

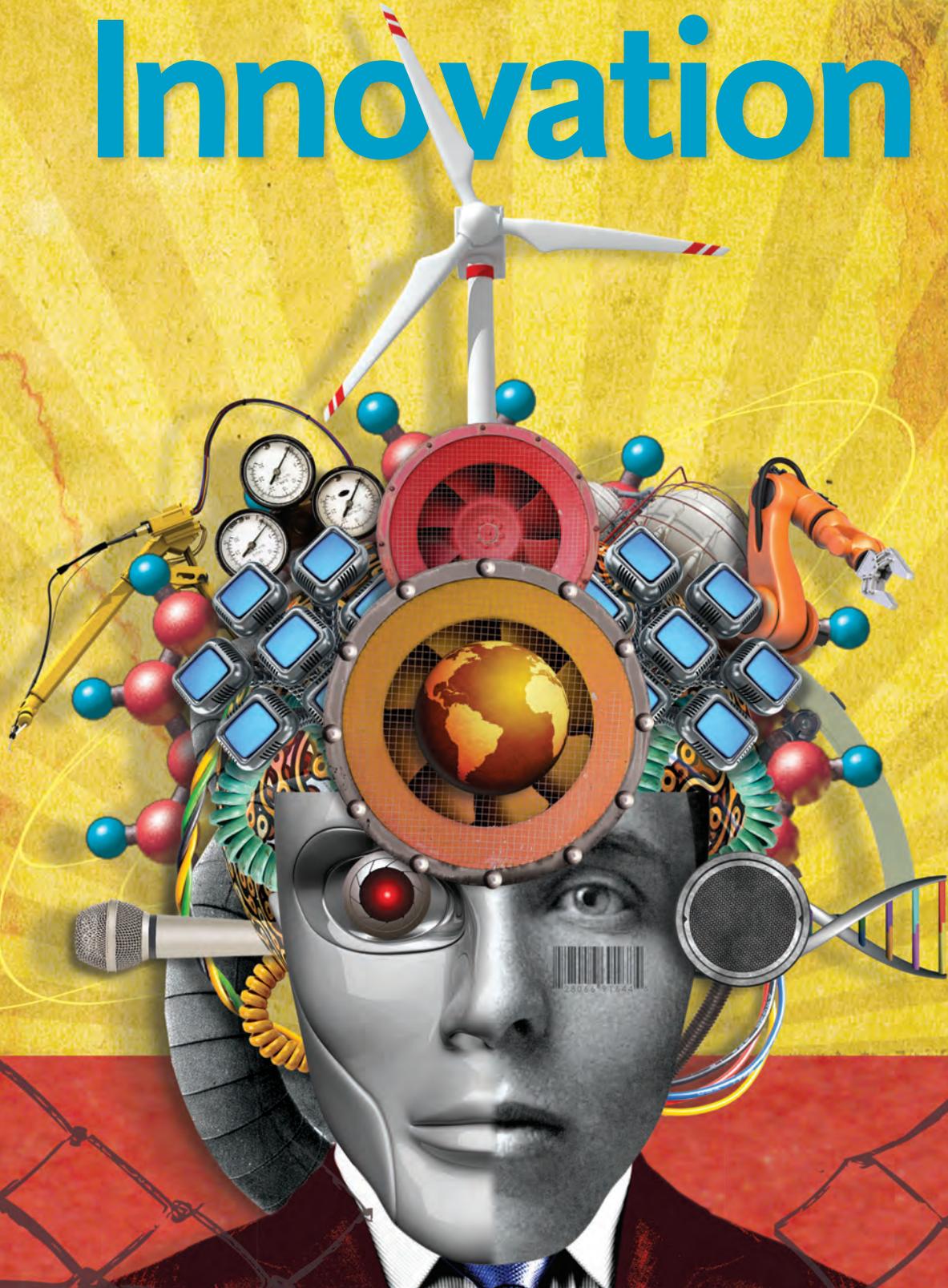
MakingIt

Industry for Development

Number 13

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- Montenegro
- Jugaad: think frugal
- Ethiopia's soleRebels

Innovation





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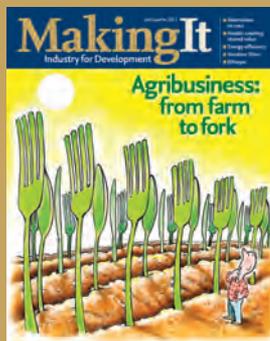
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Editorial

According to a leader published in *The Economist* in February 1999, “innovation has become the industrial religion of the late 20th century.” The leader continued, “Business sees it as the key to increasing profits and market share. Governments automatically reach for it when trying to fix the economy.”

Since then, the relevance and importance of innovation has grown still further. Over the past two decades, it has become clear that it has a pivotal role in development. The build-up of innovation capacities has played, and continues to play, a central role in the growth dynamics of successful developing countries.

There are other compelling reasons why the issue of technological innovation demands attention. The world is in the midst of a serious economic crisis, and technology can be a means of re-launching or recreating economic activities worldwide. Major environmental challenges, in particular, climate change and resource scarcity, require wide-ranging changes in patterns of production and consumption. The global system is undergoing a profound transformation based on information technology and other fields such as biotechnology and nanotechnology.

All over the world, people are realizing that we should be more frightened of sticking with old ideas than embracing new ones.



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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

Disseminating ideas

I find *Making It* magazine a very useful source of information on development issues. For many years, industrial policies have been a taboo in mainstream development blogs and newspapers. While there are many scientific research documents on industrialization, it is hard to find them in a "friendlier" format – and I think this magazine addresses this niche.

Also, it approaches gender and environmental issues within the context of industrialization. Many development advocates often think the former two areas are not linked to (or are even opposed to) industrialization!

In other words, I think this magazine is a great way to disseminate ideas that can improve today's development narrative.

● **Beatriz Calzada, MA**
International and Development Economics, Hochschule für Technik und Wirtschaft Berlin, by email

Thanks @makingitmag for sharing your magazine with us! Great topics!

● **@HUBOttawa, a co-working community uniquely optimized for innovators, artists, professionals and entrepreneurs to collectively create positive impact,** by Twitter

North-South

Some important issues were raised in the keynote article on South-South cooperation (*Making It* issue 12). I agree with Jayati Ghosh when she says that many recent South-South trade and investment agreements (and the resulting processes) have been similar in unfortunate ways to North-South ones due to "corporate" interests. But how useful is it to divide the global economy into the "North" and "South" at all? If we look at foreign direct investment, whole swathes of the world receive very little. A recent United Nations report, *World Investment Report* (UNCTAD 2012), shows that developing countries received 45% of foreign investment flows in 2011, but this was distributed highly unevenly. Thirty per cent of it went to one of the emerging countries, China, yet the whole of the African continent received only 6.2% – a mere 2.8% of the world total. In economic terms, it seems absurd to include both



China and Africa in the "South", particularly as the largest corporations in the world are diving into every sector of the Chinese economy. Using measures for individual nation states also masks the widely differing regional dynamics of change in production across the whole world. The most powerful country in the "North" by a mile, the United States, has a new phenomenon: "rural sourcing". Companies have found they can get away with paying 25 to 50% less in wages in small rural towns than in big cities – a "corporate interest" that should be abhorred, North or South.

● **James Robertson, Edinburgh, UK,** by email

Young entrepreneurs

I like your series about young entrepreneurs ("I think there are many more youths who could realize their potential", *Making It* issue 11). Please can

you provide updates letting us know how they have got on since you first wrote about them? I think it would be great to know if their businesses have thrived or, if not, what challenges they have faced. I am particularly interested in the Tunisian wind turbine company. When is their product going to make a market impact?

● **Kelly Manson, website comment**

A different prosperity

Thank you for the article by Chandran Nair ("No escaping the numbers", *Making It* issue 10), where he wrote, "Asian political leaders must reject the Western consumption-driven model of economic growth. In its place, they must create economies where resource-use is constrained via a true pricing of environmental externalities." This is very much a conversation that the West's elite needs also to have. For the most



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.



part, the majority of those in the West (both recent and generational) have been largely at the mercy of “growthism” via immigration-to-ruin policies, which use the lure of prosperity to drive inequality both domestically and globally.

It is good to see Japan’s population declining and as it does, their quality of life improving – they have lower unemployment than the US and Europe, and their ratio of GDP to GPD per capita suggests a reasonable spread of income in stark contrast to Europe and the USA. They certainly have hurdles, for instance the contention of resources with China, but

Japan is certainly turning conventional Western economics on its head. And furthermore, the US is turning conventional Western economics on its head with the growing realization that population growth and development are costs and that economies only really recover when population growth slows, stabilizes or even declines – not that there is much scope for recovery now. As Chandran Nair suggests, a different economic model with a different view of prosperity is needed – e.g. food/water and basic energy security, environmental health, etc.

● **Matt Moran, website comment**

Good news for Bangladesh

The information in the article on Viyellatex (“Good business”, *Making It* issue 10) is very good news for us and for Bangladesh. I think Echotex Ltd, Chandra Polli Bidyut, Kaliakoir, Gazipur, is another example of a factory that is trying to be fully eco-friendly and trying to conform to government and environmental rules and regulations. Already this factory has received some national awards in recognition of its contribution in saving the environment through ethical business practice. This factory is trying to disperse zero discharge

waste from its effluent treatment plant (ETP) using a biological treatment and it is re-using huge amounts of water and heat to save energy and the environment.

● **Abu Bakar Siddique, website comment**

Subscription

Although I read your magazine online, I much prefer to read printed copies. Is it possible to buy a subscription?

● **Keith Burkinshaw, New York, by email**

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Implementing the sustainable energy future

Arnold Schwarzenegger on the coalition of forces which believes that climate change and green economic development can be tackled at the sub-national level.

Humanity is facing inextricable challenges due to climate change, and action needs to be taken at all levels to drastically reduce greenhouse gas (GHG) emissions. The green economy concept can be thought of as an alternative vision for sustainable growth and development, consistent with the need to reduce GHG emissions globally.

The ideal pipeline of clean energy projects is not currently happening, even though intergovernmental bodies, national governments, sub-national governments, non-governmental organizations, academics, technology providers, and public and private financial partners share the same vision and want concrete action. This is due to a number of factors:

- National and sub-national politicians lack awareness of the long-term political, technical and financial solutions for a sustainable, safe and clean economy;
- Project developers do not know how to identify, design and communicate the right information to project investors;
- Investors are not sure how low-carbon investments fit into their existing investment instruments and portfolios.

The R20 is a non-profit organization that, together with the United Nations, I founded in 2010. Its goal is to address these factors at sub-national level to help build an effective green deal flow. This is made possible by connecting regions, technology and finance to build sustainable low-carbon projects. The R20 plays the role of a global facilitator between public and private stakeholders involved in sustainable development.

The R20 mission is to provide guidance and accompany sub-national governments during the long and complex transition to the green economy. The R20 is an impartial and independent organization, playing an intermediary role on behalf of private and public entities interested in taking concrete steps to developing green economic activities and projects.

Global facilitator

The R20 network today forms a worldwide coalition of partners and members willing to share their expertise and to mobilize themselves in order to push in the same direction. This coalition intervenes on demand from sub-national authorities, to help states, provinces or regions around the world to develop, implement, and communicate low-carbon and climate resilient projects, policies, and best practices.

Bottom-up approach

In order to shift to a greener economy, the commitment of everyone is needed. In particular, sub-national authorities have an

important role to play, as there are many opportunities in their hands. The vast majority of sub-national governments around the world have proven their will to improve the quality of life of their citizens and contribute to a sustainable global economy. They know well the needs and opportunities available within their own territories. However, despite their political weight, sub-nationals may lack experience in building projects and having them financed, which can greatly restrain their capacity to bring about the change they seek.

The R2o bottom-up approach enables local governments to implement a multitude of projects that can only be managed at sub-national level. Sub-national priority areas include: clean public transport, energy efficiency building permits, LED street lighting, wind farming, micro-hydro, solar PV and waste-to-energy projects. Such projects are in the hands of mayors and/or presidents of districts, regions and provinces. Moreover, recent research published by the UNDP shows that 75% of the potential solutions to a low-carbon economy lie with the sub-national governments.

Focus on projects

The R2o is focused on concrete and practical solutions; the main goal is to implement real, sustainable projects helping mitigation and adaptation to global warming. In order to fulfill its mission, the R2o is building a pipeline of sustainable, bankable projects around the world. The R2o strongly believes that it is time to scale-up from a

As Governor of California from 2003 to 2010, environmental action man ARNOLD SCHWARZENEGGER made the state a world leader in renewable energy and combating climate change. He implemented a number of ground-breaking sustainability policies, including the landmark Global Warming Solutions Act of 2006, the Hydrogen Highway Network and the Million Solar Roofs initiative. In 2010, together with other sub-national leaders, he created the R20 Regions of Climate Action organization.



philanthropic, social, corporate responsibility market to a more mature and regular market.

Following its business model, the R2o has identified and contacted numerous potential investors, both public and private, and through discussions and questionnaires, the R2o has identified the specific needs and expectations of these investors.

This process forms the basis of the R2o Green Finance Network, which allows the R2o to accurately select, for a given project, a

potential matching investor. The R2o is continuously updating this network.

During 2012, in less than 12 months, the R2o applied this unique business model and managed to identify and present around one billion dollars’ worth of sustainable and bankable sub-national projects to potential investors, with a first commitment of US\$150m private equity from a private investor. R2o thus demonstrated that building a suitable public environment for investment with public pre-investment funding can leverage much larger private investment. The ambition of the R2o, with larger partners such as UNIDO, is now to replicate and scale up in order to meet the UN sustainable energy for all targets.

● For more info on R20 Regions of Climate Action, check www.regions20.org

HOT TOPIC

At the intersection of technology and development

Two perspectives on the potential of information communication technologies to develop change and change development

Mobile technologies and empowerment

Raúl Zambrano and Ruhiya Kristine Seward look at the potential of mobile technologies to improve development outputs and outcomes at the country level.

Mobile technologies are opening new channels of communication between people and governments, potentially offering greater access to public information and basic services to all. No other technology has been in the hands of so many people in so many countries in such a short period of time. In fact, globally, more people now have access to a mobile device than to justice or legal services. Recent estimates indicate that information communication technologies (ICTs) could be accessible to everyone by 2015 and bring internationally agreed development targets ever closer to achievement. Indeed, we are witnessing a new wave of democratization

of access to innovative ICT channels, propelled by state-of-the-art technologies and diminishing barriers to entry.

In a global population of nearly seven billion people, the total number of mobile phone subscriptions globally is an astonishing 5.4 billion – and counting. Given that individual subscribers may have multiple and/or inactive SIM cards, the actual number of individual mobile subscribers worldwide is estimated at around 3.9 billion. Latest figures indicate that mobile phone penetration rates stand at almost 45% in low-income countries and 76% in lower-middle-income countries. Given that entire villages in poor and/or

rural communities will often share one or two cell phones, it is also estimated that 80 to 90% of people in some poor countries have at least minimal access to a cell phone. Furthermore, close to 80 million mobile subscribers, most of them in developing countries, have no access to the electrical grid – and yet use a mobile phone.

That is in part because mobile technologies offer portable, real-time, communication and information access for people who previously had little to no access to affordable communication channels. Mobiles have relatively low physical infrastructure requirements and can reach remote areas in a more cost-effective fashion than other ICTs such as the Internet or fixed phone lines. In some places, mobile devices are simply the only option available. And mobile phones require only basic literacy, making the barriers to entry much lower than with other modern ICTs.

Yet, mobile services for people at the bottom of the pyramid remain high: the price basket for mobile services can amount to 15.75% of monthly average per capita income in countries with low human development (compared with 4.86% in

Sahal Gure Mohamed, 62, texts on his mobile phone while waiting in line at dawn to register at Ifo refugee camp in Dadaab, Kenya, in August 2011. Mohamed fled to Dadaab from Beledhawo, Somalia. Just over 10% of new arrivals and nearly 20% of long-term residents surveyed said they access information through cell phones.



Photo: InternewsEurope

medium human development contexts). And coverage in remote or marginalized areas is often nonexistent. There are indications that at least ten percent of the global population and 40% of people in least developed countries are not covered by a mobile network, entrenching divisions between populations in urban centres and poorer populations in the periphery.

However, mobile phone subscriptions in the developing world are rapidly outpacing those in the developed world and costs are coming down. Moreover, public investment and public-private partnerships are becoming essential tools

for extending connectivity, services and information.

As a result, mobile technologies are starting to have an indelible impact on human development, enhancing democratic governance and other development areas such as health, education, agriculture, employment, crisis prevention and the environment. For instance, studies have suggested that

“In fact, globally, more people now have access to a mobile device than to justice or legal services.”

increased mobile ownership is linked to higher economic growth. It is also likely to have twice as large an impact on economic growth in developing countries as in developed ones because the starting point of infrastructure in poorer countries is so much lower in terms of landlines and broadband access.

Leapfrogging of traditional infrastructure requirements such as landlines is possible in low-income countries as mobile technologies have lower investment costs. Other benefits include increased telecom-based tax revenues, greater employment opportunities, and overall increased productivity, not to mention a thriving ➤

HOT TOPIC

► telecom industry that attracts foreign direct investment.

Within governance, mobile technologies can offer new means for empowering citizens and stakeholders by opening and enhancing democratic processes and mechanisms. M-governance initiatives that expand access to information and communications channels are creating new venues for people's participation and giving new voice to those who have historically been marginalized. What was once in the domain of official or large private, corporate media channels is now in the hands of anyone with a mobile or an Internet connection – flattening information and broadening the distribution of that information. This in turn can support wider stakeholder mobilization within a much shorter period of time, as witnessed during the so-called Arab spring of 2011 and other political mobilizations happening around the world today.

The simplicity of new mobile platforms requiring only a basic mobile phone with SMS capacity has allowed their adoption all over the world – from South Africa, to India, to Mexico – to monitor elections, track violence and crime, provide logistical support in natural disasters, and oversee inventories. The portability and ubiquity of mobile phones have helped them become an important tool for civil society, enabling local mobilization and networking among geographically dispersed people.

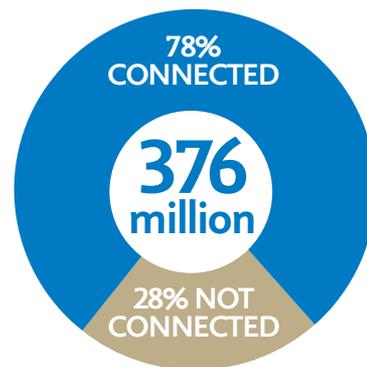
Mobile technologies are also strengthening the demand side of governance by providing people with critical tools to engage with public institutions and demand more and better services. This fosters broader transparency and social accountability. Enhancing service delivery and reform within

41%

2013

of the world's households are connected to the internet

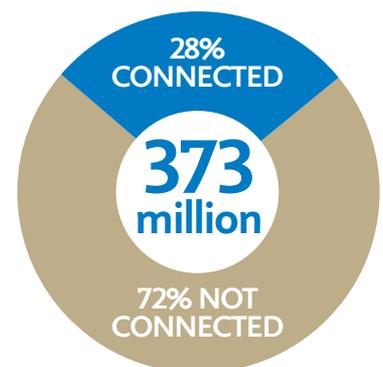
DEVELOPED COUNTRIES:



important governing institutions – from public administrations to parliaments to systems of justice – generates new possibilities for open government. Mobile technologies can reduce bureaucratic holdups for average citizens and streamline work for civil servants. They enable citizens to bypass intermediaries who may take money for facilitating transactions, making service delivery more efficient and transparent.

Significantly for poor people and rural development, mobile technologies can help reduce information gaps and restrictions inherent in marketplaces where consumers and producers have little means of comparing commodity prices between distant markets. Micro-entrepreneurs, for instance, can access market information from remote locations, increasing the speed of trade

DEVELOPING COUNTRIES:



and reducing travel expenditures.

Mobiles also offer greater independence for women by opening new channels of information and affording greater personal privacy. They can also offer women greater security, not only as emergency tools, but also to report and monitor violence against women. And, where once women may have needed male relatives to act as intermediaries, mobile platforms now provide them the chance to make decisions for their economic well-being by and for themselves, which in turn can facilitate female entrepreneurship.

Mobile applications are also being used to combat poverty by expanding service delivery possibilities in health care, agriculture, employment and education. In the health sector, there have been many pioneering mobile initiatives improving connectivity and information

transmission in areas that are hard to access. As emergency response tools, mobile technologies have helped establish networks of communication between citizens, organizations and government agencies in times of crises. They are also being used to educate and keep citizens and vulnerable stakeholders abreast of environmental and energy-related issues, including weather patterns, climate change and responsible environmental stewardship.

By themselves, mobile phones will neither pull people out of poverty, nor propel democratic governance. Instead they are catalytic tools for enhancing and broadening development programming if deployed strategically. They open new channels for connecting the poor to services, new ways for citizens to have their voices heard, and new opportunities for civic engagement in larger governance processes.

At the same time, to reach historically under-served communities, policies need to be in place to help realize the development potential of this medium. It is important that policies support both broad access to information and service distribution, so that mobile services will reach difficult-to-access (and most times un-lucrative) rural areas. It is also important not to overlook literacy challenges and infrastructure limitations. Yet, even within the constraints, mobile technologies are offering marginalized people new ways to leverage their resources to enter the marketplace and demand public services.

RAÚL ZAMBRANO and RUHIYA KRISTINE SEWARD, the Democratic Governance Group at the United Nations Development Programme's Bureau for Development Policy. The above is the executive summary of *Mobile Technologies and Empowerment: Enhancing Human Development through Participation and Innovation*.

An inconvenient truth?

Ken Banks argues that the future of information communication technologies for development lies with the rise of homegrown solutions to development problems.

Ten years ago, I was preparing for my first ever piece of work in mobile technology, two years of work which would lead to the development of an innovative conservation service in 2003 – wildlife! – and the release of one of the earliest reports on the application of mobile technology in conservation and development. A lot has happened since then, not least an explosion in interest, buzz, excitement – and, yes, hype – and a sense that mobile can be the saviour of, well, everything.

Back then, you'd likely be able to fit everyone working in mobile-for-development (M4D) into a small café. Today you'd need at least a football stadium. M4D – and its big brother, ICT4D – have become big business. Not that I needed more proof of mobile's status at development's top table, in December 2012 I attended Vodafone's Mobile for Good Summit in London. It was a high-profile affair, and an extremely upbeat one at that. Yet I left with mixed feelings about where M4D is heading.

My five takeaways after a day of talks, debates and demonstrations were:

1. Everyone is still excited by the *potential* of mobile.
2. The same projects surface over and over again as proof mobile works.

3. Mobile is still largely seen as a solution, not a tool.

4. It's up to the developed world to get mobile working for the poor.

5. The top-down mindset is alive and well.

Suffice to say, all of these conclusions troubled me as I sat on the train home.

I've been thinking for some time about the future of M4D and how far we've got over the past ten years or so. I've written frequently about the opportunities mobile technology offers the development community, and my fears that we may end up missing a golden opportunity. I've long been a champion of platforms, and understanding how we might build tools for problem owners to take and deploy on their own terms. Yes, we should provide local entrepreneurs and grassroots non-profits with tools – and where appropriate and requested, expertise – but we shouldn't develop solutions to problems we don't understand, we shouldn't take ownership of a problem that isn't ours and we certainly shouldn't build things thousands of miles away and then jump on a plane in search of a home for them.

But this is still, on the whole, what seems to be happening. And this, I'm beginning to believe, is rapidly becoming ICT4D's "inconvenient truth". ▶

HOT TOPIC

► A fulfilled future for ICT4D (of which M4D is an increasingly dominant part) is not the one I see playing out today. Its future is not in the hands of western corporates or international non-governmental organizations (NGOs) meeting in high-profile gatherings, and it's not in our education establishments who keep busy training computer scientists and business graduates in the West to fix the problems of 'others'.

The whole development agenda is shifting, and my prediction for the future sees a major disconnect between what 'we' think needs to be done, and what those closest to the problems think needs to be done. Call it disruptive development, if you like. As I told *The Guardian* newspaper in a December 2012 interview, "The rise of homegrown solutions to development problems will be most crucial in future. That means African software developers increasingly designing and developing solutions to African problems, many of which have previously been tackled by outsiders. This, I think, will be the biggest change in how development is 'done'."

I'm not the only person to be saying this. Many good friends working at the intersection of African development and technology have been doing the same for some time. The real change, and the big difference, is that it's *finally* happening. A message which was previously given in hope, a message that was previously given out of an inherent belief that there was a better, more respectful and appropriate way of doing things, is now becoming reality. ICT4D is changing, and the balance of power is changing with it.

FrontlineSMS is a free open source software that I developed and which has been used by developing country NGOs to distribute and collect information via text



Image courtesy of kiwanja.net

“There’s no shortage of donor money out there for projects that seek to implement the latest and greatest proven Western innovations in a development context.”

messages. It has always spoken to an approach I've long believed in, one where users are empowered to develop solutions to their own problems if they so wish. There are many reasons why FrontlineSMS continues to work – the decision of the new management team to shift software development to Nairobi is one of the more recent ones. But fundamentally it's about what the platform does (and doesn't do) that really resonates with innovators, entrepreneurs, non-profits and problem owners across the developing world. As a recent newspaper article put it, "As open-source technology for mobile platforms, innovations like FrontlineSMS are essentially a blank canvas for grassroots organizations to apply to any local context".

That local context is becoming increasingly vibrant as university students across Africa graduate with computer science and business management degrees; as innovation hubs spring up across the continent meeting a growing, insatiable demand for places to meet,

work and network with like-minded problem solvers and entrepreneurs; and as investors launch funds that show they're starting to take young African tech startups seriously.

This activity hasn't escaped big business. Google, IBM, Microsoft, Nokia, Hewlett Packard and Samsung have been opening offices across the continent, snapping up much of the talent in the process (ironically often at the expense – and to the despair – of locally-based NGOs). But while technology businesses take note and develop local capacity that enables them to develop more appropriate local solutions, the broader development 'community' seems trapped in an older mindset of technology transfer.

Technology transfer, of course, is big business – there's no shortage of donor money out there for projects that seek to implement the latest and greatest proven Western innovations in a development context, and there are countless tens of thousands of jobs that keep the whole machine running. A lot has to change if the development community is to face up to all its new realities, yet it's looking more likely that the destiny of the discipline lies in the hands of the very people it originally set out to help.

So, if the future of ICT4D is not university students, NGOs or business graduates devising solutions in labs and hubs thousands of miles away from their intended users, what is it?

I'm not usually one for making predictions but it is my ten year anniversary in mobile, so here's a biggie.

Development is changing, powered by accessible and affordable liberating technologies and an emerging army of determined, local talent. A local talent that is gradually acquiring the skills, resources and support it needs to take back ownership of many of its problems – problems it never took original ownership



Image courtesy of kiwanja.net

“Development is changing, powered by accessible and affordable liberating technologies and an emerging army of determined, local talent.”

of because those very skills and resources were not available. Well, now they are.

The ICT4D community – education establishments, donors and technologists among them – need to collectively recognize that it needs to adjust to this new reality, and work with technologists, entrepreneurs and grassroots non-profits across the developing world to accelerate what has become an inevitable shift. Or it can continue as it is, and become increasingly irrelevant. “Innovate or die” doesn't just apply to the technologies plied by the ICT4D community. It applies to the ICT4D community itself.

KEN BANKS, founder of kiwanja.net and FrontlineSMS, devotes himself to the application of mobile technology for positive social and environmental change in the developing world. He has worked at the intersection of technology, anthropology, conservation and development for the past 20 years and, during that time, has lived and worked across the African continent. His latest project, Means of Exchange, helps reconnect communities with local business, local resources and each other.

trends



■ According to the 2013 Sustainability Leaders survey, produced jointly by GlobeScan and SustainAbility, the private sector outperforms only the world's national governments when it comes to effectively addressing sustainability challenges. That is to say, they are second to last.

Still, a handful of companies – and one in particular – are highly regarded. Unilever continued its reign as the top-ranked company and actually increased its score, according to the survey, which is based on the responses of 1,170 “qualified sustainability experts” polled in early 2013. Companies are

named on a top-of-mind basis – that is, they are asked to name leadership companies but aren't given a list from which to choose.

Another top-tier company was Patagonia, which “catapulted to the No. 2 position on back of strong gains in last year,” according to the study.

Interface and Walmart round out the top four, with 10 additional companies are clustered roughly with similar rankings: (in descending order) GE, Marks & Spencer, Puma, Nike, Coca-Cola, Natura, IBM, Google, Nestlé and Novo Nordisk.

Nearly all of these “sustainability leaders” are headquartered in the Global North. Companies from the emerging economies of Brazil, Russia, India and China, are for

BUSINESS MATTERS

Innovative city of the year

Medellín, Colombia, has been declared the world's most innovative city. An online contest was organized by Citibank and the Marketing Services Department of the *Wall Street Journal* Magazine together with the Urban Land Institute. Voters were asked to vote for a list of 200 cities, and a first round of voting brought the list down to 25. Another round of voting produced three finalists: New York City, Tel Aviv and Medellín.

Announcing the winner in early March 2013, the Urban Land Institute (ULI) noted, “Few cities have transformed the way that Medellín, Colombia's second largest city, has in the past 20 years. Medellín's homicide rate has plunged, nearly 80% from 1991 to 2010. The city built public libraries, parks and schools in poor, hillside neighbourhoods, and constructed a series of transportation links from there to its commercial and industrial centers. The links include a metro cable-car system and escalators up steep hills, reducing commutation times, spurring private investment, and promoting social equity as well as environmental sustainability.”

ULI continued, “A change in

the institutional fabric of the city may be as important as the tangible infrastructure projects. The local government, along with businesses, community organizations, and universities worked together to fight violence and to modernize Medellín. Transportation projects are financed through public-private partnerships; engineering firms have designed public buildings for free; and, in 2006, nine of the city's largest firms funded a science museum. In addition, Medellín is one of the largest cities to successfully implement participatory budgeting, which allows citizens to define priorities and allocate a portion of the municipal budget. Community organizations, health centres and youth groups have formed, empowering citizens to declare ownership of their neighbourhoods.”

Many of Medellín's suburbs line the steep slopes of the Aburrá Valley, making the city an urban planner's nightmare. For many of the city's residents, the journey to the centre of town was a long and arduous one, involving crowded diesel buses and shared taxis, negotiating narrow, hilly roads. Then, Medellín's authorities came up with an innovative solution: six cable-cars that link the outskirts to the city centre.

Photo: Deutsche Welle Global Ideas



the most part notable by their absence. Only Brazilian cosmetics manufacturer, Natura, ranks among the top 15 companies.

■ GE's third annual "Global Innovation Barometer" has found that while business executives continue to value innovation as a strategic priority, one in three report concerns over their ability to maintain a competitive edge in a faster-paced, more globalized and

resource-constrained environment.

This emerging "Innovation Vertigo" – an uneasiness with the changing dynamics of today's business landscape and uncertainty over the best path forward – is challenging leaders to think differently about how they will achieve growth. Many executives, however, seem to be embracing this complexity by exploring new and sometimes unexpected opportunities to innovate.

"Innovators must be resilient or risk being left behind," said GE's Beth Comstock. "Change has become constant and we see leaders responding by betting big on more unconventional approaches to innovation to unlock growth. At GE, we are exploring different markets, partnership structures and business models – all in the pursuit of uncovering new ways to better serve our customers and meet the world's biggest challenges head on."

The Barometer was conducted by an independent research and consulting firm to explore how business leaders around the world view drivers and barriers to innovation, and how those perceptions influence strategy. GE expanded the study this year by surveying more than 3,000 senior business executives in 25 countries, all with direct involvement in their companies' innovation strategy and decision-making.



Rising to the challenge

A Pan-African science education initiative is supporting students in an effort to boost post-graduate degrees and reverse brain drain. The Regional Initiative in Science and Education (Rise) supports promising science and engineering students pursuing advanced degrees in sub-Saharan Africa. The programme hopes to boost higher-education in engineering and science across the continent – mainly through a series of international networks that connect universities, students, civil society and industry.

Arlen Hastings, executive director of the Science Initiative Group, which launched Rise, said, "The rationale behind the programme was that there are many pockets of excellence around Africa, but there aren't that many African universities, outside of South Africa, that have the capacity to provide comprehensive PhD programmes in science and engineering. However, if you take elements, pieces from each of a bunch, you can put together a pretty strong education."

Rise has five subject-based networks – covering material and engineering science, natural products, biochemistry and

informatics, water resources and the western Indian Ocean region – which provide students with expertise from all over Africa. Rise's PhD candidates are required to have at least two advisers. One must be from another university in the network.

The Science Initiative Group at the Institute for Advanced Study in Princeton, New Jersey, USA, first started accepting applications for Rise in 2007 under a US\$3.3m grant from the Carnegie Corporation. By 2008, the initiative had selected its first three grantees from a pool of 48 proposals. Four years later, Rise is supporting 63 Master's and 67 PhD students.

But creating academics isn't the same as retaining them, so Rise also focuses on training grantees locally. Joseph Borode, a coordinator for Rise's material science and engineering network, says that before Rise the best option was often to send students abroad for training, but many never came home, meaning, he says, that the investment in their study abroad "had no return". To reverse the "brain-drain", Rise incentivizes students to stay in their home countries by building supportive research communities, opening connections and paving the way to faculty positions, Hastings says.

Innovation has always played the decisive role in countries' economic and social development: it is the principal source of economic growth, it provides the basis for improving productivity, it is the foundation of competitiveness and it improves welfare. Today, with the world in the midst of a serious economic crisis, the application of newer vintages of technology can be the means to re-launch, recreate and reinvigorate economic activities worldwide. At the same time, major environmental challenges require wide-ranging changes in patterns of production and consumption, and these can only be achieved by the application of innovative solutions.

Innovation is fundamentally the task of the private sector and entrepreneurs, but history has shown us that at times of major transformations and crises, the role of governments has always been crucial. It is only governments that can assume the risks involved in the launching of large-scale programmes that help renew infrastructure, and it is only governments that can facilitate nationwide learning processes for innovative initiatives. Only governments can legitimately impose requirements relevant to the educational, research and other knowledge sources which are needed to cope with deep and rapid technological change. And, in most instances, it is only governments that can fund the adaptation of these requirements.

As more and more countries start to formulate policies designed to support innovation, the experiences and existing good policy practices of dynamic economies, especially those in the developing world, can provide important lessons. One of these lessons is that effective and efficient approaches are based on an understanding that innovation policy must coherently address the overall innovation climate. This goes far beyond traditional science and technology policy, and involves many government departments in a 'whole of government' approach.

Government action

Government action can usefully focus on a few generic functions. In the first instance, this means supporting innovators by providing the necessary technical, commercial and other services. Services of strategic relevance for innovation policy include basic industrial services like promotion, marketing, and internationalization; technology extension services; metrology, standards, testing, and quality control; innovation in organization and management; and information and communications.

Innovation policy: why, what and how

Frank L. Bartels considers the basics of innovation policy for developing countries

Governments can also reduce (or better still) remove, obstacles to innovation. This means combating anti-competitive and monopolistic practices, suppressing bureaucratic hurdles and adapting the regulatory framework to support the search for and diffusion of novelty. This action requires the mobilization of many areas of government, including taxes, customs, procurement and standards. It has the additional benefit of allowing 'sunset' businesses to fade away, thereby releasing resources.

Intervening to strengthen the research and development (R&D) base is another government function, but one that many developing countries have found to be prohibitively expensive. The bulk of the world's R&D effort has traditionally taken place in the OECD countries, although recently emerging economies such as Brazil, China, India and Russia have become significant investors in R&D.

More generally, the quality of the educational system can help form a receptive and creative population. Support for the complementary competencies needed for innovation, such as engineering, design and business, should be provided, while "soft" skills, such as problem-solving, communication and teamwork, are also important. Governments in developing countries should understand that for innovation to develop, young people need to learn additional skills relating to functional literacy and the ability to 'think outside the box'.

For each of these functions, economically advanced, as well as less advanced, countries offer good practices that can be adopted and

adapted through 'local lenses' to local conditions and contexts. Depending on a country's technological competence and the quality of its business environment, any one government will need to choose its goals and strategies. After focusing on the prime movers - those entities that drive the innovation that makes a difference in the marketplace - and creating innovation endowments, such as technology centres, science parks or export zones, a government will need to build critical masses of innovative and entrepreneurial initiatives. This can be done by promoting industrial clusters, actively attracting foreign direct investment (FDI) and possibly even creating new cities.

Innovation systems

Government innovation policies are increasingly focusing on innovation systems, a concept which stresses that it is not only inputs, such as research expenditures, and outputs, such as patents, that are important. Equally crucial is the interaction between the actors that are needed in order to turn an idea into a process, product or service for the market. In other words, the flow of technology and information among people, enterprises and institutions is the key to an innovative process.

The study of national innovation systems directs attention to the linkages or web of interaction within the overall innovation system, and an understanding of these systems can help policymakers develop approaches for enhancing innovative performance in today's knowledge-based economies.

One recent example of such a study was carried out by the United Nations Industrial Development Organization (UNIDO), and looked at Ghana's National System of Innovation. The 18-month-long survey, concluded in late 2012, was conducted in conjunction with Ghana's Ministry of Trade and Industry and

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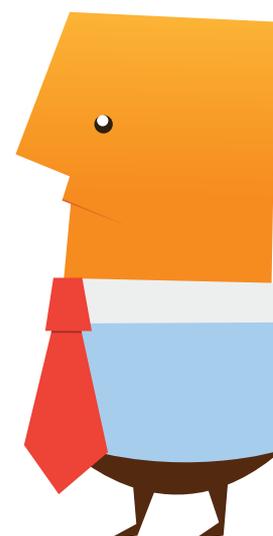
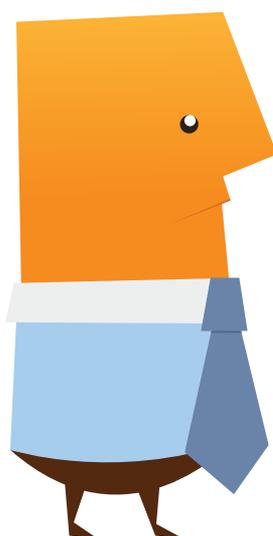
key national stakeholders, the Kwame Nkrumah University of Science and Technology (KNUST), and the Science and Technology Policy Research Institute (STEPRI).

The subsequent report, *Ghana National System of Innovation (GNSI) – Measurement, Analysis and Policy Recommendations*, surveys and depicts, for the benefit of policymakers, the essential and systemic features of the innovation landscape in Ghana.

The report contained the following conclusions:

- The Ghana National System of Innovation (GNSI) suffers from low concentrations of organizational capital, which prevent system-wide combinations of skills and assets from delivering significant productivity increases based on science, technology, engineering, mathematics and information technology.
- The quality of market demand is characterized by a few islands of sophistication in a sea of simplicity. This situation dissuades the manufacturing and service sectors from innovating in order to offer products of enhanced quality and value.
- The organizational constraints within the GNSI and their bearing on the actors within it are unusually high. These constraints, mainly relating to managerial rigidities and investment risks, combine to thwart adaptive behaviour and prevent actors from responding to market signals.
- The application of fiscal and monetary schemes falls short of fully supporting the risk appetite of innovators and businesses in the early stages of ideation (the creative process of generating, developing and communicating new ideas), invention and start-up.

The gist of the report points to the GNSI being fragile, with an asymmetric distribution of actor linkages and with low-density relationships between the actors. The policy instruments that are available are neither



calibrated nor configured to successfully overcome the barriers to, and constraints on, innovation. The major implications are that there are few or no externalities from the public goods of funding research institutions. Furthermore, business enterprises have little access to external sources of ideation, and knowledge-based institutions' outlets to markets through intermediation and commercialization are highly restricted. Based on these findings, the report makes a number of recommendations in relation to policies to enhance the country's innovative performance.

In conclusion, accelerating sustainable development requires new industrialization approaches that exploit knowledge and

innovation. Such policy approaches represent the crucial elements of any economy's ability to enhance its competitiveness and economic growth. The national system of innovation (NSI) represents the strength and quality of systematically organized interactions between governments, knowledge-based institutions, industry and financial arbitrageurs (those entities, such as banks or brokerage firms, that engage in the practice of taking advantage of a price difference between two or more markets). The NSI's characteristics, and the policies that shape them, are the critical determinants of efficiency and effectiveness in the application of science, technology and innovation.



How does innovation impact on development? How, and under what conditions, do entrepreneurs in developing countries innovate? And what can be done to support innovation by entrepreneurs in developing countries? **Wim Naudé** and **Adam Szirmai** investigate.

Taking a leap

Innovation and entrepreneurship in developing countries

Innovation is the driving force in development; without innovative entrepreneurs we would not have most of the tools and services that provide many of us with a prosperity today that far exceeds that of ancient emperors. From birth control to the internet, innovation has fundamentally changed the world. Despite this, most of the work on understanding the process of innovation and its relationship to public policy has been conducted in economies at more advanced stages of development. Several authors have even downplayed the importance of innovation for developing countries. In a similar fashion there has been a resurgence of interest in the role of entrepreneurship in innovation, employment creation and economic growth, but ►

► in this literature the primary focus is on the advanced economies.

Together with Micheline Goedhuys, we edited a book, *Entrepreneurship, Innovation and Economic Development*, published in 2011 by Oxford University Press, which deals with these relatively neglected issues, and argued for a better understanding of the roles that entrepreneurs can play in innovation even in the poorest countries. The book focuses in particular on the entrepreneurship–innovation nexus in the context of development. In this article, we share some of the findings from the book.

Defining innovation

The *Oxford Handbook of Innovation* describes innovation as the putting into practice of inventions. In a narrow sense, innovation refers to product and process innovations, or technological innovation. In a broader sense, innovation is the development of new products, new processes, new sources of supply, as well as the creation and exploitation of new markets and the development of new ways to organize business.

Different types and degrees of innovation may take place across different stages of development. Many entrepreneurship scholars in the West believe (largely mistakenly in our view) that innovation is not really important for economic growth and development in less developed (so-called “factor-driven”) economies. We believe that these types of broad-brush generalizations about the nature of economic growth understate and underestimate the importance of innovation in earlier stages of development. One reason is that one should distinguish between incremental innovations and more radical innovations, and between innovation that is new to a country or firm and innovation that is new to the world. The former type of innovation is imitation, where developing country entrepreneurs adopt new products or processes from the rest of the world. Such innovation can play an important role in technological upgrading and increasing the utilization and the efficient allocation of production factors. China’s development achievement is an example of this – despite being classified by some Western economists as being in the factor or efficiency stages of growth, it is outperforming many rich countries in terms of innovation – more patents were for instance filed in China in 2011 than in the USA.

Another reason is that several developing countries have indeed experienced rapid economic catch-up – in a sense, leapfrogging de-

velopment. They were able to absorb and creatively adapt international technological knowledge and thus to achieve accelerated growth. Such adoption of existing technologies goes beyond mere imitation – it is an example of creative and innovative behaviour and examples are provided in our book. Alice Amsden argues that privately owned, domestic firms in East Asia were better at adopting and absorbing technologies from advanced economies than foreign-owned firms. Erik Stam and André van Stel highlight how adoption of foreign technology provides entrepreneurs with a potential to create new markets and contribute to structural change and self-discovery.

“Several developing countries have indeed experienced rapid economic catch-up – in a sense leapfrogging development.”

Entrepreneurship and firms

Entrepreneurship refers to the discovery and exploitation of opportunities. It plays a potentially important role in development, including in cost discovery, gap filling, accumulation of human and physical capital, input completion, reallocation of resources from less productive to more productive resources, and supporting the process of structural change. In this book we focus in particular on incentives, policies and institutions that liberate the productive potential of entrepreneurship in development. Here, three strands of work on entrepreneurship are distinguished. The first strand defines entrepreneurship as a creative, dynamic characteristic of actors, be it the managers, owners of small enterprises, or heads of departments. In this strand there is hardly any distinction between entrepreneurship and innovation. The second strand of literature focuses on firm behaviour. Here we can make a clear distinction between innovative and non-innovative firms. The third strand of literature focuses on a subset of firms, namely owner-operated firms. Owner-operated firms are usually small and medium-sized but can also include large firms. In this strand we can also make

the analytically desirable distinction between innovative and less innovative entrepreneurship.

An important question throughout the book asks who are the innovative actors in a developing country context. Are these large domestic firms, subsidiaries of multinationals, owner operated small and medium enterprises or micro enterprises? Alice Amsden points out that large private-owned enterprises are much more flexible and innovative than the subsidiaries of foreign-owned firms and that the importance of privately owned enterprises in East Asia explains the economic success of this region, as compared to the foreign-dominated economies of Latin America.

Other authors in our book emphasize the importance of small and medium-sized enterprises. They account for a very substantial part of employment in developing countries across the globe. Most small scale entrepreneurs however are survival entrepreneurs and are hampered by weak infrastructure, lack of finance and lack of capabilities. The systems of innovation are often not providing the best incentives for entrepreneurs to become more innovative. However, in our book, Jaap Voeten et al. provide an encouraging example of innovative behaviour amongst clusters of handicraft enterprises in Vietnamese villages, which are transforming themselves through new products or more advanced production techniques.

Policy implications

Promoting innovation by entrepreneurs across the stages of development therefore seems justified. But how? Answering this question first necessitates raising the question, why do entrepreneurs innovate? The answer is they are driven by profit motives. Adam Smith realized that although entrepreneurs act in pursuit of their own profits, they may generate benefits to the broader society in the process, and that there is a link between the degree to which the entrepreneur will engage in innovation and the size of the market. Markets can thus be seen as important drivers of growth and development.

In the poorest developing countries, markets unfortunately fail to fulfil this driving role. Developing country markets are often small, fragmented and imperfect, due to lack of infrastructure, low per capita incomes, misguided policies and institutional constraints. The political stability, predictability and transparency, peace and other institutional prerequisites for the functioning of markets

are often absent. With fragmented, small and uncertain markets there is often insufficient incentive for entrepreneurs to innovate. Where markets are restricted because of barriers to trade (either natural barriers such as lack of infrastructure or man-made barriers) it is difficult for innovations to spread. Through the ages, international trade has exposed traders and merchants to new ideas, and technologies. This is one of the reasons why trade functions as an engine of growth. Where markets are restricted by inappropriate regulations or strangled by predatory governments or monopolies, there is no incentive for entrepreneurs to introduce innovations that are new to the firm. And where inappropriate property rights and contract enforcement makes any returns on innovative activity risky, there will be little incentive for entrepreneurs to invest in innovations, new to the domestic market or new to the world.

While broadening the market may be one of the necessary conditions for innovation, it will often not be sufficient. The reason is that innovation is increasingly knowledge and skill-intensive. Because of the positive externalities inherent in investment in knowledge, technological advance and human capital, public policy has been increasingly recognized as having an important complementary role to play in fostering entrepreneurial innovation. Innovation requires not only highly knowledgeable, experienced, and skilled entrepreneurs, but also highly skilled labour. Thus, educational policies and capability-building are important public policies.

Without the latter, well-meaning donor and development organization policies may fail to stimulate innovation. For instance, trade liberalization is often prescribed for small developing countries as a development strategy, assuming that knowledge will automatically and without friction flow to these countries, not taking into account the need for absorptive capacity. Donors often promote competition through private sector development programmes, not realizing that with too much competition, there may be little opportunity for entrepreneurs to recoup investments in innovative activities, particularly if domestic financial markets are underdeveloped and entrepreneurs have to finance innovation out of profits. Thus, in the absence of careful government interventions and policies, the operation of markets may result in underinvestment in knowledge and innovation. Nowadays, ‘innovation policy’ and ‘national innovation systems’ have become a

standard part of the economic growth discourse in both advanced and developing economies.

The interplay between market development, systems of innovation and government science, technology and innovation policies is an important theme of this book. For instance, Sunil Mani shows that in India the emergence of private institutions and initiatives to complement government support programmes for innovation, as well as an increased availability of skilled labour, were essential for the fast growth of the country’s ICT sector.

Many developing country governments have in recent years attempted to overcome some of the weaknesses in the institutional environments by supporting business incubators. Semih Akçomak provides a discussion of incubators as tool for innovation in developing countries. He proposes eight dimensions of a good incubator policy, including clarity of mission and purpose; clear selection, entry and exit criteria; managerial capacity and incubator management skills; engage-

“Sometimes, even an adverse environment can spur innovative behaviour, and entrepreneurs may become the drivers of policy and institutional change.”

ment in constant monitoring and performance evaluation of participating firms; strategic selection of services; minimization of start up costs and red tape; a focus on intangible services rather than tangible services such as office space or infrastructure; promotion of networking as a deliberate strategy; and lastly, financial sustainability.

Finally, there is the puzzle of how many entrepreneurs succeeded in innovating in often deeply adverse environments, characterized by overregulation, high cost of doing business, weak enforcement of property rights, poor capital markets and underdeveloped markets. India is a case in point, as discussed by Suma Athreye. In India it seems, adversity promoted creativity. She finds that the very success of the software industry was a source

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ADAM SZIRMAI is Professorial Fellow at UNUMERIT and Professor of Development Economics at the Maastricht Graduate School of Governance, University of Maastricht.

of subsequent improvement in the institutional environment – not brought about by government taking the lead, but by institutional entrepreneurship. As she puts it, the “impetus for institutional reform has not come from government, international institutions or their advisors, but primarily from the business sector itself.”

There are three general lessons from our book. First, the impact of innovation is important across countries and institutional contexts. Entrepreneurs in developing countries provide innovations that are important for firm and country growth. Innovation can play an important role in catch-up and growth in a global economy. This is so, first and foremost, through the varied innovations of local entrepreneurs, but also through the role of entrepreneurs in advanced countries where innovations are generated and applied in to developing country context.

Second, large and small firms can be equally innovative, but in different ways. In our book there is a strong emphasis on small and medium enterprises, as these predominate in developing (and many advanced) countries but which also face particular constraints to innovation. Often such small firms contribute to growth, but not optimally, since they lack innovativeness. Here, characteristics of the entrepreneur (education, age, experience, networks), the region (location), and the sector (technological intensity) were identified to be important determinants of innovation.

Third, the policy and institutional environment is an important determinant of entrepreneurs’ innovative behaviour. Governments need to support innovation directly and indirectly. This can take many forms – from reform of the environment for doing business, to providing venture capital, to tapping into migrant workers and diasporas, provision of technical and managerial education, infrastructure, and state–private sector partnerships. Sometimes, even an adverse environment can spur innovative behaviour, and entrepreneurs may become the drivers of policy and institutional change.

More

with less:

resource scarcity as a catalyst
for green industrial development

KEYNOTE

Peder Holk Nielsen,
the CEO of Novozymes,
a Denmark-based
biotechnology company,
explains how bio-based
products are improving
manufacturing
processes and saving
resources and costs.



PEDER HOLK NIELSEN took office as President and CEO of Novozymes on 1 April 2013. Up until his appointment as CEO, he served as Executive Vice President and Head of Enzyme Business from 2007-2013. During his 28-year career at Novozymes and Novo Industri/Novo Nordisk, Nielsen has played a central role in the development of Novozymes in its current form. On taking office as CEO, he said, "Our success rests on our ability to bring new innovation to our customers, and our ability to find new ways biotechnology can help them improve their products and make more with less. A key focus for me will be to make sure we bring these innovations to the market even faster than we do today." ➤





► Industries all over the world face an uphill battle in meeting the material needs of a rising global population at a time when natural resources are dwindling. To respond, industries must rethink the way they produce their goods. By sourcing raw materials from sustainable sources, minimizing water and energy use, and replacing harsh chemicals with biologically derived alternatives, they must put sustainability at the heart of their – and the world’s – growth.

Bio-based products are already making this transition possible. They are greening value chains in diverse industries such as textiles, paper, food and detergents, helping boost agricultural yields, and making biofuels from trash a commercially viable alternative to gasoline. They are reducing energy and resource costs for businesses, and raising living standards of millions of consumers, especially in emerging markets, without stretching natural resources to breaking point.

Inspired by nature

Biotechnology has long had an impact on human society. Legend has it that ancient herders in Central Asia accidentally discovered cheese by carrying milk in bags made from calves’ stomachs, which contain the coagulating enzyme rennin. Baking, brewing and alcohol production are other examples of enzyme processes known since prehistoric times. Despite their fierce reputation, the Vikings are believed to have comforted their infants by giving them pacifiers made of a piece of bread wrapped in cloth. The enzyme amylase, found in human saliva, broke down the bread releasing sugars which kept the child happy.

Perhaps it is fitting that Novozymes, a Denmark-based biotechnology company founded in 2000, but with roots dating back to the 1920s, is inspired by nature and is today the world’s biggest producer of industrial enzymes.

Enzymes are basically proteins that help speed up biochemical reactions in all living organisms. Among many other uses, enzymes convert food in our stomachs into energy, turn fallen leaves into compost, help soften leather and increase the clarity of apple juice. As they have one unique function, and cause no side effects, enzymes are ideal tools for use in clean industrial production.

Novozymes’ scientists have sought micro-organisms, and the enzymes they produce, in diverse natural habitats. They have dredged Arctic lakes for enzymes that survive extreme cold, which makes them suitable for use in laundry detergents effective in cold water. Conversely, they have tapped geothermal springs to find micro-organisms resistant to high temperatures, and therefore optimal for use in baking. Our researchers have discovered enzymes that function in harsh environments such as places lacking oxygen, or in highly-alkaline soil, and then optimized them for use in industrial processes mimicking these conditions.

Today, Novozymes supplies enzymes to over 40 industries, where they are used to turn agricultural waste into biofuel, replace oil-based chemicals in detergents, and keep bread fresh longer, among others. We see these solutions as steps on the way to attaining a bio-based economy, which is built on a sustainable, low-carbon approach to energy and production.

Innovating with industry

Innovation is the cornerstone of the bio-based economy, and lies at the heart of Novozymes' business. Research and development (R&D) forms the backbone of our company, absorbing more than 20% of its global workforce, and 13-14% of its revenues. We have built up a unique industrial biotechnology platform, including microbiology, protein engineering, bioinformatics, assaying and fermentation technology, which helps us undertake innovation in step with market needs and in close collaboration with customers. Early customer involvement in product development allows us to quickly find out if a proposed product will perform as intended, whether it satisfies customer needs at relevant cost, and what, if any, are its competitor technologies.

Given our commitment to embed sustainability throughout our value chain, we use Life Cycle Assessment (LCA) to understand better the future potential of our R&D pipeline. LCA is a method of measuring the environmental footprint of a product, process or service from design and manufacture through to use and disposal. The idea is to gain an understanding of what in our pipeline could reduce environmental impact in the industrial area in which it is deployed. These sustainability considerations are included in the process which determines whether a particular product finally comes to market. Typically, Novozymes brings 6-8 new bio-innovations to market per year, and holds some 7,000 granted or pending patents in total.

Cleaner textiles, detergents and plastics

We recognize that our customers buy our products to improve manufacturing processes and save resources and costs, which in turn improves their sustainability. A vivid illustration of how this works comes from the textile and fashion industry. Some nine million tonnes of knitwear – typically used for making t-shirts – are produced annually, consuming vast amounts of water and energy. This has a profound impact on water security, not least in China, which is the world's largest textile producer.

A Novozymes LCA shows that, by moving away from traditional chemicals and adopting enzymatic solutions, textile manufacturers save 70-90,000 litres of water and around one tonne of carbon dioxide (CO₂) emissions per tonne of knitwear. Were these solutions applied in the textile industry globally, there would be potential savings of 630 billion litres water and nine million tonnes of CO₂ annually. That equals drinking water for 24 million Chinese living in rural areas and taking two million cars off the road.

By replacing chemicals with enzymes, manufacturers can reduce the consumption of water, energy and chemicals in many stages of textile processing. For instance, the enzyme, pectate lyase, acts in a targeted way to degrade pectin and remove wax from raw cotton. This enables the textile scouring process to take place at lower temperatures, and reduces the number of rinsing baths needed. In the 1980s, Novozymes' enzymes replaced the pumice stones traditionally used in making the wildly popular stonewashed jeans, leading to huge savings of water while improving ➤

► the lifespan of the fabric. Moreover, as enzymes deactivate into tiny pieces of protein and carbohydrate that function as food for beneficial micro-organisms, and later degrade into harmless compounds, they greatly reduce the environmental impact of effluent from textile mills.

Big gains are also witnessed in the detergent industry where enzymes make it cheaper and more effective to do laundry. Enzymes such as protease, lipase and amylase improve stain removal even when clothes are washed at 30 degrees Celsius, down from typical wash temperatures of 60 degrees, thereby cutting energy and chemical use. That translates into lower electricity bills and fewer CO₂ emissions for consumers.

In 2012 alone, we helped customers reduce their CO₂ emissions by an estimated 48 million tons – corresponding to CO₂ emissions from 12 large, coal-fired power plants – by the application of our various biosolutions. It is our ambition to enable a 75 million ton reduction in CO₂ emissions in 2015.

And there are still more gains to be had. Last year, Novozymes developed a micro-organism – a fungus – that enables production of malic acid from renewable raw materials instead of oil. Malic acid has significant potential as a building block in the chemical industry. It belongs to a group of acids which can be converted into 1,4-butanediol, a veritable Swiss Army knife of the industry, and which can be further converted into numerous chemicals, including plastics, polymers and resins for use in everything from printing inks to cleaning agents.

In producing biochemicals, renewable raw materials such as starch from corn or cellulosic biomass from agricultural waste are converted into sugars, which are, in turn, transformed into chemical building blocks by specifically-designed micro-

organisms. These biochemicals provide an alternative to oil-derived chemicals, helping address issues of energy security, price stability and CO₂ emissions. Analysts and researchers estimate that biochemicals could contribute as much as 17% of the global chemical market by 2025.

Investing in partnerships

To fully realize the potential of the bio-based economy, innovation must be scalable, address market challenges, meet consumer needs and, ideally, involve stakeholders across business and social value chains and across the globe.

For instance, hundreds of millions of women in the developing world have no choice but to feed their families with meals cooked on stoves fired with solid fuels like charcoal, which is produced in ways that lead to deforestation. Pollutants from the cooking smoke linger in their small, poorly-ventilated homes, causing an estimated two million deaths annually, as well as underweight births, cancer, respiratory disease, and increased rates of infant mortality. Moreover, nearly a third of Africa's seven million square kilometers of forest have already been burnt for charcoal, causing biodiversity loss and a huge release of greenhouse gases, while making areas more susceptible to flooding or drought.

These elements have combined to create a perfect storm of environmental and health problems in Mozambique. But there now exists a clean, bio-based and sustainable solution to meet the rising demands for food and cooking fuel in that country's rapidly-expanding urban areas.

In 2010, Novozymes initiated the CleanStar Mozambique (CSM) programme, which has since convinced thousands of smallholder farmers in Mozambique's Sofala province to move away from



slash-and-burn agriculture and charcoal production. Instead, they cultivate a range of crops and trees that improve their food security, rejuvenate soil through crop rotation, and sell any surplus crops to the CleanStar Mozambique (CSM) company.

In turn, CSM operates a local food and ethanol cooking-fuel production facility and produces a range of food products, as well as a clean, cheap, renewable and safe ethanol-based cooking fuel made from cassava, a crop which is widely cultivated in the area. These products, as well as clean-burning ethanol cooking stoves, are then sold in local, urban markets.

Novozymes brings to CSM its financial and business development support, as well as enzyme solutions used in food, agriculture and bioenergy industries. Other project partners provide expertise in agroforestry, engineering, ethanol cooking stove manufacture and carbon finance.

Today, CSM has over 5,000 cooking stove and fuel customers, and has engaged more than 1,200 smallholder farmers. It is on track to meet and improve on its goal of 4,000 hectares of avoided forest destruction per year in 2014. CSM's first cooking fuel plant, also in Sofala province, is targeting sales of 20 million litres per year in 2014, to serve 80,000 households.

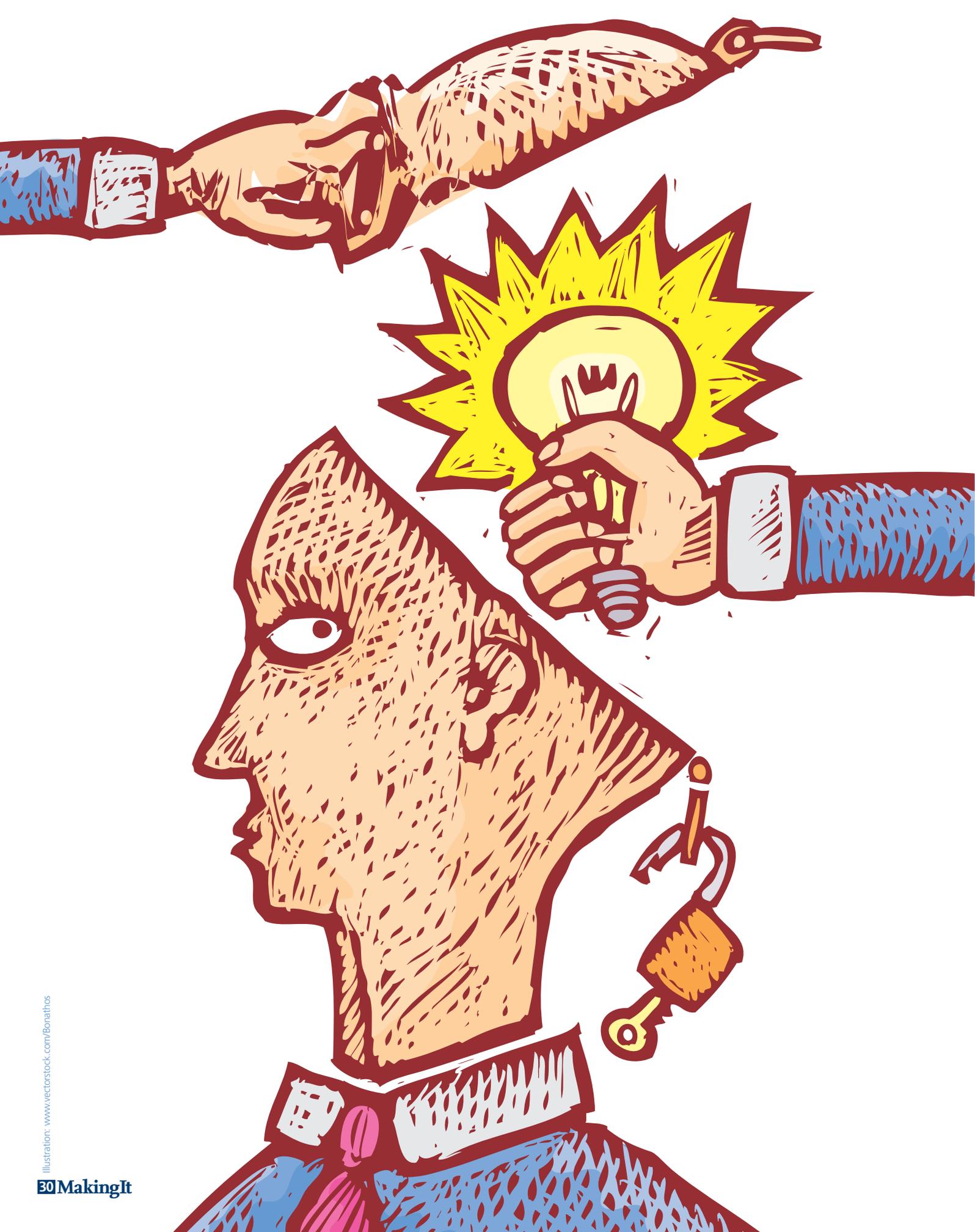
Novozymes believes the CSM model is replicable and scalable in many parts of the developing world, including in over 40 major cities in sub-Saharan Africa, where the urban poor rely on increasingly expensive charcoal. The model will improve market access for local farmers, build sustainable and restorative bio-based markets, deliver clean and affordable energy, and help curb global greenhouse gas emissions.

Leading industry by example

While promoting sustainable solutions to industry and society, we are determined also to make Novozymes' value chain more sustainable. We source all electricity for our operations in Denmark from CO₂-neutral wind power, and have improved energy efficiency 38% and water efficiency 32% in 2012, as compared with 2005. Furthermore, the company's production facility in Kalundborg, Denmark, is part of the world's first functioning industrial symbiosis, where the residual product originating from one enterprise in an industrial cluster, including energy, biotechnology and pharmaceutical companies, becomes the raw material of another enterprise. Residual products traded include steam, dust, gases, heat, slurry or other waste that can be transported physically between the enterprises. Organic waste from Novozymes' facility is distributed to local farms for use as fertilizer.

Recently, our desire to put sustainability and clean solutions at the heart of industry led us to join UNIDO's Green Industry Platform. We enthusiastically share its ambition of promoting cleaner production and scaling up the availability of existing technologies that are proven to work.

Biotechnology and the bio-based economy can dramatically reduce resource consumption and waste, improve energy security and foster green growth, at a time when climate change action and global economic recovery are top of the agenda. Industry must seize the chance to be a part of this brave, new and sustainable future. ■



Jugaad is a Hindi word that roughly translates as “overcoming harsh constraints by improvising an effective solution using limited resources”. **Navi Radjou, Jaideep Prabhu** and **Simone Ahuja** see *jugaad* (and its equivalents) as a powerful approach to innovation that is most active in the emerging markets of Asia, Africa and Latin America. It has the benefits of being frugal, enabling innovators to do more with less. It is flexible, supporting improvisation and iteration. And it is inclusive, bringing in the knowledge of diverse swathes of customers and employees alike, while addressing the needs of previously marginalized consumers.

Use **JUGAAD** to innovate faster, cheaper and better

Jugaad innovators don't view customers as merely passive users of their products and services. Recognizing the diversity of customer needs, they invent new solutions from the ground up by working closely with marginal groups to identify their unique needs. They then engage local communities and partners to set up a grassroots value chain to locally build, deliver and support their solu-

tions – making these solutions, in turn, affordable, accessible and sustainable.

For instance, to effectively serve the six hundred million unbanked Indians, Yes Bank is constantly experimenting with new technology-powered inclusive business models that tap a vast network of partners. The Yes Money service is one such initiative. As part of this initiative, the bank has teamed up with

various payment platform companies like Suvidhaa Infoserve and Oxigen Services which offer payment services through about two hundred thousand ‘mom-and-pop’ retail stores in urban and rural areas. Yes Bank has helped these companies to deploy a specialized “domestic remittance” module, allowing, for example, migrant workers in cities to send money to their families in far-flung villages ►

“Jugaad innovators cleverly employ technology – especially mobile computing – to reduce the cost of delivering services to marginal segments. They also leverage technology to customize their offerings on a large scale.”

►through the National Electronic Fund Transfer system. Compared to money order remittance services (offered by India Post, a government undertaking), Yes Money is about five times cheaper and five times faster. Yes Money also offers a cost-effective alternative to Western Union. Moreover, the majority of the fees collected are passed back to the payment platform companies and the retailers – creating value for all partners in the Yes Money ecosystem.

Like Yes Bank, Zone V is positioning its products as tools for economic empowerment rather than for passive consumption. Zone V's phones can therefore enable blind women in rural India to manage not only the finances of their households but also those of their neighbours and the village council. In this way, the individual phone becomes a vehicle for driving socio-economic growth in an entire community. To make all this happen, Zone V will rely on a host of partners. It has outsourced its design and manufacturing to contract engineers and manufacturers, and relies on non-government organizations like Sightsavers to distribute its phones in emerging markets like India – especially in rural areas. More important, Zone V will create a platform for third-party software developers to develop “inclusive apps” for its phones. These apps will be available at different price points depending on the customer segment and the phone being used. Abhi Naha, CEO of Zone V, believes that many mobile app developers will be motivated to create solutions that meet the basic needs of blind people worldwide.

In emerging markets, *jugaad* innovators often partner with state-level and local governments to make health care, education and financial services more inclusive. For instance, GE Healthcare has signed a performance-based service contract with the government of the Northwestern Indian state of Gujarat.



Under the terms of this public-private partnership agreement, GE-trained partners will operate and maintain all the medical equipment installed in government-run hospitals in the smaller cities of Gujarat. Rural hospitals, for their part, won't need to invest in expensive equipment or scramble to recruit qualified technicians. Nevertheless, they will be guaranteed higher equipment uptime and lower utilization costs – all of which will translate into cost-effective and high quality care for rural patients.

Jugaad innovators cleverly employ technology – especially mobile computing – to reduce the cost of delivering services to marginal segments. They also leverage technology to customize their offerings on a large scale. A case in point is Reuters Market Light (RML), a mobile phone service developed by Thomson Reuters in India. RML delivers to farmers customized and localized weather forecasts, local crop prices, agricultural news and other relevant information (namely relevant government aid schemes), in the form of three SMS messages sent daily to their mobile phones in the local language. Such customized and

timely information enables farmers to better plan their activities such as irrigation, fertilizer use and harvesting. As a result, farmers can better manage risks and improve their decisions regarding when and where to sell their produce to maximize profit. The service costs just 250 rupees (US\$5) for a three-month subscription. As of 2011, some 250,000 Indian farmers from over fifteen thousand villages had subscribed to RML. Thomson Reuters estimates that over a million farmers across at least thirteen Indian states have benefitted from the RML service. Moreover, farmers have reaped substantial returns from their investment in RML. Some have realized up to 200,000 rupees (US\$4,000) in additional profits, and savings of nearly 400,000 rupees (US\$8,000) from an investment of only US\$5.

Another *jugaad* innovator using technology to bring low-cost services to the masses is Dr. Liu Jiren, chairman and CEO of Neusoft, China's largest IT solution and service provider. Dr. Liu, a former professor of computer science, is worried that the Chinese, thanks to sustained double-digit economic growth, "have accumulated lots of wealth in the past two decades, but have also accumulated lots of diseases as they got richer." It is estimated that ninety million Chinese suffer from diabetes and two hundred million may be suffering from cardiovascular diseases. The explosion of chronic diseases – which are particularly devastating for low-income Chinese in rural areas – is forcing the government to invest in a health care system that has so far been deficient or nonexistent in the rural areas, which lag behind urban areas in medical resources and health care infrastructure. But Dr. Liu warns: "If the Chinese government were to build a health care system to serve 1.3 billion Chinese modelled on the United States [where health care spending is projected to account for 20% of GDP by 2020] we will need a huge budget which will soon bankrupt our country. We need an alternative health care model that is smart, affordable and inclusive. We need a model that focuses on – and enables – disease *prevention* rather than treatment."

For its part, Neusoft has developed several low-cost but high-tech solutions, such as affordable health monitoring devices and telemedicine solutions for rural hospitals to serve low-income Chinese patients. More impressively, Neusoft has developed a cutting-edge wristwatch for chronic disease patients to use as a mobile health monitor. On a regular basis, the watch collects bio-indicators from sensors attached to the patient's body.

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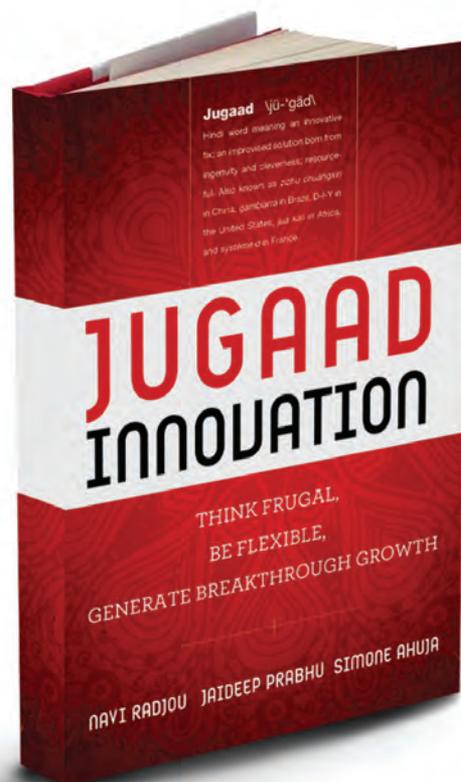
JAIDEEP PRABHU is the Jawaharlal Nehru professor of Indian business and enterprise and director of the Centre for India and Global Business at the University of Cambridge's Judge Business School. SIMONE AHUJA is the founder of Blood Orange, a marketing and strategy consultancy with a focus on frugal innovation and emerging markets.

This dynamic data is sent to Health Cloud, a cloud computing-based expert system. Health Cloud analyzes the data using a health care knowledge database and offers customized advice to the patient in terms of exercise plans and diet regimen, thus helping the patient make healthy lifestyle changes. For instance, if you are overweight, the system will suggest a three-month jogging plan, monitor and report back your progress daily, and even suggest improvements when needed.

Dr. Liu notes that in a rapidly aging China – where family ties are important and the over-sixty-five population is projected to increase from 130 million in 2010 to some 222 million by 2030 – these wristwatches and home health monitors have become popular gifts from young Chinese to their parents. Through these gifts, young Chinese can remotely track their parents' health – through daily reports on their mobile phones – and proactively tend to their well-being. Dr. Liu believes that Neusoft's ability to serve marginal groups (such as the elderly and the rural poor) faster and cheaper by harnessing affordable technologies like cloud computing gives the company an advantage over Western multinationals. He says: "We don't have the resources of a large multinational corporation, but we identify opportunities in underserved markets early on and execute fast on them by harnessing the power of technology – especially cloud computing, which significantly lowers the cost of service delivery in sectors like health care."

Jugaad innovators like Dr. Liu successfully include the margin by approaching marginal groups as whole new markets, helping everyone climb up Maslow's hierarchy of needs, co-creating value with customers and partners throughout the value chain, and making clever use of affordable technology to scale up their personalized solutions. As Western firms focus more on emerging markets and as Western nations become increasingly diverse, there is a growing urgency for Western companies to pay close attention to the margin. But there are several factors (explored in *Jugaad Innovation*) that are holding back Western companies from including the margin in their business strategies.

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There is of course a need to ensure that the IP system safeguards the interests of all IP stakeholders – including developing countries – and that it continues to serve the public good. Indeed, this is a constant challenge for WIPO and its constituents. The international IP system must be able to deliver tangible benefit to all countries, irrespective of where they fall on the spectrum of technological or economic development. The reality for a global organization like WIPO, with its diverse members, is that it must be fully able to serve all of them.

It is important to bear in mind that the IP system is a key tool for stimulating and disseminating innovation and creativity, for countering unfair competition and for contributing to market order. The debates and discussions at WIPO are ultimately about how the system can best serve these objectives, from which all countries stand to benefit.

An innovation-driven future

Almost fifteen years since the world came together and agreed a blueprint to rid the world of poverty (the Millennium Development Goals), the international community is reflecting on progress achieved so far and how to move forward. Significant advances have been made in better understanding the role that science, technology and innovation can play in addressing some of the most urgent challenges facing humanity. This is why I particularly welcome the timely focus of the UN Economic and Social Council (ECOSOC) on science, technology and innovation, and on the potential of culture to promote sustainable development and achieve the Millennium Development Goals.

Science, technology and innovation play a critical role in addressing global challenges such as climate change, food security and public health. IP has a role to play both in incentivizing investment in the new technologies that can help solve these problems, as well as in facilitating access to the knowledge embodied in those technologies. In the patent system, a bargain is struck between the innovator and the state – in exchange for a limited period of market advantage, during which investment can be recouped, the innovator publicly discloses the knowledge on which the innovation is based. To further encourage and foster the dissemination of this knowledge, WIPO created Patentscope, the world's largest, free technology database, with over 14 million patent documents.

Patent filings over the past years have revealed to what extent the geography of inno-

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vation has changed. While a wide gap remains between high-income countries and developing countries, especially least developed countries, some emerging economies, notably in East Asia, are seeing remarkable growth in innovative activity. For instance, demand for patents – one indicator of innovation – has risen from 800,000 applications worldwide in the early 1980s to 2.14 million in 2011. The increase was driven by Japan and the United States of America in the 1980s, Europe and the Republic of Korea in the 1990s and, more recently, by China.

The new innovation eco-system

The nature of innovation has also significantly changed. Innovation is no longer typically driven by the R&D teams of one company, but rather by collaboration between individuals who in the past may never have had the chance to work together. Chains of innovation and creativity run far beyond the border of a single company, or even a single country.

Encouraging innovation requires much more than a functioning IP system. It requires an “innovation eco-system” to facilitate collaboration and a flow of ideas between different innovation actors. Innovation ecosystems are increasingly complex, internationalized, collaborative and open. Therefore, creating a free flow of information and knowledge between the elements of the systems is increasingly important. Innovation leaders, whether in the public or private sectors, enterprises or higher education, have to work together to achieve the outcomes that public policymakers are looking for.

It is also important to note that IP alone will not address global challenges where markets are weak or non-existent. We see this most clearly with respect to neglected tropical

“Innovation is no longer typically driven by the R&D teams of one company, but rather by collaboration between individuals who in the past may never have had the chance to work together.”

diseases where patient populations are typically the very poorest. Market-based incentives historically did not drive the investments that were needed. This is why, since 2000, we have seen a switch in the way in which innovation into neglected tropical diseases (NTDs) is funded and carried out, especially with the emergence of a whole range of new product development partnerships. WIPO is also playing an important role in finding solutions to these complex problems.

WIPO-led initiatives

WIPO has spearheaded the creation of WIPO Re:Search, through which companies and other providers can share their knowledge assets with researchers throughout the world to stimulate more research and development in NTDs, tuberculosis and malaria for new and better treatment options for those suffering from these conditions. WIPO Re:Search was launched in October 2011 in collaboration with eight of the top research pharmaceutical companies, and more than 20 other public and private sector partners from developing and developed countries, and with the World Health Organization as technical advisor. The partnership has now more than doubled in size and researchers are starting to use the tools that WIPO Re:Search offers, including access to IP for pharmaceutical compounds, technologies and – most importantly – making know-how and data available for research and development. More than a dozen teams of researchers have started new collaborations in this way.

WIPO is also working to create solutions for environmentally sound technologies (ESTs). Through our WIPO GREEN platform we are looking to facilitate the sharing of knowledge on ESTs and accelerate the transfer and diffusion of these technologies to help overcome the world's many environmental challenges. It comprises a free database and a partnership hub. Once registered, users can access the searchable WIPO GREEN database to offer their green technologies for licensing or partnership agreements, or to notify others of their technology needs. The WIPO GREEN network can also provide advice and services to assist partnership-building and bring together relevant experts from around the world.

WIPO is committed to ensuring that IP plays the fullest possible role in harnessing man's innate curiosity and creativity to tackle some of the major global challenges which we collectively face. We are doing this in partnership with governments and the private sector, as well as within the United Nations family.



South-east Europe's economic standout

Montenegro became officially independent in June 2006, becoming the 192nd member of the United Nations. Formerly a member of the Socialist Federal Republic of Yugoslavia, and then of the Union of Serbia and Montenegro, Montenegro had effectively been running its own affairs for some years before independence, notably adopting the euro as its currency in January 2002.

Over the last decade, high levels of foreign direct investment (FDI) have made the country the economic standout of South-east Europe. Gross national income has tripled since 2003 and the country now has the highest per capita income in the region. Poverty has declined from 11.3% in 2005 to 9.3% in 2011 (the last year for which data was available), and the country maintains a relatively moderate inequality of income.

Following a credit consumption boom and real estate bubble that began in 2006, the economy hit a wall in 2009, contracting by 5.7%. After recovering some growth in 2010-2011, it slipped into recession again in 2012. The crisis in the eurozone is partly to blame for the slowdown but, as the World Bank notes in its May 2013 report, *Montenegro:*

Preparing for Prosperity – Ensuring Sustainability, Connectivity, and Flexibility for Dynamic Growth, recent successes are being offset by negative trends in the country: “Until now, Montenegro has followed an economic growth model emphasizing capital inputs, Foreign Direct Investment and a steady supply of inexpensive capital. Productivity growth in Montenegro, on the other hand, has been virtually non-existent.”

While praising the government's reform



At a glance

Head of state: Filip Vujanović of the Democratic Party of Socialists of Montenegro (DPS).

Population: 632,000 (2011)

Urban population (% of total population): 61

Population under the age of 14 (% of total population): 15

Internet users (% of total population): 40 (2011)

Electricity production from hydroelectric plants (% of total): 76 (2009 est.)

Ranking in the World Economic Forum's Global Competitiveness Index 2012-2013: 72 out of 144 countries

GDP – composition by sector (2011 est.): agriculture: 0.8%, industry: 11.3%, services: 87.9%

Main industries: steelmaking, aluminum, agricultural processing, consumer goods, tourism

Overnight tourism stays in seaside resorts (% of total overnight stays): 97

efforts, the World Bank is urging further improvements to the business climate for investments and growth. In particular, the Bank is encouraging Montenegro to capitalize on its connectivity – via trade, infrastructure and human capital – to ensure the kind of macroeconomic stability and sustainability necessary for long-term growth.

Zeljko Bogetic, World Bank Lead Economist and lead author of the report, said, “Montenegro is an exciting place to do business. It has a great location and is well-positioned in Europe to take advantage of both regional and global markets. Unfortunately, the country is not making the best of these advantages.”

Structural issues holding the country back include the high level of the government's indebtedness, which has been increased by the burden of its support for the country's crucial metals industry, particularly the partly state-owned, Kombinat Aluminijuma Podgorica (KAP) aluminium plant and the Zeljezara Niksic steel mill.

In May 2013, the International Monetary Fund recommended the closure of the KAP, in order to stem a sharp rise in its public debt. The KAP factory produced 120,000 metric tons of aluminium in 2012, accounting for 4.7% of the country's economic output, but its total debt of around €350m is equivalent to one tenth of GDP, and it soaks up a further €3m of state subsidies every month. The plant which is situated on the outskirts of Podgorica, the capital of Montenegro, employs 1,200 people, making it the country's biggest single industrial employer and Montenegrin politicians fear that shutting it down would provoke social unrest.

Montenegro has the highest per capita income among the six countries comprising South East Europe – Albania, Bosnia and Herzegovina, Kosovo, the Former Republic of Macedonia, Montenegro and Serbia.

Photo: Georgios Giannopoulos



The other mainstay of the economy is tourism. With a rich architectural and cultural heritage, a diversity of landscapes and climates, and a well-preserved natural environment, Montenegro is naturally well-suited for development of all kinds of tourism. The destination is especially popular with visitors from Russia and neighbouring Serbia. Ranked one of the top ten destinations to visit in *Lonely Planet's* prestigious 'where to

go in 2013' list, Montenegro is described by the publication as being "on a fast track to tourism superstardom".

To date, most investment in the tourism industry has been concentrated on the coast in the south-west of the country, and the development of glitzy resorts on the Adriatic coast is providing a stark contrast with the lack of development in the mountainous north of the country. The northern region's

11 municipalities score double the unemployment and poverty rates compared to the 10 municipalities in the south. In order to reduce this gap and increase employment, ensure sustainability and an even spread of economic opportunities, five United Nations agencies in Montenegro are working to implement a programme to support the growth of small and medium-sized enterprises in the north.



An exclusive interview with His Excellency President **Filip Vujanović**

‘We have to change the concept of Montenegrin industrial development’

Accession to European Union (EU) will offer some new opportunities for the economy but the process will also pose some challenges. What are the implications of accession to the EU for Montenegro’s economy?

In all the member countries, the process of accession to the EU exerted a strong transformative effect on the entire society, including the economy. In the case of Montenegro, we estimate that the implications of the entire process will be multiple, and the effects on the overall economic development, positive. At the end of this process, we will have a free flow of capital, people, goods and services with a large part of Europe, which will change our market and our economy for good. An integral part of this process is the commitment on the part of Montenegro and the EU to promote intra-regional relations in South-east Europe, which will improve economic cooperation and the competitiveness of our market with respect to the region.

Along with the EU, we are working to improve our capacities for effective implementation of European legislation. According to the agreed agenda, our administration, numerous experts, legislators and the non-governmental sector will be focused, in the beginning, on the chapters referring to the rule of law and anti-corruption, as well as the chapter referring to science. However, having learnt from the experience of other countries, which have recently gone through this process, in particular we are preparing ourselves for the chapters referring to our key economy sectors – steel, aluminium, agriculture and fisheries – and environmental protection.

In the medium-term, we consider our greatest challenge to be the Montenegrin economy’s existing structural problems and the crisis-stricken international financial envi-

ronment, which could slow down or limit our economic recovery.

What is the government of Montenegro’s industrial strategy and what would accession to the EU mean for the country’s strategic industries?

Industry has a very significant production multiplier effect for the Montenegrin economy and it is quite important for the country’s overall economic development. Unfortunately, during the 1990s, due to the wars and economic blockade, economic activities in Montenegro rapidly decreased, which had an impact also on industrial production. In addition, during this period and, later on, during the transition period, the structure of the Montenegrin economy changed a lot, with a shift in favour of the service sector. Production statistics demonstrate that, at the beginning of 1990s, industrial production represented 40% of overall production in Montenegro but, by 2000, it was 19.1%, and, ten years later, just 12.7%. However, despite its reduced share in overall economic activity, industry is still one of the important economic sectors, especially because the largest compa-

nies in Montenegro, such as the aluminium producer, Kombinat Aluminijuma Podgorica (KAP), and the Nikšić steelworks, operate within this sector. Their joint multiplying effect on the entire social-economic situation is quite significant.

Today, the industrial sector of Montenegro is characterized by low productivity and weak competitiveness. The state of domestic industry demonstrates that Montenegro can no longer be developed on the same basis as in the past, and that it is necessary to change the concept of industrial development. Keeping focus solely on the big companies, at the expense of the small and medium-sized enterprises, is unrealistic and unjustified.

Due to the increasingly wide social and economic gaps and unequal development opportunities in different parts of Montenegro, the government is working on defining a development strategy for processing industries. An additional factor, which adds to the significance of defining this strategy, is the process of accession to the EU, in the sense that it is particularly important to be well-prepared in order to make good use of European funds intended for the development of the economy. Through a quality project approach to these funds, we shall attempt to get closer to the average level of social and economic development in the EU.

In accordance with the above, in the following period, we have to define and implement an industrial policy which will support the development of strategic branches of industry, especially the energy sector, metal industry and infrastructure. By attracting foreign investment and using special state funds, we have to strengthen industrial competitiveness, increase the opportunities for experts, stimulate scientific and research work, and establish

Born and raised in Belgrade, FILIP VUJANOVIĆ graduated from the University of Belgrade’s Law School. He worked as a lawyer in Titograd (Podgorica) before entering politics in March 1993. He became a member of Montenegro’s Democratic Party of Socialists (DPS), which had formed in 1991 during the break-up of the Socialist Federal Republic of Yugoslavia. Vujanović served as Montenegro’s Minister of Justice (1993–96), Minister of the Interior Minister (1996–98) and Prime Minister (1998–2003). In 2003, he was elected President and supported the move to secede from the Federal Republic of Yugoslavia (comprising Montenegro and Serbia). He became the country’s first president when Montenegro made its formal declaration of independence on 3 June 2006. Vujanović was re-elected as president in 2008 and again in April 2013.

“The general objective is to contribute to a more equitable regional development by strengthening competitiveness and capacities for the creation of new jobs... especially in the less-developed municipalities in the north of Montenegro.”



Filip Vujanović, President of Montenegro, addresses the UN General Assembly, 24 September 2010.

an adequate infrastructure for the development of entrepreneurship.

Only such an approach will enable us to achieve the long-term, stable development of priority industrial sectors, a higher employment rate and a more equitable regional development, which is the primary objective of the economic policy of the Government of Montenegro.

What efforts are the Government making to encourage economic diversification and to prevent further north-south population movements?

Despite the significant infrastructural and other investments in the northern region of Montenegro, the projects implemented so far have not maximized the comparative potential for the development of tourism, agriculture and the energy sector in this part of the country. Our government has established that the future development policy of the state must be based on the effort to make the best

use of the northern region's resources and to valorize them in the market.

In this respect, in May 2012, the Ministry of Economy, in cooperation with the UN system in Montenegro, adopted the *Strategy for sustainable economic growth in Montenegro through the introduction of business clusters 2012-2016*. The general objective is to contribute to a more equitable regional development by strengthening competitiveness and capacities for the creation of new jobs in micro, small and medium-sized businesses, and especially in the less-developed municipalities in the north of Montenegro. Another important objective is to stimulate the development of new companies and to create new jobs. It is important that the strategy also provides a basis for financing the projects arising from the process of EU support for our integration, which will also contribute to the equalization of development opportunities for various economic entities and regions.

Specific results in this field confirm that we are heading in the right direction: in 2011/12, the government provided 12 million Euros in investments for the development of agriculture, out of which 80% refers to small and medium-sized farms in the north of Montenegro. Also, a major part of a World Bank grant of 3.5 million Euros, provided through Montenegro Institutional Development and Agricultural Strengthening (MIDAS) projects, has been allocated for the partnership programmes of agricultural producers in the northern region.

The lack of employment and income opportunities for youth has triggered uprisings in many countries in the Northern Africa and Middle East region in recent years. What are the policy responses that your government has adopted to address this specific challenge?

Certainly, we have identified unemployment as a peril to the stability of society if its causes are not addressed in a timely manner. The rate of unemployment in Montenegro is the lowest in the region. At the same time, the rate of employment of non-residents in seasonal jobs is the highest in the region. This indicates that there is a problem with the structure of the labour force and a chance for additional training and re-training. Owing to the preservation of the macroeconomic stability, we have had no cases of major lay-offs. Also, we have had a continuous responsible dialogue with the trade unions, and no major social unrest. However, the global economic crisis poses a challenge to all of us in the region, and it is not our ally in solving the key causes of unemployment.

That is why our new government is committed to solving the problem of unemployment, especially as regards youth. The Ministry of Labour has already launched a programme to fund first employment for the duration of nine months. We have introduced tax reductions for the small and medium-sized enterprises which create new jobs, and we are expanding the incentive measures for entrepreneurs and for domestic companies providing seasonal employment in the tourism and construction industries.



In the fourth of a series focusing on remarkable companies that are making waves in the areas of green industry and sustainable industrial development, *Making It* talks to **Bethlehem Tilahun Alemu**, the founder and managing director of the Ethiopian footwear company, soleRebels.

soleRebels

An innovative footwear manufacturer that pays fair wages and uses locally sourced materials is helping to transform the economic landscape in Ethiopia. soleRebels, which was founded by Bethlehem Tilahun Alemu in 2004, has become Africa's largest footwear brand, with its range of artisan-made shoes now selling in 55 countries. In 2011, the company ramped up US\$2m in sales and it is expecting to generate over US\$15-20m in revenue by 2015.

Alemu has become one of Africa's most celebrated businesswomen. She was featured on the front cover of *Forbes* magazine in January 2012, and was selected as a "Young Global Leader" by the World Economic Forum 2011. In June 2012, she won the award for "Most Outstanding Businesswoman" at the annual African Business Awards, organized by *African Business* magazine.

Export-oriented success story

Her success with soleRebels is regularly cited as a sign that Ethiopia is ready to transition from being reliant on foreign aid to being able to direct its economic future by exploiting home grown skills, resources and business opportunities. The company is also held up as inspiration for Ethiopia's newly-emerging private sector, particularly as an example of an export oriented success story.

Alemu explained how she set up the company in a small village on the outskirts of Addis Ababa, "Having grown up watching our family and neighbours struggling, we decided to create the 'better life' we were all waiting for by harnessing our community's incredible artisan skills and channeling them into a sustainable, global, fair trade, footwear business."

She continued, "We selected shoes because we saw that footwear was an excellent platform to begin to share many of Ethiopia's indigenous eco-sensible craft heritages and artisan talents with the world. Our approach to footwear creation – hand-crafted and eco-sensible – meant we could source and make almost all our materials locally, thereby creating an export product from 100% local inputs."

Tyre-soled shoes

The soleRebels footwear range includes sandals, flip flops and shoes with soles made from recycled car tyres. Alemu explained that the recycled car tyre-soled shoe has existed in Ethiopia for a long time. "It was *the* footwear from back in the day when the original "soleRebels" fought off the invading forces and kept Ethiopia as the only African nation to never be colonized! We took this wonderful, indigenous, age-old recycling tradition and fused it with fantastic Ethiopian artisan crafts and excellent modern design sensibilities, and turned it into footwear that has universal flavour and appeal."

She is proud of the production process, stating that all the company's styles incorporate as much recycled and sustainable materials as possible, with ingredients like hand-spun and hand-loomed organic cotton fabrics, and natural fibres, including Abyssinian hemp and koba. However, she shuns the term, 'green business', stating that she regards it as something of a fad. "We are embracing these deeply sustainable and traditionally zero-carbon methods of production and materials because they are integral parts of Ethiopia's cultural fabric, a tradition which we grew up within and feel passionate about preserving."

Workers' rights

soleRebels is also setting a high standard for workers' rights, providing 100% medical coverage for employees and their families and free doctor-run medical checks, as well as providing transport to and from the worksite for workers with disabilities. Alemu insists that workers are treated with respect, noting that on average the company's 90 employees get paid four times the legal minimum wage and three times the industry average wage for similar work.

Unlike most companies in the apparel and footwear sector, soleRebels does not use a quota system. Alemu explained, "The quota system of work, endemic in the fashion business always struck us as truly demeaning. It is a system that shows no confidence that workers can be incentivized to achieve targets and it creates a hostile working



soleRebels CEO, Bethlehem Tilahun Alemu. “soleRebels represents the tip of a changing dynamic in Ethiopia, a historic and vital shift to control our own destiny by rising up the value chain and exporting higher-value, branded, finished goods, instead of low-value commodity exports.”

environment. soleRebels pays all workers based on negotiated wages that are subject to mutually agreed, company-wide goals. This means that we are all in it together in terms of making sure that deadlines are met and that top-notch product quality is always achieved.”

Expansion

In order to meet growing demand, the company is constructing a new production facility and when it is finished Alemu expects the workforce to grow in number to around 300 employees. “Built with indigenous, eco-sensible materials and employing 100% renewable and self-generating power, this first of its kind production facility will serve as a leading innovation centre, allowing us to develop the cultural wealth of the country, while simultaneously

expanding and enhancing our own production capabilities.”

Alemu believes that her company can be emulated by others and help foster inclusive, sustainable development in Ethiopia. She said, “soleRebels is living proof that creating innovative world class products and trading them with the world is the best road to greater shared prosperity for developing nations like ours.”

She also sees lessons for the rest of Africa. “Today, Africa accounts for a mere two percent of global trade. If sub-Saharan Africa were to increase that share by only one percent, it would generate additional export revenues each year greater than the total amount of annual assistance that Africa currently receives. We simply need the opportunity to increase our market share, something every good, strong, global business seeks to do.”

Green economies for sustainable resource use

By MONIKA DITTRICH, STEFAN GILJUM, STEPHAN LUTTER and CHRISTINE POLZIN

In general, global dynamics during the past thirty years have shown that economic growth entailed increased material extraction and consumption. Although most countries made improvements in material productivity, the current amount of used materials and the continued unequal distribution of consumption between different world regions are far from being sustainable.

Some current trends are extremely alarming. The development process itself and the perpetuation of highly material-intensive lifestyles in rich countries, and in an increasing number of emerging economies, require large amounts of resources. The quantities are so huge that this model of development cannot realistically be provided for all humans.

Many countries with a relatively higher performance of material use and resource productivity achieved this by outsourcing their material-intensive economic activities. Those countries which increased their activities in material intensive economic sectors had a worse performance. Nevertheless, both developments are two sides of the same coin in the interlinked system of international specialization. From those findings arises the question “What are the options that the green economy concept can provide?”

The potential of green economies

A key component of green economic strategies is improved resource management. Green economies thus have to improve resource productivity and reduce absolute levels of resource use. Such a transition could be achieved through concerted action by policymakers, setting the framework for increased resource efficiency, by companies exploiting the economic and environmental potentials of increased resource efficiency and by consumers making informed and active choices for resource efficient products and services. A few examples for such effective measures include:

- a transition towards more sustainable energy production by substantially increasing investments in renewable energy sources for power generation, while considering limits, e.g. related to increased biomass use and environmental impacts;
- a transition in manufacturing industries towards closed material cycles and

“A sustainable system of global resource use must therefore operate on a level significantly below the current one; we need to reduce our resource consumption in absolute terms.”

improvements in resource efficiency and productivity;

- a transition towards eco-friendly housing by constructing new green buildings and retrofitting the existing energy and material intensive buildings stock, and
- a transformation of the transport sector by promoting access instead of mobility, shifting to less harmful modes of transportation, and lowering carbon emissions by improving vehicles.

Some fundamental questions

Based on the information presented in our study on green economies and its potential to increase resource efficiency and decrease the amounts of materials required for production for production and consumption processes around the world, the fundamental questions humanity will face in the future are:

- Is the current model of material intensive lifestyles desirable as a future vision? And if not, what is an attractive and sustainable alternative?
- Are we willing to implement a limited and equal distribution of material consumption globally? If yes, at what level? The current OECD-level, which would mean accepting a doubling of environmental pressures? The current global average, accepting global distribution and current levels of ecological pressure? A level oriented on current best practices or maybe less? If one of these options seems to be favourable, what kind



Photo: Kevin Dooley

of incentives and sanctions would humanity accept to enforce them?

● If an equal distribution is not worthwhile, what would be an alternative approach to reach a globally sustainable level of resource use? Should inequalities of more than a factor of 50, as we observe currently, be maintained or would a minimum or maximum level of material consumption for each person be more attractive? What level of inequality could be acceptable in terms of global social justice?

Reducing our resource use, improving our quality of life

Independently of how those important questions are being addressed, two basic

facts need to be taken into account when global strategies towards sustainable resource use are being discussed. First, the current level of global resource use is not sustainable. The significant growth of resource extraction, trade and consumption is the main driver for most global environmental problems. At least with regard to some environmental impacts, humanity already exceeds the ecological capacity of the Earth's ecosystems. Climate change is the most prominent example, but biodiversity loss, desertification and soil erosion are also clearly linked to our use of natural resources. A sustainable system of global resource use must therefore operate on a level significantly below the current one;

we need to reduce our resource consumption in absolute terms.

At the same time, billions of people on the planet are still living in material poverty and rightly demand a substantial increase of their consumption and material welfare. A strategy of reducing global resource use therefore needs to fully address distributional aspects, both between different countries and regions and – to a growing extent – also within countries. Ultimately, the objective is to ensure a high quality of life for all people while keeping resource use within the ecological limits of our planet.

● Extracted from *Green economies around the world? Implications of resource use for development and the environment.*

Could shifting the location of production bring GHG benefits?

By **PETER ERICKSON** and **MARION DAVIS**, the Stockholm Environment Institute's US Centre (SEI-US).

In recent decades, trade has become a foundation of the world economy: exports now represent nearly a third of global GDP, more than double the share of just 30 years ago. Many economists see trade as a significant source of growth and well-being, but there are concerns that it may also lead to increased global greenhouse gas (GHG) emissions.

We recently began exploring whether trade could perhaps help reduce global GHG emissions – if production of goods and materials were to shift to places where they can be manufactured with the fewest GHG emissions.

We examined the relative GHG intensity of production of selected goods in different world regions and the potential for regions to access the low-GHG fuels and feedstocks needed to expand low-GHG production, aiming to gauge what conditions might enable countries to be future low-GHG producers.

We found that the average GHG intensity of producing some of the most significant traded goods and materials (e.g. clothing, electronics, vehicles, steel,) may vary by a factor of two to over five among countries. Thus, there could be substantial potential for reducing GHG emissions by shifting production, if these averages were to hold.

The actual benefits of shifting production are much more complicated to assess, however, and depend on several factors, including the ability of countries to invest in new, efficient technologies and expand use of low-GHG energy; the availability of raw materials, the opportunity cost of diverting resources (energy, labour, or capital) and production costs.

Steel, for example

For example, significant GHG emissions are associated with internationally traded steel. The GHG intensity of steel depends on the energy intensity of production (energy per tonne) and the carbon intensity of that energy (tonnes of CO₂ per unit of

energy). There are three primary routes for producing crude steel: basic oxygen furnace (BOF), electric arc furnace using direct reduced iron (DRI-EAF); or electric arc furnace using scrap (Scrap-EAF). Our analysis shows the GHG intensity of these three primary routes can range from as little as 0.3 t CO₂e per tonne of steel – the Scrap-EAF route, if powered by renewable electricity – to as much as 3.5 t CO₂e – DRI-EAF with iron-making fuelled by coal and steel-making powered by coal-based electricity.

Which of these three technologies countries choose to make steel affects the GHG-intensity, but so does the efficiency of operation (and vintage of the technology) and the GHG intensity of the energy used. In theory, any region may be able to invest in the latest technology to expand production, but regions may differ in their ability to expand supplies of lower-GHG fuels (e.g. natural gas, or sustainable biomass for charcoal-based iron production in a blast furnace) and low-GHG electricity (for production of steel in an electric arc furnace from direct reduced iron). Shifting production to (or locating new production in) regions with access to expanded supplies of these factors could perhaps help reduce the overall GHG emissions associated with steel production, even after accounting for any increases in transportation requirements. This example is for steel, but similar conditions also exist in other sectors.

“The actual benefits of shifting production are complicated to assess, and depend on several factors, including the ability of countries to invest in new, efficient technologies and expand use of low-GHG energy.”

Tata Steel employee, Rouha Hussaina, relights a blast furnace, Port Talbot, UK, February 2013.



Photo: Tata Steel/NewsCast

Policy options and research needs

In theory, a number of policy options are available to steer trade one way or another; these include quantitative restrictions, punitive tariffs, anti-dumping duties or countervailing duties (as a response to unfair subsidies), border carbon adjustments (BCAs), technical regulations or standards related to the emissions of energy-intensive products, and preferential tariffs and quotas.

The cost, environmental effectiveness and feasibility of measures will depend, to a great extent, on their specific design. Some policies, would likely be challenging both from a legal and a political perspective: these include outright bans or quantitative

restrictions on goods from specific countries.

It may also be difficult to design trade measures aimed at reducing GHG emissions that comply both with World Trade Organization (WTO) rules – which require most-favoured nation treatment among all its members – and equity principles under the United Nations Framework Convention on Climate Change. Measures that favour some developing countries over others, or that reward countries that work to reduce emissions, might face challenges under the WTO. One proposal to address emissions embodied in significant trade flows that could be WTO-legal is to return revenues from BCAs to the exporting countries as

climate finance. This proposal deserves further research.

Conclusion

Shifting production away from the more GHG-intensive regions to less GHG-intensive ones could reduce emissions. However, significantly more research is needed to explore the real-world feasibility of such shifts.

We recommend more detailed and in-depth analysis of the costs and availability of key resources for low-GHG production in each region, to help develop more specific low-GHG pathways for specific industries and specific countries. Data from industry associations may be crucial in this regard.

The hidden global poverty problem

Ahead of the next issue – looking at the role and interests of middle-income countries in the nexus of global sustainability and economic policy – **EDWARD BARBIER** – highlights the spatial poverty traps found in rural areas in the developing world.

A slew of recent reports suggest that we are winning the war on global poverty. The latest, from the Oxford Poverty and Human Development Initiative, found that a multi-dimensional index of widespread poverty declined significantly in 18 of 22 developing countries, which contain over two billion people. This is good news for the World Bank President, Jim Yong Kim, who declared, just over a year ago, that the world could end poverty by 2030 if the right mix of development and aid policies is adopted by the international community.

However, as I pointed out in *Natural Capital, Ecological Scarcity and Rural Poverty*, a policy paper written for the World Bank, the renewed optimism over “ending” global poverty will be short-lived, unless the world is prepared to address an important, and seemingly intractable, “hidden” dimension to this problem.

Since 1950, the estimated population in developing economies on “fragile lands” has doubled. These fragile environments are prone to land degradation, and consist of upland areas, forest systems and drylands that suffer from low agricultural productivity, and areas that present significant constraints

for intensive agriculture. Today, nearly 1.3 billion people – almost a fifth of the world’s population – live in such areas in low and middle-income economies. Almost half of the people in these fragile environments (631 million) consist of the rural poor, who throughout the developing world outnumber the poor living on favoured lands by 2 to 1.

In addition, around 430 million people in developing countries live in remote rural areas. These are locations with poor market access, requiring five or more hours to reach a market town of 5,000 or more. Of the rural populations in such remote regions, nearly half are found in less favoured areas, which are semi and semi-arid regions characterized by frequent moisture stress that limits

agricultural production. Again, people in remote rural regions tend to be some of the poorest in the developing world.

To put these numbers in perspective, the total population in the richest countries of the world is around 850 million. In contrast, as noted above, 1.3 billion people in the fragile environments in developing countries, and 430 million people inhabit remote rural areas.

The clustering of rural populations in less-favoured areas and fragile environments is also likely to continue into the foreseeable future, given current rural population and poverty trends in developing economies. Although from 1981 to 2005 the number of extreme poor globally declined from 1.9 billion to 1.4 billion, current development policies are not winning the war on poverty in the rural areas of low and middle-income countries. First, despite rapid global urbanization, the rural population of developing regions continues to grow, at just over 1.0% per year in recent decades. Second, around three-quarters of the developing world’s poor still live in rural areas, even allowing for the higher cost of living facing the poor in urban areas. In general, about twice as many poor people live in rural than in urban areas in the developing world. As a consequence, rural populations in poor countries are growing, rural poverty is endemic, and substantial spatial poverty traps are widespread.

Overcoming such spatial poverty traps and alleviating rural poverty in many developing economies will therefore

“Although from 1981 to 2005 the number of extreme poor globally declined from 1.9 billion to 1.4 billion, current development policies are not winning the war on poverty in the rural areas of low and middle-income countries.”

FURTHER READING

- Anthony, Scott D. – The Little Black Book of Innovation: How It Works, How to Do It
- Chandy, Laurence, Derviş Kemal and Rocker, Steven – Clicks into Bricks, Technology into Transformation, and the Fight against Poverty
- Dichter, Sacha, Katz, Robert, Koh, Harvey and Karamchandani, Ashish – Closing the Pioneer Gap
- Gourville, John – The Curse of Innovation: Why Innovative New Products Fail
- Govindarajan, Vijay and Trimble, Chris – Reverse Innovation: Create Far from Home, Win Everywhere
- Harford, Tim – Adapt: Why Success Always Starts with Failure
- Harvard Business Review – 10 Must Reads on Innovation
- INSEAD and the World Intellectual Property Organization – The Global Innovation Index 2012
- Koulopoulos, Thomas M. – Cloud Surfing: A New Way to Think about Risk, Innovation, Scale, and Success
- Mutua, Will and Ally, Mbwana (eds) – Innovative Africa: The New Face of Africa: Essays on the Rise of Africa's Innovation Age
- OECD – Innovation for development: A discussion of the issues and an overview of the work of the OECD Directorate for Science, Technology and Industry
- OECD – Science, Technology and Industry Outlook 2012
- Taylor, William C. – Practically Radical: Not-So-Crazy Ways to Transform Your Company, Shake Up Your Industry, and Challenge Yourself
- World Economic Forum – Technology Pioneers 2013: Pushing New Frontiers
- World Intellectual Property Organization (WIPO) – Understanding Industrial Property
- WWF-UK – Green game-changers: insights for mainstreaming business innovation

Manufacturing agro-processing equipment at the Rural Technology Service Centre, Mampong, Ghana. In 2011, Ghana was reclassified as a middle-income country by the World Bank.



Photo: ©IFAD/Nana Kofi Acquah

require a much more robust strategy than current global economic development efforts. Specific policies need to be targeted at the poor where they live, especially the rural poor clustered in fragile environments and remote areas. This will require involving the poor in these areas in payment for ecosystem services, targeting investments directly to the rural poor, reducing their dependence on exploiting environmental resources, and tackling their lack of access to affordable credit, insurance, land, and transport. Where possible, efforts should be made to boost rural employment opportunities, especially for those poor households dependent on outside labour employment.

Clearly, global poverty trends are moving in the right direction. But unless a serious effort is made, first, to acknowledge the “hidden” global poverty problem, and second, to take these concrete policy steps to address this problem, then it is rather premature to be predicting the end of global poverty in 20 years time.

● Originally published at TripleCrisis.com – global perspectives on finance, development and the environment.

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FURTHER SURFING

- www.businesscalltoaction.org – Business Call to Action challenges companies to develop innovative business models that achieve commercial success and development outcomes
- www.the-hub.net – The HUB is a global movement to provide the support structures that will facilitate the power of innovation through collaboration
- www.ideaslaboratory.com – Ideas Lab brings together experts and thought leaders to address some of today's most pressing issues, from manufacturing to technology to jobs, serving as a platform for fresh perspectives on critical policy challenges
- www.innovationpioneers.net – The Innovation Pioneers Network brings practitioners together to share knowledge, experience, problems and common challenges
- www.oecd.org/sti – OECD Directorate for Science, Technology and Industry
- www.policyinnovations.org – Articles, multimedia and analysis on how ethical innovations shape global society
- www.sirgtaiwan.wordpress.com – The Social Innovation Research Group is a Taiwan-based think-tank studying how and why social innovation entities succeed or fail
- www.unreasonableinstitute.org – The Unreasonable Institute gets world-changing entrepreneurs what they need to scale their impact
- www.wired.com/insights – Wired magazine website's innovation insights section

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