

Executive Summary

Augusto López-Claros and Yasmina N. Mata

The first chapter, by authors Augusto López-Claros and Yasmina N. Mata, entitled “**Policies and Institutions Underpinning Country Innovation: Results from the Innovation Capacity Index,**” begins with a brief review of some of the little-known history of innovation, long before the Industrial Revolution. We learn that the invention of eyeglasses not only significantly lengthened the working life of skilled workers, but spawned the invention of precision instruments. 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, 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) have become increasingly widespread and have resulted in improvements in 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 increasingly linked to sound policies, good governance, effective management of scarce financial resources, and, most important, to the extent to which societies are able to harness the latent creative capacities of their populations. Successful countries today are not necessarily large geographically, nor richly endowed with natural resources, nor 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 2010 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 percent 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 different 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 be 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' income per capita 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.

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 2010–2011 are presented in Table 1. This year's printed edition of the *Innovation for Development Report* includes the individual innovation profiles of 70 countries, accounting for the lion's share of world output. The remaining 61 can be found at the dedicated web site <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: Korea, Brazil, China, Israel, and Spain.

These case studies highlight a number of important lessons: (1) the fundamental role of a sensible policy framework that extends well beyond the traditional focus on macroeconomic stability, and which includes an outward orientation and active encouragement of foreign investment, for the tangible benefits it brings in terms of building innovation capacity; (2) the need to provide early support to human capital development and the building up of a modern infrastructure for training and education, without which countries will be greatly hampered in their efforts to boost productivity and to foster innovation; (3) the desirability of removing bureaucratic and regulatory obstacles to entrepreneurial activity, the excess of which can greatly stifle innovation; (4) the scope for active government policies which, through transparent and well-designed incentives, can accelerate the development of

Table 1. Innovation Capacity Index rankings 2010–2011*

Country	ICI rank	ICI score	Country	ICI rank	ICI score	Country	ICI rank	ICI score
Sweden	1	80.3	Mauritius	46	54.7	Belize	91	43.7
Switzerland	2	78.1	Malta	47	54.6	Honduras	92	43.4
Singapore	3	76.7	Tunisia	48	54.1	Rwanda	93	43.2
Finland	4	76.1	Saudi Arabia	48	54.1	Zambia	94	42.5
United States	5	74.8	Azerbaijan, Republic of	50	53.8	Algeria	94	42.5
Denmark	6	74.3	Jordan	51	53.7	Madagascar	96	42.1
Canada	7	73.6	South Africa	52	53.2	Syrian Arab Republic	97	42.0
Netherlands	8	72.8	Croatia, Republic of	52	53.2	Tanzania	98	41.9
Taiwan	9	72.5	Kazakhstan, Republic of	54	53.1	Bolivia	98	41.9
Luxembourg	10	72.2	Romania	55	53.0	Nicaragua	100	41.5
Korea, Republic of	11	72.1	Uruguay	56	52.8	Kenya	101	41.4
Norway	12	72.0	Russian Federation	56	52.8	Nepal	102	40.8
Hong Kong SAR	13	71.4	Oman	58	51.8	Pakistan	102	40.8
New Zealand	14	71.3	Kuwait	59	51.3	Venezuela	104	40.4
United Kingdom	14	71.3	Costa Rica	59	51.3	Mozambique, Republic of	105	39.8
Japan	16	70.2	Ukraine	61	50.4	Uganda	106	39.7
Australia	17	69.4	Turkey	62	50.2	Papua New Guinea	107	39.5
Ireland	18	69.1	Mexico	62	50.2	Ethiopia	108	39.2
Iceland	19	69.0	China, People's Republic of	64	49.9	Malawi	109	39.1
Germany	20	68.9	Greece	64	49.9	Senegal	110	38.6
Israel	21	67.5	Panama	66	49.4	Bangladesh	110	38.6
Austria	22	66.7	Colombia	66	49.4	Suriname	112	38.4
Belgium	23	66.1	Argentina	68	49.3	Cambodia	113	37.4
France	24	65.3	Botswana	69	48.9	Lao PDR	114	37.2
Estonia, Republic of	25	60.5	Peru	70	48.7	Cameroon	115	37.1
Lithuania, Republic of	26	59.6	El Salvador	71	48.0	Nigeria	116	36.8
Slovenia, Republic of	27	59.1	Trinidad and Tobago	72	47.7	Yemen, Republic of	117	36.3
United Arab Emirates	28	58.9	Bosnia and Herzegovina	73	47.5	Congo, Republic of	118	36.0
Spain	29	58.8	Vietnam	74	47.1	Mauritania	118	36.0
Latvia, Republic of	30	58.7	Egypt, Arab Republic of	75	46.6	Sudan	120	35.9
Chile	31	58.3	Ghana	76	46.4	Mali	121	35.0
Czech Republic	32	57.8	Indonesia	77	46.0	Côte d'Ivoire	122	32.8
Bulgaria	33	57.4	Namibia	77	46.0	Iraq	123	32.6
Bahrain, Kingdom of	34	57.0	Dominican Republic	79	45.5	Guinea	124	32.1
Hungary	35	56.8	Jamaica	79	45.5	Angola	125	31.9
Slovak Republic	36	56.7	Philippines	81	45.3	Togo	126	31.2
Portugal	36	56.7	Brazil	81	45.3	Niger	127	31.1
Italy	36	56.7	Guatemala	83	44.7	Zimbabwe	128	29.6
Malaysia	39	56.4	Ecuador	84	44.6	Haiti	129	28.3
Poland	40	56.3	Iran, Islamic Republic of	85	44.5	Afghanistan, Islamic Republic of	130	27.4
Qatar	41	55.9	Sri Lanka	86	44.4	Chad	130	27.4
Macedonia, FYR	42	55.3	Lebanon	87	44.3			
Cyprus	43	55.2	Morocco	88	44.2			
Georgia	44	55.0	India	88	44.2			
Thailand	45	54.8	Paraguay	88	44.2			

*All rankings and scores are after rounding.

an ICT sector and, along the way, significantly boost innovation capacity—certainly the inference than can be drawn from the experiences of Korea, Israel, and Taiwan; (5) the need to constantly review government spending priorities, with gains to be made from investments in the promotion of ICTs, as against the funding of consumer subsidies or other expenditures with high opportunity costs.

Other dimensions of innovation

José María Figueres

In his evocative essay “**There is no Planet B!**” José María Figueres tells us how the first international climate change agreement, known as the Kyoto Protocol, was hammered out, calling upon 37 industrialized nations to reduce their carbon emissions by 5.2 percent from their 1990 level. Although 114 countries have signed the Protocol, the largest emitters (the U.S. and China) have not, and little progress was made, with the exception of a few countries which turned proactive environmental policies into good business opportunities. The business-as-usual attitude to climate change chosen by the international community meant that valuable time was lost. Figueres cites five reasons why this trend must be reversed: 1) climate change is real and, given leadership and action, it is possible to mitigate carbon emissions and begin to reverse serious damage; 2) the scientific community largely agrees on the reality and impact of climate change and has determined the dangers of adding 2.5 ppm of atmospheric carbon yearly; 3) people are now willing to make changes to safeguard future generations; 4) encouraged by knowledgeable NGOs, governments can now establish regulatory frameworks and put a price on carbon; 5) finally, with entrepreneurship, management skills, and the ability to muster capital and resources behind new and innovative models, business can make or break the fight against climate change. He describes the next summit, held in Copenhagen following the November 2008 financial meltdown, as a dismal failure, with no expected outcomes materializing. Three factors transformed his disillusionment into hope: first, the growing realization that there is no “Planet B” and that although the Copenhagen Accord was achieved by only five countries, it left the door open for other

nations to adopt; second, the science of climate change is finally accepted; third, the promising signs that major businesses are now in the forefront of change, understand the opportunities provided by the environment to bolster their bottom line, strengthen brand value, consolidate customer loyalty, and increase market share. In the world after Copenhagen, countries will not wait for others to transform “green” into a new competitive advantage. Instead of all-inclusive solutions, the approaching Cancun conference will allow separate agreements to be reached, laying the foundation for further agreements down the road.

Pamela Hartigan

In the chapter entitled “**Creating Blueprints for Business in the 21st Century: Social Entrepreneurship Shows the Way,**” author Pamela Hartigan describes projects headquartered in six countries (Singapore, India, France, Mexico, the United States, and the United Kingdom), but having an impact far beyond those borders. In contrast to “charitable” work, with which it is often confused, she defines social entrepreneurship as the “resourceful, pragmatic, innovative, and visionary” creation of a new or improved product or service, not with the expectation of sale or profit generation for entrepreneur or investors, but, rather, to address market and/or government failures, to deliver goods and services needed to address social, economic, or environmental challenges which governments are generally unable or unwilling to tackle. Distinguishing social entrepreneurs from other actors in the citizen sector, Hartigan proceeds to discuss the “distinctive domain” and driver of social entrepreneurship, neglected positive externalities. The remainder of the paper outlines significant projects—both profit-making and non-profit—which harness positive externalities through new organizational forms and ways of operating, creating organizations that are innovative, philosophically positive, and morally compelling. She shows how each venture responds to an opportunity and uses a business model which challenges the traditional legal frameworks that dichotomize “do-good” from money-making organizations. To cite only three of her fascinating examples: the World Toilet Organization is a global service-platform network providing solutions to sanitation challenges around

the world, focusing on toilets instead of water, providing governments with solutions that promote sanitation and public health policies, and in which all toilet and sanitation organizations can learn from one another and leverage media and global support. Two avid motorcyclists created Riders for Health, a program for maintenance and management of neglected motorcycles and other vehicles in remote, hard-to-access African communities, such as the vehicle fleets used by Ministries of Health and NGOs in the delivery of essential healthcare services and preventative health education to rural populations. The Aravind Eye Care Hospital, modeled on McDonald's, gives sight to the blind and visually impaired. They perform up to 1,000 sight-restoring surgeries daily—at a fraction of the cost of similar procedures in other countries—provide eye-screening camps in remote areas, and train medical personnel around the globe.

Björn Johnson

Writing about “**The Learning Economy as a Phase in Economic Development: Contradictions and Institutional Responses**,” Björn Johnson offers the view that the current “essentialist” economics—in which processes are often not situated in real time and do not consider the diversity of specific market economies—is methodologically inadequate for understanding the specifics of the contemporary learning economy. Basing his description on the concept of dialectics, he examines some of the drivers of and contradictions in the changing dynamics of capitalist systems, such as the interrelations between technology and institutions, and concludes that without taking technical, organizational and institutional innovation into consideration in the analysis, it is not possible to understand economic development. Johnson contends that the learning economy develops not only by means of continuous and rapid technological change, but also through institutional reactions to its own contradictions, such as the way knowledge does not always translate into usable commodities; how new knowledge may be incompatible with old knowledge in a society; how knowledge diversification can lead to fragmentation and close down some learning possibilities; short-term vs. long-term decisionmaking; or the tension between indigenous and foreign knowledge in devel-

oping countries. Beyond these general categories, the author analyzes more closely the way firms typically innovate, using either the DUI (doing, using, and interacting) mode or the STI (science, technology, and innovation) mode or a combination of both. But the inherent myopia which results from habits of thought also opens up new perspectives when different bodies of knowledge collide and feed on each other. Although mixing different types of knowledge is not always easy, whether unintentional or encouraged by organizational change in support of mixed strategies, the learning economy demands that the contradictions and tensions be consciously tackled so that new perspectives and options be opened up and the innovation process supported.

William Kerr

In his chapter entitled “**Breakthrough Inventions and the Growth of Innovation Clusters**,” author William Kerr questions the prevalent theory that cities and industries tend to follow the geographic locations of breakthrough innovations. Kerr contends that the model, according to which centers of innovation are dictated by where frontier inventions occur, and that the industry migrates to be close to these new innovations, does, indeed, fit the distribution of cities and industries well in several countries. However, he suggests, one might just as easily argue that new technologies are simply transported to the existing cluster. His paper describes research to investigate whether breakthrough inventions do, in fact, draw subsequent research efforts for a technology to a local area and outlines the empirical work done to verify these spatial movements, the speed at which reallocations occur, and their economic consequences. After first classifying breakthrough inventions—such as resins, surgical instruments, and optics—he then models the relative number of breakthrough inventions that occurred in various locations. A given city's share of breakthrough patents for a specific technology is divided by the city's overall share of patents for the technology, and compared to their general degree of activity in the technology field. High values indicate that a city was disproportionately the center of new breakthrough innovations for a technology. Kerr then looked at whether the places with relatively high shares of breakthrough inventions out-

performed their closest peers. A surprising outcome of his findings was that immigrants play a disproportionate role in the question of geographic reallocation. The workforce of immigrants—who represent 24 and 47 percent of US scientists and engineers with B.A. and Ph.D. degrees, respectively—are not only more geographically mobile, but are more flexible in deciding their initial location upon immigration to the US, thus influencing the geography of innovation. Kerr's research provides qualitative support for theoretical models by which centers of breakthrough innovation do experience subsequent growth in innovation relative to their peer locations, and for the strategic importance of the mobility of a given industry's labor force in speeding up reallocation.

Robert Rosenfeld, Gary Wilhelmi, and Andrew Harrison

Three authors have collaborated on the chapter entitled **“Organizations Don't Innovate, People Do: Trust Is the Foundation,”** based on a lively, hands-on workshop given for business personnel, and focused on the motivations and culture of innovators and their interactions with others. Their jumping-off point is the humorous story of how “Boss” Charles Kettering, founder of General Motors, succeeded in reducing the time to paint a new car from 17 hours to one, over the obstinate and disbelieving objections of all those involved in the process. They then walk the reader through a series of exercises designed to elicit greater understanding of the “people side” of innovation, how individuals behave and interact with others, and how leaders and managers can develop new ways of responding to the human challenges of innovation. Innovation is intriguingly described as a “continuum,” defined as any change, whether revolutionary, expansionary, or evolutionary, that leads to a quantifiable gain in a process. In order to transform the understanding of such ideas into action within an organization, trust is the foundational principle that makes such innovation happen. Whether among three or 30,000, it is trust that encourages imagination, allows for risk, spurs the passion for solving difficult problems, and profoundly affects productivity, quality, turnover, absenteeism, motivation and, ultimately, the generation of the quantifiable gains sought by innovating. Challenging readers to consider the real people they have trusted—or not—in their past experience, the au-

thors discuss the culture of trust that allows people to care about their organization, jobs, co-workers, and customers, and to be more creative and innovative by reducing or eliminating the fear of individual failure. Digging deeper, they illustrate the processes of communication and “filtering” systems that enable people to either be open to understanding and change, or close off and “protect.” Finally, distinguishing between “head” and “heart” trust, they provide a tool for readers to calibrate the degrees and quality of trust which they have in others, whether in the workplace, in the family, or among friends, as a way forward in establishing “creativity partnerships” that can lead to successful innovation.

Mahmud Samandari

In his insightful article **“Innovation: Thoughts on Purpose, Definition, and Governance,”** author Mahmud Samandari first summarizes the way in which innovation has revolutionized how the majority of human beings live, learn, obtain information, obtain goods and services, relate to and participate in government and politics, view and handle money, etc. He goes on to describe the profound changes over time in the paradigm of innovation, with less emphasis on regulation and insistence on copyright and intellectual property, the vanishing of national borders as the vast majority of innovation is conducted outside of the country headquarters of its investors, and as crowdsourcing and networking have become virtually ubiquitous tools of the trade. As a result, innovation has become “collaborative” as never before in history, with firms and individuals working more cooperatively across previously impermeable barriers. He then explores some of the myriad purposes which innovation has served and the surprising ways in which it has come about, from economic gain and return on investment, increasing human comfort or crop yield, military superiority and national prestige, to the drive for individual fame and notoriety, and even sheer accident, as was the case of gun-powder and the telephone. Some of the unintended and unforeseen consequences of innovation are also discussed, such as the phenomenon of suburban sprawl resulting from the emphasis on the automobile, and worrisome social isolation as a result of the advances in television and ICT. In the concluding discussion, the author shares his con-

viction that what is now needed is a “values-based” approach to innovation, whereby shared values become the foundation for making conscious decisions which “align with the future we want to experience.” Using the analogy of the acorn which is “pulled” to its ultimate destiny of becoming an oak tree, so human beings can decide to use innovation to extend human productivity, raise standards of health and well-being, sharpen and refine the potential of the human brain and “stimulate the intellectual, moral, and spiritual life” of the whole human family. Such a conscious, ethical, multidisciplinary approach to innovation, rather than being perceived as restricting, may be seen as revealing our human potential for organic, goal-oriented, sustainable growth, aimed at identifying and working toward the common good.

Hulya Ulku

In her chapter entitled “**Technological Capability, Innovation and Productivity in Least-Developed and Developing Countries**,” author Hulya Ulku investigates the rankings of least-developed countries (LDCs) and developing countries on the key indicators of technological capability, innovation and productivity. She analyzes the associations between technological capability/knowledge spillover and innovation/productivity in the two groups of countries. She shows that, while LDCs closely follow developing countries in some of the basic human capital capacity indicators and passive knowledge spillover channels, they lag far behind in physical and digital infrastructure, direct knowledge spillover channels, innovation, and labor productivity. In terms of the association of the four pillars of technological capability (physical and digital infrastructure, human capital capacity, and institutional environment) and knowledge spillover with innovation and productivity, she demonstrates that human capital capacity has the strongest association with both innovation and productivity in LDCs. As regards the developing countries, she provides evidence that the associations of both the technological capability and knowledge spillover channels with innovation and productivity is much stronger in these countries as compared to LDCs, although they also have a weak association between knowledge spillover, innovation, and productivity. An important finding concerns the

fact that innovation is strongly associated with productivity in developing countries, whereas this association is not significant in LDCs. In addition, it seems that the scientific knowledge base in LDCs and lower-middle-income developing countries is geared more toward agriculture, while in upper-middle-income countries it is geared toward the manufacturing sector. Based on her findings, Ulku concludes that LDCs need to prioritize the promotion of physical and digital infrastructure and strengthen their human capital capacity, while developing countries need to focus on the promotion of absorptive capacity to take better advantage of knowledge spillovers. She points out the crucial role of government in both the development of national science and technology policies and promotion of technological innovation in industries with a strong local knowledge base and linkages with the rest of the economy.

