially small and medium-sized enterprises. Regrettably this is what is currently happening in the UK, with investment for the NISP expected to finish in March 2014. Ironically, having pioneered industrial symbiosis back in 2005 through its investment in the NISP, the country looks set to fall behind the rest of Europe by not having a programme at all.

However, there is a lot to be positive about the future for industrial symbiosis. Some policymakers and regulators are beginning to integrate industrial symbiosis into spatial planning, economic development and sustainability policies. Policies and regulations can help foster the conditions that incentivize industrial symbiosis and resource-efficient behaviour by clarifying definitions and responsibilities, and providing predictability and reliability for companies to plan. It is surely now only a matter of time (and hopefully not a long time) before industrial symbiosis is adopted as mainstream policy and practice in developing countries.

Latin America's star performer


Photo: Jungle Boy

A recent International Monetary Fund (IMF) report gave Peru a glowing assessment, describing the country's macroeconomic performance over the past decade as "exceptional". The IMF's report states, "After a period of prudent macroeconomic policies, ambitious structural reforms, positive terms of trade and large direct foreign investment, Peru emerged as one of the fastest growing and most stable economies in the region. Over the period 2002–12, the Peruvian economy almost doubled in size, real Gross Domestic Product grew at an average annual rate of 6.3% (the highest 10-year average growth in Peru's history), and the annual inflation rate fell to 2.75% on average (the lowest in Latin America)."

Historically, the country's economic performance has been tied to exports, which provide hard currency to finance imports and external debt payments. The country is one of the top global producers of silver, copper, zinc, tin and gold. However, although the export-led model has provided substantial revenue, it has proved difficult for Peru to achieve self-sustained growth and a more egalitarian distribution of income.


Photo: Global Crop Diversity Trust

Over recent decades, the country's economic policy has undergone a profound change in direction. The 1968–1975 government of Juan Velasco Alvarado introduced wide-ranging reforms, including agrarian reform, the expropriation of foreign companies, the establishment of an economic planning system and the creation of a large state-owned sector. Although these measures failed to achieve the objectives of income redistribution and the end of economic dependence on developed nations, there was no significant change in direction until the 1990s. Since then, the authorities have pursued fiscal consolidation, trade openness, exchange rate flexibility, financial liberalization, higher reliance on market signals and prudent monetary policy.

Over the last decade, these macroeconomic policies, together with a

Photo: Presidencia Perú

At a glance

***Head of state:** Ollanta Humala, a former army officer, and leader of the Partido Nacionalista Peruano, was elected President after winning 51.5% of the vote in a second-round run-off election in June 2011.*

Population: 30 million

***Urban population (% of total population):** 77.24*

Internet users (% of total population): 36.5

***Ease of Doing Business rank (out of 189 economies) 2013:** 39*

GDP – composition by sector (2012 est.) agriculture: 10%, industry: 35%, services: 55%

***Main industries:** mining, metal fabrication, petroleum extraction and refining, natural gas, fishing, glass, textiles, clothing, food processing*

Main exports: Fish and fish products, copper, zinc, gold, silver, tin, crude petroleum and by-products, lead, coffee, sugar, cotton

Photo: World Bank Photo Collection

Photo: CIFOR

favorable external environment, notably a spectacular surge in global commodity prices, have revitalized the economy. The growth of an affluent middle class has driven up private consumption growth and the country has been able to diversify its export basket to include textiles and farm produce like artichokes and mangoes.

So far, the effects of strong growth have yielded an important decline in poverty rates. According to the World Bank, the national poverty rate fell from 48.5% in 2004 to 27.8% in 2011. However, disparities across the country remain high, particularly between rural and urban areas.

The challenge facing President Ollanta Humala, who began a five-year term in July 2011, has been how to extend the benefits of the country's robust economic performance to all Peruvians, particularly those from traditionally disadvantaged indigenous and rural communities. In his inaugural address to the Congress, Humala said he would "dedicate all of my energy … so we once and for all erase from our history the damaging face of exclusion and poverty [and] build a Peru for everyone."

President Humala has created or bolstered some social programmes, fostered job creation programmes and provided greater access to financing to encourage decentralization and enterprise in resource-poor areas. The IMF's representative in Peru, Kevin Ross, recently remarked approvingly on a resulting reduction in chronic child malnutrition and an expansion in the employment rate. Ross also hailed the government for generating greater local added value, thus increasing the country's participation in international trade by promoting the diversification of the economy.

The government has also prepared a new National Industrial Development Plan (PNDI), which aims to stimulate the emerging industrial sector, particularly in the country's highlands and jungle regions, as well as remove barriers to investment. The PNDI is particularly relevant in the context of the country's poor infrastructure, which discourages investment and hinders the spread of growth to non-coastal areas. The importance of the plan has been underscored by a sharp reduction in mineral prices on the international market during 2013. A drop in demand in the context of a struggling world economy and a slowdown in China, one of Peru's top trading partners, have pushed the prices of many of Peru's main exports down, sucking the wind from the sails of the economy.

Luis Salazar, head of the Sociedad Nacional de Industrias (National Society of Industries), hopes that the PNDI's implementation will have a major, positive impact on bridging the country's infrastructure gap, thus narrowing the distance between national markets and local industries. "The development of industry, in particular in the highland and jungle areas, will lead to new communications routes, not only in relation to highways and terminals, but also to telecommunications," Salazar noted.

For Peru's Minister of Production, Gladys Triveño, the development priority is clear. She said, "We firmly believe that the next step in Peru's development must be industrialization. This will generate more competitive businesses and quality jobs."

Interview with His Excellency President **Ollanta Humala**

Increasing opportunities, reducing inequality

What progress have you made with your 2011 election campaign promise to ensure that Peru's economic expansion benefits the whole country, and how has this progress been achieved?

Peru maintains a high level of growth despite the adverse situation in international markets – the low growth rates of important commercial partners and the reduction in commodity prices. In addition to maintaining macroeconomic and fiscal stability, our government has sought, in all its operations, to improve the quality of public expenditure by implementing budget programmes that evaluate results, objectives and aims.

In this framework, we are working with great effort on what we have defined as a "National Strategy on Development and Social Inclusion – *Incluir para Crecer*" which has made important achievements, such as reducing poverty to 25.8% in 2012 (27.8% in 2011). The strategy emphasizes:

- A reduction of rural poverty, by acting on child malnutrition, increasing support for rural education and improving incentives for health care and infant education;
- A reduction in the existing gaps in the provision of basic services (drinking water, sanitation, road infrastructure, rural electrification and the optical fibre network);
- The development of the productivity and employability of the population;
- Protection of and enhanced welfare for the elderly.

Our social programmes are moving away from welfare and are focusing on increasing people's opportunities and reducing inequality, so that a larger portion of the population can benefit from the country's growth.

Can you explain the ways that Peru is approaching the challenge of diversifying its economy?

Peru is one of the most dynamic economies in the region. However, in order to achieve inclusive and sustainable economic growth, our government is implementing a series of measures to promote diversification into value addition. This strategy aims to promote Peru's capacity to participate in global value chains by attracting and facilitating investment and improving competitiveness. Our strategy places emphasis on developing our human capital, infrastructure and local supply networks, to have local production comply with international standards. But it also promotes entrepreneurship, innovation and technology transfer.

For the past twenty-five years, the driving force behind our economy has been mining. While this has been very positive, we are aware that the way production is structured in the country today is not very different to how it was 25 years ago. Mineral exports have doubled between 1995 and 2012, from approximately 30% to 60%, and while we have to continue capitalizing on this, we should also create synergies with other productive activities.

Diversifying our production requires a long and complex reform process that must start with bolstering our human capital. Our programmes are working to achieve this: expanding the coverage of the *Juntos* (conditional cash transfer) programme guarantees that no more children are born into extreme poverty, while the *Cuna Más* programme helps children under the age of three who live in poor, rural areas. *Qali Warma* is a school feeding initiative, and the *Beca 18* scholarship programme prepares young people for an increasingly demanding labour market. The current education reform aims at raising the standard of education. All this prepares human capital for industrialization.

We are also finalizing the design of the National Industrial Development Plan (PNDI), which will seek to focus the diversification of production towards those activities where we have a comparative advantage. To that end, we have constructed a series of tools to make investing in the country more attractive. Some of these will be destined for foreign investment, so that they will create employment and stimulate the economy but also transfer knowledge. This knowledge will bring about sustained economic growth in the medium term and ensure that a broader part of the population reaps the rewards.

Can you explain how the PNDI will foster the industrial development of the country's highland and jungle regions?

To diversify the economy it is necessary to promote the manufacturing companies that generate the most value added but also to decentralize industry. At present, 56% of our manufacturing companies are in Lima. This concentration is due to the capital's relatively good connectivity locally and internationally, which is hardly the case with other places in the country.

In the regions, such as the highlands and the forests, there is great potential to develop value added activities, and this potential has been identified as part of the PNDI. To make the best out of this, we seek to bring in new private investment or pull existing investors currently focused on the extraction of natural resources, and create new productive chains that integrate small and medium-size enterprises into the value chain. The success of this strategy implies solving the specific needs of industry in the short term. What are these? Amongst others, suitable workplaces, human capital, access to technology and qualified providers. The tools provided within the PNDI will help and will favour industrial development in the highland and jungle regions.

How is your administration encouraging entrepreneurship, in particular in relation to formalizing the large numbers engaged in the informal sector?

Peruvians are entrepreneurs by nature – sometimes out of choice, sometimes out of necessity – but most businesses are highly informal and have a low level of productivity. We are looking into simplifying procedures and making it easier to register a business. Furthermore, with the sanctioning of Law 30056,

Photo: Presidencia Perú

the national tax office (SUNAT) and the Ministry of Labour will help small and medium-sized enterprises to correct formal contraventions of the rules, giving them the opportunity to familiarize themselves with the labour and tax legislation without having to face burdensome penalties.

On the other hand, we need to increase productivity. For this we are giving tax breaks to businesses that train their workers (up to 1% of their annual returns), with the aim of solving businesses' concrete needs. We are also fostering support services and technology transfer, quality promotion programmes, supply development (with bigger producer chains that demand their goods or services), and so on.

What policies are being implemented to help Peru make a transition to a green economy?

The institutional strengthening of the Ministries of Environment and Production is part of a strategy to achieve a green economy. Our government is working on establishing a modern legal framework that promotes coherent environmental management. The government has been conducting a series of actions to create an extensive green economy. First of all, it is pushing forward change within the energy system, including increased use of natural gas and the promotion of investment in renewable energy. Secondly, the government is emphasizing the improved treatment of solid waste. Thirdly, the government has been involving all economic sectors in a green growth strategy by implementing national mitigation actions with the Ministries of Housing (green construction codes and sustainable housing); Production (energy efficiency in the production of building materials); Transport (improving public transport); and Energy and Agriculture (generating bioenergy). Furthermore, it has been boosting the development of the forestry sector.

"To diversify the economy it is necessary to promote the manufacturing companies that generate the most value added but also to decentralize industry."

There are also industrial restructuring initiatives. For example, through the Multilateral Fund for the Implementation of the Montreal Protocol, 22 initiatives of industrial conversion, totalling US$5.7m, have been implemented. We also provide technical assistance and investment in emissions reduction projects. Similarly, we have 17 Technology Innovation Centres in nine regions of the country, whose functions include providing support to companies in the implementation of cleaner production projects.

● *Translated from Spanish by Amalia Berardone.*

GOOD BUSINESS

In the latest of a series focusing on remarkable companies that are making waves in the areas of green industry and sustainable industrial development, *Making It* interviews **CHEN Chunhong,** managing director of a Chinese company which manufactures water-efficient toilets.

Yiyuan Environmental Group

"Toilets consume a lot of water, so I had the idea of producing a small, daily-use product that preserves scarce water and can be part of a water-saving revolution." Since setting out with this idea back in 2007, CHEN Chunhong has faced numerous obstacles, including a lack of business experience, meagre start-up capital and an abundance of indifference and scepticism.

Today, she is the managing director of the Shanghai-based, Yiyuan Environmental Group, a company that produces and markets toilets whose patented technology can save up to 83% of water compared with conventional 6-litre models. The company has quickly grown to employ more than 30 people, with plans to set up a number of subsidiary companies. In cooperation with four manufacturing factories, it now has annual sales of 150,000 units, a ten-fold increase over the last four years.

Chen and her company's products are gaining increasing recognition both in China and abroad. During the Expo 2010 China Shanghai, the Yiyuan Environmental Group's water-saving toilets were installed in the United Nations pavilion, and in 2011, Chen was invited by UN Secretary-General Ban Ki-moon to participate in the fourth UN Conference on the Least Developed Countries. In 2012, she was listed on *Fortune China*'s '40 Under 40' roll call of the country's rising business stars, and she has been honoured as a National Outstanding Entrepreneur by the State Council of the People's Republic of China.

Award winner

Chen also won the Cartier Women's Initiative Award for the Asia-Pacific region in 2011, becoming the first Chinese woman to win the award since its launch in 2006. Around one thousand women compete for the annual awards which offer a prize of US$20,000 and a year of personalized business coaching to one winner from each of six continental regions. The Initiative Awards coordinator, Cécile Ney, recalls the reason for Chen's success, "Alongside a solid business plan, it was the social impact and conviction of her initiative that appealed to our juries."

Despite her success in recent years, Chen remains modest. Speaking to *Making It*, she reveals that the idea of building a business was not her original intention. "I just wanted to promote the concept and products in support of my father. But it was a hard lesson to learn. What supported me throughout the hardest time was my hope that both the concept and the technology of water-saving can be promoted worldwide through products like ours, so that our Earth will become a better place."

Innovations

Yiyuan Environmental Group's most innovative product is its YYtoilet, which uses breakthrough technology, devised by Chen's father and patented by the company. As Chen explains, there are three major changes to the structure of the traditional toilet.

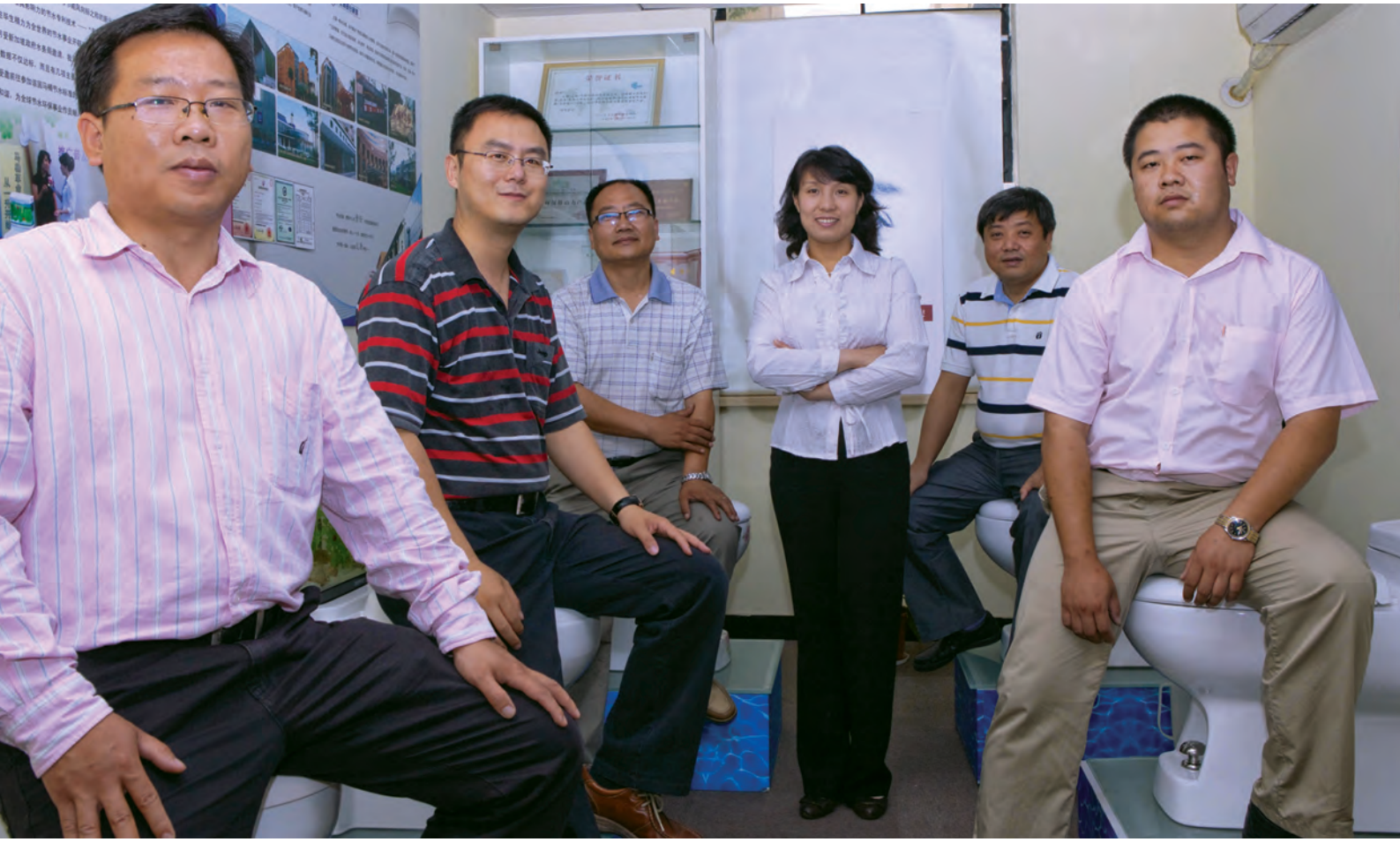
"The siphon pipe and water tank used in the conventional toilet are abandoned. The removal of the pipe brings a smooth and fast flush, thus solving possible problems like blockage, and the no-tank design spares the headaches of water leakage caused by tank failure or damaged tank parts."

Secondly, traditional flushing toilets use a siphon to drain the waste and the water that remains in the bottom of the bowl acts as a seal with the drainage pipe. In contrast, the YYtoilet uses gravity to pull sewage down, which means that a small amount of water, just one litre of water, suffices to wash the toilet clean, and there is a valve to separate the dirty water from the clean and to prevent the problems of sewage back-flow and the intrusion of bacteria, insects and rats.

The third innovation is the use of a foot-pedal instead to the traditional flush handle. Chen explains, "The foot-pedal means you don't even touch the toilet with your hands, so no cross-contamination issues arise." ➤

Photo: The Cartier Women's Initiative Awards

Photo: CHEN Chunhong



➤ In addition to these features, the YYtoilet system requires no new fittings or adjustments to install and is extremely hard-wearing. Tests to measure its robustness have seen it takes up to 300,000 flushes before any sign of a fault. "Going by average use for one family, that makes a lifespan of 100 years – three times longer than traditional flush-toilets," adds Chen.

Breakthrough technology

Asked whether she is afraid that her patented technology will be counterfeited, Chen responds, "To patent is not to prevent others from stealing our idea. The patent only states that we are the initiator. Furthermore, in another way, being copied says our technology is good. Especially from a macro-perspective, if more companies would employ this water-saving technology, it would actually bring more benefits to the global environment as a whole. In this sense, copying our idea is a good thing."

Chen continues, "In China, toilet flushes account for half of a family's total water consumption. Shanghai has a population of 23 million people. Imagine if all of them used our water-saving toilets. Clean water wastage could be reduced by nearly 270 million tonnes in the whole city."

Chen's success is testament to her perseverance and determination. Hailing from a farming family in a village near the city of Longyan in south-west China's Fujian province, Chen was obliged to leave school early and support her father by taking work in a succession of tough factory jobs. She later taught herself English and finance and qualified as a professional teacher.

In 2007, she quit her job, sold her apartment and set off for Shanghai to try and promote the water-saving toilet technology. Only her husband supported her bold move. Her father, who designed the technology in the first place and whose dream she wanted to help fulfill, was angry about her decision to stop teaching.

Against the odds

In Shanghai, she struggled at first, lacking capital, connections and support – all of them indispensable for starting a business in a new, competitive environment. With no money for advertising, Chen took on the work of promotion by herself: she talked to people on buses, and she displayed her products on the roadside, anywhere that she could attract people's attention. With no money to employ workers, she delivered toilets and installed them for customers by herself.

In 2009, she got a break when she discovered an industrial park for energy-saving and environmental protection businesses in the city's Hongkou district and relocated her business there. Chen recalls, "When I first set up my office in the industrial park, the building was still under construction. But the worst thing was my limited capital meant I couldn't afford the rent. I had to convince the industrial park managers to let me install my toilets in their buildings without cost and, in return, I didn't have to pay rent for half a year." This deal paved the road for the business's stability and eventual growth.

Chen named the company, Yiyuan, which is the combination of two Chinese characters: 'yi' meaning fairness and 'yuan' meaning water source. By giving the company this name, she wanted to make it clear that it would be a champion of fair and responsible use of water.

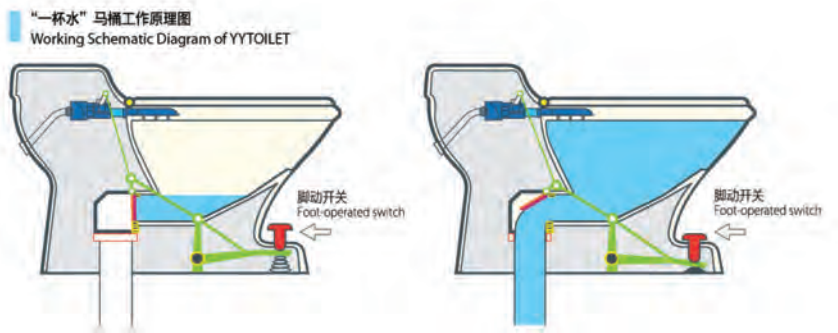
Green industry

According to MA Jian, the National Programme Officer for the United Nations Industrial Development Organization (UNIDO) in China, Chen is something of a green industry pioneer in China. "Currently, the development of green industry in China is still in its early stages. But the country's large population and its consumption of resources create a great demand for green industry. Thus, the Chinese government is giving ample recognition to the need for and the importance of developing green industry, and is providing special support to green companies."

Chen is one of the beneficiaries. The local authorities have installed Yiyuan Environmental Group products in different government projects, including schools, hospitals, hotels and low-cost housing. The company is also a registered central government procurement provider.

Chen is well-aware of her role as a green entrepreneur. "China is a developing country with a large population and a large consumption of resources. Promoting green concepts is of vital significance in today's Chinese society. It will be Yiyuan's permanent responsibility to save water and reduce sewage discharge in order to maintain a harmonious co-existence between Man and the Earth."

Chen's trail-blazing experience has been recognized by UNIDO, which has recently invited her to join its Green Industry Platform as a member of its Technical Expert Committee. As Heinz Leuenberger, Director of UNIDO's Environmental Management Branch, explains, "We are very pleased to have Chen on board because her commitment to research, resource efficiency and innovative technology makes her a natural catalyst for green industry. As China plays a large and increasing role in global manufacturing, energy demand and consumer spending, it is important to have more businesses moving toward the principles of green industry, and resource-efficient and cleaner production."



Above: diagram showing some features of the innovative YYtoilet. Left: CHEN Chunhong with some of her staff in the company's Shanghai offices. Below: CHEN Chunhong at the 2011 Cartier Women's Initiative Awards ceremony, Deauville, France.

Women's entrepreneurship

Recalling her early days in Shanghai, Chen admits that, compared with her male counterparts, it was more difficult for her to start a business, but thinks that the current two to one ratio of men to women entrepreneurs will change. "With women's role in the economic sphere increasing, the female force in entrepreneurship can't be ignored anymore. I believe our society should work together to create a better environment for women's entrepreneurship."

As to how this can be achieved, Chen has some clear ideas. "First of all, women's burden inside the family should be reduced. Men should be encouraged to share in-house responsibilities, such as caring for the elderly, children and housework, thus giving women more time and space to use their talents."

She continues, "Secondly, more women's entrepreneurship funds should be established, so as to provide direct financial support. Thirdly, policies in favour of female entrepreneurship should be implemented. We should set up training institutes and hubs for female entrepreneurs to share their knowledge and experiences. Lastly, governments and organizations, like the United Nations, should work together with the media to create a generally more encouraging atmosphere for female entrepreneurship."

● *Interview by ZHONG Xingfei.*

Photo: Cartier Women's Initiative Awards

How to stay ahead in a low-carbon global economy

By **KAREN ELLIS**, Business and Development Programme Leader at the Overseas Development Institute

Overseas Development Institute (ODI) analysis suggests that over the next ten years, global trade patterns will be transformed by natural resource scarcity, climate change and international mitigation policies, resulting in an inevitable shift to a low-carbon global economy. This is already beginning to happen: we are seeing higher oil prices and increased competition for land and water; carbon taxes, carbon footprinting and new green certification schemes being developed by both government and business; and climate change is already affecting agricultural production and hydropower potential.

ODI analyzed how these drivers might affect economic prospects in low-income countries (LICs), and asked how – in this changing context – they might achieve 'low-carbon competitiveness', i.e. how they can remain or become competitive in a future, low-carbon global economy. ODI has reviewed the opportunities and risks faced by three low-income countries in particular: Kenya, Cambodia and Nepal. Based on this, we identified ten key measures that can help to promote low-carbon competitiveness.

1. Develop a green-energy sector. LICs can capitalize on their relatively early stage of energy development to create a green-energy sector, giving them a competitive advantage in a future low-carbon global economy. Competitiveness benefits will be even greater as fossil-fuel prices are generally expected to rise, while renewable energy costs are expected to fall as technologies mature. This would avoid the need for any future costly mitigation measures and could be supported through new sources of climate finance.

2. Use fossil-fuel reserves wisely. Countries with fossil-fuel reserves, such as Kenya and Cambodia, must take strategic decisions to use them in ways that support the development of renewable energy e.g. by exporting them and investing the revenues in renewables. It is also important to specify a clear direction for energy policy, to minimize the uncertainty which undermines incentives for private investment in renewables.

> "There is much to be gained if policymakers and businesses start thinking now about how to manage the risks and capitalize on the opportunities."

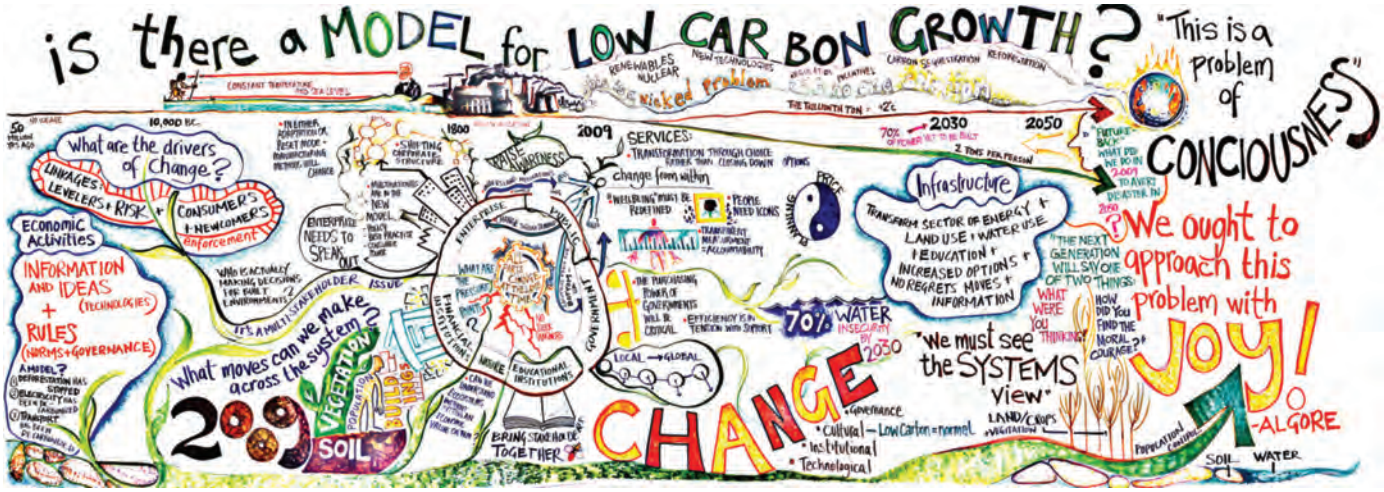
3. Take advantage of firms' innovation to generate their own green electricity. There are impressive examples from Kenya of manufacturing and agribusiness firms investing in their own mini-hydro power plants, geothermal plants, cogeneration from sugar production, solar panels and waste-to-energy installations. Some firms are also establishing their own tree plantations, to create a sustainable supply of fuelwood and avoid depleting forests. An appropriate policy framework, including feed-in tariffs, the establishment of mini-grid frameworks, and net metering mechanisms for example, can encourage further investment in these alternative energy solutions, to improve competitiveness and increase the energy supply.

4. Promote energy-efficiency measures. Some firms are already investing in energy efficiency, generating impressive cost savings and reduced carbon emissions. For example, a garment company in Cambodia which invested £100,000 in energy-efficiency measures enjoyed cost savings of nearly £400,000 per year, and reduced greenhouse gas emissions by a third. Introducing mandatory energy audits, as in Kenya, will encourage this strategy, which could contribute to significant competitive advantage over time.

5. Remove fossil-fuel subsidies. Subsidizing fossil fuels encourages inefficient energy use, undermines competitiveness and incentives for development of renewables, and imposes a heavy financial burden. For example, the Nepal Oil Corporation has accumulated subsidy-related losses of around US$315m, which is undermining its ability to ensure supplies and invest in distribution infrastructure to meet growing demand, which is in turn undermining wider industrial development.

6. Take advantage of the growing market for biofuels as global demand is expected to more than double over the period 2010-2020,

Photo: The Value Web Photo Gallery



and biofuels have higher income potential than traditional crops. There could be merit in promoting dual crops, which can be used for both food and biofuel, such as sugar, cassava, sweet sorghum, or castor. This could raise incomes and enable farmers to diversify their livelihoods, helping to promote both food and energy security, if a domestic market for biofuels can also be established.

7. Implement environmental regulation, standards or certification in the manufacturing sector to keep pace as environmental standards or certification increasingly become requirements to access international markets. For example, the Cambodia Chamber of Commerce recognizes that Cambodia needs to take account of environmental concerns in its manufacturing sector through an environmental accreditation programme if it is to continue exporting successfully in future.

8. Support farmers in the transition to sustainable agricultural practices and carbon footprinting to meet future certification requirements, enhance yields, ensure long-term sustainability of production, and capitalize on projected rising global food prices. There are big differences in uptake of these practices across countries. A report from the Food and Agriculture Organization (FAO) states that 400,000 small farmers are involved in conservation agriculture in Ghana, while only 5,000 are in Kenya, with potentially significant implications for the competitiveness of the Kenyan agriculture sector.

9. Develop economic sectors that capitalize on forest resources and encourage sustainable forest management, such as wildlife tourism, or non-timber forest products such as medicinal and aromatic plants (MAPS). This will encourage conservation of forest assets, which should also increase in value over time as carbon market mechanisms develop. Given its abundance of endemic species, Nepal has a strong potential competitive advantage in the market for MAPS, which is estimated to be growing by 8-10% a year globally – although Nepal's production and export capability need to be developed to take advantage of this. Ecotourism is growing even faster, at around 20% per year, and some countries are much better than others at capitalising on their wildlife and nature. Both sectors need regulation to ensure they are managed sustainably.

10. Establish green credentials for the country's tourism sector. Increasing international emphasis on environmental responsibility will reward those tourism destinations that are perceived as relatively green, and early converts to sustainable tourism will make market gains. Therefore, establishing a brand as a green tourism destination will be important to creating a competitive advantage for the future. It will also help ensure the sustainability of the industry. Tourism has been growing at a rate of 20-30% per year for over a decade in Cambodia, but faces big challenges now due to environmental pressures which could jeopardise its future growth. For example, there are concerns that the water shortage in areas surrounding Angkor Wat, exacerbated by illegal water pumps constructed by hotels, could create instability causing the ancient monuments to crack or crumble.

Low-income countries face big opportunities and risks as global trading patterns change. But there is much to be gained if policymakers and businesses start thinking now about how to manage the risks and capitalize on the opportunities, positioning themselves for success in a low-carbon global economy.

Export-led development is no longer viable

By the United Nations Conference on Trade and Development (UNCTAD)

The UNCTAD T*rade and Development Report 2013* (TDR13), subtitled "Adjusting to the changing dynamics of the world economy," cautions that a prolonged period of slow growth in developed countries will mean continued sluggish growth in their imports. Developing and transition economies can compensate for resulting growth shortfalls through countercyclical macroeconomic policies for some time, the study says. But, in the longer term, policymakers will need to reconsider development strategies that have been overly dependent on exports. Instead, the report says, development strategies should place a greater emphasis on the role of wages and the public sector in the development process.

Prior to the 'Great Recession', buoyant consumer demand in some developed countries enabled the rapid growth of manufactured exports from industrializing developing countries which, in turn, provided opportunities for primary commodity exports from other developing countries. The overall expansionary – though eventually unsustainable – nature of these developments boosted global growth. The boom also seemed to vindicate developing and transition economies in adopting an export-oriented growth model. However, such a model is no longer viable in the current context of slow growth in developed economies. To address the prospect of a prolonged period of considerably slower export growth, policymakers need to give greater weight to domestic demand.

Moving towards a more balanced growth path could, on a sustained basis, compensate for the adverse effects of slower-growing exports to developed countries. Moreover, it could be pursued simultaneously by all developing and transition economies, without the "beggar-thy-neighbour" effects and the contractionary wage and tax competition inherent in export-led strategies. Indeed, if many developing and transition economies simultaneously give domestic demand a greater role in their growth strategies, their economies could become markets for each other, fostering regional and South-South trade, and thus further growth for all. Hence, shifting the focus of development strategies to domestic markets does not mean minimizing the importance of the role of exports. Exports could actually expand further if several trade partners were to achieve higher economic growth at the same time. In that context, natural-resource-rich countries may be able to continue to benefit from historically high commodity prices. But they should ensure that the resulting revenues are used for investing in new activities that enable production and export diversification.

The study warns that there are challenges to such shifts in growth strategies. Developing countries' insufficient market size is often cited as a reason why domestic-demand-oriented growth is not viable. But recent projections on the growth and composition of the "global middle class" suggest that some of the most populous developing and transition economies may now have the rising household consumption needed to compensate for a major part of any decline in export demand from developed countries. The study underlines, however, that to realize this sales potential, policymakers must boost domestic purchasing power and achieve an appropriate balance between increases in household consumption, private investment, and public expenditure. The specifics of this balance depend on the circumstances of individual countries. But, in general, striking the balance will require a new perspective on the role of wages and the public sector.

The TDR13 recalls that export-oriented strategies emphasize the cost aspect of wages. Indeed, wages have lagged behind productivity growth in most countries in recent decades. By contrast, a strategy giving a greater role to domestic demand would emphasize the income aspect of wages, as it would be based on household spending as the largest component of domestic demand. Employment creation combined with productivity-oriented wage growth should create sufficient domestic demand to fully take advantage of growing productive capacities, without having to rely on continued export growth. Some developing countries have recently tried to boost consumer spending by easing access to consumer credit, but such an approach can lead to excessive debt and household insolvency, as amply demonstrated by recent experiences in a number of developed countries.

The report contends that the public sector can further boost domestic demand by increasing public employment and undertaking investment. Moreover, changes in the tax structure and the composition of public expenditure can

Photo: istock.com/claireview

shape the distribution of purchasing power towards those income groups that spend larger shares of their incomes on consumption. Increased aggregate demand from household consumption and the public sector would provide an incentive to entrepreneurs to invest in increasing real productive capacity.

Investment decisions could be further supported by industrial policy. This would aim at making the sectoral allocation of investment better match the newly emerging patterns of domestic and regional demand. Local enterprises in developing countries may already have an advantage over foreign ones in catering to the new demand patterns emerging in their countries and regions. They have better knowledge of local markets and local preferences and can more easily develop appropriate new products and distribution networks. Thus, they could prevent the rise in domestic demand from causing excessive trade deficits.

"Natural-resource-rich countries should ensure that the resulting revenues are used for investing in new activities that enable production and export diversification."

In the case of countries heavily dependent on commodities exports, the TDR13 advises a careful evaluation of future developments in export earnings to determine if commodity prices are in a so-called "super-cycle", and, if so, at what point in the cycle they are currently located. It argues that a collapse of commodity prices or a quick return to a long-running deteriorating trend is unlikely to occur in the next few years. As long as commodity prices remain at relatively elevated levels and commodity producers are able to appropriate a fair share of resource rents, policymakers should ensure that the revenues accruing from natural resource exploitation are used to reduce income inequality and to spur industrial production. Related measures should include public investment and the provision of social services targeting those segments of the population that do not directly benefit from resource revenues.

Setting green finance on the right track

DR. NANNETTE LINDENBERG, German Development Institute/Deutsches Institut für Entwicklungspolitik (DIE)

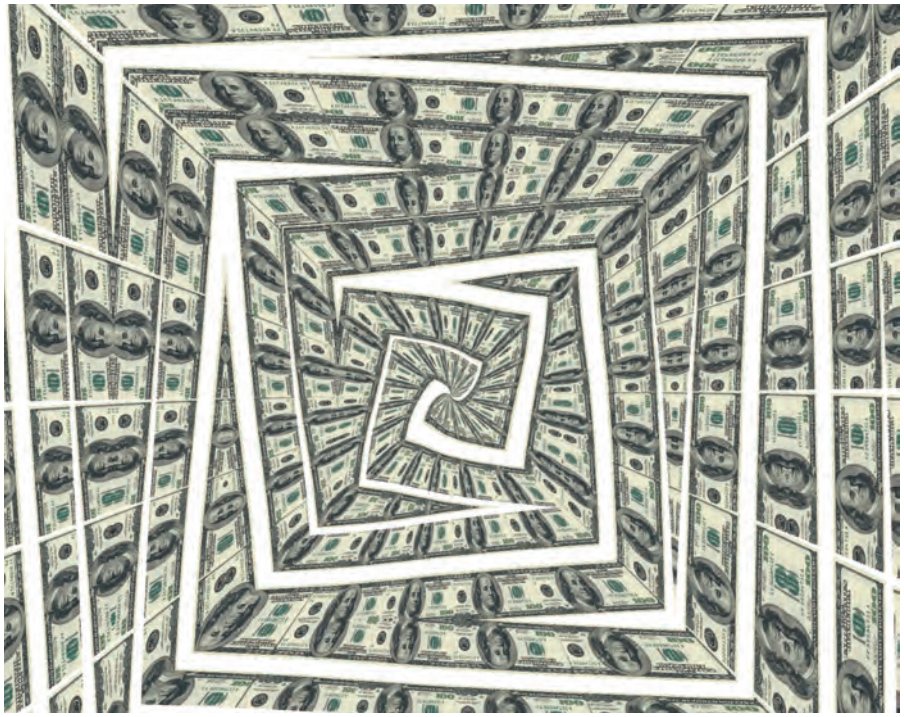


Illustration: Patrick Hoesly

Environmental disasters around the globe keep reminding us that humankind has to change its unsustainable ways of living. Therefore we need enormous amounts of green finance to tackle these challenges in the coming decades. The good news is that we have a broad consensus on this necessity. However, almost acknowledged as much as the notion that we have to restrict our ways of living in a way that we stay within the planetary boundaries, is the sense of helplessness about where this green finance shall come from.

At this point, we are facing the first hurdle: we do not have a precise definition of 'green finance', which makes it hard to mobilize it. For the moment, we will define 'green finance' broadly as finance flows or investments that respect the planetary boundaries.

A multitude of reports on the bottlenecks and challenges of green finance have been published. The same is true for estimations of financing resources and needs, as well as case studies on best practices. In a nutshell, financing needs are impressively high, with estimates for investments in green infrastructure varying between US$1-2trn per year for the next decades. Government budgets are insufficient, even more so in the aftermath of the latest crisis, and private and institutional investors (such as pension funds, assurances and sovereign wealth funds) that have assets under management of several tens of trillions of dollars only invest less than 1% of their portfolios in capital products that are targeted for green investments. The well-known constraints include high risks, insufficient policy support and enabling environments, and a lack of a project pipeline.

Why can't we succeed in moving forward, in scaling-up and mainstreaming green investments? The answer is definitely a complex one, but a good starting point might be to change the way, the processes and the places that we are using to discuss green finance and the necessary economic, political, legal and regulatory framework conditions.

We need a trio of exchange, transparency and cooperation. Why will this make the difference? The answer is straightforward: there are too many actors, too much fragmentation. The problem is not just that we have two distinct communities, development cooperation and climate finance, with different perspectives on green finance, as well as many different processes on the international level, within the different international organizations and country groupings. The problem is also that within national governments there are many parallel working streams that all focus on green finance in one way or another. It seems logical that the ministry for development cooperation deals with the financing of sustainable green investments, the environment ministry with climate finance, the finance ministry with long-term infrastructure investments – which have to be green to avoid lock-in effects, and the energy

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ministry (if such a ministry exists) with financing for sustainable energy, and so on and so forth. But it does not stop here; often there are several directorates within one ministry that feel responsible for the processes in different international bodies, like the UN system, the World Bank and the G20. If this seems confusing, inefficient or even counter-productive, well, it is.

The first thing to do is to establish ways of exchanging and sharing among actors engaged in green finance-related activities – within ministries and governments, but also within the international bodies, such as the G20 Development Working Group's Dialogue Platform for Inclusive Green Investments, the G20 Study Group on Long-Term Investment Financing, the G8 Impact Investment Taskforce, and the UNFCCC Work Programme on Long-term Finance, to name just a few. Although, the main focus and purpose of their activities might differ, after all their goals are ultimately all related to financing a sustainable future for humankind.

The second thing to do is to put transparency at the core. One aspect concerns the different processes: it should be feasible for all interested stakeholders to get a rough overview of relevant processes with a bit of research. The other relevant aspect is the necessity to publish the data relating to the experience of existing financing of green projects. Here, development finance institutions and the private and institutional finance sector will have to make an effort and break ingrained habits. They certainly have good reasons to be reluctant to publish information about green finance, but we urgently need this data in order to rigorously assess existing experiences, to learn about best practices, to find out more about broadly applicable business models and to deduce recommendations for others. If we are to shift the focus from pioneering to mainstreaming green finance, case studies are no longer sufficient.

The third thing that needs to be done is to increase cooperation and stop fragmentation into different communities (the development advocates versus the climate change combatants versus the long-term financing promoters). It is not always necessary to create a new task force or an additional working group, just because the framing or wording of the existing initiatives is, for whatever reason, not the favoured one. Less can be more. It is not necessary to separate sustainable green finance from climate finance, from long-term finance, from developing finance. The goal must be to consolidate the different processes, to make them more effective and efficient. Cooperation should, however, not only include governments, but research institutions, the financial sector and private companies too.

The goal must be to come up with consistent, concise and apt recommendations – and more importantly – policy actions that speed-up the rise of green finance. We have to achieve this on time – climate change is not waiting until we finally find a good solution – and making use of the collective intelligence might make a difference.

Our New Year's resolution for 2014 should be to pave the way for green finance. In theory, it is simple. The trio of more exchange, more transparency and more cooperation can contribute significantly to our common goal: to mobilize the necessary resources to finance a decent life for every single one of more than seven billion people and their descendants.

FURTHER READING

Berners-Lee, Mike – The Burning Question: We can't burn half the world's oil, coal and gas. So how do we quit?
Brautigam, Deborah – The Dragon's Gift: China in Africa
Dietz, Rob and O'Neil, Dan – Enough Is Enough: Building a Sustainable Economy in a World of Finite Resources
Hallegatte, Stephane; Fay, Marianne; Vogt-Schilb, Adrien – Green industrial policies: when and how
Helm, Dieter – The Carbon Crunch: How We're Getting Climate Change Wrong – and How to Fix it
The International Institute for Environment and Development (IIED) and the Green Economy Coalition – Scoping a green economy: A brief guide to dialogues and diagnostics for developing countries
Jackson, Tim and Victor, Peter A. – Green Economy at Community Scale
McKinsey Global Institute – Manufacturing the future: The next era of global growth and innovation
Monga, Célestin; Stiglitz, Joseph; and Lin, Justin Yifu – The Rejuvenation of Industrial Policy
Schwarzer, Johannes – Industrial Policy for a Green Economy
UNIDO – Emerging trends in global manufacturing industries
UNIDO – 21st century manufacturing
Wade, Robert – Return of industrial policy?

FURTHER SURFING

www.cepal.org – The Economic Commission for Latin America and the Caribbean assists and promotes economic and social development
www.chinadialogue.net – A bilingual website, with news, features and reports on environmental issues in China and the rest of the world
www.climate-kic.org – Europe's largest public-private innovation partnership focused on climate change
www.global-inst.com – The Global Institute For Tomorrow is an independent think-tank providing executive education from an Asian worldview
www.greengrowthknowledge.org – The Green Growth Knowledge Platform enhances and expands efforts to identify and address major knowledge gaps in green growth theory and practice
www.greenindustryplatform.org – The Green Industry Platform is a global, high-level, multi-stakeholder partnership and forum to catalyze, mobilize and mainstream action on green industry around the world
www.ineteconomics.org – The Institute for New Economic Thinking was created to broaden and accelerate the development of new economic thinking that can lead to solutions for the great challenges of the 21st century
www.isid.org.in – The Institute for Studies in Industrial Development (ISID) is an Indian policy research organization
www.teriin.org – The Energy and Resources Institute works towards global sustainable development, creating innovative solutions for a better tomorrow
www.whygreeneconomy.org – A space to share ideas from across the world on a new economic model to tackle climate change and protect the environment
www.wupperinst.org/en – The Wuppertal Institute interlinks aspects of climate, environment and resources

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