Executive Summary

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This fifth *Global Information Technology Report 2005–2006* appears at a time when there is broad satisfaction in the business community and among government leaders with the recent performance of the global economy. However, this is tempered by growing concern about a range of emerging global challenges. The world's population is projected to exceed 8 billion by 2025, 2 billion more than at the outset of the 21st century. This will have fairly direct implications in a number of key areas, from energy consumption, to job creation, to management of the global environment. How countries are able to adapt to the fast pace of change and cope with the challenges that are implicit in the emergence of an increasingly complex global economy will depend heavily on how adept they will be at formulating intelligent policies, and modernizing the institutional framework which forms the basis of modern societies. It is becoming evident that the more successful countries are those in which governments, businesses, and civil society have evolved mechanisms that facilitate consultation and cooperation, and which lead to giving a high priority to boosting education and training. A central element of this is the ability to harness the potential of information and communication technologies (ICT) to leverage the development process. Future prosperity seems increasingly to be as much a function of investment in human capital and the technologies that will enhance productivity, as it is of investment in physical capital and infrastructure.

Against this background of cautious optimism about global economic prospects and the challenges that growing prosperity brings, we are once again endeavoring to provide an overall picture of the state of ICT developments in a large number of countries around the world, accounting for the lion's share of the global economy. This *Report* builds on the work done in the four previous editions and should be viewed as part of a long-term commitment by both the World Economic Forum and INSEAD to the dissemination of business-relevant research on information technology issues, with a strong practical focus.

The *Report* is divided into five parts. The first three contain essays written by practitioners, scholars, and experts with relevant knowledge and experience in the ICT area. An update on the well-established Networked Readiness Index rankings is followed by chapters on issues of networked readiness, productivity-related topics, and reports on the varied state of ICT developments in Chile, Israel, Korea, Mexico, and Taiwan, highlighting signal successes and challenges yet to be overcome. The essays, which are summarized briefly below, are followed in Part 4 by Country Profiles, which provide valuable background information on the components of each country's networked readiness rankings. These profiles, coupled with the Data Tables in Part 5, facilitate international comparison.

Networked Readiness and the Benchmarking of ICT Competitiveness

In this paper, authors Soumitra Dutta and Amit Jain, both of INSEAD, illustrate the recent strong shifts in the global landscape of information and communication technologies (ICT). Countries such as India have transformed their economies, largely due to the benefits of the ICT revolution. Others, such as Ireland and Israel, have also benefited from the contribution of ICT, and emerged as centers of software development. Countries such as Singapore, Hong Kong, and Taiwan, while not major hubs of software development, have incorporated the key ingredients of networked readiness in order to provide an optimal environment for key stakeholders, in particular, businesses. These facts, and the increasing dependence of the world's inhabitants on the Internet as a tool for information sharing and exchange, testify to the importance of a nation's networked readiness. This paper represents the continuing collaboration of INSEAD with the World Economic Forum for the computation of this fifth[1] Networked Readiness Index (NRI).

The NRI is defined as the degree of preparedness of a nation or community to participate in and benefit from ICT developments. The immediate objective is to help policy- and decision makers understand the complex and diverse factors underlying national ICT development, and, hence, to assist them in working toward their development objectives.

This chapter first discusses the structure and framework of the NRI, and how it has been used to assess and compute the relative degree of networked readiness of 115 countries. The results of the research and analysis are presented in the form of a relative ranking of nations. In

the third section, some key trends in the evolution of ICT diffusion and usage are presented, based on the analysis of three key ICT indicators: the numbers of telephone mainlines, personal computers, and Internet users. An analysis of global and regional levels is then followed by an examination of the trends in the seven most populous nations of the world. The authors then show how the NRI and its constituent indicators can be used to benchmark a country's ICT development with neighboring or comparable countries, and discuss some of the main challenges in conducting the study.

The Infrastructure Challenge

Authors Scott Beardsley, Luis Enriquez, Mehmet Guvendi, Miguel Lucas, and Andreas Marschner, of McKinsey & Company Inc., discuss the complex trade-off faced by today's telecommunications industry. While, on the one hand, competition must be encouraged, the industry must, on the other, ensure that operators have sufficient economic incentives to build the next generation of access infrastructure. Major technology-driven trends, in particular the rise of mobile and Internet protocol, are already transforming the revenue model and economics of infrastructure operators. The effects are being felt in fixed networks, and could eventually spread to mobile. Although change is taking place at different rates in different countries, it may not be long before it begins to hit expected industry returns and hence investment.

If industry stakeholders decide that the building of new infrastructure deserves their collective support, current approaches to policy will have to be rethought. Policymakers and regulators must understand the cumulative effect of the various levers they deploy, and should start to experiment with new approaches. It may be necessary for agencies involved in the regulation and oversight of the market to redefine their missions. Infrastructure providers must recognize the impact of these trends, adjust their business and revenue models accordingly, and actively shape both the regulatory debate and the evolution of the market.

Innovation and Interactions: Wellspring of Competitive Advantage

Guaranteed Low Prices! Everyday Low Prices! We Sell For Less! Has global business simply become a race to the bottom? Perhaps not, answers Douglas Frosst, of Cisco Systems, Inc. A recent survey of US business leaders indicates that their focus for increased competitiveness is on increasing the pace of innovation. Only 14 percent listed lower wages.

This chapter discusses a research project to identify opportunities and barriers to corporate innovation, carried out by Innovation and Competitiveness: United States, designed by Cisco Systems, Inc. and the Momentum Research Group. The research team surveyed more than 600 business and information technology executives from the United States. Participating executives from organizations of different sizes, industries, and regions responded with their attitudes, aspirations, and concerns about innovation.

The study sought to identify the level of interest by industry in specific technology innovations, the impact on innovation of interactions between various stakeholders, and the opportunities and benefits of innovation in education and healthcare. Executives were asked to identify industry sectors, including their own, which they believed would substantially benefit from additional technology innovation. A short series of questions exploring attitudes toward innovation in healthcare and education were included in the study design and are discussed in this report.

The author argues that as markets and industries evolve companies look for new sources of productivity, competitive advantage, and growth. In the current global environment, innovation and creativity are seen as a critical aspect of business success.

Information Technology and Productivity, or "It Ain't What You Do, It's the Way that You Do I.T."

At the macro level, productivity growth in the United States accelerated after 1995, and much of this is accounted for by sectors which used or produced IT intensively. Authors John Van Reenen and Raffaella Sadun, of the London School of Economics, see a contrast between the United States and Europe, where, despite the acceleration in productivity in sectors which produce IT (e.g., semiconductors, computers), there was no comparable acceleration in the sectors that used IT intensively (such as retail, wholesale, and finance). At the micro level, recent statistical research on large samples of firms has shown that information technology significantly increases productivity, but that there is wide variation in the size of this effect. The organizational structure of some American firms—greater decentralization or better management practices—enables them to obtain much higher returns from their IT investments than other firms in the same sectors with similar levels of employment and capital investment. The authors show that the higher productivity of US multinationals located in Europe—as compared to other multinationals—appears to be linked to their better use of IT. They argue that this is likely to be due to the superior internal organization of the US firms, such as stronger worker incentives, smarter targets, leaner manufacturing, etc. This effect is particularly strong in the ICT-using sectors, where the United States experienced a productivity burst, whereas Europe did not. This difference in the use of IT may

explain the absence of US-style productivity acceleration in Europe over the last decade.

An Emerging Opportunity for India: The Productivity of Interactions

The forces of globalization are reshaping our world. Advancements in ICT are giving rise to a global, networked economy, characterized by the mobility of information and factor capabilities, and the rise of highly flexible processes and value chains.

Author N. R. Narayana Murthy, of Infosys, reminds us of the extent to which ICT presents developing countries with unique opportunities for growth, and redefines our approach to economic and social development. ICT is enabling countries such as India to effectively leverage cost and factor advantages, and evolve new, dynamic strategies to drive productivity growth. In addition, ICT has facilitated the development of innovative solutions, increased access to resources and services, helped in the fight against poverty, and addressed the income divide across the developing world.

ICT-enabled networks have speeded up technology obsolescence across markets and industries, and are rendering traditional communication structures inefficient. This means that the failure to integrate effectively into the global information economy will widen economic and technological disparities between developing and developed countries. Low levels of technology adoption will limit the role of ICT in facilitating the transformation and enhancing the productivity of industries.

To leverage ICT effectively for growth, India must recognize the close connection between ICT policies and economic and social development, both of which lag far behind in the country. The country must address existing bottlenecks to the expansion of technology access and investment in the Indian economy, as part of a broad-based reform agenda. The role of ICT must be complemented by market reform, the development of strong infrastructure systems, and effective investment in social and educational improvement. Only in this way will India be able to integrate ICT in a truly sustainable manner and meet overall development goals.

Information and Communication Technologies in Chile: Past Efforts, Future Challenges

Chile's accomplishments in the field of ICT development have captured world attention. A team of authors, Carlos Alvarez Voullième, Constanza Capdevila de la Cerda, Fernando Flores Labra, Alejandro Foxley Rioseco, and Andrés Navarro Haeussler, explain the formula behind Chile's outstanding achievements as the leader in Latin America in the field of ICT. Their paper charts the background history of Chile's transition in the ICT sector in recent decades, and the involvement of progressive government policy intervention in bringing it about, involving joint efforts by both the public and private sectors. Policymakers, businesses and educators have all recognized ICT as a major tool in achieving higher productivity, efficiency and growth, and as the prime mover behind technology adoption. This understanding—and the policies which have flowed from it—have succeeded in making Chile a reliable front runner for both local and foreign investors, with clear rules and qualified human capital. What is remarkable is that this stable transition has occurred in a region characterized by economic instability, ideological conflict, and social stress.

Remaining challenges are clearly outlined, such as the conflict between the proponents of innovation and those who cling to more traditional approaches, and the massive task of providing education and training for the country's labor force, with the aim of enhancing the country's human capital and international competitiveness.

Israel: Factors in the Emergence of an ICT Powerhouse

The Israeli government has set an explicit goal to position Israel at the center of the knowledge economy, but the process has been neither fully planned nor completely organic. In this case study, authors Augusto Lopez-Claros and Irene Mia, of the World Economic Forum, highlight the important role of the government in the emergence of Israel as a high-tech power. They describe how it has collaborated closely with and supported the private sector and encouraged it to compete in international markets.

Significant components of government action have taken the form of heavy investment in education, reinforced by immigration, effective investment incentives favoring foreign investors, maintenance of a ratio of R&D investment to GDP higher than that of any other industrialized country, and the implementation of incubator and venture capital programs to convert research into cutting edge businesses.

Israel has also made important strides in laying the foundation for macroeconomic stability, controlling previously run-away inflation, and implementing wide-ranging reforms to reduce the scale of the public sector and support modernization of the economy. The authors also analyze the significance of education, culture, immigration, and security issues in the development of Israel's ICT sector, and explore in detail the role of investment, support for R&D and innovation, and the relationship between the ICT sector and Israel's overall economy. Israel's experience and impressive success in this area—like Taiwan's—is worthy of study and emulation by countries with similar aspirations, but which are often unfamiliar with the

policies and institutions which support the process of technological innovation.

The Impact of Information and Communication Technologies on the Economic Competitiveness and Social Development of Taiwan

In this article, authors Arthur Dahl and Augusto Lopez-Claros chart the course taken over half a century by Taiwan in making the transition from poverty and underdevelopment to information and communications technology powerhouse, and the world's fifth most competitive economy. With no significant natural resources, it has built its competitive advantage on its human capital, creating a model which other countries would do well to follow.

The government has played a central role in this transformation. It has implemented strong and coherent planning mechanisms for the economy, science and government, and for close collaboration with the private sector, and has made a heavy investment in education, research and infrastructure. When its educational system was weak, it turned the brain drain to its advantage, building a large pool of experienced researchers, engineers and managers abroad, then attracting them home when the economy could absorb them and using the skills they acquired to expand the universities to meet manpower requirements. Unique institutional arrangements have been made, such as the quasi-governmental Institute for Information Industry, which serves as a think-tank and research center for both government and business. Government-constructed science parks support innovation and the incubation of new ideas, build synergies among growing businesses, and make efficient use of the best available human resources, facilitating both growth and wealth generation.

A dynamic, entrepreneurial and flexible private sector, made up largely of small and medium enterprises, has flourished in this atmosphere of government encouragement, while both good governance and sound macroeconomic management by the government have earned the confidence of business. Taiwan is also a leader in the adoption and widespread use of information and communications technologies, in stimulating innovation, and in demonstrating their effectiveness. As an export-oriented economy in a globalizing world, Taiwan demonstrates the advantages that long-term strategic vision combined with adaptive management can confer.

Connectivity Strategies to Enhance Competitiveness: The Mexican and Korean Experiences and Lessons for Latin America

In order to survive in a context of fierce international competition, developing economies around the world are in search of new strategies to develop highly competitive knowledge-based industries. Authors René Villarreal Ramos and René Villarreal Arrambide compare and contrast the experiences of Mexico and South Korea in dealing with the challenge of developing high value-added industries to evolve such knowledge-based economies, and of making the transition from manufacturing to what the authors call "mindfacturing." While Korea, in only two decades, has become an ICT leader, Mexico has been content to implement a strategy of passive economic trade and financial liberalization. Korea has been able to dramatically transform its economy since its financial crisis in 1997 into a highly competitive one, using the consolidation of the ICT and IT industry as a key economic growth engine, while Mexico still lags far behind, and its policies have proven to be insufficient for increasing competitiveness and connectivity. They challenge policymakers to carefully analyze the Korean experience for the lessons to be learned.

Note

1 The first *Global Information Technology Report 2001–2002* was edited by Kirkman et al. at the Center for International Development at Harvard University, in association with the World Economic Forum; the *Reports* for 2002–2003 and 2003–2004 were the result of the joint efforts of INSEAD, Infodev at the World Bank, and the World Economic Forum; the 2004–2005 and 2005–2006 *Reports* have been produced jointly by INSEAD and the World Economic Forum.