

# The Innovation for Development Report 2009–2010

Strengthening Innovation for the Prosperity of Nations

Augusto López-Claros

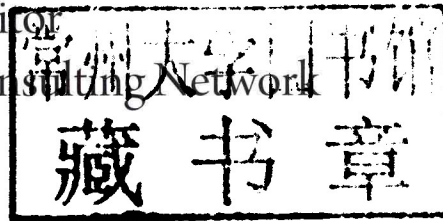




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Augusto López-Claros, Editor  
Director, EFD–Global Consulting Network

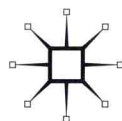


**The Innovation for Development Report**  
**2009–2010: Strengthening Innovation for the**  
**Prosperity of Nations**

European Business School

**Augusto López-Claros**  
Editor

The terms country and nation as used in this report do not in all cases refer to a territorial entity that is a state as understood by international law and practice. The term covers well-defined, geographically self-contained economic areas that may not be states, but for which statistical data are maintained on a separate and independent basis.



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Augusto López-Claros

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# Preface

Professor Christopher Jahns,  
President, European Business School

Seen in the context of the current financial and economic crisis, at least two reasons why many have seen a diminished role for innovation stand out. First, many question how it is possible to generate R&D-driven, technological innovation, given the shortage of funds and the apparent unwillingness or reluctance of banks to lend, even to solvent companies. Second, the entire notion of innovation may have suffered in the public imagination. Financial “innovations” have been at the centre of the crisis itself—derivatives, structured products, financial engineering driven to perfection, yet often incomprehensible even to many bankers and their managers, and seen as value-destroyers by the general public.

However, it is particularly in times like these that innovation—done the right way—should play a more prominent role in companies and nations at large. Innovation is a powerful *value-driver*, which can be utilized by governments and companies to improve their competitive advantage and emerge from the crisis in a stronger position, better able to face the challenges of our increasingly complex global marketplace.

Our understanding of what drives national prosperity has evolved over time. Natural resources, population growth, industrialization, geography, climate, and military might have all played a role in the past. We also know that the relative importance of these drivers has shifted over time, and that in recent decades more importance has been given to the coherence and quality of policies and the development of supporting institutions. A relative newcomer to this debate—identified as perhaps one of the most important modern engines of productivity and growth—has been the innovation excellence of a country; that is, its industries, researchers, developers, creative thinkers, politicians, lecturers, managers, and clusters.

The “discovery” of innovation as a driver of prosperity is not only an indication of the rising social welfare awareness of nations. It also constitutes an unexpected shift in direction towards a more equitable world and a fairer division of the fruits of global prosperity at this critical stage in the evolution of capitalism. The prosperity of a country no longer depends solely on raw materials, capital, and other structural endowments, as the current unequal distribution suggests, but increasingly mirrors a nation’s innovation strength, as reflected in the quality of its governance and the strength of its institutions. More critical today is the extent to which societies



allocate resources for the development of human capacities through education and training, and succeed in promoting social inclusion, gender equity, and environmental sustainability.

Commendable as the insight about the importance of innovation for prosperity may be, the challenge is to make this realization practical. How does a country boost its own innovation potential? What constitutes a nourishing innovation climate? How can it be created, cultivated, and allowed to flourish? If the innovation capacity of a country developed in a particular way in the past, how will it develop over the next few years when changes have taken place in the global environment? In which direction is the innovation capacity of a country moving? Has innovation resulted from greater attention to training the labor force in new skills and from investment in human capital? Or has greater attention been paid to creating a more transparent regulatory environment, one in which the state sees its role as the setter of sensible rules rather than mindless bureaucracy? What are the tradeoffs and how quickly can changes in direction be made? Is the pace of change consistent with shifts in the environmental dynamic?

In contrast, what are innovation climate “killers” and how can countries avoid them? These are all important policy questions that must be probed. The answers to these questions entail more than the usual sweeping recommendations which often come from the mouths of policymakers. Answers are needed that will allow every country to assess its strengths and weaknesses and gauge where it stands in comparison to other countries, to see more clearly which factors contribute to its current ranking, and to understand how it can improve innovation through a combination of more efficient allocation of scarce resources and more coherent policies based on scientifically established strategies and roadmaps. *The Innovation for Development Report* provides an excellent foundation for intelligent debate on these central questions, for the saying that “You can’t manage and improve what you can’t measure” applies equally well in this context.

Unquestionably, nations have come to recognize the importance of innovation for productivity growth. Indeed, the global race for excellence in innovation is on. However, desire alone is not sufficient to “win the race.” It is the support for the culture of innovation, adequate structures and effective and efficient processes, which make the difference between will

and reality. I am convinced that leaving decisions of how to develop the right atmosphere, structures and processes to the free market alone is at best inefficient, and at worse dangerous. The free market is not only blind to fair and equal distribution in theory and practice; it is also blind in other ways. It only innovates what is economically advantageous or profitable. Sometimes it does not innovate at all, or not enough of what is absolutely necessary for future generations—witness our well-justified, present-day worries about the dangers of climate change and the extent to which environmental problems reflect serious market failures. It is the responsibility of scholars, researchers, and managers to remedy these failures. For these reasons, we feel it is worthwhile collaborating in the preparation of a report which addresses these fundamental questions.

In its broad view of innovation, this *Report* goes far beyond R&D as the main source of (product) innovation, beyond conventional process and business models, and beyond the private sector, which is so often seen as the main locus of innovation. The *Report* provides a macro perspective of the entire value-chain of innovation and innovation management, and includes analysis of the many factors which underpin a modern conception of innovation. Furthermore, as the title indicates, innovation is seen as an important driver of development in its broadest sense. It is here that the strengths of the *Report’s* Editor, Augusto López-Claros, are of greatest value. His many years of service with such institutions as the International Monetary Fund and the World Economic Forum, have given him an understanding of innovation from a truly global perspective. Together with a team of eminent contributors from diverse backgrounds, institutions and countries, he has put together a volume that delivers both a range of insightful perspectives on many dimensions of innovation and that offers the Innovation Capacity Index, a tool for assessing the extent to which nations have succeeded in developing a climate that will nourish the potential for innovation. The Index allows policymakers and entrepreneurs around the world to examine the broad range of country-specific factors which underlie innovation capacity, creating a quantified intellectual framework for formulating and implementing better policies for the creation of an environment supportive of innovation.

The *Report* contains three thematic sections. Part I features the Innovation Capacity Index, a methodological tool that

examines those factors, policies, and institutions that critically affect innovation in a large number of countries. Part 2 offers the contributions of a number of leading experts, who deal with different dimensions of innovation, and address such questions as: What is the effect of increasing access to information and communication technologies on a country's economic growth? What is the role of good governance in fostering a culture of innovation? What are the myths and the realities of knowledge-led productivity growth? Does the US patent system strengthen or weaken innovation and progress? How do emerging markets innovate? Finally, Part 3 presents innovation profiles for those 68 important countries, which account for the lion's share of world output.

The European Business School (EBS), with its strong ties to government, industry and entrepreneurs around the globe, is honoured to support this study. Our mission is to educate students to become responsible leaders, to inspire each individual with the vision of sustainable business through innovation. With our international profile and clear focus on emerging markets, EBS already offers an inside view on many countries to students, stakeholders, and the scientific community.

In supporting this publication we are making a contribution to further discussion on how to analyze, measure, and encourage innovation on various levels of society. I am confident that this publication will provide the basis for the fruitful exchange of ideas between countries, governments, policymakers, entrepreneurs, managers, and academics in our mutual striving to create a better world for the generations to come.

## Executive Summary

**Augusto López-Claros and Yasmina N. Mata**

The first chapter, **“The Innovation Capacity Index: Factors, Policies, and Institutions Driving Country Innovation,”** by authors Augusto López-Claros and Yasmina N. Mata, begins with a glimpse at some of the little-known history of innovation, long before the industrial revolution. We learn that the invention of eyeglasses not only extended productive working life, but spawned the invention of precision instruments, laying the foundation for later articulated machines with fitted parts. The clock permitted the ordering of life in cities, but gave rise to the very notion of productivity, leading to Adam Smith’s insight that wealth and prosperity depend directly on the “productive powers of labor.” As the authors show, the varied paths followed by different nations in their approach to innovation and scientific discovery determined their ability to capitalize on their innovations and buttress their development and technological potential. They explain how, despite the priceless inventions they bequeathed to the world—printing, paper, the compass, gunpowder, porcelain, silk, the use of coal and coke for smelting iron, and the numerous inroads into scientific research which far surpassed what was known in Europe in their day—the totalitarian nature of the regimes in the Arab world and China stifled the possibilities for further development. With the coming of the Renaissance and the establishment of scientific societies and formal programs of scientific enquiry, Europe imposed fewer constraints on innovators, leading inexorably to the industrial revolution and the culture of innovation and research which we now see as powerful engines of economic and social development.

There is no doubt that, in recent years, progress in the dissemination of knowledge and the use of information and communications technologies (ICT) has become increasingly widespread and has resulted in improved productivity. As the authors make clear, the traditional sources of power and influence, such as territory, resources, raw manpower, and military might—for centuries the chief determinants of nations’ prosperity—are far less important today, and have given way to a world in which successful development is not only increasingly linked to sound policies, good governance, and effective management of scarce financial resources, but, most important, to the ability of societies to release and harness the latent creative capacities of their populations. Successful



countries today are not necessarily large geographically, neither are they richly endowed with natural resources, or able to project military power beyond their borders. More and more, the countries to look to are those which have managed to expand opportunities for their populations through the full exploitation of the opportunities afforded by the world economy through international trade, foreign investment, the adoption of new technologies, macroeconomic stability, and high rates of saving.

In building the **Innovation Capacity Index** (ICI), the authors draw on a sound theoretical framework and the best available data to correlate the wide-ranging set of relevant factors, policies, and institutional characteristics which play a central role in boosting a nation's capacity for innovation. In its 2009 edition, the ICI covers 131 countries and identifies over 60 factors that are seen to have a bearing on a country's ability to create an environment that encourages innovation, such as a nation's institutional environment, human capital endowment, the presence of social inclusion, the regulatory and legal framework, the infrastructure for research and development, and the adoption and use of information and communication technologies, among others. Fully 90 per cent of the variables used in the construction of the Index are "hard"—i.e., measuring directly some underlying factor, such as the budget deficit, expenditure in education, or cumbersome regulations, etc.—and, therefore, not dependent on a survey instrument.

The authors explain in detail the construction of the Index, which explicitly incorporates the notion that, while there are many factors which influence countries' innovation capacity, their relative importance varies, depending on the stage of a country's development and the particular political regime in which policies are being implemented. These differing stages of development are closely correlated with rising economic prosperity and per capita income. But, the authors also take the view, anchored in empirical observation, that democracies tend to do better than authoritarian regimes at encouraging the creation of friendly environments for innovation. These notions are reflected in the weight distribution assigned to the different pillars of the Index according to countries' per capita income and political regime classification. Those pillars which have more to do with people, institutions, and social networks are shown to be foundations for the pillars dealing

with means and other enabling factors. The weight distribution encourages achievements in the last set of pillars in countries where the institutional and human resource foundations are well laid, whereas the reverse obtains for achievements in these same areas, in countries where these foundations are lacking.

The ICI is offered as a policy tool to promote dialogue for examining more closely the broad range of policies and institutions which foster an environment conducive to innovation. The methodologies developed offer country-specific policy prescriptions, based on nations' stages of development, and the nature of their political regimes. The authors have constructed the Index on the foundation of the large body of work which sees indexes—with all their limitations—as working tools to generate debate on key policy issues, and to track progress over time in the evolution of those factors which help explain national performance. The Innovation Capacity Index rankings 2009–2010 are presented in Table 1. This year's printed edition of the *Innovation for Development Report* includes the individual innovation profiles of 68 countries, accounting for the lion's share of world output. The remaining 63 can be found at the dedicated Website: [www.innovationfordevelopmentreport.org](http://www.innovationfordevelopmentreport.org)

Following a detailed description of the constituent elements of the Index and its construction, the authors highlight the uses to which the ICI can be deployed, and examine in some depth the innovation capacity of five countries: Sweden, Chile, India, Russia, and Taiwan, brief descriptions of which follow:

Sweden (ICI rank 1) is the ICI's top performing country in 2009, serving as a benchmark for other countries. The authors point to Sweden's important presence in the global economy and to elements in its approach to innovation, which are of particular relevance not only to other industrialized countries, but to many middle-income countries with aspirations to join the league of top innovators. Sweden is impressive not only in combining open and transparent government, universal social protections, and high levels of competitiveness and productivity—making it one of the most innovative economies in the world—but equally so in the extent to which the country's excellent policy framework has turned the private sector into the main engine of innovation.

Chile is presented as an interesting case, proving that sound policies and good institutions are not the result, but rather the



**Table 1. Innovation Capacity Index rankings 2009–2010\***

Country	ICI rank	ICI score	Country	ICI rank	ICI score	Country	ICI rank	ICI score
Sweden	1	82.2	South Africa	46	53.3	Ecuador	91	44.2
Finland	2	77.8	Macedonia, FYR	47	53.1	Tanzania	92	43.7
United States	3	77.5	Romania	47	53.1	Nicaragua	93	43.4
Switzerland	4	77.0	Uruguay	49	52.8	Madagascar	93	43.4
Netherlands	5	76.6	Russian Federation	49	52.8	Morocco	95	43.3
Singapore	6	76.5	Mauritius	49	52.8	Kenya	95	43.3
Canada	7	74.8	Malta	52	52.4	Pakistan	97	42.7
United Kingdom	8	74.6	Cyprus	53	52.3	Belize	98	42.1
Norway	9	73.5	Ukraine	54	52.0	Zambia	99	41.8
New Zealand	10	73.4	Saudi Arabia	55	51.9	Bolivia	100	41.5
Luxembourg	11	73.3	Tunisia	56	51.8	Papua New Guinea	101	41.3
Denmark	11	73.3	Kazakhstan, Republic of	57	51.6	Venezuela	102	40.9
Taiwan	13	72.9	Costa Rica	58	51.5	Nepal	103	40.3
Iceland	14	72.6	Turkey	59	50.8	Nigeria	104	40.2
Japan	15	72.1	Peru	60	50.6	Suriname	105	40.1
Hong Kong SAR	16	71.3	Mexico	61	50.5	Bangladesh	106	39.8
Australia	17	71.2	Oman	62	50.2	Syrian Arab Republic	107	39.4
Ireland	18	70.5	Greece	62	50.2	Mozambique, Republic of	108	39.1
Korea, Republic of	19	70.0	Kuwait	64	50.1	Uganda	109	38.3
Germany	20	68.8	China, People's Republic of	65	49.5	Cameroon	109	38.3
Israel	21	68.2	Argentina	66	49.2	Senegal	111	38.1
Belgium	22	67.6	Botswana	67	49.1	Cambodia	112	37.5
Austria	23	66.7	Panama	68	48.9	Malawi	112	37.5
France	24	65.4	Trinidad and Tobago	69	48.7	Ethiopia	114	37.3
Estonia, Republic of	25	62.7	Bosnia and Herzegovina	70	48.3	Mauritania	115	37.1
Lithuania, Republic of	26	60.7	El Salvador	70	48.3	Lao PDR	116	36.8
Latvia, Republic of	27	60.5	Colombia	72	48.0	Yemen, Republic of	117	35.1
Spain	28	60.3	Namibia	73	47.5	Sudan	118	35.0
Chile	29	59.4	Azerbaijan, Republic of	74	47.3	Iraq	119	34.2
Italy	30	59.1	Philippines	75	47.0	Mali	120	33.8
Slovenia, Republic of	31	58.6	Algeria	76	46.7	Angola	121	33.4
Czech Republic	32	58.0	Ghana	77	46.6	Rwanda	122	33.3
Bulgaria	33	57.7	Vietnam	78	46.4	Congo, Republic of	123	33.0
Malaysia	34	57.3	Dominican Republic	79	46.3	Côte d'Ivoire	124	32.4
Portugal	35	57.2	Egypt, Arab Republic of	79	46.3	Zimbabwe	125	31.8
Bahrain, Kingdom of	36	56.6	Jamaica	81	46.2	Niger	126	30.6
United Arab Emirates	37	56.2	Honduras	82	46.0	Togo	127	30.1
Croatia, Republic of	38	56.0	Lebanon	83	45.8	Guinea	128	29.1
Slovak Republic	39	55.8	Iran, Islamic Republic of	84	45.7	Haiti	129	28.7
Poland	40	55.7	India	85	45.6	Chad	130	25.6
Hungary	41	55.6	Sri Lanka	86	45.5	Afghanistan, Islamic Republic of	131	24.0
Georgia	42	55.1	Brazil	87	45.2			
Thailand	43	54.6	Indonesia	88	44.9			
Jordan	44	53.9	Guatemala	89	44.5			
Qatar	45	53.8	Paraguay	90	44.3			

\*All rankings and scores are after rounding.



engines for, the creation of wealth and prosperity. Chile's performance (ICI rank 29) is far ahead of any other country in Latin America, and in many critical areas it is already ahead of the European Union average. A mix of sound macroeconomic management—including one of the most virtuous fiscal policies in the world—institutional reforms, and the opening of its economy to the benefits of free trade, foreign investment, and international competition, have combined to create a reliable engine of high growth and poverty reduction. The authorities have also sought to implement micro-policies aimed at enhancing the efficiency of public services through various electronic platforms, and facilitating the use of ICTs more generally. Chile is well poised to catch up with the richer members of the EU.

India is acknowledged as one of the world's fastest-growing economies and has aspirations to be a global player in the field of technological innovation. Its economic performance over the past two decades has been impressive, and has turned it into the world's fourth largest economy. India has not only a long political tradition of democracy and rule of law, but also favorable demographics, with a growing working age population which, if properly educated, could spur rising productivity and growth. But the authors deal also with India's disadvantages, including high illiteracy, a poorly developed infrastructure, a festering fiscal deficit problem, and a highly bureaucratic regulatory framework, all of which seriously discourage entrepreneurship and innovation. While its ranking in the ICI (85) is not high, they indicate that there is wide scope for the implementation of better policies, including institutional reforms, which might allow India to scale up in the rankings.

Russia (ICI rank 49), despite its well-established tradition of solid contributions to basic science, is shown to be lagging far behind its true potential for innovation performance. In previous decades a leader in space exploration, nuclear technology, and aviation, it has had a difficult transition from the inefficiencies of bureaucratic central planning to the challenges of a market economy. The authors describe how the commodity boom of the past five years has increased Russia's economic dependence on energy and other raw materials exports, and how the country's unfriendly business environment hinders entrepreneurship and the incubation of new ideas and approaches to new products or process creation. They

point also to corruption, the lack of independence of judges and courts, and the gradual return to authoritarian forms of governance as factors which do not bode well for the creation of an environment conducive to various forms of innovation. However, they conclude that there is no intrinsic reason why a country with such rich human and natural resources and distinguished history of scientific innovation should not be able to catch up with the best of the world's innovators.

Taiwan (ICI rank 13) is offered as the most impressive example in the post-World War II period of the consequences of high growth and the policies that underpin it. That a country should be able to increase its income per capita from under US\$200 in 1952 to close to US\$17,000 in 2007 is nothing short of astounding. Taiwan's success is attributed to two factors: first, its success in achieving high growth, while taking full advantage of the benefits of international trade and investment and the acquisition of new technologies, and second, in avoiding the errors that have inhibited development in so many other countries. While acknowledging Taiwan's rapid transformation in less than a half century from a simple agrarian society in the earliest stage of development into a global technology powerhouse and world leader in the production of ICT equipment, the authors suggest that Taiwan's challenge in coming years will be to find creative ways to cooperate with China—an emerging technology power in her own right, with a much lower cost structure—and to move closer to the best performers in the ICI.

## Other dimensions of innovation

### Laura Altinger

The chapter entitled “**Technology and Innovation for Addressing Climate Change: Delivering on the Promise**,” by Laura Altinger, first provides an overview of the current thinking about climate change and then an analysis of the promising role for innovation in global efforts to reduce greenhouse gases, in adapting technologies to decrease the vulnerability of those most likely to suffer the most serious impact of climate change, and in moving our economies onto green and sustainable growth trajectories. While key technologies already exist with great potential for limiting GHG emissions, leading up to 2050, the technologies that will be relied upon



to make the substantial cuts in GHG emissions required to keep the planet safe will target energy efficiency in all key sectors: carbon capture and sequestration for power generation and industry, nuclear power, biofuels, wind, electric and plug-in vehicles, and hydrogen fuel cells. The author describes the roles to be played by the private sector in developing technologies, and by the public sector in addressing important market failures, using such mechanisms as carbon markets and regulatory regimes to provide investment incentives for alternative environmental technologies, to facilitate research, and ensure an adequate pool of human capital. She proposes that governments boost investment, supplemented by carbon taxes, in supportive infrastructure for new technologies or green fiscal stimulus spending aimed at environmental technology development. Finally, she discusses the importance of legally binding commitments to regulate countries already generating significant GHG emissions, improving risk management in smaller developing countries, removing barriers to trade and investment, and support by developed countries for the transfer of clean technology in regions of the world where it is most needed.

#### **Sarah Box and Ester Basri**

In their chapter entitled **“International Mobility of the Highly Skilled: Impact and Policy Approaches,”** Sarah Box and Ester Basri discuss the international mobility of highly skilled people, with a particular focus on “human resources for science and technology” (HRST), the group of skilled individuals, such as scientists, engineers, and researchers, who play an important role in stimulating innovative activity. The mobility of such skilled people, including human resources in science and technology, has become a central aspect of globalization, with talented migrants playing an important role in shaping the skilled labor forces of many countries and influencing the creation and diffusion of knowledge. The authors present selected data to describe the broad patterns of mobility of highly skilled people, the importance of mobility for the transfer of knowledge, the effects on receiving and sending countries, focusing in particular on the potential impacts of “brain gain,” “brain circulation,” and the diaspora. Finally, they outline the policy responses of selected OECD countries regarding mobility of HRST. Their central message is that mobility of the highly skilled has the potential to ben-

efit the migrant, the receiving country, and the sending country, but that the policy environment plays an important role in whether this mobility can lift innovative performance. The evidence on return migration and brain circulation, beneficial brain drain and diasporas suggests that there are a variety of mechanisms by which migrants can continue to contribute to knowledge creation and innovation in their home countries.

#### **Simon Commander**

The article entitled **“How Do Emerging Markets Innovate? Evidence from Brazil and India”** by Simon Commander examines the productivity effects of ICT adoption and use in two of the emerging market economies, Brazil and India. The author takes off from the past studies on the varied productivity and growth consequences of ICT adoption across countries and regions and inquires into the factors behind such variation. ICT has been adopted and managed in different ways in different parts of the world, and, not surprisingly, associated organizational dimensions of the new technology appear to play an important role in explaining differences in outcomes. The author’s research, based on interviews with 1,000 manufacturing firms in the two countries, describes the factors explaining the pace of ICT adoption—including policy and financing constraints—and the consequences of that adoption. The results show that there are differences not only in the timing of adoption and the patterns of ICT use across the two countries, but also within the countries themselves. Larger sized firms and foreign ownership tend to be associated with higher adoption, and in both countries, associated with a higher share of educated workers and a change in the skill mix. The Brazilian firms are shown, on average, to have adopted more ICT than their Indian counterparts, and to have used it more intensively. However, firms operating in Indian states with good institutional arrangements tend to have adoption rates similar to those in Brazil. There is clear evidence that high returns in productivity have resulted from investment in organizational change and improvement in the quality of infrastructure arrangements.

#### **Alexander Ebner and Florian Täube**

In their article **“Dynamics and Challenges of Innovation in Germany,”** authors Alexander Ebner and Florian Täube analyze the historical underpinnings and current challenges



facing innovation in Germany. They first review the conceptual frameworks for assessing innovation dynamism and survey the relevant institutional components of the German economy, discussing the trade regime, competition law, labor relations, the financial system, and entrepreneurship policies. They then highlight the basic features of the German innovation system, in particular pointing to factors such as education and training, R&D, and university-industry relations. From its renowned position as a “social market economy,” combining technological innovativeness, international openness, and industrial competitiveness with an extensive welfare system, Germany has become an institutional “hybrid” moving in the direction of greater entrepreneurial spirit. The innovation system, based in a rather bureaucratic, bank-dominated economy, has been seriously challenged by globalization, technological change, demographic pressures, persistent unemployment, and the burdens of reunification. They contend that the current situation requires an urgent institutional response, in the form of increased venture capital, high-growth stock markets, more flexible regulatory measures, the removal of hindrances to innovation in small and medium enterprises, and increased public support for R&D. According to Ebner and Täube, the German service sector lags behind in knowledge-intensive services to create employment in the current world economy and there is a significant lack of human capital in high-tech industries which could be addressed by creating more attractive conditions in the research and educational systems.

#### Anil. K. Gupta

**“Grassroots Green Innovations for Inclusive Sustainable Development,”** the title of the article by Anil K. Gupta, is an exploration of open, user-driven innovation, as exemplified by individuals in India. Long reliant on internal R&D for innovation, large companies are often constrained in their ability to identify and meet the needs of what he calls “excluded clients.” The ability of corporations to influence the lives of common people with a variety of products and services has not increased in the recent past. The author presents the model of the “Honey Bee Network,” which offers new thinking to help the formal sector learn from grassroots innovators and traditional knowledge-holders, enabling them to solve problems in an affordable, accountable, and accessible manner. Using intriguing examples of grassroots innovations by users—a bi-

cycle that generates energy from bumpy roads, a peanut pod-collecting device, an organic pesticide, and more—the author stresses the importance of reorganizing consumption and production relationships, minimizing investment in wasteful packaging, creating frugal design and development processes, allowing communities to take creative ownership in order to solve serious local problems, creating global markets of grassroots products, and redesigning supply chains. Gupta stresses the importance of including grassroots innovators in the benefits of their creativity when products are marketed, and giving them full credit for their work, through patenting and intellectual property rights.

#### Markus Haacker

**“Quantifying the Impact of ICTs on Growth in Developing Economies”** is the title of the article by Markus Haacker, in which he sets out to quantify the growth impact of technological advances in ICTs across the developing world. The author analyzes existing data on the production of ICT equipment, and builds a dataset covering the absorption of ICT equipment in a cross-section of developing economies. His analysis suggests that the direct growth impact of technological advances in the production of ICT equipment plays a subordinate role in the developing world. However, advances in ICTs do affect economic growth across the developing countries, as lower prices of ICT-equipment result in ICT-related capital deepening. Haacker finds that the growth impact of ICTs across the countries covered has increased from 0.19 percent annually in 1991–1995 to 0.26 percent annually in 2000–2006, and that there appears to be a greater growth impact in low-middle-income countries than in low-income countries, reflecting higher rates of ICT-related investment. He concludes that the sources of these growth increments are divided evenly between capital deepening related to IT and to communications equipment and that, while investment in communications equipment has been roughly twice as high as investment in IT equipment, the rate of technological progress regarding IT equipment has been higher.

#### Alan Hughes

In his article **“Innovation Policy as Cargo Cult: Myth and Reality in Knowledge-Led Productivity Growth,”** author Alan Hughes compares the mid-20th century Melanesian



“cargo cults” to the danger he perceives that the evolution of innovation policy structures which copy perceived cultural and structural characteristics of the US innovation system will also fail to deliver the “goods,” viz. economic well-being through improved productivity. Hughes describes these “ritual structures” as increased R&D expenditure, the commercialization of science, and the promotion of an entrepreneurial culture based on the subsidization of risk-taking in venture capital investment. In questioning the emphasis on R&D-intensive high-technology spin-offs, he contends that they have been exaggerated to the neglect of other key factors in the innovation system which must be considered. After considering these factors (e.g., diffusion and use of ICT as a general-purpose technology, the role of performance transformation of existing firms as compared to new entrants in driving productivity, and the role of universities in the creation of human capital, role of public procurement policy, among others), he concludes by arguing that the crafting of any specific national innovation policy requires a careful consideration of its own structural features and particular opportunities and challenges. In order for the innovation “cargo” to be delivered, space must be created in institutional mechanisms for the practical utilization of scientific advances, focused problem solving, and the recognition and potential exploitation of commercial opportunities.

### Josh Lerner and Adam B. Jaffe

In their article “**The US Patent System: Does It Strengthen or Weaken Innovation and Progress?**” authors Lerner and Jaffe ask the critical question: whether it strengthens or weakens innovation and progress. In order for technological innovation to create broad social benefits, to enable us “to live differently from our grandparents,” institutions must create incentives for individuals and firms to invest money in a financially rewarding process. After a brief excursion into the history of the “passionate debates” over patenting in Britain and the Netherlands, the authors describe the workings of the US Patent Office (PTO), the process by which patent applications are examined for utility, novelty, and non-obviousness, and, how, if granted, patents are intended to ensure intellectual property rights and protect inventors from the risks of infringement. They then outline three ways in which patents fail to protect and how they are wielded to retard innovation. By

analyzing the 60 largest countries (by total economic activity) in 2000, they show how patent systems changed from 1859 to 1990, significantly constraining the discretion of government officials, increasing the length of patent shelf life, but not solving the universal dilemma of patent validity. Changes to US patent law and policy between 1982 and 1990 have resulted in a decline in rigor with which the standards of novelty and non-obviousness are applied, pushing under-qualified, underpaid, and overworked examiners, using “flawed and obsolete tools” to resolve cases quickly. Coupled with the explosion in patent litigation, the deterioration in the examination standards of the overworked PTO has resulted in thousands of noxious “patent weeds” which threaten the innovation garden. The authors end with concrete recommendations for reform, with the aim of achieving a better balance between rapid approval of good applications and reliable rejection of bad ones, without dramatically increasing expenditures.

### Daniel Kaufmann

The article “**Good Governance for Sustained Growth and Development,**” by Daniel Kaufmann, provides more solid evidence for judging the effects of governance on development, and the effectiveness of strategies to improve it. Kaufmann’s research disproves the common assumption that becoming rich is a precondition for a country to “afford good governance,” to have a competent government bureaucracy, sound rule of law, and an environment in which corruption is not condoned. Contrary to popular belief, he says, corruption is not the direct result of low income, and good governance is not a “luxury good.” His studies point to better governance as being the *cause* of higher economic growth and improved development, and not the reverse. By introducing the notion of “state capture” and “legal corruption,” the author explains why traditional definitions and views of the investment climate—usually focused on the public sector—have tended to underestimate the importance of governance factors and why they do not accurately reflect what enterprises themselves report as being of greatest significance for their operation. He ends his chapter by showing how moves toward transparency, gender equality, freedom of expression, and public participation result not only in better socio-economic and human development indicators, but in higher competitiveness, less corruption, and the fostering of a culture of innovation. Reforms in



such areas have proven to be net *savers* of public resources, obviating the necessity for excessive regulations or rules. Kaufmann makes strong recommendations to the international aid community to rethink strategies and embrace more fully good governance approaches.

### Mohsen Khalil and Ellen Olafsen

In their article “**Enabling Innovation and Entrepreneurship through Business Incubation,**” the authors demonstrate how a globally applied mechanism of “business incubation” is facilitating the creation of an innovation and entrepreneurship ecosystem that encourages entrepreneurs who are willing and eager to take the risk of bringing new ideas to the market, and helps them turn the potential of their ideas and ambitions into real social and economic value. Basing their research on the international network of “infoDev,” they provide the reader with examples of a wide range of innovations in products, services and business models which have been brought to market by developing country entrepreneurs: from biogas cooking stoves in Rwanda, to improved honey production methods in the Ukraine, to improved bus services through telephony and tracking in Brazil. They discuss in some detail the various methods countries can use to spur innovation domestically and adapt imported innovations, in order to couple such innovations with viable entrepreneurship. In addition to the more commonly encountered factors which foster innovation, they stress an often-overlooked characteristic called “cultural capital,” which refers to the level of tolerance for risk and the interpersonal trust that exists in a given society, affecting both decisions to start a business and the entrepreneur’s ability to grow it. The authors describe the intricate web of interactions making up the innovation “ecosystem” and the linkages between all stakeholders in the system. They then illustrate how business incubators assist early-stage enterprises to become competitive and grow by interacting with all the actors in the ecosystem, either directly or indirectly through the enterprises they serve, and help them to meet the challenges their clients face, whether related to regulations, finance, labor, or infrastructure.

### Hernán Rincón

In his article “**Innovation and Social Development in Latin America,**” author Hernán Rincón shares his view of the cur-

rent financial crisis and its effects on developing economies from the perspective of the CEO of Microsoft Latin America. He takes issue with the notion that “developing” necessarily implies moving from a low- to a high-income economic model, and to the idea that countries are going to return to the seemingly “stable” high-income regime that prevailed before the current crisis. For Rincón, economic development does not necessarily dovetail perfectly with economic growth—as measured by GDP—any more than GDP satisfactorily measures economic well-being. Referring to the current situation as a challenge of recalibration rather than recession, Rincón uses the example of the photographic industry which failed to foresee the onslaught of the digital camera, and stresses the critical importance of people-centered training, re-training, R&D, and IT applications in managing the shift to new business models. He points to the success of Brazil’s San Luis Digital project in providing an entire province with free wireless Internet access, and Mexico’s Housing Funds Institute, which gave partners access to instant messaging, video and audio conference capabilities, vastly simplifying communications, and increasing productivity. Rincón is optimistic that Latin America is now better positioned to face the downturn and adapt to new conditions, both because of the continent’s past experience in surviving severe economic, political, and social upheavals, and because of recent stronger economic policies which lowered inflation and interest rates, improved public finances, reduced external debt, and substantially increased foreign exchange reserves. Rincón concludes by describing Microsoft’s “Unlimited Potential” program to promote sustained social and economic opportunity for the world’s five billion people, who have yet to benefit from technological advances, by transforming education, fostering local innovation, and creating jobs and opportunities.

### Andrew Stirling

“**From Enlightenment to Enablement: Opening up Choices for Innovation,**” by Andrew Stirling, provides insight into the “knowledge society” and the widespread notion that scientific and technological progress is linear and cumulative, that every possible or feasible path will be realized. Rather, Stirling writes, “whether deliberately, blindly, or unconsciously,” societies pursue only a restricted subset of diverse possibilities, in which certain pathways for change are “closed down,”



while others are “opened up.” The factors driving choice are determined by whether power is exercised deliberately and democratically, and whether public policy is open, inclusive, and accountable in dealing with links between technological risk, scientific uncertainty, social values, political priorities, and economic interests. Stirling analyzes the relationships between social and technological progress, on the one hand, and public participation and responsible precaution, on the other, and asks what are the most appropriate and practical ways, under different conditions, to “get the best out of specialist expertise,” while “engaging stakeholders, learning from different experiences, and empowering the least privileged groups in society.” Stirling analyzes the vulnerability of society from technology (biological, environmental, etc.), and its intriguing opposite: the risks for technology from society, such as when wise, feasible choices are foreclosed because of “market lock-in,” prejudice, or the needs, preferences, values, and interests of restricted groups. After a discussion of the governance of these vulnerabilities, the author examines some of the unfounded assumptions about knowledge itself: that every marketable innovation is socially acceptable, or that the knowledge responsible for an innovation also encompasses its consequences, and reminds us that even apparently complete knowledge may be indeterminate in its implications, that facts and values are not necessarily interdependent. The article ends with a description of the “precautionary principle” which acknowledges both the potential for irreversible harm and the impossibility of scientific certainty, and opens up “directions for choice.”

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